PY2006-2008 INDIRECT IMPACT EVALUATION OF THE STATEWIDE EDUCATION & INFORMATION PROGRAMS

FINAL: VOLUME II OF III
STUDY ID: CPU0026.02

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INTRODUCTION TO VOLUME II

This volume is divided into two sections.

The first section presents supporting documents for the nine programs that received full evaluations in our Indirect Impact Analysis: Builder Energy Code Training (PGE 2044), Build It Green (PGE 2057), Southern California Home Performance (SCE 2548), Portfolio of the Future (SCG 3530), PACE Energy Efficiency Ethnic Outreach Program (SCG 3531), CLEO Custom Language Efficiency Outreach Program (SCG 3532/SCE 2513), K-12 Energy Efficiency Education (SDGE 3032), Time of Sale Energy Check Up (SDGE 3036), and Business Energy Assessment (SDGE 3040). This section provides detailed chapters on each of these programs, based on memos that were submitted to the California Public Utilities Commission, participating investor-owned utilities, and the program implementers prior to the development of the integrated report (Volume 1).

The second section of this volume provides brief summaries of the ten programs verified but not evaluated as part of our Indirect Impact Analysis: One-2-Five Energy Program (SCE 2540), Affordable Housing Energy Efficiency Alliance (SCE 2542), Email Based Energy Efficiency Program (SCE 2545), Aggregation of Housing Agencies (SCE 2547), Energy Efficiency Delivery Channel Innovation Program (SCG 3504), Energy Efficiency Kiosk Pilot Program (SCG 3529), Advanced Home Renovation Program (SDGE 3031), Industrial Energy Efficiency Acceleration (SDGE 3033), Sweetwater Schools Demonstration (SDGE 3037), and CHEERS New Construction (SDGE 3041).

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SECTION I: INDIRECT IMPACT ASSESSMENT

1. PGE 2044: BUILDING ENERGY CODE TRAINING

1.1 Introduction

Pacific Gas & Electric (PG&E) was awarded funding from the California Public Utilities Commission (CPUC) to implement the Builder Energy Code Training (BECT) Program during program years 2006 to 2008. The BECT Program provides classroom and on-site code training to the building industry with the goal of improving compliance with Title 24 energy codes for residential new construction. BECT is a well-established program that has been in operation for over 20 years. The program is run by a third party, ConSol, and the trainings are conducted by building code experts, most of which are certified Home Energy Raters. The program targets contractors, subcontractors and local code officials. The three-year program implementation budget was $1.4 million.

This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavioral change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants were fed into resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program?

In addition to these research questions, we also comment on the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on this area in a section called Evaluability Assessment toward the end of this report.

1.2 Summary of Key Findings

While our evaluation sought to determine the extent of the energy savings provided by BECT in PY2006-2008, BECT was implemented as an education and information program and consequently did not have explicit energy savings goals. As a result of this education, code officials are expected to better inspect homes to meet Title 24 standards, and builders are expected to better construct homes to meet these standards. The program is particularly valuable for two main reasons: (1) To maintain and confirm existing market actors' knowledge of Title 24 code and (2) To show market actors how to successfully meet recent

code change requirements. Below is a bulleted summary of the key findings from this evaluation:

- Builders must construct to meet Title 24 code and the code officials must inspect to that code. During trainings, builders and code officials are typically exposed to Title 24's compliance documentation and requirements for lighting, infiltration, insulation, and water heating. This program is particularly valuable because Title 24 code is continuously evolving and the building community needs to be informed and trained on code updates - so that there is compliance and enforcement. Title 24 changes went into effect on October 1, 2005. Consequently, the program focused its content on the 2005 Title 24 changes throughout the 2006-2008 program cycle. Changes to Title 24 were also announced in 2008, however these changes were not planned to go into effect until 2009. The program mentioned these upcoming changes in their 2007 information, but mostly focused on the 2005 code changes that were already in effect. Notably, the program focuses the majority of its information on meeting Title 24 standards, not necessarily building beyond Title 24 standards. Because of this program's primary focus, we would not expect to see large increases in energy efficiency knowledge or behavior changes beyond the Title 24 code.
- The building community may receive Title 24 code information and change notifications through other sources, e.g. mail, websites and other Title 24 training courses. Other training courses are offered throughout the state at Energy Centers and offer similar content to the BECT program. The unique part of the BECT program is that it brings the trainings to builders versus having the training at a fixed location to which builders must travel. In this respect, BECT program makes Title 24 general code information more accessible to a wider audience.
- The program reaches builders and code officials that build or inspect a significant number of new residential homes each year. On average, a participating builder might construct up to 275 homes per year and a code official might inspect up to 300 homes per year. The program conducted a total of 167 trainings in the 06-08 program cycle, exceeding its goal, and trained a total of 1,978 builders and code officials.
- Our survey findings indicate that participants are typically large, well-established builders. If this course targeted new market actors, a segment that is not knowledgeable of Title 24 codes and standards, we would likely see a large increase in Title 24 knowledge and a large percentage changing their behavior due to course information. Instead, participants tend to be very knowledgeable about the Title 24 code and come to the trainings for small bits of information that add to their current knowledge.
    - Nine in ten participants said they came to the course with "some" or "a lot" of knowledge about Title 24.
- Participants claimed the program moderately increased (mean of 4.6 on a scale of 1 to 7) their knowledge of how to meet or enforce Title 24 standards.
- Resource program promotion and channeling is not a main component of the BECT program. Some programs, such as the Build It Green and California Solar Initiative New Home programs, are listed in manuals provided to training participants. Based

on our survey, the manuals do make some participants aware of utility programs. Less than half of the participants (builders, 38%; code officials, 45%) strongly agreed that they were more aware of utility programs after attending the training.

- Participants made several types of behavior changes after the training. The data below indicate that the course information may be more valuable to code officials than to builders. Builders who did not make changes claimed they did not have anything to change based on the course information as they were already building to code. Others said they did not make changes due to the downturn in the construction industry over the last few years leading to the lack of building opportunities in general.
    - Among builders, 70% applied the course concepts to their jobs and 55% recommended energy saving actions learned in the training.
    - Among code officials, 87% applied the course concepts to their jobs and 73% required energy saving actions learned in the training.
- Overall, 58% of the builders reported making at least one change to a specific area in a home and 70% of the code officials say they now enforce certain code requirements for at least one specific area of the home. Lighting, insulation, duct work, and HVAC are the places in the home that are most impacted by this program.
- We estimated annual energy savings for the 750 participants who participated in the program. These values are 16,950 MWh and 1,555,350 therms.

1.3 Methodology

Opinion Dynamics utilized multiple sources of data, secondary and primary, to build a chain of evidence for the program's energy and non-energy impacts. Secondary data collection included a review of program documents and databases. For primary data collection, we observed a classroom training session and a construction site training session and conducted several depth interviews with course attendees while on-site. These data collection efforts allowed us to understand the education and information provided by the program and to determine the potential behavior changes to which the program likely contributed.

Furthermore, we fielded a telephone survey of builders and code officials who attended a BECT course between 2006 and 2008. A sample of attendees was created from sign-in sheets provided by the program implementer. From these sheets, we were able to create a sample of 736 builders and code officials with telephone numbers. Out of the sample of 736 individuals with contact information, 107 BECT course attendees completed a phone survey between October and December 2008. Of the 107 individuals who completed the survey, 44 said they were builders and 63 said they were code officials.

The builder survey included a range of questions on awareness and knowledge of energy efficient building practices and elicited information about behavioral changes stemming from the program. From the responses, we estimated energy savings from BECT. The code official survey included questions on awareness, knowledge, and behavioral change. However, we stopped short of calculating deemed savings from this target audience, and instead focused on self-reported behavioral change.

1.4 Detailed Findings

1.4.1 What education or information is provided and what behaviors are encouraged?

BECT provides Title 24 Building Energy Efficiency Standards training, both in-classroom and on construction sites, to builders and code officials with the goal of improving compliance with, and enforcement of, Title 24 code. Title 24 changes went into effect on October 1, 2005. Consequently, the program focused its content on the 2005 Title 24 changes throughout the 2006-2008 program cycle. Changes to Title 24 were also announced in 2008, however these changes were not planned to go into effect until 2009. The program mentioned these upcoming changes in their 2007 information but mostly focused on the 2005 code changes that were already in effect. During trainings, builders and code officials are exposed to Title 24's compliance documentation and requirements for:

- Lighting;
- Infiltration;
- HVAC;
- Insulation; and
- Water heating.

Trainings are given to code officials and builders simultaneously. During the classroom trainings the educational format is a lecture with a PowerPoint presentation. For the on-site training sessions, BECT instructors use a hands-on "real life" educational format, where participants walk through a house under construction (pre-drywall, when insulation and penetrations are still exposed) and in which instructors demonstrate installation, quality control, and inspection techniques that result in improved construction quality and higher efficiency levels. To further illustrate the course's concepts during on-site sessions, Program staff perform blower door and duct blaster tests on a second house that is complete (ready for move-in) and usually identical to the pre-drywall house. The Program staff then verbally connects what was seen in the walk-through house (pre-drywall) to course concepts and to the diagnostic test results while acknowledging the builder for what was installed well, and identifying areas for improvement.

For both types of trainings (classroom and on-site) instructors provide participants with a detailed manual that walks them through the state's energy code requirements and associated required documentation. For builders that hosted the training at one of their construction sites, the Program sends a follow-up letter detailing the results of the blower door and duct blaster tests (services that normally cost about $150 each) and lists customized recommendations for additional steps to improve the quality of the homes under construction.

The trainings are marketed as "peer-to-peer" training. Residential energy efficiency experts, with many years of industry experience and certification as HERS raters, conduct the trainings. When asked to describe the instructors, a code inspector who attended one of the

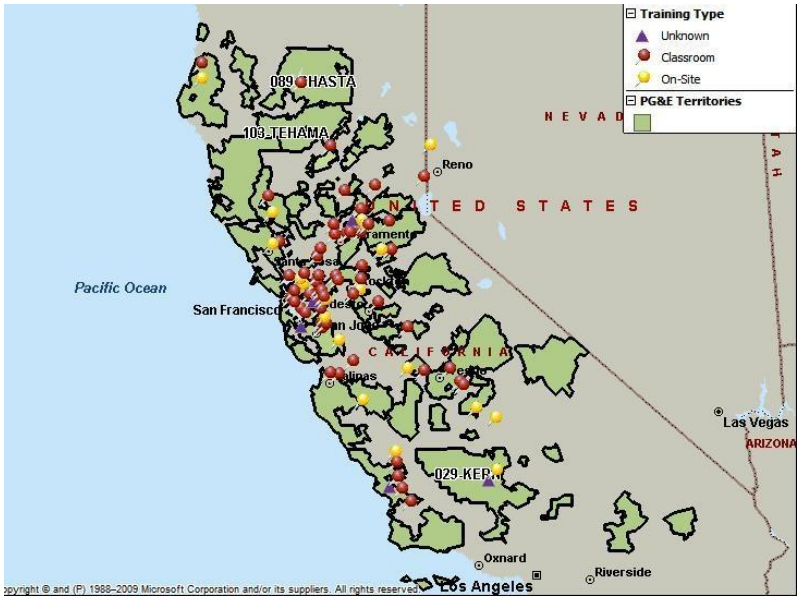
training courses said, “Most of them had been in the industry for a number of years, have a good grasp of the regulation. And, they were able to articulate. That’s one of the things that are important for inspectors.”

1.4.2 What is the reach of the program?

The program conducted a total of 167 training sessions throughout 2006-2008, 133 in-classroom and 34 on-site. As a result, the Program trained a total of 1,978 market actors (750 builders and 1,228 code officials).[1] The type of builders attending these trainings typically focus on construction, building design and code approval. Eight builders attended the on-site training we observed: three were superintendants and the others represented warranty and planning departments.

The program is reaching builders that construct homes on a large scale, survey results showed that on average, a participating builder might construct up to 275 homes per year. Further, the program is reaching code officials that inspect a large number of homes per year. On average, a participating code official might inspect up to 300 homes per year. Given these large numbers, the program has the ability to impact the energy consumption of a significant number of new residential homes in PG&E territory. Between 2006 and 2008, 209,491[2] new homes were constructed in the state of California. Assuming that PG&E comprises roughly 40% of the new homes in the state, this program potentially impacted approximately 83,000 new homes. Figure 1 depicts the locations of BECT on-site and classroom trainings.

Figure 1. BECT Training Location Map



[1] This number was stated by the program implementers during depth interviews and confirmed through program records and sign-in sheets.

[2] Data represents new permits. Data collected from the Construction Industry Research Board (CIRB)

1.4.3 How likely is the program to induce behavioral change?

Participants face challenges when trying to meet Title 24 standards. According to survey respondents, the top four concerns reported as anticipated challenges to meeting the new Title 24 code were the same for code officials and builders: 1) costs; 2) understanding of new lighting requirements; 3) not knowing what measures will be needed to achieve code; and 4) getting information to other trades. Except for costs, the BECT course addresses the remaining concerns through their trainings and thus the program has the potential to address some of these challenges and induce behavioral change.

The BECT program has the potential to induce behavior change given that BECT trainings provide an opportunity for the building community to learn how they can better construct and inspect homes to meet Title 24 standards. As a result of this education, code officials are likely to better inspect homes to meet Title 24 standards and builders are likely to better construct homes to meet these standards. Given that this program trains the building community to meet and inspect code requirements, it is likely that this program will induce behavioral change provided that the builders and code officials are not currently meeting code with their existing practices.

Observations of an on-site training indicated that only moderate increases in knowledge and behavior change were likely for this program:

"Participants are likely to have a somewhat higher level of knowledge about energy efficiency as a result of this training session because while they are likely aware of the types of things that they should be doing to make a home energy efficient prior to the course, they may not have known details of how they could improve smaller, specific job tasks to make the homes more energy efficient. The attendees are very likely to change their behavior in that they will incorporate small tidbits ("how to's") in their day-to-day jobs that will make the homes more efficient. For example, the contractors will now ensure that the windows were installed correctly, with the correct side facing out; the planners will spec out fluorescents in the kitchens, and the contractors will also be doubly careful that the insulation is installed without big gaps or voids."

1.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

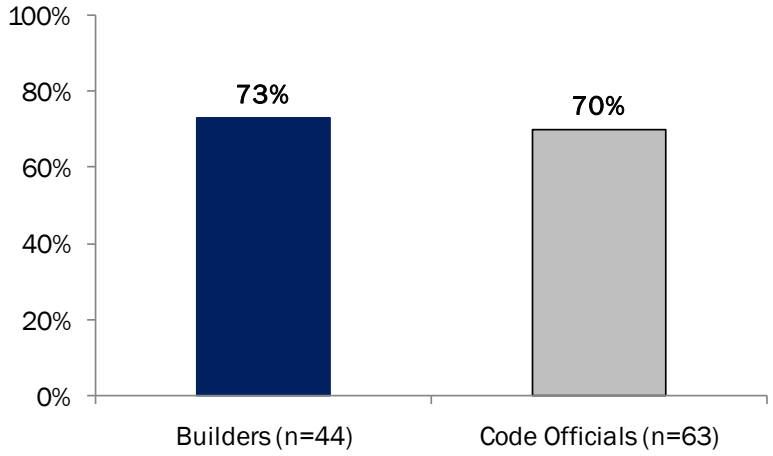
In this section we explore the program's impact on Title 24 code awareness by looking at several indicators: the newness and usefulness of the course information, as well as the self-reported increases in Title 24 code knowledge overall and in specific aspects of the Title 24 code.

Program provides new information

Among both builders and code officials, the majority of respondents reported that the course information was new, therefore providing evidence that the BECT program is educating most participants - regarding code changes of which they were previously unaware. Among

builders, a majority of course participants (73%) indicated they heard some new information. Similarly, among code officials, a majority of class participants (70%) indicated they heard some new information. Figure 2 shows the percent of builders and code officials who reported hearing new information at a training session.

Figure 2. Percentage of Participants Hearing New Information

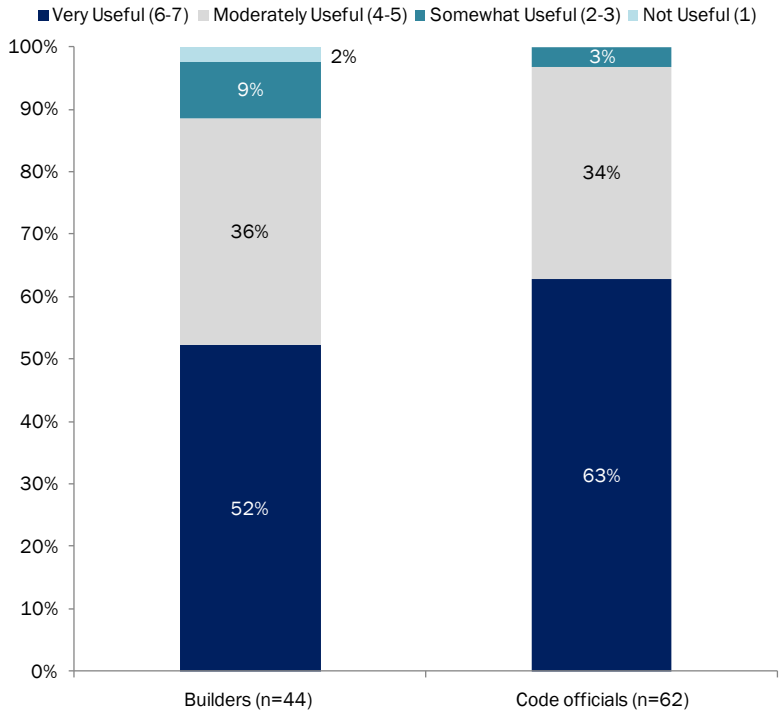


While this is the majority, a significant percentage (28% overall) did not learn anything new, which points to the questionable value of the program's information for more than 1/4 of the participants. These participants likely attended the training to gain some Title 24 code information that they did not already know, but instead, found that the information confirmed their existing knowledge. One code official we interviewed attended the training session in order to "keep current" and claimed he was not exposed to any new information as he had already been exposed to it through "reading the code… (and) bulletins from the state." Nor could he provide any examples of how he inspected homes differently since attending the course. Yet, he made a distinction between "the strict legal information" and the "practical application," saying it was "important to hear how applying them works in the real world."

Program provides useful information

Among both builders and code officials, the vast majority of all respondents reported that the course information was useful. Using a 7-point scale where 1 is "not at all useful" and 7 is "very useful," we grouped participants into four categories as shown in Figure 3. For, a majority of both builders (52%) and code officials (63%) the information was "very useful" (i.e., a 6 or 7); and for an additional third of each group (34-36%) the information was "moderately useful" (i.e., a 4 or 5). Thus, overall 88% of builders and 97% of code officials gave ratings reflecting that the information was "moderately" or "very" useful.

Figure 3. Usefulness of Program Information



Note: Percents may not add to 100% due to rounding.

Program's Impact on Energy Code Awareness

To evaluate the program's impact on energy code awareness, survey respondents were asked to state their level of energy code knowledge prior to the program and then asked how much they learned as a result of the course using a 7-point scale where a 1 indicates "not at all" and a 7 indicates "very much." The results, shown in Figure 4 below, reveal that builders and code officials come into the Program with high levels of energy code knowledge. Nine in ten participants said they came to the course with "some" or "a lot" of prior Code 24 knowledge. The survey results also show that the BECT course had a moderate impact on both builders' and code officials' awareness of Title 24 code; yet this moderate impact is expected given that participants are typically already knowledgeable about the energy code and are likely seeking a limited degree of information to further their knowledge.

The differences in knowledge increase between builders (4.7) and code officials (5.4), among those who reported "some" prior knowledge, is not surprising. All concepts included in the course are likely applicable to code officials; whereas, for most builders, only aspects of the course content might apply depending on their specific role in the building process. For example, a planner who works for a builder is likely more interested in how to spec out fluorescent lights to meet code, and therefore might pay less attention on how to effectively inspect insulation. The sample size for builders and code officials who attended the program with "no" knowledge or "very little" knowledge (i.e., 9 out of 107 attendees) represent too small a sample size to make any generalizations about the population. This reflects the type of program outreach and attendees of the training sessions, which tend to be more

knowledgeable about Title 24 prior to attending the training sessions. Levels of prior knowledge aside course attendees still report knowledge gain. Figure 5 shows that for both types of attendees, the vast majority (80-81%) report a moderate or large increase in knowledge as a result of attending the course.

Figure 4. Title 24 Knowledge Increase

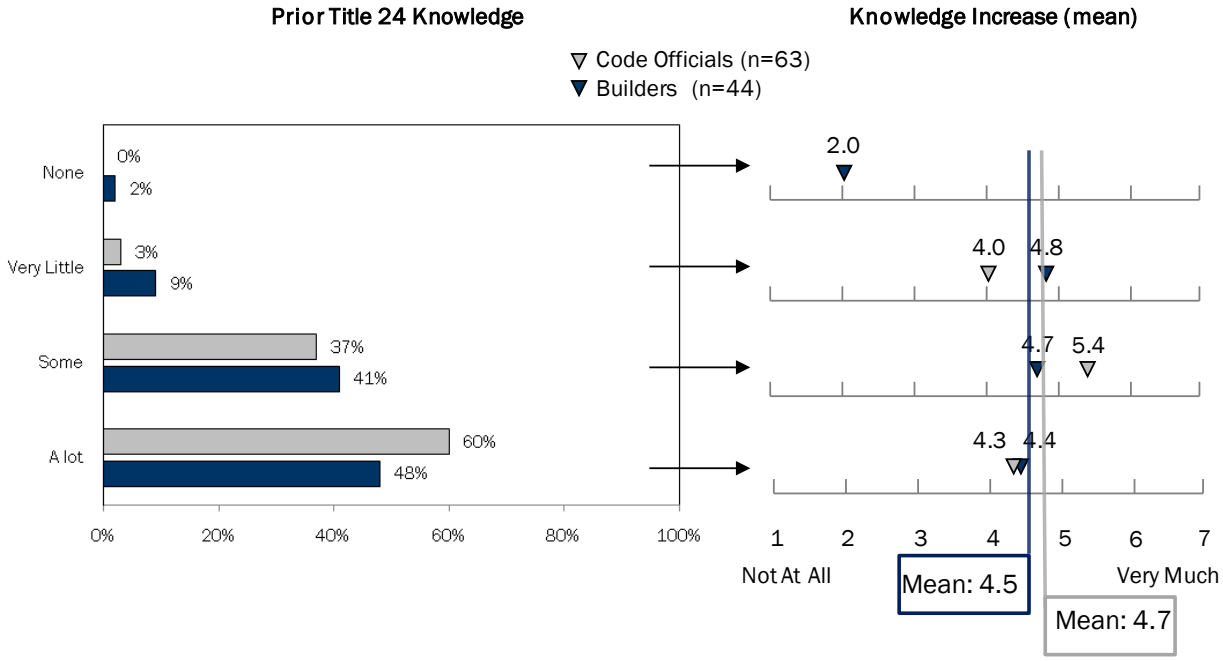
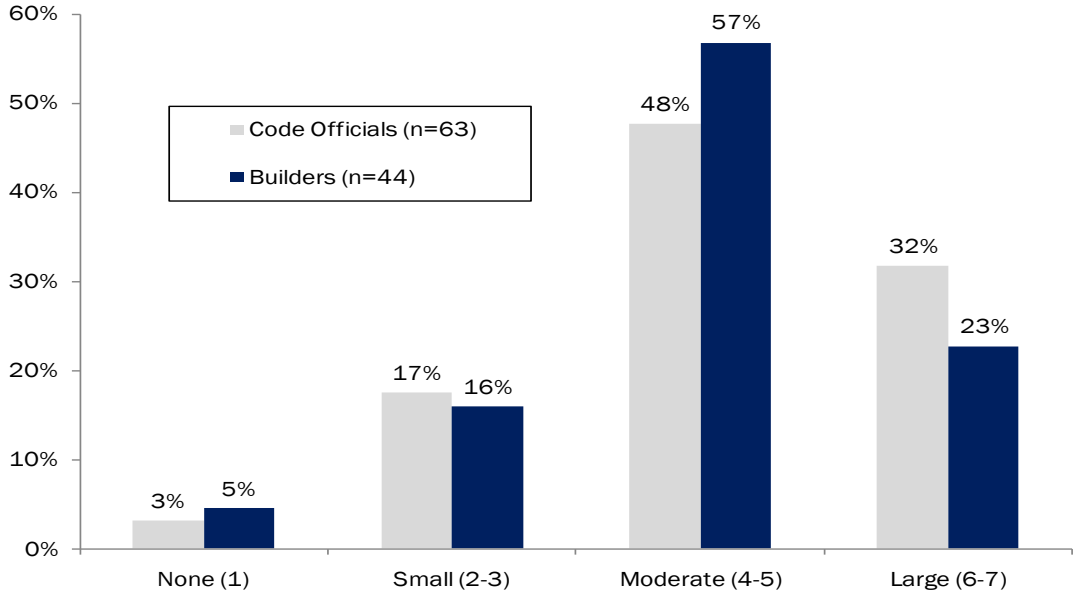


Figure 5. Overall Amount of Knowledge Increase by Participant Type



Beyond reports of general Title 24 code awareness, we also asked respondents if the program increased their familiarity with specific areas of the code (e.g. lighting requirements, infiltration requirements, etc.). Participants rated their level of agreement that the course increased their familiarity with specific code requirements on a 7-point scale where 1 was "strongly disagree" and 7 was "strongly agree." As shown in Table 1, the majority of participants strongly agreed (i.e. a rating of 6 or 7) that the program increased their familiarity with Title 24 requirements across most topic areas.

Most builders and code officials said they gained knowledge in all areas taught in the course: compliance documentation, infiltration requirements, lighting requirements, future code changes, insulation requirements and water heating. Both groups indicated that their knowledge level increased least for water heating requirements. Notes from our observation of the on-site training session reinforce these findings. The instructor spent extra time explaining the details of the Title 24 compliance documentation process to builders, specifically what forms were required, and few attendees showed much interest in water heating requirements.

Table 1. Increased Familiarity with Specific Title 24 Requirements

% Strongly agree (6-7 rating) that training increased familiarity with…	Builders (n=44)	Code Officials (n=63)
Lighting requirements	62%	70%
Insulation requirements	61%	55%
Compliance documentation	60%	64%
Expected changes in future code	60%	58%
Infiltration requirements	54%	66%
Water heating requirements	46%	54%

The main objective of the program is to ensure that the building community is better prepared to meet Title 24 requirements. As shown in Table 2 below, the knowledge imparted by the program makes the majority of participants believe they are better able to meet or enforce Title 24 requirements. Our finding for code officials is similar to that found for code officials participating in the Energy Center's Title 24 training courses: 68% of code officials participating in the BECT trainings and 72% of code officials participating in the Energy Center's courses said they were better able to enforce Title 24 requirements as a result of the courses.

Table 2. Impact on Ability to Meet/Enforce Title 24

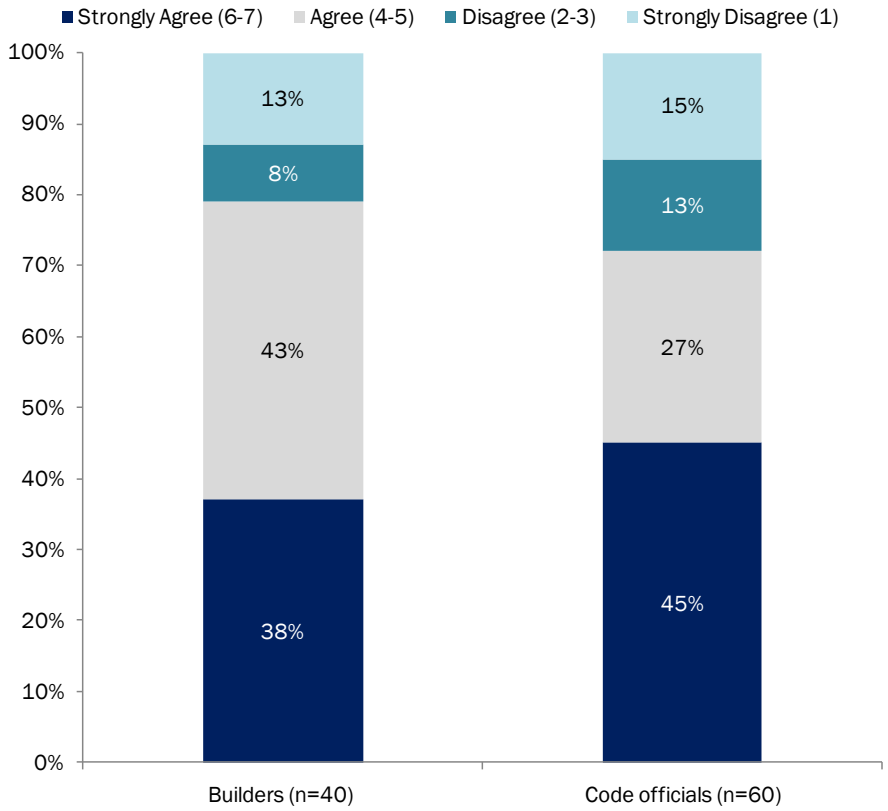
% Strongly agree (6-7) that after the training they are now…	Builders (n=44)	Code Officials (n=63)
Better able to meet/enforce Title 24 requirements	62%	68%

Program's Impact on Resource Acquisition Program Awareness

This evaluation also explored BECT participants' gains in awareness of utility sponsored energy efficiency programs. While the program provides information about utility programs, it is neither something that is highlighted during the actual presentations, nor a main program component. During training observations, the instructor did not verbally mention any utility-sponsored rebate programs, instead limited program information is provided to participants in written manuals. Specifically, the Build it Green (BIG) and California Solar Initiative New Homes programs are listed in the manuals provided to the participants.

We asked participants to rate their level of agreement with the statement "As a result of the training, I am more aware of utility sponsored energy efficiency programs," on a 7-point scale where a "1" is "strongly disagree" and a "7" is "strongly agree." Figure 6 shows that less than half of the builders (38%) and code officials (45%) reported strong agreement with this statement suggesting that only a limited number of participants are made more aware of resource programs from the training.

Figure 6. Program Impact on Resource Program Awareness [a]



[a] Data shows agreement with the statement, "As a result of the training, I am more aware of utility sponsored energy efficiency programs." Results for code officials total more than 100% due to rounding.

1.4.5 What behavior change occurred that indirectly influenced energy savings?

BECT course participants made changes to their jobs in multiple ways. First, nearly six in ten participants are now more likely to recommend energy efficient equipment, designs or practices as a result of attending the course (see Table 3).

Table 3. Impact on Likelihood to Recommend Energy Efficiency

% Strongly agree (6-7) that after the training they are now…	Builders (n=44)	Code Officials (n=60)
More likely to recommend energy efficient equipment, designs, or practices	59%	58%

Code officials were the most likely to change behavior as a result of the course. Most code officials stated that they applied course concepts to their jobs (87%). Nearly three-fourths of the code officials now require energy saving actions learned in training (73%). These high percentages indicate that the behavior of code officials is highly influenced by the Program

and a critical factor in their education and application of code knowledge. Table 4 lists these changes.

Table 4. Changes in Code Official's Behavior

Changes in Behavior…	Code Officials (n=63)
Applied course concepts to their jobs	87%
Required energy saving actions learned in training	73%
Made changes that became a standard practice	52%

While code officials showed the most behavior changes, many builders also reported changes. Table 5 shows the percentage of builders that reported behavior changes. The majority of builders (70%) applied course concepts to their jobs. Slightly more than half of the builders have recommended energy saving actions learned in training (55%). Smaller, but still sizeable, portions of builders reported changes in how they specify and size energy-intensive equipment (43%); how they use building or design principles they had not known about prior to the course (41%); how they install or maintain energy-intensive equipment (34%); and how they use diagnostic tools or practices they did not know about before the course (30%). Although this last set of percentages might seem low, these percentages are substantial given that some builders may have previously known about some of these course topics. Notably, these types of impact have the potential to turn into large impacts statewide over time.

Table 5. Changes in Builders' Behavior

Changes in Behavior	Builders (n=44)
Applied course concepts to their jobs	70%
Recommended energy saving actions learned in training	55%
Changed the way they size and specify new equipment that uses a lot of energy	43%
Made changes that became a standard practice	43%
Used building or system design principles or elements that they did not know much about before	41%
Changed the way they install or maintain equipment that uses a lot of energy	34%
Used diagnostic tools or practices that they did not know much about before	30%

1.4.6 What behavior change occurred that directly influenced energy savings?

Code officials said they are better equipped to enforce code requirements to meet Title 24 standards. Overall, 70% of the code officials reported that they now enforce certain aspects of the codes in specific areas in a home than before taking the training. Code officials increased their enforcement especially of codes pertaining to lighting, insulation, duct work, and HVAC. Out of the total code official respondents:

- 54% now enforce code requirements for duct work
- 49% now enforce code requirements for HVAC and lighting
- 46% now enforce code requirements for air filtration
- 44% now enforce code requirements for water heating, windows and doors
- 43% now enforce code requirements for insulation

As a result of attending the BECT training sessions, builders are changing building techniques to be more compliant with Title 24 code. Overall, 58% of builders reported making at least one change to a specific area in a home, especially in regards to lighting, insulation, duct work, and HVAC. Out of the total builder respondents:

- 47% made changes to insulation and lighting
- 45% made changes to HVAC and duct work
- 39% made changes to air filtration and water heating
- 37% made changes to window and doors

Conversely, 42% of the builders and 30% of the code officials did not make changes to the way they build or inspect homes after the training. The training sessions appear to have an effect on behavior to the extent that the course attendees are in a position to change their professional practices. When - participants who did not made changes since attending the training sessions were asked why they had not. Most - gave one of two reasons: 1) “There’s nothing to change,” or 2) “I haven’t had the chance to change anything because I have no new projects.” The latter reason is, in part, due to the down housing market. The former reflects the already high levels of professional practice at which some BECT course participants have been operating. Thus, for a majority of these participants, lack of behavior change was not necessarily due to a deficiency in the course curriculum.

1.4.7 What are the net energy savings as a result of the program?

Participants reported a moderate increase in knowledge as well as some behavior changes after taking the BECT training sessions. More than half of the builders (57%) reported making some sort of change to a specific area of a home; almost all of those who made these changes (91%) believe that it resulted in measureable energy savings. For builder

participants, we have calculated deemed energy savings from BECT. We used several of the survey questions to calculate a cognitive change index (CCI), or a value between 0 and 1 that estimates how much of the reported changes can be attributed to the program.

Builders were asked if they had made changes in the following areas of the home: insulation, windows and doors, lighting, HVAC, duct work, water heating, and air infiltration. The CCI for builders who reported taking action was 0.72. This value is applied in the energy savings calculations. It should be noted that the Program does not have any direct energy savings goals associated with it.

By reviewing the BECT training materials, we can obtain an idea of what changes the builders are making. For example, to meet code, water heating changes include insulating hot and cold water pipes as well as the tank itself in some circumstances. Lighting changes may include using a variety of sensors or installing high efficacy lighting. However, the remaining areas relating to building envelope and HVAC are more difficult to pinpoint because of the range of activities and limited knowledge of what specifically each builder did that they had not done previously. Additionally, the typical energy savings from secondary information would most likely overstate possible savings as this data is for retrofit situations or for building above the energy code, rather than incremental savings based on changing practices to meet code.

As a result, rather than assigning energy savings to each of the individual areas asked about, we took more of a whole house approach. Summit Blue used DEER 2008 to create an estimate of savings from bringing HVAC-related measures up to code, assuming an increase of 5% over what would be done anyway. Participants were counted in this category if they said they had made changes in at least two of the following HVAC-related measures: insulation, air infiltration, windows and doors, or duct work.

For water heating, Summit Blue assumed baseline consumption from DEER for new construction and calculated estimated savings for additional water heater insulation and additional pipe insulation. For lighting, Summit Blue found that the DEER 2008 data was too high for a baseline because at 2,000 kWh it was relatively unchanged from the numbers before low efficacy lighting was effectively banned by Title 24. Summit Blue adjusted the baseline and then assumed savings as the difference between 90% and 100% compliant.

We used the numbers provided by Summit Blue, along with the numbers of builders who made changes, the average number of homes built per year per builder, and the CCI to calculate energy savings estimates for the program (Table 6). Extrapolated to the total population reached of 750, this amounts to 16,950 MWh and 1,555,350 therms.

We note that the savings estimates for this program is annual, not lifecycle. There are likely ongoing savings as long as the measures are still in function.

Table 6. Net Builder Energy Savings (n=44)

Measure	n	Mean Houses per builder	MWh			Therms		
			Low	Med	High	Low	Med	High
HVAC (insulation, air infiltration, windows and doors, duct work)	16	245	51.2	102.4	153.7	17,406	34,812	52,218
Water Heating	15	253	42.9	85.8	128.8	33,696	67,392	101,088
Lighting	18	387	463.2	926.5	1,389.7			
Gross Total			**557**	**1,115**	**1,672**	**51,102**	**102,204**	**153,306**
CCI=0.72								
Net Total			**401**	**803**	**1204**	**36,793**	**73,587**	**110,380**
Adjusted Net Total[a]			**498**	**995**	**1,493**	**45,624**	**91,247**	**136,872**
Average Savings Per Participant			**11.3**	**22.6**	**33.9**	**1,036.9**	**2,073.8**	**3,110.7**

[a]We know that 31 respondents (out of 44) took action, but 6 did not answer the question we used to determine energy savings. Therefore we adjusted the net total by attributing the average energy savings per the 25 respondents who did answer the question to the additional six.
Notes: These numbers assume 74% gas heating fuel share, 10% electric heating fuel share, 74% gas water heating fuel share, 9% electric water heating fuel share, and 39% central air based on RASS for PG&E.

1.4.8 What is the value of the program versus the cost of the program?

The total three-year adopted budget for this program was $1,427,033. As shown in Table 7, the program's expenditures were slightly greater than the initial budget. The expenditures totaled $1,548,426.

Table 7. 2006-08 Budget and Spending[3]

Adopted Program Budget (3 - Yr)	Program Expenditures (3-Yr)
$1,427,033	$1,548,426

The BECT Program had the goal of organizing 156 training sessions by the end of 2008. It exceeded its goal by 7%, holding 167 total training sessions, though they held more

[3] Taken directly from Energy Efficiency Groupware Application (EEGA) Standard Reports, Program Expenditures December 2008. Publicly available at: http://eega2006.cpuc.ca.gov/ReportsDisplay.aspx

classroom sessions and fewer construction site sessions than originally planned. A telephone interview with Program staff in March 2009 indicated that this shift was due to the dramatic slowing of the housing market in 2008 that diminished the number of active construction sites. Table 8 shows the goals and achievements for the three year period.

Table 8. Program Goals and Achievements

Goals	Achievements by the end of 2008	% Complete
104 classroom training sessions	133 classroom training sessions	128%
52 On-site training sessions	34 On-site training sessions	65%
Total: 156 training sessions	Total: 167 training sessions	107%

This program has existed for over 20 years and still attracts a large number of participants. In the 2006-2008 program cycle, the program reached over 1,900 market actors (builders and code officials). The program is particularly valuable for the two reasons: (1) It maintains or confirms market actors' knowledge of Title 24 code by hearing how the code is applied from peers; and (2) It shows market actors how to successfully meet recent code change requirements.

The BECT program is one of many sources of Title 24 code information and training. The building community may receive Title 24 code information and change notifications through other sources, e.g. mail, websites and other Title 24 training courses. Other training courses are offered throughout the state at Energy Centers and offer similar content to the BECT program. The unique part of the BECT program is that it brings the trainings to builders versus having the training at a fixed location to which builders must travel. In this respect, the BECT program makes Title 24 general code information more accessible to a wider audience.

1.5 Evaluability Assessment

The participant contact information and program materials to which we had access are noted in Table 9 and Table 10. Overall, we had the information we needed to evaluate this program. The program provided us with the sign-in sheets for each event to create a contact database. However, the sign-in sheets did not always state whether the training was held in a classroom or on-site setting making verification of training types a challenge. The sheets also made it difficult to verify the type of participant, builders versus code officials, and the location of events as they were partially complete or illegible.

Table 9. Program Information Available: Participant Contact Information

Contact Information	Dates Covered	Electronic or Hard Copy
Sign-in sheets for training attendees (Name, company, position)	2006-2008	Electronic
List of attendees through April 2007 (Name, position, company, address)	2006-4/2007	Electronic

Table 10. Program Information Available: Program Materials

Program Information	Dates Covered by Document	Electronic or Hard Copy
Presentation materials for training courses (PowerPoint)	2006-2007	Electronic
Class schedule flyer	October 2007-March 2008	Electronic
Class schedule brochure	October 2007-March 2008	Electronic
On-site satisfaction surveys for training session attendees (PDF)	2006-2008	Electronic
Training course booklet (PDF)	2008	Electronic
PG&E Funding Change Order Forms 1-3	6/12/08, 11/3/08, 12/29/08	Electronic
Quarterly reports and narratives	Q2 2007-2008	Electronic
Database of all training course locations and dates	2006-2007	Electronic
PG&E statement of work	2006-2008	Electronic

For future evaluation efforts, we recommend that the program:

- Alter sign-in sheets for trainings so they have a check-box for the participant type, builder or code official, and clearly state the training type on the sheet and the training location (by City and Zip Code if possible).

2. PGE 2057: BUILD IT GREEN

2.1 Introduction

The California Public Utilities Commission (CPUC) awarded Pacific Gas and Electric (PG&E) funding to implement the Green Building Technical Support Services – Build it Green (BIG) program -- during program years 2006 to 2008. The program is run by Build It Green, a non-profit whose mission is to promote healthy, durable, energy and resource-efficient residential buildings in California. BIG supports the development and regulation of the green residential market in California in two key ways. First, the program supports the supply and demand sides of the market by providing both building professionals and consumers with the tools and technical expertise they need to build green homes. Second, the program supports the regulation of green construction by providing local government officials information and forums to discuss and design green residential construction policy. The three-year adopted budget for this program was approximately $1.6 Million.

The BIG program encourages the production of green homes through a variety of outreach methods targeting multiple market influencers and end-users. However, the "backbone"[4] of the program is the GreenPoint Rated Checklist, which prescribes and measures the extent to which a new or retrofitted residential construction project is "green." In effect, the Checklist encapsulates all the program's information and education and is the document that undergirds most of its activities. BIG defines "green" along five main dimensions: livable communities, indoor air quality, resource conservation, water conservation, and energy efficiency. To become GreenPoint Rated, homes must meet a minimum number of points. The program has a Checklist system for three types of homes: existing single family remodel; single family new construction; and multi-family new construction. While the Checklist is based on five dimensions, throughout our report we divide the dimensions into two categories: "energy efficiency" (those measures that save residential customers money on their gas and electric bills) and "green" (measures originating from the "livable communities, indoor air quality, resource and water conservation" dimensions). Importantly, any project that results in GreenPoint certification is considered at least 15% more energy efficient than Title 24 standards. Table 11 lists only some of the many ways in which a project can score energy efficiency points.

[4] As described by program's development director in an interview.

Table 11. Energy Efficient Point Areas by Project Type

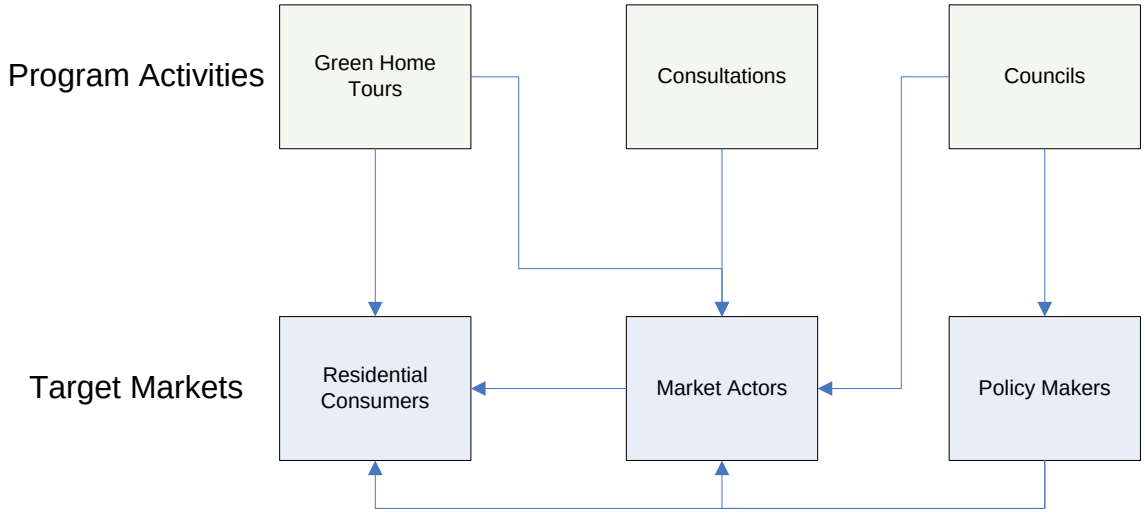
GreenPoint Checklist Energy Efficient Areas	Existing Single Family	New Single Family	New Multi Family
Plant Shade Trees	X	X	
Tightly Seal the Air Barrier between Garage and Living Area	X	X	
Energy Heels on Roof Trusses	X	X	X
Thermal Mass Walls		X	
Insulate All Accessible Hot Water Pipes	X	X	
Install On-Demand Circulation Control Pump	X		
High-Efficiency Showerheads Use ≤ 2.0 gpm at 80 psi	X		
Bathrooms Faucets Use ≤ 1.5 gpm	X		
Air Conditioning Compressor Operates Properly and Refrigerant Charge is Optimal	X		
Design and Install HVAC System to ACCA Manuals J, D and S	X	X	
ENERGY STAR Bathroom Fans Vented to the Outside	X	X	X
All Bathroom Fans are on Timer or Humidistat	X	X	
ENERGY STAR Ceiling Fans & Light Kits in Living Areas & Bedrooms	X	X	X

Note: "X" indicates that the project type is eligible for this point area

Opinion Dynamics conducted an indirect impact evaluation examining the program during the PY2006-08 period. This evaluation pulls from several data collection methods as well as several primary and secondary sources to provide a holistic presentation of the program which consists of many activities. The program provides consultations to customers, designers, and builders; hosts green home tours; organizes workshops and training courses; maintains online directories of green products and services; and provides support to local associations focused on developing, supporting, or practicing residential green building. For this evaluation we delved deep into three program activities where we could measure impacts on awareness and behavior: 1) Green Home Tours, 2) Councils[5], and 3) Consultations. Figure 7 provides an overview of these three activities and who the activities target either directly or indirectly.

[5] For ease of presentation, we use the term "councils" to include the set of program-supported professional associations which includes four "councils", one "guild", and one "coalition."

Figure 7. Program Activities Evaluated and Target Markets



This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavior change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants were fed into resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program? In addition to these research questions, we also comment on the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on this area in a section called Evaluability Assessment toward the end of this report.

We note that we attempted to answer all research questions listed above however some questions were not applicable based on the type of activity evaluated.

2.2 Summary of Key Findings

While our evaluation sought to determine the extent of the energy savings provided by BIG in PY2006-2008, BIG was considered an education and information program and did not have explicit energy savings goals. Overall, the program conducts many activities to ultimately connect consumers and building professionals with the tools and technical expertise they need to build quality green residential buildings.

Another similar green building rating system is the Leadership in Energy and Environmental Design (LEED) system. The LEED certification for homes also provides a suite of standards to help design “green homes.” However, the LEED certification standards are more rigorous and more costly than the BIG rating system. The BIG program encourages the market to build homes that are at least 15% more energy efficient than Title 24 but it has less stringent standards than what is required for full LEED certification. This is by design so that the BIG program can provide an easy entrance into building more efficient homes. Many residents want to build an environmentally-friendly and energy efficient home but may not want to spend the time, resources and money involved in getting full LEED certification. The

BIG program often appeals to these residents who want to take action toward building a "green home" but may not be ready to fulfill the requirements for LEED certification.

This evaluation delved deeply into the program's three main activities: Green Home Tours, Councils and Consultations. The three program activities we examined in depth target different areas of the market. First, the Green Home Tours serve to raise consumer awareness and demand for green homes and products by providing interested home owners and buyers with a "hands-on" experience with green homes. The tours also influence a smaller subset of market actors, such as architects, designers, and contractors. Second, the program's support to councils facilitates and bolsters six different professional groups. These groups provide professional networking to facilitate green building. Consistent with the name of each group, these six organizations supply materials for, build, sell, or pass policy on (affordable) green homes. Thus, the councils influence both the supply side of the market and the public sector. Third, consultations provide designers, builders, developers, and owners project-specific, practical advice on how to create or remodel homes to meet green guidelines. Thus, consultations also support market supply. Each of these program activities employs a different education type and focuses on different audiences. Table 12 provides a general profile of each of these three program activities.

Table 12. Program Activity Profiles

	Program Activities		
	Green Home Tours	Councils	Consultations
Target Market / Sector	Residential Consumer	Market Actor, Policy Maker	Market Actor
Target Audience	Residential Home Owners, Buyers, General Public	Market actors: builders, suppliers, members of local and regional government, real estate professionals, affordable housing developers	Builders, designers, developers.
Numbers Reached PY2006-08	At least 6,200	2,069	152
Education Type	Demonstration of Exemplary Homes	Ongoing technical and administrative support; Building communities of market actors	Technical expertise and recommendations
Type of Information given	Technical profiles of green homes with person-to person explanations; BIG's certification overview; lists of regional green building resources.	Wide range of in-depth information on topics pertinent to each group.	Project-specific information, advice, and perspective given based on the Green Point Rated Checklist
Behaviors Encouraged	Choosing green homes, products, or practices when buying	Market transformation through green policy	Building and remodeling to meet Green Point Rated

	Program Activities		
	Green Home Tours	Councils	Consultations
	or remodeling	and practices changes with a focus on consistency across regions	Certification Level

Below is a summary of the key Program findings from this evaluation:

- The three-year adopted budget for this program was $1,668,918; however, program expenditures totaled $1,735,003 by the close of 2008. Aside from the funding that the program received from the CPUC, the program also receives funding from other sources. The program Director estimated that 20% of the program's funding comes from the Public Goods Charge. However, the program does not differentiate activities funded by the CPUC and those financially supported by others. Therefore, the findings in this report represent the program's activities that were funded by all sources. This makes it challenging to calculate the energy savings that specifically resulted from the CPUC's funding versus others. For example, it is impossible to say whether the relationship between funding level and program effects is linear and thus it is inappropriate to apply a percentage-based multiplicative factor.
- The program successfully achieved all of its planned goals and achievements for the PY2006-2008 period.

Below is the summary of the key Green Home Tour findings from this evaluation:

- The program conducted 6 green home tours during this program cycle that attracted approximately 6,200 participants. Based on our survey results, 72% of the total green home tours participants are residents. By applying this proportion to the 6,200 total green home tours participants, we calculate that 4,464 total residents were reached through the Green Home Tours.
- The greatest value of the Green Home Tours is the educational method itself. The homes demonstrate energy efficient options in a real home setting and provide an opportunity for residents to get 'hands-on' experience with green technology options in addition to one-on-one education provided by the homeowner, architect and/or builder. Furthermore, the tours provide participants with the resources they need to take action on the products and features they see in each home by providing them with a list of local and regional green building resources.
- The tours tend to attract a pool of residents that is already knowledgeable of energy saving opportunities and is interested in learning more about what they can do. According to the survey of residential tour participants, the vast majority (93%) of residents describe themselves as already having at least "some" energy efficiency knowledge prior to attending the tour. Despite this prior level of knowledge, respondents still reported that knowledge from the tour was useful (an average rating of 5.8 on a 7 point where 1 is "not at all useful" and 7 is "very useful") and that their levels of energy efficiency knowledge increased (an average rating of 5.0 on a 7 point where 1 is "did not learn anything" and 7 is "learned a lot").

- The Green Homes Tours also facilitated actions that have a direct impact on energy savings. According to the survey, 95% of residents reported taking an energy-related action since attending a Green Home Tour. These behaviors included energy conservation behaviors (76%) such as turning off lights before leaving a room, and energy efficient behaviors (83%) such as installing energy efficient measures. Purchase actions after the Green Home Tours participants include purchasing energy efficient lighting, insulation/air barriers, windows, thermostats, refrigerators and water heaters.
- We estimate that the total energy savings resulting from Green Home Tours in the residential market to be an average 98 MWh and 23,666 therms.

Below is a summary of the key Council findings from this evaluation:

- The program has six councils with a total of 2,069 members including a mix of building professionals, real-estate professionals and policy-makers.
- The program provides the councils access to the expertise of BIG program staff and updates to relevant developments in energy efficiency. The program formed these councils to help it distribute information, most of which is based upon the GreenPoint Rating system. These councils meet several times throughout a given year and the program uses these meetings to promote the GreenPoint Rating system, encourage its use in the building market, and provide networking opportunities in support of building a residential green market.
- Members describe themselves as already having at least "a little" energy efficiency knowledge prior to participating in the councils. The respondents still reported that knowledge gained from the meetings was useful (an average rating of 5.7 on a 7 point where 1 is "not at all useful" and 7 is "very useful") and that their levels of energy efficiency knowledge increased (an average rating of 5.5 on a 7 point where 1 is "have not learned anything" and 7 is "have learned a lot").
- The Councils also facilitated actions that impact energy consumption. According to the survey, the majority of council members (83%) changed or enhanced the services they provide by applying the energy efficient concepts they learned about at meetings. Among members who are policy makers, most (82%) reporting helping pass energy efficiency-related building or construction policies since attending the meetings. For example, 70% recommended new building design principles they learned about at the meetings and 41% recommended energy modeling for equipment that uses a lot of energy.
- Through its support of councils, BIG has influenced the statewide adoption of green building standards that save 15% more energy than Title 24 standards. In January 2008, the Home Builder's Association endorsed the adoption of mandatory green building standards in all 101 Bay Area cities and counties. In March 2009, the California Building Industry Association also endorsed the GreenPoint Rated approach to building.

Below is a summary of the key Consultation findings from this evaluation:

- The program reached 152 participants through 24 formal consultation meetings. During these consultations, BIG staff provides technical expertise for a specific

building project regarding energy efficient measures and methods. Participants in these consultations are typically a mix of builders, architects, engineers and project sponsors (such as a developer or a homeowner) that are involved in the building of a given project.

- Throughout qualitative, depth interviews, all participants indicated that their knowledge increased as a result of the consultation meetings with five of the six participants describing significant increases in knowledge. . Participants highlighted new information and increased knowledge about energy efficient measures and their cost-effectiveness, as well as city ordinances and policies.
- Participants recalled applying specific measures recommended by BIG consultants, which were either designed into the final plans and/or installed into the final construction. Across four of the five projects, measures were incorporated into the plans for 370 units. A portion of the measures were installed into 114 built units; another portion were being installed into 150 units under construction; and the final portion remained uninstalled due to economic constraints on the planned construction of 106 units. These measures included such things as air barriers, building envelope, proper installation of measures, insulation, and occupancy sensors.
- The program provides both immediate and long term value to market actors incorporating energy efficient building measures. Because the consultation recommendations are specific and actionable, they can immediately benefit projects' energy efficiency. Additionally, because the consultants also lay a foundation for transferring knowledge to future applications, all interviewed participants reported that the BIG consultation influenced other residential projects or were expected to influence future projects.

2.3 Methodology

Opinion Dynamics drew inferences from observations, participant depth interviews, and surveys to assess the potential impact (both energy and non-energy) of the program. Secondary data collection included a review of program documents and databases, and interviews with program staff. Primary data collection included surveys, observations, and depth interviews. This approach also allowed us to consider the program from three separate perspectives (i.e., consumer, professional, and policy maker). Table 13 summarizes our primary data collection efforts by each of the three program activities we examined in depth.

Table 13. Primary Data Collection Efforts by Program Activity

Program Component	Observations	Depth Interviews	Internet Surveys
Green Home Tours	Observed in June 2008; approximately 1,200 attendees	-	Conducted survey between March and April 2009 (n=195)

Program Component	Observations	Depth Interviews	Internet Surveys
Councils	Observed in December 2008; 30-35 participants	-	Conducted survey between March and April 2009 (n=143)
Consultations	Observed meeting in October 2008; 12 participants	Interviewed 8 participants between November 2008 and March 2009	-

Opinion Dynamics fielded an internet survey tailored to attendees of the six BIG Green Home Tours that occurred between January 2006 and December 2008. Our survey primarily focused on residents as this is the primary target audience for the home tours. Opinion Dynamics also fielded an internet survey to members of the six councils, tailoring questions to both policy-makers and general market actors. Finally, we studied the reports from 24 consultation meetings[6] and chose eight projects where there was the most potential for energy savings through energy efficiency design and installation. We conducted a total of eight depth interviews, between November 2008 and March 2009, with participating builders and designers. From the eight interviews, we were able to deeply analyze the data from six interviews[7] as they represented projects with the greatest potential for saving energy. Table 14 summarizes the research targets and methods across our primary data collection efforts.

Table 14: Summary of Research Targets and Methods

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Green Home Tour Attendees	Internet Survey	Unknown, but at least 6,200	1,366	195
Councils Members	Internet Survey	2,069	1,748	125
Consultation Participants	Depth Interviews	24 consultations, 152 attendees	8 consultations	5 consultations, 6 respondents

[6] These 24 consultations ranged from walk-thrus of existing buildings, to design charettes for new multifamily construction and remodeling. During these consultations BIG consultants made energy efficient and "green" recommendations.

[7] There were six interviews regarding five projects.

2.4 Key Findings

The key findings from this evaluation are presented for each of the three program activities - i.e. Green Home Tours, Councils and Consultations – separately below.

2.4.1 Green Home Tours

What education or information is provided during Green Home Tours?

Green Home Tours seek to "create a focal point for consumer education and public relations activities," and "strengthen the visibility and market value of the Green brand." [8] The tours are designed to increase consumer awareness and demand for green homes and green technology in the residential market. The program hosted six Green Home Tours throughout the San Francisco and Monterey Bay Areas between 2006 and 2008. During each home tour, attendees get 'hands-on' experience with green technology options. Table 15 outlines the educational focus of the Green Home Tours.

Table 15. Education and Information Provided During Green Home Tours

Education Type	Target Audience	Type of Information Given	Behaviors Encouraged
Demonstration of exemplary green homes	Residential home owners, buyers, general public	Technical profiles of green homes with casual, in-person explanations; BIG's certification overview; lists of regional green building resources	Choosing green homes, products, or practices when buying, constructing or remodeling

The tours consist of a variety of green homes ranging from newly-built, cover-of-design-magazine homes to modest, remodeled bungalows and duplexes. Multifamily developments, such as townhomes, condos, conventional and affordable apartments for seniors and the general population were also included in the tour. Many of the homes in each tour have participated in the program's GreenPoint Checklist Rating system. Architects, builders, and homeowners are available at each home to answer technical questions. Additionally, homes display signs citing the home's green features.

Given that the tours provide the opportunity for residents to visibly see energy efficient product options, the tours tend to exaggerate visible energy efficient measures over features hidden behind walls, floors, and attics. Furthermore, the homes boast both energy efficient and green products, such as recycled building materials. During the tour we observed, several attendees appreciated the incorporation of day lighting into designs/retrofits, and commented on other striking features such as windows, solar tubes, roof top gardens, dual flush toilets and Forest Stewardship Council-rated wood products. We observed fewer comments about less visible features like insulation, thermal mass, tankless water heaters,

[8] Adapted from Green Building Technical Support Services, Program Implementation Plan, PGE2057, February 2006.

or radiant floors. Further, discussion tended to focus on green features such as the use of recycled building materials, as opposed to energy efficient features. Notably, no conversations discussed lower energy bills.

Green home tours also provide participants with written material to take with them, including a brochure describing Build It Green; an overview of the program's GreenPoint Rating system; and a booklet with page-long descriptions of the technical details involved in building homes included in the tour and a list of local and regional green building resources.

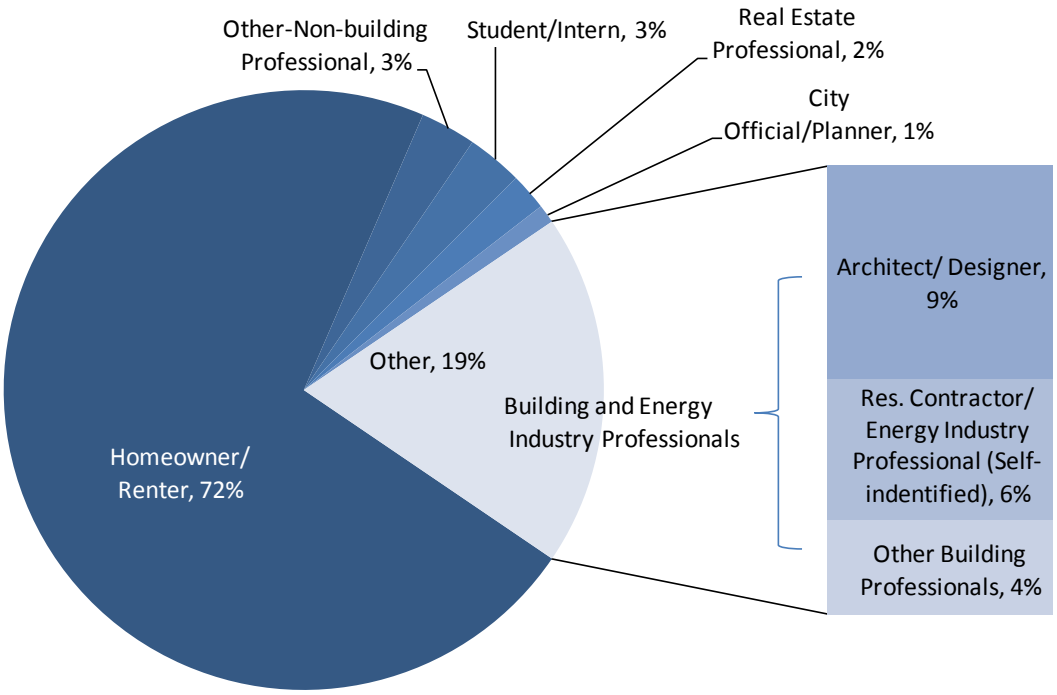
What is the reach of the Green Home Tours?

The program conducted 6 green home tours during this program cycle that attracted approximately 6,200 participants [9]. Each tour included approximately 15 homes. Participants reported visiting about five to six houses[10] per tour and spending about 45 minutes in each house. Based on our survey results, and as Figure 8 depicts, the majority of tour participants were homeowners or renters (72%), followed by building and energy industry professionals (18%), mostly architects and designers.

[9] Although BIG does not collect specific data as to the number of attendees per tour, the program does encourage attendees to fill out evaluation forms while on the tour and we used these documents to estimate an average minimum number of 1,200 attendees per tour during the 2006-2008 period (The program's own estimates are close at about 1,124 per tour based on their estimates of the five tours found in the monthly reports 4/06 though 12/08.). By multiplying across 6 tours, we at first estimated a minimum of 7,200 people. However, 27% of the survey respondents indicated having attended at least one additional tour other than the one for which they were contacted. To avoid double counting, we adjusted the number downward to a minimum of about 6,200 unique people reached through the tours. We used the following rationale: 73% of 7,200 evaluation forms represent (5,256) unique attendees. The difference between 7,200 and 5,256 equals the number of forms (1,944) filled out by those who attended more than one, and usually two, home tours. Dividing 1,944 by 2, results in 972 additional unique attendees. Thus, in total, there were about 6,200 unique attendees.

[10] This finding matches program records.

Figure 8. Participant Type at Green Home Tours, 2006-2008 (n=195)



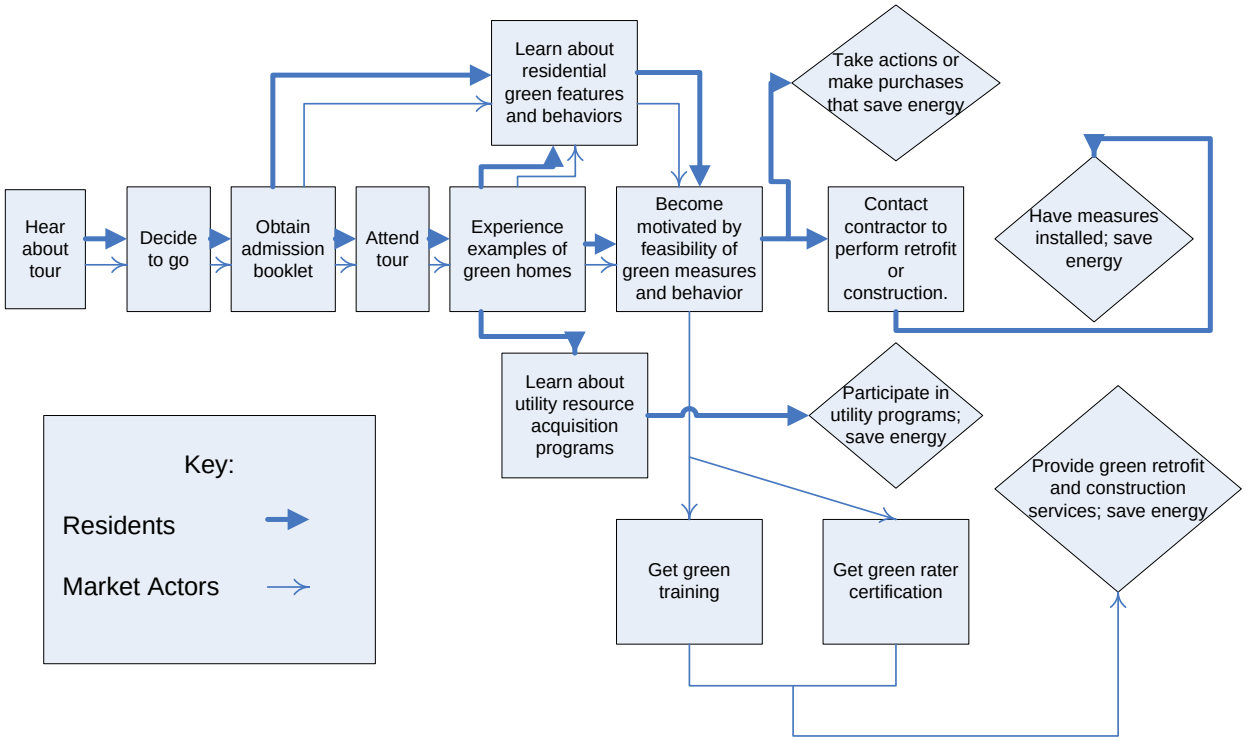
Note: Due to rounding, total percent is greater than 100.

Given that the Green Home Tours are primarily designed to reach the consumer market (i.e., homeowners and renters) and that this group makes up the majority of the participants, our analysis primarily focuses on the value of Green Home Tours to this participant group.

How likely are the Green Home Tours to induce behavioral change?

Green Home Tours are designed to primarily increase residents' awareness of residential energy efficiency and green building practices. By increasing awareness and knowledge of green and energy efficient opportunities and by showing that these opportunities are feasible, Build It Green expects that attendees will become motivated to take energy saving actions in their own homes. Tours may also induce behavior change in the supply-side of the market. Although not originally intended for market actors, there is some evidence that the tours are also motivating building and energy professionals to take action. For example, some market actors reported that after attending a green home tour they attended other BIG training courses to become GreenPoint Rater Certified. Figure 9 outlines the potential paths to behavioral change for both residents and market actors may follow once they hear about a tour.

Figure 9. How Tours Induce Change



What are the changes in awareness of energy saving opportunities as a result attending Green Home Tours?

The tours tend to attract a pool of residents that is already knowledgeable of energy saving opportunities and is interested in learning more about what they can do. According to the survey of residential tour participants, the vast majority (93%) of residents describe themselves as already having at least “some” energy efficiency knowledge prior to attending the tour. Despite this prior level of knowledge, respondents reported that their levels of knowledge increased. Figure 10 depicts the average increase in knowledge for each level of prior knowledge. As expected, those with the least amount of prior knowledge (i.e., those who said “very little” or “some”) had the largest increases in knowledge as a result of the tour. Figure 11 shows the overall amount of knowledge increase for all residents.

Figure 10. Energy Efficiency Knowledge Increase by Level of Prior Knowledge

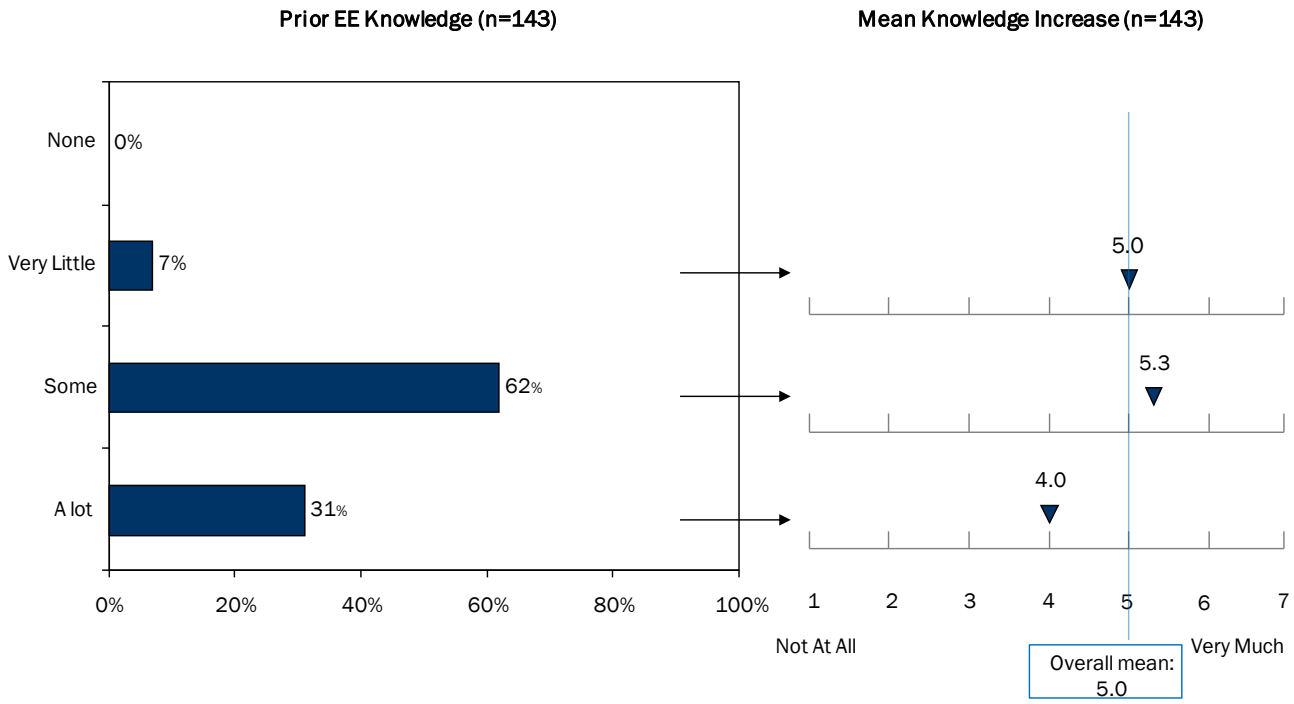
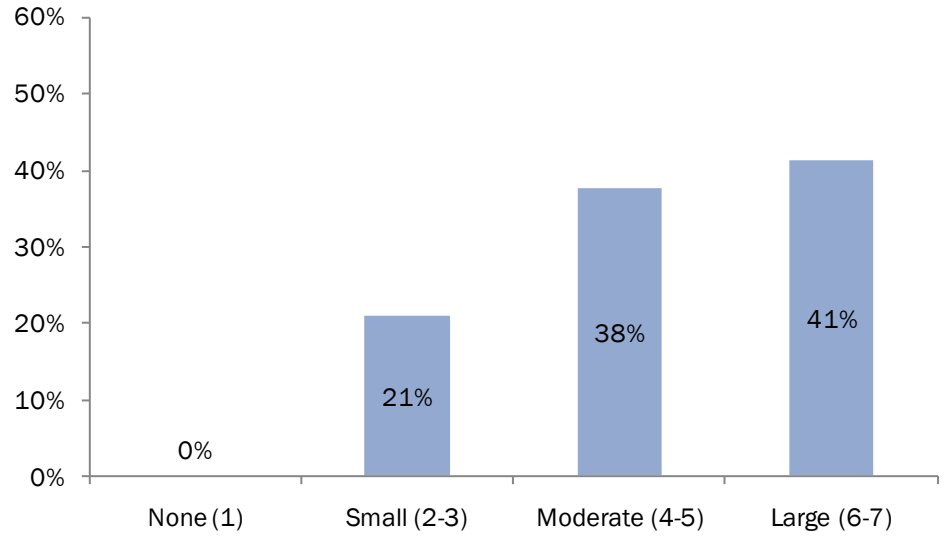


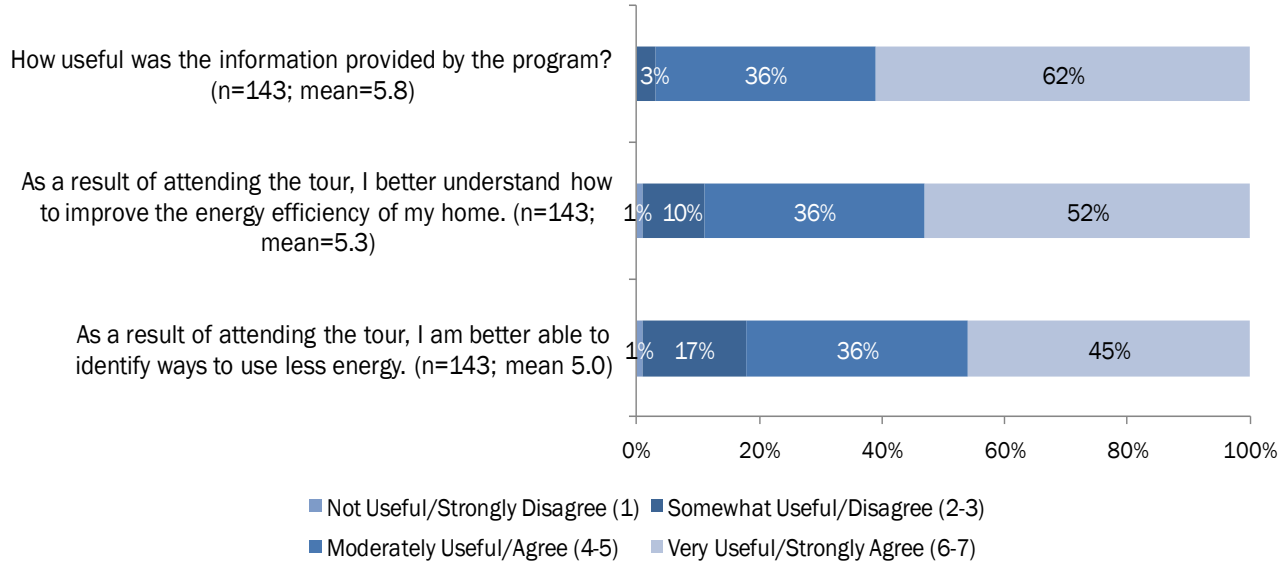
Figure 11. Overall Knowledge Increase (n=143)



The majority (62%) characterized the knowledge they gained from the tour as very useful. Fewer strongly agreed that the tours helped them to better understand how to improve the energy efficiency of their home (52%) or identify ways to use less energy (45%). Figure 12 shows that a significant percentage of participants thought the information was moderately useful (36%) and only moderately helped them to identify ways to use less energy (36%) or better understand how to improve the energy efficiency of their homes (36%). This data

show that there is likely room to improve the education and information provided during the home tours so that people feel better prepared to identify and act upon energy efficient opportunities.

Figure 12. Knowledge and Awareness Gains

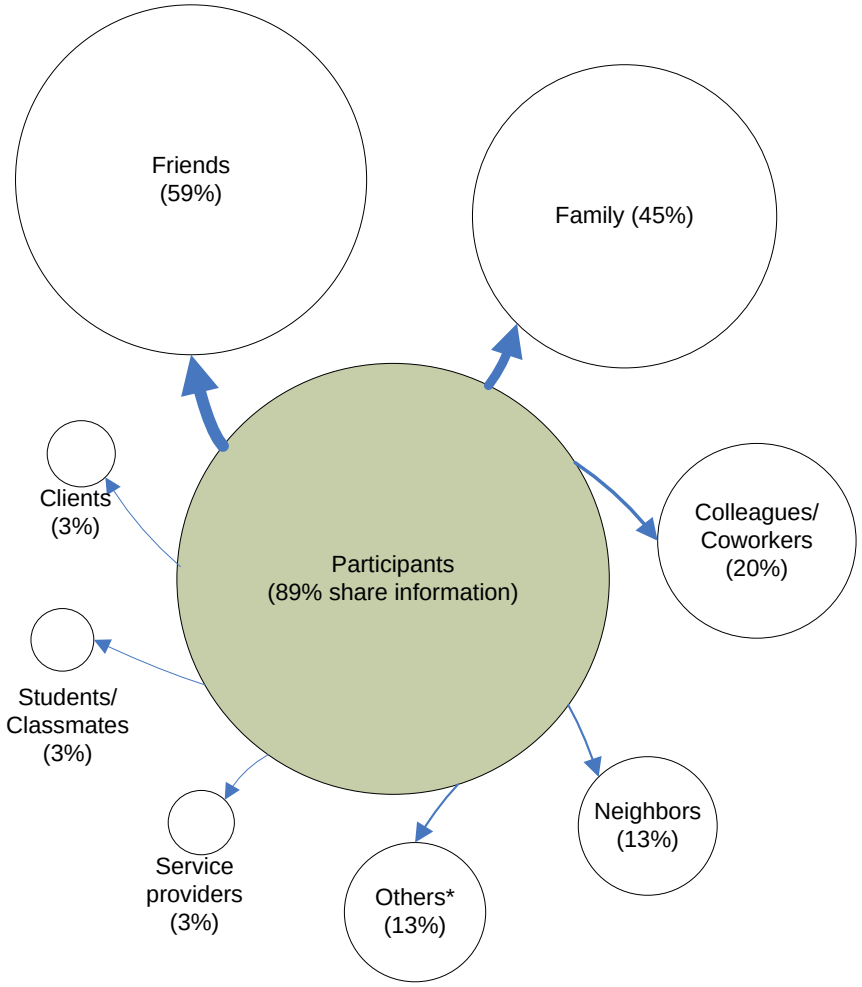


Note: Questions in this graph were asked on two different scales. The useful question was asked on a 7-point scale where "1" meant "not useful at all" and "7" meant "very useful". The statement questions were asked on a 7-point scale where "1" meant "strongly disagree" and "7" meant "strongly agree." Percents may not add to 100% due to rounding.

What behavior change occurred as a result of the Green Home Tours?

The intent of the Green Home Tours is not only to increase energy efficiency awareness and knowledge, but to turn that awareness into action. Participants took a variety of indirect and direct actions after attending the home tour. According to the survey, the vast majority of residents not only shared the information they learned about on the tour with others (89%), but also searched for additional information for ways to save energy (91%). These findings show that residents are discussing energy efficient aspects of green buildings within a larger community as well as searching out more information. Figure 13 shows the types of people with whom residents shared information. The most prevalent responses included friends (59%) and family (45%).

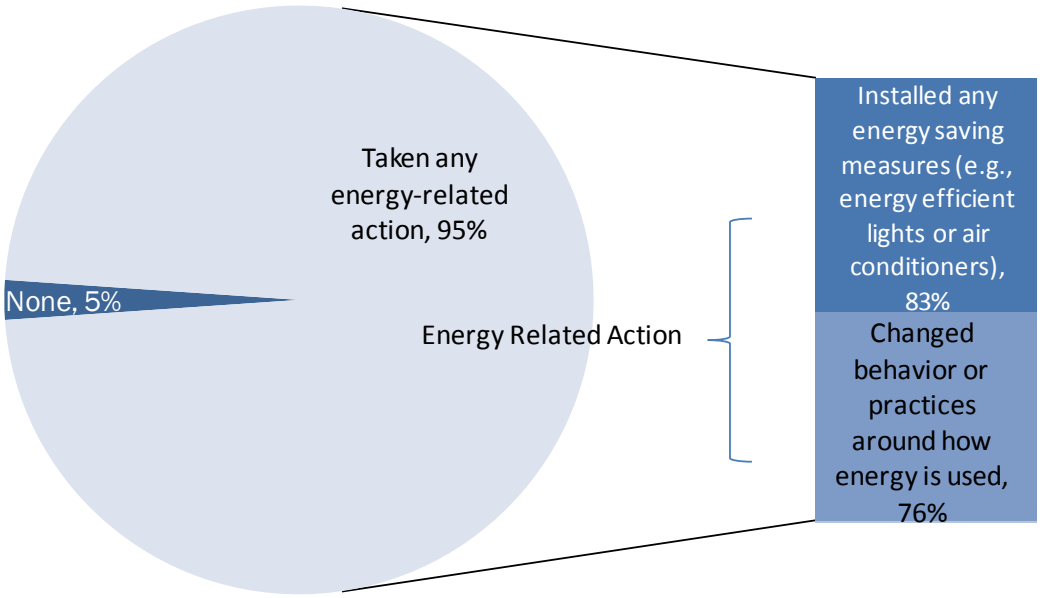
Figure 13. Types of People with whom Residents Share Information (n=143)



* Others include a wide a range of persons (e.g., landlord, visitors, board members, etc.)

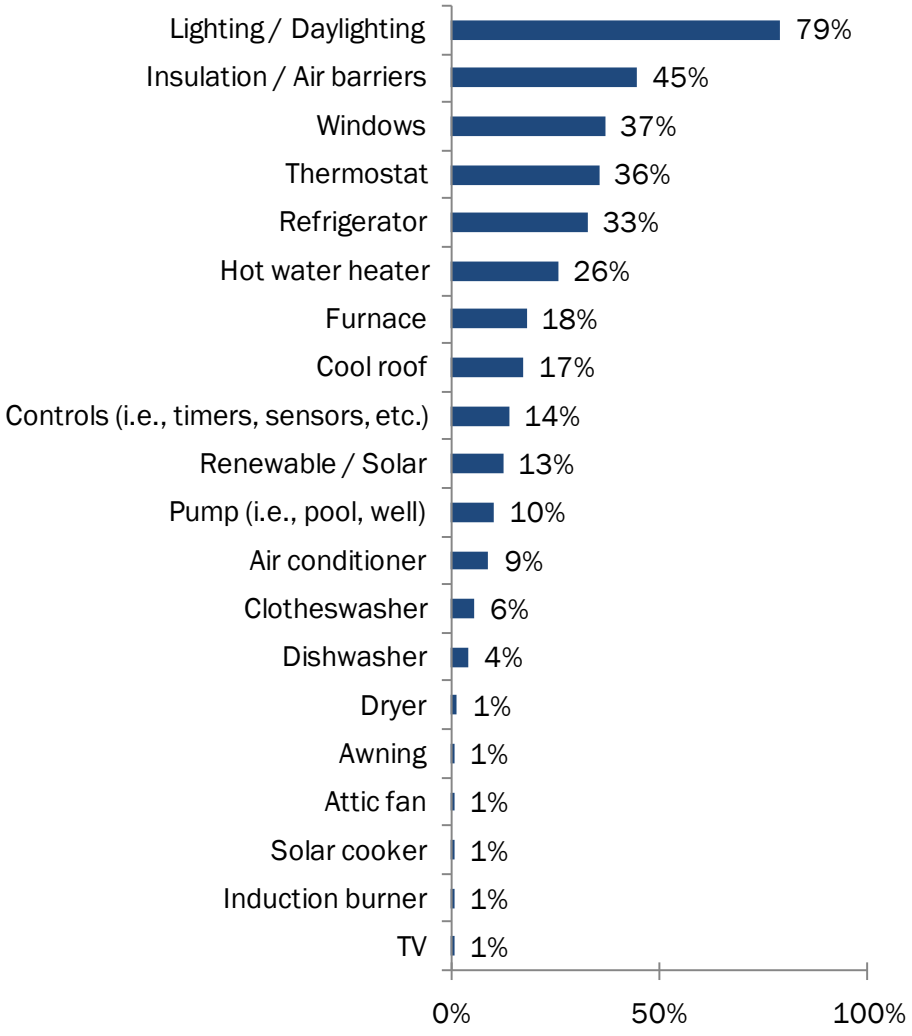
The Green Homes Tours also facilitated actions that have a direct impact on energy savings. According to the survey, 95% of residents reported taking an energy-related action since attending a Green Home Tour. These behaviors included energy conservation behaviors (76%), such as turning off lights before leaving a room, and energy efficient behaviors (83%) such installing energy efficient measures. Only seven respondents, or 5% of the sample, stated that they had not installed any energy efficient measures nor had any plans to do so in the next twelve months. Reasons for not taking any energy-related actions included cost and incapability (i.e. renters). Figure 14 shows the percent that took action since attending a tour.

Figure 14. Percent That Took Action since Attending a Tour (n=143)



Green Home Tours participants most often take action after the tour by purchasing energy efficient lighting, insulation/air barriers, windows, thermostats, refrigerators and water heaters. Figure 15 shows the specific measures that were installed by tour attendees, and the percent of residents that installed those measures.

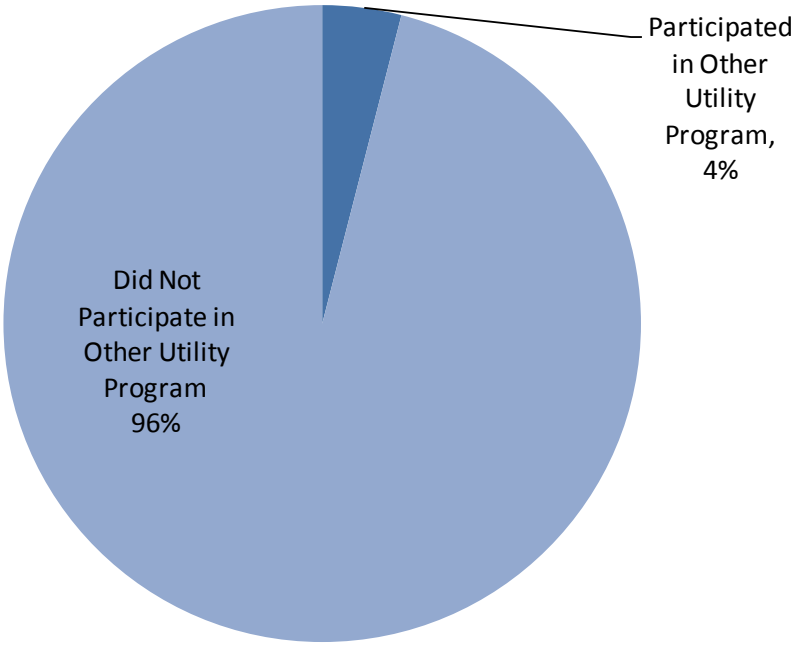
Figure 15. Measures Installed by Residents since Attending a Tour (n=143)



What percentage of Green Home Tour participants was fed into resource or non-resource programs, and which programs were promoted?

Our analysis found some evidence that the tours increased participants' awareness of utility programs, although this does not appear to be a main objective of the program. Slightly more than half (52%) of the survey respondents said the tour increased their awareness of utility programs. However, as shown in Figure 16, only 4% of participants reported that the tour channeled them into another utility program. While there is typically no mention of utility programs during the tour, program materials distributed during the tour listed numerous programs.

Figure 16. Percent of Green Home Tours Participants Channeled into Utility Programs



What are the net energy savings as a result of the Green Home Tours?

Despite the fact that the Build it Green program does not have any direct energy savings goals associated with it, our analysis has calculated a range of potential energy savings as a result of the program. The net energy savings are calculated by reviewing the energy savings from the reported measures installed. For the net-to-gross calculation, we calculated the program's influence on actions taken through a cognitive change index (CCI), which provides a value between 0 and 1. The CCI for those participants who reported taking action was 0.73, and therefore we attributed 73% of the energy savings realized from green home tour participants to the program.

Our preliminary estimate of residential energy savings for Green Home Tour survey respondents (which comprised 143 residents) include a net average 100 kWh (or 0.1 MWh) and 24.1 Therms per participant (See Table 16). These numbers are based only on those

residents who took action without other utility assistance.[11] In addition, our analysis includes only those residents who reported retrofitting existing homes.

We note that the savings estimates for this program is annual, not lifecycle. There are likely ongoing savings as long as the measures are still in function.

Table 16. Net Green Home Tour Energy Savings (n=143)

		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Energy efficient lights	73	1.2	2.5	3.7			
Insulation	34	0.4	0.9	1.3	1,413.4	2,826.7	4,240.1
Windows	29	0.3	0.8	1.3	103.8	311.5	519.2
Thermostat	28	-0.3	4.2	8.6	-5.1	714.5	1,434.0
Refrigerator	21	1.1	2.1	3.2			
Furnace	15				358.8	717.7	1,076.5
Hot water heater	12	0.1	0.3	0.4	44.4	88.8	133.2
Air barrier	12	0.1	0.2	0.3	29.7	59.3	89.0
Air conditioner	6	2.0	4.0	6.1			
Energy efficient pump	2	1.0	2.1	3.1			
Gross Total		**6**	**17**	**28**	**1,945**	**4,718**	**7,492**
CCI=0.73							
Net Total		**4**	**12**	**20**	**1,420**	**3,445**	**5,469**
Average Savings Per Participant		**0.0**	**0.1**	**0.1**	**9.9**	**24.1**	**38.2**

Notes: These numbers assume a 74% gas heating fuel share, a 10% electric heating fuel share, a 74% gas water heating fuel share, a 10% electric water heating fuel share, and a 39% central air saturation based on RASS for PG&E.
Although PG&E provided only about 20% of the program's funds, we chose not to portion out savings using an estimated factor. Two primary reasons are 1) the complexity of the program; and 2) the inability to estimate the program effects at a different level of PG&E funding.
Estimates of savings are based on measures evaluated by Summit Blue based on industry standards.
All measures reported were assumed to be energy efficient.

Taking a conservative approach to extrapolating energy savings from the participant survey, we calculated savings for only those participants who had email addresses (1,366) and were able to take the survey. By applying our percentage of residents from the survey (72%) to those participants with email addresses (1,366), we estimated total energy savings to 982 total residents. Therefore, we estimate that the total energy savings resulting from Green Home Tours in the residential market to be an average 98 MWh and 23,666 therms. These numbers demonstrate the order of magnitude of energy savings that may be created by the Build it Green Home Tour.

[11] We removed any respondents reporting participation in any resource acquisition utility program; however, we could not determine per respondent whether participation affected all the reported measures or just a fraction of them. Additionally, those who installed more measures had a greater chance of having at least one measure that was the result of participating in a utility program. So in removing participating respondents with multiple measures installed, it is likely that the BIG program is receiving less credit than it may be due. On the way to estimating energy savings, we erred on the conservative side.

In addition to the measures used to estimate energy savings, participants also reported installing other measures for which reliable energy savings estimates are not currently available. These measures include daylighting equipment, renewable energy, controls/energy management systems, cool roofs, and steam systems. These measures are less residential home owner based and were not included in the energy savings estimates, although they could be contributing to some energy savings attributable to the program.

2.4.2 Councils

In this section we explore the councils of the BIG program. Due to the nature of this program activity, not all of our research questions apply. Nevertheless, many are still relevant and we use these to provide organization for this section. Specifically, we discuss the information provided by the councils, their reach, the process through which they induce change, and changes in awareness and behavior.

What information is provided and what is the reach of the Council?

One of the methods by which the program encourages market actors to adopt energy efficient practices is through its creation and facilitation[12] of six councils. The program provides the councils with an array of administrative services,[13] access to the knowledge and expertise of BIG program staff and consultants, and updates to relevant developments in the green market or green policy. Five of the councils are comprised of general market actors: including builders, real estate professionals, building suppliers, architects, engineers, and proponents of affordable residential buildings. The remaining council is the Public Agency Council, which focuses on influencing energy policies.

The program formed these councils to help it distribute green building information, most of which is based upon the GreenPoint Rating system. These councils meet several times throughout a given year and the program uses these meetings to promote the GreenPoint Rating system, encourage its use in the building market, and provide networking opportunities in support of building a residential green market. In addition, the program also invites guest speakers to present energy efficient building information catered to a specific type of market actor. For example, at one of the Real Estate Council meetings, a presentation was given on the National Green Residential Mortgage Underwriting Standard. Program records indicate that there are members participating in several of the six councils. Table 17 below shows the six councils, who participates in them, and an example of the type of catered information members receive through the program.

[12] An interview with the program's Development Director clarified that the program was "instrumental in creating every guild and council in every chapter except for the East Bay chapter of Green Building," which the program has nevertheless "influenced heavily since" its independent inception. Some council and guild chapters were established by the program before PY2006-08, yet all were supported by the program during PY2006-08.

[13] Administrative services include general organizational support such as reserving meeting space, arranging speakers, providing refreshments, etc.

Table 17. Profile of Councils, Members, and Information

Member Type	Council	Membership	Market Actor Type	Example of Catered Information Received
General Market Actors	Builders Council (BC)	60	Home builders	Discussion focused on local government incentives and GreenPoint Rated marketing initiatives
	Real Estate Council (REC)	142	Real estate professionals (e.g., realtors, lenders, and developers)	Presentation on the National Green Residential Mortgage Underwriting Standard
	Suppliers Council (SC)	190	Suppliers (e.g., manufacturers and retailers)	Presentation on the work of the climate action task force which addresses and implements AB32.
	Green Building Professionals Guild (GBPG)	967	Contractors, architects, developers, and Green Point raters	Presentation on basic concepts involved with mechanical ventilation of homes, their advantages and limitations, and, options for complying with 2008 Title 24 requirements
	Green Affordable Housing Coalition (GAHC)	200	Green affordable housing proponents	Presentation on underwriting process for multi-family, affordable, green homes
Policy-Makers	Public Agency Council (PAC)	510	Local and regional government staff	Updates on legislative and building standards; discussion of state pre-emption and legal ramifications of mandatory programs

How likely are the Councils to induce behavioral change?

The councils are a critical part of BIG's strategy to create and encourage a market for residential green building and remodeling. The councils accomplish this by 1) focusing on the supply side of the market by supporting the ongoing education and professional networking of builders, suppliers, and real estate agents; and by 2) focusing on the public sector by supporting local and regional governments in their attempts to pass consistent green building policy across jurisdictions. As such, the program influences the energy-related actions and decisions of the council members; and the program uses the members as an extension of its staff, thereby extending the reach of BIG information to the members' networks/clients/colleagues. Beyond educating market actors and the public sector on energy efficiency, the program implementers view the council members as "our leverage, multiplying staff efforts through their own volunteer efforts and day-to-day business activities. By participating in the councils, their individual efforts are likewise leveraged through collaboration and coordination with their peers."[14] Thus, support of councils helps build a potent community of informed, practicing market actors focused on green building and spreading its acceptance in the larger California housing market.

[14] Green Building Technical Support Services, Program Implementation Plan, p. 12. PGE2057, February 2006,

What are the changes in awareness of energy saving opportunities as a result of the Councils?

On average, across all councils, members attend about 5 meetings a year and describe themselves as already having at least "a little" energy efficiency knowledge prior to becoming a member. As expected, the general market actors joined the councils with slightly more energy efficiency knowledge than the policy-makers. Despite this difference, the vast majority of all respondents find the information presented at meetings useful[15] and report that it has had a strong impact on their energy efficiency knowledge. Figure 17 shows the average increases in knowledge among general market actors and policy makers at each level of prior knowledge. Generally, across all councils, members find the general and council-specific information presented at the meetings increases their knowledge of energy efficiency.

Figure 17. Energy Efficiency Knowledge Increase Among Council Members

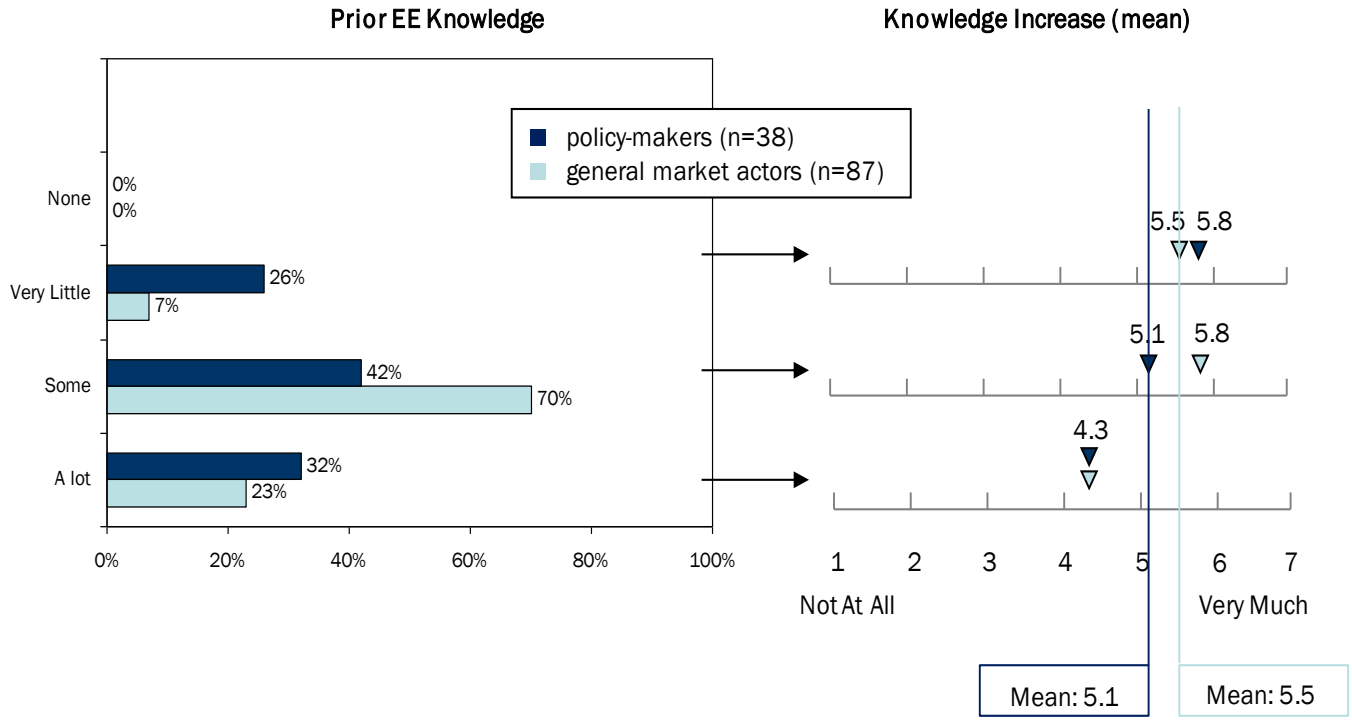
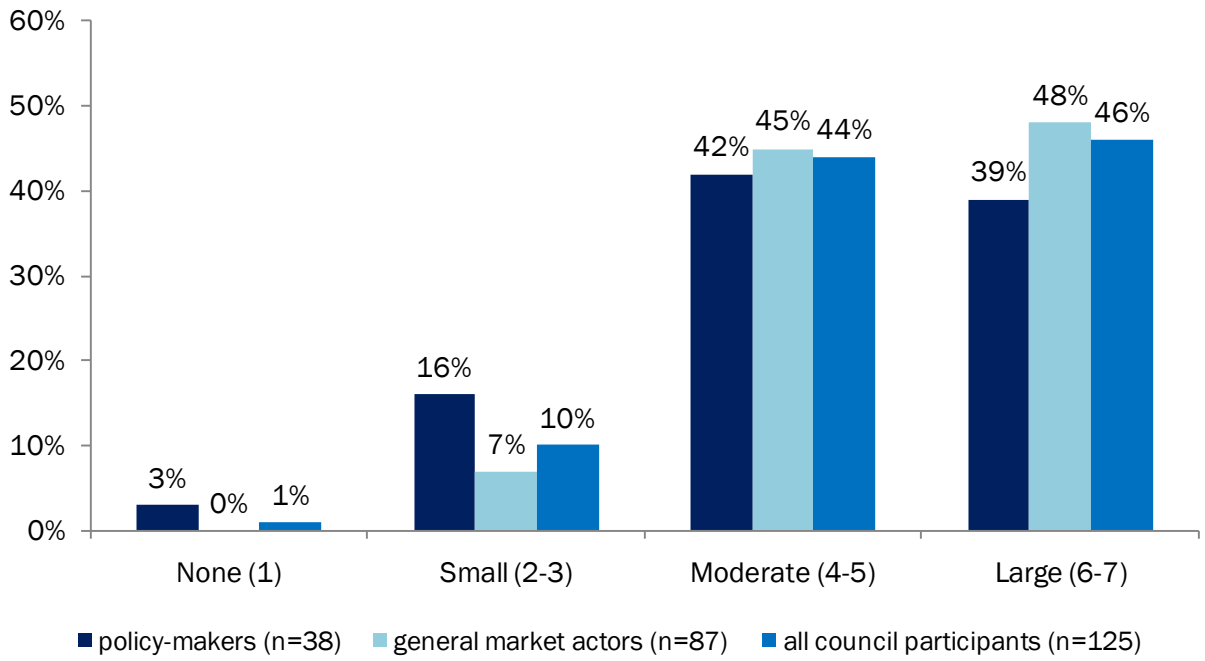


Figure 18 shows the overall amount of knowledge increase among all policy-makers and all general market actors, as well as the increase among all council participants. Generally, members reported moderate (42-45%) and large (39-48%) gains in knowledge as a result of attending councils meetings.

[15] Across all councils, respondents reported an average rating of 5.7 on a 7 point where 1 is "not at all useful" and 7 is "very useful"

Figure 18. Overall Knowledge Increases by Council Type



Note: Percents may not add to 100% due to rounding.

What behavior change occurred as a result of the Councils?

The program information provided to the general market actors is having a positive impact on their energy-efficiency-related actions. Eight in ten (83%) changed or enhanced the services they provide by applying the energy efficient concepts they learned about at meetings. For example, we found that 83% recommended energy saving actions to their clients that they learned about in the meetings. Thus, one GBPG respondent stated, "We try to know the customer better as far as life style and income level to better suit the correct equipment to the end user." Further, 61% used building or system design principles that they did not know much about prior to attending the meetings. For example, a GBPG respondent "talked to clients about more controls on their (lighting & HVAC) equipment," while a BC respondent used "foam insulation for a air tight home (resulting in) less energy consumption with no off gassing."

Similarly, the program is having a positive impact on the policy makers. Eight in ten (82%) helped pass energy efficiency-related building or construction policies since attending the meetings. A large proportion (76%) applied ideas they heard about at the council meetings to their work. These ideas fell into two main categories. First, 70% recommended new building design principles they learned about at the meetings. For example one respondent said, "I recently wrote a new ordinance requiring that sustainable construction and improved energy efficacy is incorporated into all new construction and substantial remodels." Second, 41% recommended energy modeling for equipment that uses a lot of energy.

Furthermore, program-related increases in knowledge have helped local governments pass mandatory green building requirements using principles from the GreenPoint Rated

Checklist. BIG promotes communication and cooperation across all councils around the state, and so local adoption of policy based on the GreenPoint Rated Checklists appears to influence similar adoptions at the regional level. This 'trickle up' effect has influenced Home Building Associations' standards, one of the largest benefits of the councils. The program has attracted the attention of home builders associations who recently endorsed the adoption of the same standards. Some examples of Builder Associations that have recently adopted BIG standards are:

- In January 2008, the Home Builder's Association endorsed the adoption of mandatory green building standards in all 101 Bay Area cities and counties.
- In October 2008, the Building Industry Association of Central California recommended the GreenPoint Rated System as the model program for voluntary green building policies, in part because the board recognized that 1) the program was already being used throughout California; 2) that it was the dominant program being used by Bay Area government jurisdictions; and 3) that training for both members and jurisdictions that adopt the program is available.[16]
- Recently, in March 2009, the statewide California Building Industry Association also endorsed the GreenPoint Rated approach to building.

Thus, through the its general support and education of market-wide councils, and its specific support of the PACs, BIG has influenced the statewide adoption of green building standards that save 15% more energy than Title 24 standards.

2.4.3 Consultations

In this section we explore the consultations component of the BIG program. Our main evaluation efforts for this component sought to understand this component's value from a qualitative perspective and so not all of our research questions apply. Nevertheless, many are still relevant and we use these to provide organization for this section. Specifically, we discuss the information provided by the consultations component and how it induces change; its reach; and changes in awareness and behavior.

What information is provided and how is change induced?

The program educates market actors on energy efficient practices through project consultation meetings. During these consultations, key project personnel [17] receive information from green building experts[18] regarding opportunities to install energy efficient and green measures. Using the GreenPoint Rated Checklist, the consultants provide project-specific recommendations that can be incorporated immediately into project designs and construction. Because of these specific and actionable recommendations, the effects of the consultations are directly attributable to the program.

[16] http://www.builditgreen.org/press-release-biacc

[17] These personnel include architects, designers, developers, builders, contractors, suppliers, building managers, etc.

[18] Program reports show that there were a total of 6 different BIG consultants, with usually one, but sometimes two, in attendance at any one consultation.

To better understand the content and nature of a typical consultation meeting, we observed a consultation of a design charette[19] for a multi-family, affordable housing project. The consultation spanned the course of three hours, during which the participants reviewed the GreenPoint Checklist against project specifics to ensure that the project would ultimately qualify for BIG certification. Two BIG consultants and twelve project personnel including the main architects, general contractors, structural and HVAC engineers, and a landscape architect participated in the consultation. While the consultants answered many green questions, they also provided answers to energy efficiency questions, particularly those having to do with the building envelope and the HVAC system. In all, roughly 25% of the meeting time was used discussing energy efficiency topics (i.e., ventilation, ENERGY STAR appliances, water efficient fixtures, solar water heating, etc.).

What is the reach of the Consultations?

Throughout PY2006-2008, the program held 24 consultation meetings with 152 participants. This suggests that about six non-BIG personnel attended each meeting. Among the five consultations[20] we looked at in depth, we found that in most cases, multiple staff in the same organization attended the consultation meeting, sometimes even when the staff had no immediate role in the project. Additionally, some respondents stated that they or colleagues at their organizations had attended BIG's two day training course on the fundamentals of green building training as a result of the consultation meetings.[21]

What are the changes in awareness of energy saving opportunities as a result of the Consultations?

The consultation participants appreciated the program's holistic approach, highlighting the consultants' accessibility, responsiveness, and knowledge. Consultations influence the market by providing:

- New information and increased knowledge regarding city ordinances and policies as well as energy efficient measures, especially their cost-effectiveness;
- Criteria and promotion of city policy and ordinance standards adoption;
- Product and standards credibility for third parties and the market as a whole;
- Attainable project specific recommendations that can be transferred to future projects ; and
- Organizational acumen, project specific recommendations and access to other organizations and resources that can help a given project.

The program reached market actors who are already inclined to take energy efficient actions but do not have all of the knowledge to do so. Levels of prior knowledge varied, ranging from a new participant with very little knowledge to another with nearly a decade of experience as a green builder and designer. Four of the six participants had high levels of pre-existing

[19] 'Charette' is a term used by program staff and within the urban planning community to mean "an intense period of design activity" (source: http://en.wikipedia.org/wiki/Charrette)

[20] To remind the reader, we conducted six interviews regarding five projects.

[21] Another participant implied that others at his architect design group would have likely attended the two day training course if there had been no slow down in the economy and building.

knowledge (e.g., LEED, HERS, California tax credits for higher building efficiency, etc), while the remaining two began the program with very little knowledge.

All participants indicated that their knowledge increased as a result of the consultation meetings with five of the six participants describing significant increases in knowledge.

> *"(The consultation meeting has) definitely given me quite a bit of…information. I really didn't know anything about green and I really started learning …. So definitely I have gained quite a bit of knowledge."*

Additionally, two participants indicated big changes in their attitude toward energy efficiency[22]. One participant stated:

> *"I was always so reluctant (before meeting with a BIG consultant)…I always thought (energy efficient construction) was just expensive, it just adds cost, not a lot of benefit. But (the consultation) has definitely changed the way I look at (energy efficient construction). "*

Participants noted that BIG consultants were responsive to project needs by providing organizational acumen, recommending improvements, and facilitating partnerships. One participant noted that,

> *"[BIG was] fantastic at helping me find things that would be consumer-friendly [i.e., competitively priced] and also energy efficient and work within the Energy Star Program."*

Additionally, participants in one consultation meeting were referred to a third party energy efficiency program implementation vendor so they could benefit from PG&E's Multi Family New Homes program.

BIG was also cited as a good source of information about city policies and ordinances as well as a proponent of standards adoption. One participant noted that:

> *"The city of Stockton has actually adopted a policy that says we need to conform to Build It Green, so all (our) upcoming projects will be Build It Green certified."*

The program also improved participants' knowledge regarding energy efficient measures, specifically air barriers, HVAC systems, envelope measures, and lighting.

What behavior change occurred as a result of the Consultations?

The consultations not only had an effect on participants' knowledge of energy efficient products, but also motivated participants to take energy saving actions. We interviewed participants regarding five projects for which they sought BIG expertise. Four of the projects incorporated specific measures recommended by BIG consultants, which were either designed into the final plans and/or installed into the final construction. For each of the five

[22] A caveat is that both participants were also influenced by factors other than BIG (e.g., LEED, independent research, etc.)

projects, Table 18 lists the number of units or homes involved; the energy efficient measures that participants recalled installing after the consultation; and the outcome of the projects.

Table 18. Installed Energy Efficient Measures Due to BIG Consultations

Project	Number of units/homes	Specific Measures Designed In or Installed	Outcome
Multifamily	103	Air barriers, Building Envelope, Proper Installation, Insulation	Built - GreenPoint Rated
Affordable Senior Housing	150	Hydronic radiator heating system	Under construction – likely GreenPoint Rated
Affordable Multifamily Housing	106	Boiler Systems, Insulation, Addressing issues of: Negative pressure, Ducts, Overheating	Likely never to be built due to economy
Single Family Homes	11	Occupancy Sensors, Building Envelope, Thermal Envelope	Built - GreenPoint Rated
Multifamily	200+	N/A: Did not install any measures due to the BIG consultation	Built - GreenPoint Rated

The project consisting of 150 affordable senior housing units is under construction and expected to meet GreenPoint Rated certification levels. As a result of the economic downturn, the construction of the 106 unit project has been postponed. Although we did not ask directly about the effect of the economy on building, three participants indicated that the influence of the program, including on projects outside those discussed at the consultations, was limited due to the economy.

Despite economic limitations, the program's reach reaches beyond the projects which received consultations. Market actors likely apply the knowledge gained from consultations to current as well as future projects. In this manner, consultations can have both a near and long term influence on market actors' behavior. By providing attainable project specific recommendations, consultants lay a foundation for transferring knowledge to future applications. One participant noted that:

> *"…(The program) gave (me) the tools and first taste of what I can do and then …I started doing a lot of stuff…so they kind of taught me how to fish as opposed to necessarily giving me the fish."*

In fact, all interviewed participants reported that the BIG consultation influenced other residential projects or were expected to influence future projects. Five participants noted that they would take on future energy efficient actions as a result of BIG participation.

- Importantly, the consultations also increased product and standards credibility, which will likely have downstream effects on building practices. One participant stated that:
  - "I could not have (created energy efficient criteria for factory homes) without (Build It Green)…because they gave the product credibility…they're an independent third party…not the one that's trying to sell it."

- This participant went on to explain that she had initially collaborated with a BIG consultant to develop a set of green criteria for factory designed homes, and that these criteria have influenced a national builder of factory homes in their design a line of green homes. Further, another participant also extended this notion of credibility to energy efficient standards by noting that the GreenPoint system had become the standard for their projects.

2.5 Program Costs and Accomplishments

The three-year adopted budget for this program was $1,668,918; however, program expenditures totaled $1,735,003 by the close of 2008.[23] Aside from the funding that the program received from the CPUC, it also received funding from other sources.[24] However, there appears to be little differentiation between those activities funded by the PGC and those financially supported by others. Table 19 lists the program's goals and achievements for the PY2006-2008 period. Notably, the goals and achievements provided below were culled from the program's quarterly reports. Only some of the program documents and databases shared for this evaluation allowed us to verify these achievements. We were able to verify from program databases that the program did sponsor 6 green homes tours and provided 24 project consultations.

Table 19. BIG Goal and Achievement Verification

Goals	Achievements	% Complete
Provide 3,808 Ask an Expert telephone and email consultations	3,808	100%
Sponsor 6 green home tours	6	100%
Give 62 workshops / presentations	62	100%
Provide 24 project consultations	24	100%
Provide 700 hours maintaining the Access Green Directory	700	100%
Provide info table for 15	15	100%
Provide 2,693 hours of staff support services to councils	2,693	100%
Produce 8 Fact Sheets	8	100%

2.6 Evaluability Assessment

This section comments on the evaluability of the program based on our evaluation efforts. We performed an abbreviated retrospective evaluability assessment of BIG to 1) determine whether information was available to rigorously answer the researchable issues dictated in the evaluation plan; and 2) to determine the information available to help with future evaluation efforts. The participant contact information and program materials to which we

23 Budget information taken from December 2008 Program Expenditure report: http://eega2006.cpuc.ca.gov/DisplayMonthlyReport.aspx?ID=6.

24 The Development Director stated that PG&E funds covered only about 20% of the 3 year program budget.

had access are noted in Table 20 and Table 21, while information that would likely be useful to future evaluation efforts is listed in Table 22.

Overall, we had the information we needed to evaluate this program; however, some of our evaluation efforts were impeded due to a lack of information. First, in our general assessment of the program's achievements (see Table 19) we were unable to reconcile the program's claims that it had provided the number of staff support hours to councils as specified by its goal with the sum of the hours reported in the monthly and quarterly reports. Second, the program has incomplete contact information for tour participants because it does not closely track the number of attendees. This forced us to create an estimate for the number of participants reached. Additionally, we could only extrapolate energy savings due to the program to those participants with email addresses as opposed to the total number of residential tour attendants.

Future impact evaluations of the BIG program might explore the tour component area in more depth. Although the program has designed the tours to primarily reach residents in the consumer market, our surveys collected clear but incomplete evidence that a smaller proportion of tour attendees are supply-side market actors who likely incorporate some tour information into services and building projects that save energy. While we focused our survey to get energy savings for residents, future impact evaluations might also focus on savings attributable to market actors. If so, the program should consider expanding its current effort to collect attendee contact information and participant type.

Table 20. Program Information Available: Contact Information for individuals or organizations touched by the program

Contact Information Database	Provided or Needed
Attendance lists from all six councils 2006-2008	Provided
BIG project consultation reports 2006-2008	Provided
Ask An Expert log of visitors 2006-2008	Provided
Attendee information from 6 green home tours 2006-2008	Provided
Estimates of number of workshop / presentation attendees 2006-2008	Provided

Table 21. Program Information Available: Program Materials

Program information	Provided or Needed
Quarterly reports and narratives (limited to Second Quarter 2007 through Fourth Quarter 2008)	Provided
Monthly reports (April 2006 to December 2008)	Provided
Green Building Technical Support Services Program Evaluation – Final Report by Quantec, dated 8/1/06	Provided
Scope of work documents including specific conditions and change orders (2006-2008)	Provided
Build It Green Strategic Plan 2006-2008 DRAFT dated 6/22/07	Provided
Program brochures 2006-2008	Provided
Program GreenPoint Rated Checklists 2006-2008	Provided
Program generated evaluation forms, data, and reporting 2006-2008	Provided
Workshops and Presentation materials 2006-2008	Provided
Councils Steering Committee meeting minutes 2006-2008	Provided

Table 22. Other information desired for future evaluation efforts

Information desired
Complete tour participant contact information

For future evaluation efforts, we recommend that the program:

- Expand the collection of contact information for tour participants to ensure that survey-based energy saving estimates can be as complete as possible not only for residents but also for market actors. This would require tour participants to include a reason for touring the homes, i.e. either for their own home or to gather ideas for designing and building homes as part of their business.

3. SCE 2548: SOUTHERN CALIFORNIA HOME PERFORMANCE

3.1 Introduction

The Southern California Home Performance program targets HVAC and remodeling contractors in SCE territory for comprehensive home improvement training. The program delivers classroom and field training that enables contractors to diagnose the energy efficiency of homes, recommend improvements and, where possible, provide energy efficiency improvements. Contractors are also trained to market Home Performance diagnostics and improvements to their clients. The three-year adopted program budget was approximately $1.3 million.[25] The program is affiliated with the national Home Performance with ENERGY STAR initiative. This program is implemented by a third party, California Building Performance Contractors Association, which is managed by Bevilacqua-Knight, Inc., under a contract with Southern California Edison (SCE2548).

This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavioral change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants were fed into resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program?

In addition to these research questions, we also comment on the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on this area in a section called Evaluability Assessment toward the end of this report.

3.2 Summary of Key Findings

Our evaluation sought to determine the extent of the energy savings provided by the Home Performance Program in PY2006-2008. While this program was an Education and Information program and did not have any energy saving requirements, it still hoped to obtain annual savings of 2,000 MWh and 2,000 kW. The program teaches contractors to expand the services they provide and encourage homeowners to improve the energy efficiency of their entire home. By focusing on marketing as well as technical training, the program prepares contractors to both sell and install measures that improve the energy performance of a home.

While the program has multiple components, this evaluation predominantly focuses on the benefits of the training provided to contractors and the changes it induced. Below is a bulleted summary of our key findings:

[25] Utility energy efficiency monthly reports: SCE.MR.200812.1xls, version 1, uploaded 3/16/2009

- Over the two-year period, the program trained 158 participants representing 112 different home remodeling-related companies. Participants were primarily in the business of remodeling homes including general contractors, HVAC contractors and energy consultants. According to program documents, participants completed at least 293 comprehensive Home Performance jobs (jobs included Home Performance assessments and often retrofits).
    - Specific behavior changes are dependent upon the job responsibilities of each participant. For example, participating General or HVAC contractors added Home Performance Assessments to their service offering portfolio or into their standard service offering. They recommended and performed assessments and then recommended measures. When homeowners wanted the recommended measures, these contractors then installed the measures for which they were qualified. While participating energy consultants recommended and performed assessments but did not actually install any measures they recommended because installation was outside of their service offering.
- The program is increasing knowledge and inducing behavior change in its targeted population.
    - Although participants for the most part had some (60%) or a lot (27%) of knowledge prior to participating, the training imparted a significant amount of energy efficiency knowledge. All participants believed they learned a lot about energy efficiency as a result of this program, with a high mean rating of 6.3 on a scale of one to seven.
    - The information also engendered change as 92% of participants reported applying training concepts to the services provided to clients. Nine-in-ten participants recommended energy efficient measures learned in training, 85% used building or system design principles, and 77% used diagnostic tools or practices learned from the training.
    - Participants recommended to their clients ceiling insulation (94%), shell sealing (94%), duct sealing (91%), programmable thermostats (83%), energy efficient windows (83%), ENERGY STAR appliance (81%), screw-in CFLs (79%), duct replacement (77%), energy efficient water heaters (77%), refrigerant charge and air flow diagnostics for existing air conditioners (70%), and check refrigerant charge for new air conditioners 962%).
- Eight in ten participants (81%) believe that the changes they made resulted in significant or moderate energy savings in customers' homes. This evaluation calculated energy savings for a sample of 47 companies that participated in the program, and extrapolated it all 112 companies. The net energy savings for a 12 month period following the program (approximately November 2008 to October 2009) are 1,960 MWh and 393,467 therms, the majority of which comes from installing ceiling insulation.

3.3 Methodology

The Opinion Dynamics evaluation team utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program materials, databases, quarterly reports, post training participant surveys, and past process evaluations.[26] For primary data collection, we observed one field training, conducted interviews with the participants in that training, conducted in-depth interviews with four participants, and fielded a quantitative telephone survey to participants. We note that we did not have access to a database of homeowners that worked with participating contractors to receive Home Performance assessments and retrofit projects. Project level data collection has been an ongoing challenge for the program due to issues with getting contractors to provide such data to the program.

A process evaluation for this program was conducted by Research Into Action for the same program cycle. This evaluation was published in September 2009 as part of the report titled "Process Evaluation of 2006-08 IDEEA & InDEE Programs with Lessons for 2009-2011." We reviewed this process evaluation as part of our background research for this impact evaluation and coordinated with the process evaluation's data collection efforts to ensure that our data collection efforts did not overlap.

We observed one day of field training in October 2008. Two trainers, two participants, and the homeowner were present for the entire day, while three other contractors visited throughout the day. The observer interviewed the participants, trainers, and homeowner at the end of the training. This observation allowed us to further explore what kind of implementation techniques and trainings the program accomplishes. The interviews helped us to understand participants' reactions to the training and likelihood to change behavior.

We conducted four in-depth interviews with program participants. These interviews took place in February 2009 with participants who attended trainings in 2007 or 2008. The interviews allowed us to obtain a better understanding of participants' experience with the program, including what they learned and what they applied.

We developed and fielded a telephone survey of program participants. The survey included a range of questions on awareness and knowledge of home performance techniques and elicited information about behavioral changes stemming from the program, including recommendations to homeowners and follow-through. The sample was drawn from a list of participants provided by the program. We attempted to contact all participants and completed surveys with 52 out of 154 potential participants. The survey was fielded in October 2009.

[26] The process evaluation for Home Performance was undertaken by Research into Action as part of the *Process Evaluation of 2006-2008 IDEEA & InDEE Programs with Lessons for 2009-2011 Programs*, published September 9, 2009.

3.4 Detailed Findings

3.4.1 What education or information is provided and what behaviors are encouraged?

The program trains contractors to deliver comprehensive home improvements tailored to the needs of individual homes and clients. It attempts to take contractors' current services and expand on them to include home performance testing that will result in recommendations for improvements and installation of measures that save energy. The Home Performance assessment provides an opportunity for contractors to educate homeowners on "whole house energy performance" at the time that they might be getting another service such as a remodel, a new appliance, or a new roof.

In order to provide these services, the contractors receive a nine day training session and five days of field training and mentoring, that provides education and information on building science and "house as a system" principles. This includes measures such as:

- Duct sealing, repair or replacement;
- Shell sealing, repair or replacements;
- Quality installation of AC and furnace replacements;
- Quality installation of insulation;
- Mechanical ventilation installation; and
- Lighting and appliances.

Contractors learn how to perform home assessments and diagnostic testing. Overall, this education allows the contractors to diagnose and correct problems not only relating to energy efficiency, but also to comfort, safety, and health.[27]

The contractors also learn how to interview the homeowner and talk to them about issues such as utility bills, comfort, and air quality and discuss energy efficiency measures with homeowners. The program places high emphasis on the business development skills of its participants in addition to technical training. Business and marketing sessions are designed to help contractors learn how to sell these services and educate homeowners. In this way, the education received by the contractors is passed on to the homeowners.

3.4.2 What is the reach of the program?

The Home Performance program reached 157 individual contractors, representing 112 unique companies, through its core training class. All participants offer services for home remodels. Participants offer a mix of different services. The most common service offerings are shown in Table 23. Some participants may only conduct Home Performance

[27] The program implementers noted that high construction costs in California mean that home upgrades cannot be justified on energy savings alone, but other non-energy benefits help sell the approach.

assessments as part of their core business while others may offer only HVAC, or as a remodeler, offer full services either themselves or through subcontractors. Remodelers tend to participate more frequently than HVAC contractors.

Table 23: Most Common Services Offered by Participants (n=52)

Multiple Response

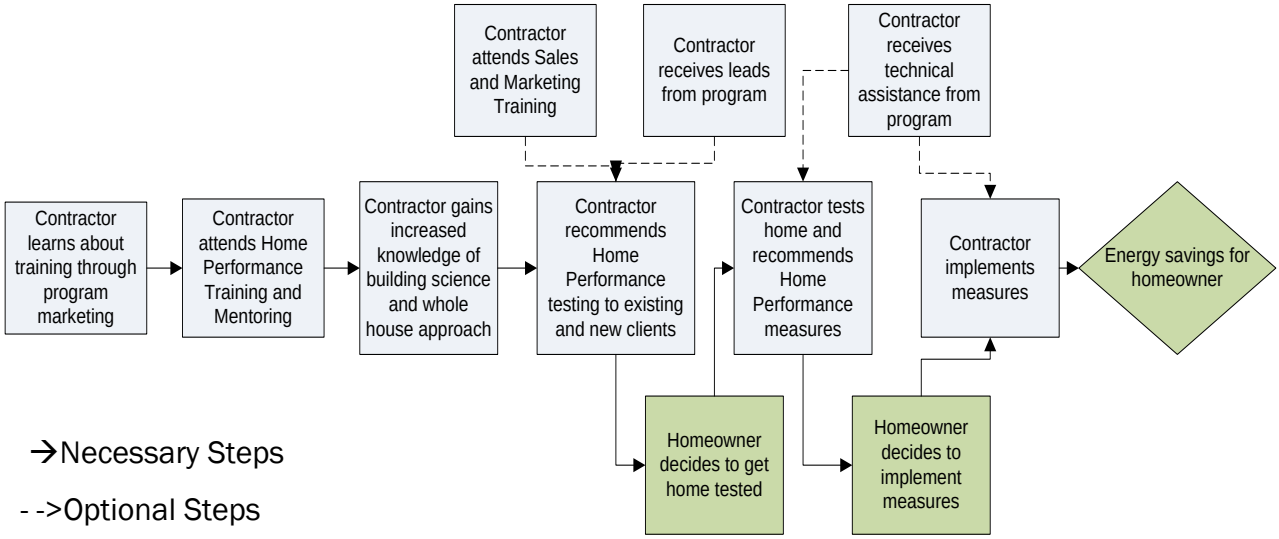
Remodeling Service	Percent
Energy technology consulting	46%
HVAC	40%
Lighting	21%
General construction	19%
Refrigeration	15%
Engineering or architectural design	12%

3.4.3 How likely is the program to induce behavioral change?

The program implementers think their education approach is innovative because they are "teaching marketing skills to contractors who have a more fix-it-and-leave mentality." The program enables contractors to expand a limited service opportunity to a whole house energy efficiency service.

Based on the information we have obtained and reviewed in this evaluation, Home Performance is likely to induce behavior change through a few different paths (Figure 19). The program attempts to induce behavior change in contractors (selling home performance testing and more energy efficient measures) and thereby induce behavior change in homeowners (agreeing to home performance testing and implementation of measures that result in energy savings).

Figure 19. Potential Primary Paths to Behavior Change



Note that behavior change in contractors might take a variety of paths:

- Change the focus of their business to energy efficiency
- Start conducting home performance testing
- Change the way measures are installed (for example, right-sizing HVAC equipment, increasing R-value of insulation, and changing from batt to blown-in insulation)
- Add new services such as leak testing, duct testing, duct sealing, and insulation
- Create a new business based entirely on home performance testing and installation

Program theory relies upon contractors' ability to successfully sell the whole house approach including additional services to homeowners. As shown in the figure above, this requires knowledge of building science as well as sales and marketing techniques. However, it also depends on the financial position of the homeowner and their ability to afford such services. At the present time, the economy presents a barrier to this step in the process. However, at the same time, program implementers believe that because business is slow for remodelers they are more likely to take the time to attend the training to gain a competitive edge in the marketplace. The program was able to train more contractors than it intended but completed fewer home projects. The program was able to document that 293 homes completed a retrofit project with participating contractors. However, this was substantially lower than the intended 1,000 projects, although program implementers believe that not all jobs were reported. For these reasons, the program is likely to give contractors the ability to change their behavior, but full behavior change may not occur until the economy improves.

We found further evidence that the program is likely to induce behavior change from post-training surveys fielded by the program implementers. Respondents reported that 67% of their total work time would be spent performing tasks requiring the skills and knowledge taught in the course.

3.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

Our survey results demonstrate that participants learn a significant amount about energy efficiency through the Home Performance training. While energy knowledge was already high prior to the training, participants with all levels of prior knowledge felt they learned a lot (Figure 20). This knowledge increase is impressive for this program, indicating that the program information is both appropriate for its given audience and effectively resonating with participants.

Figure 20. Energy Efficiency Knowledge Increase

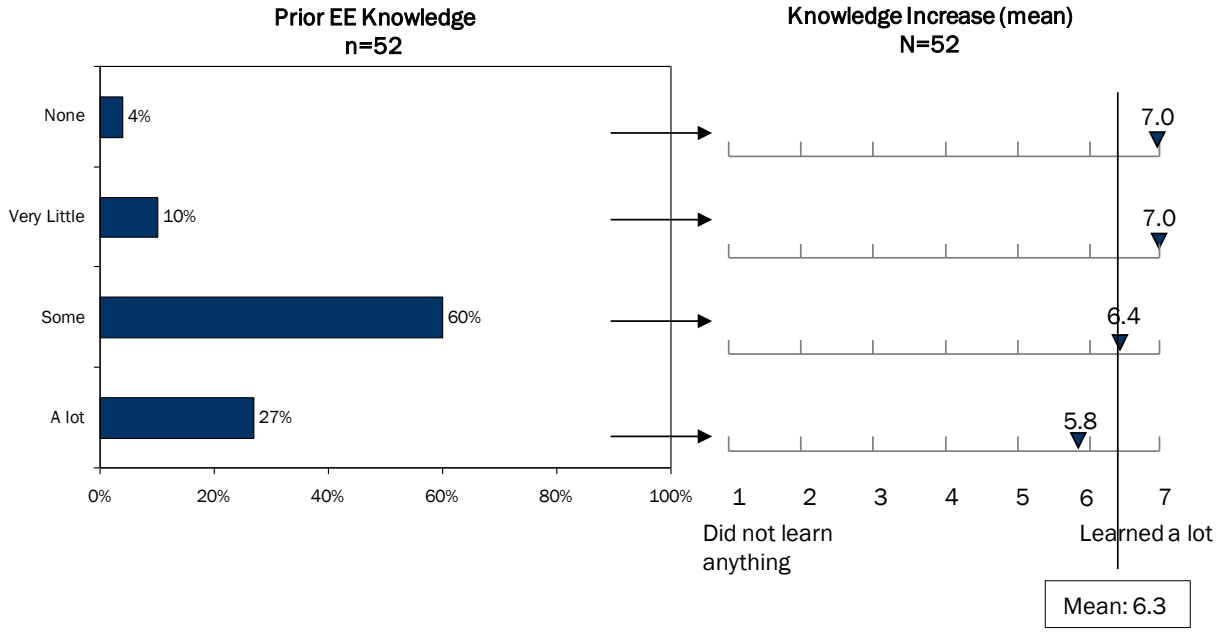
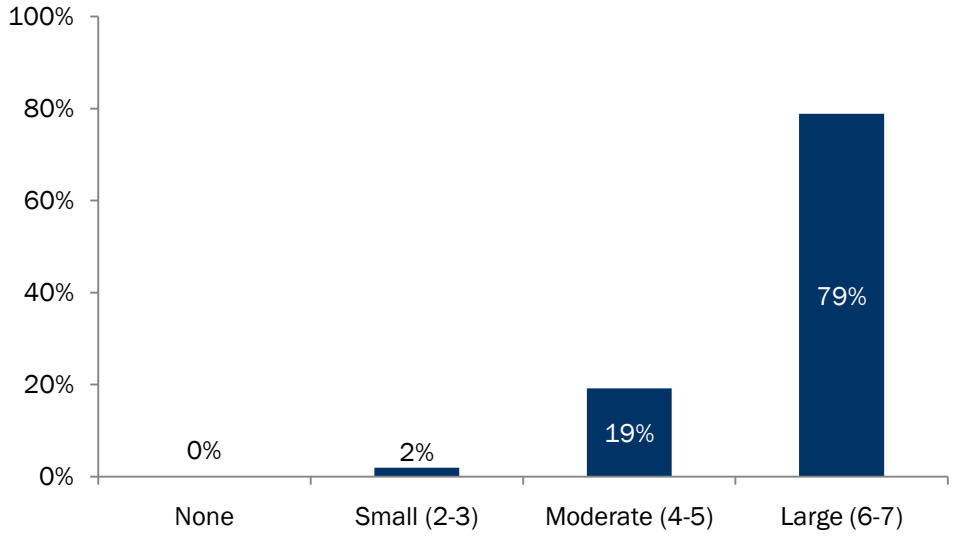


Figure 21. Overall Knowledge Increase (n=52)



Nine in ten participants found the training to be very useful (rating usefulness as a six or seven on a scale from 1 to 7). Further, over 88% or more of participants demonstrated other awareness and knowledge gains as a result of the training, including familiarity with tools and techniques and ways to reduce energy usage (Figure 22). These knowledge gains and ratings are exceptionally high.

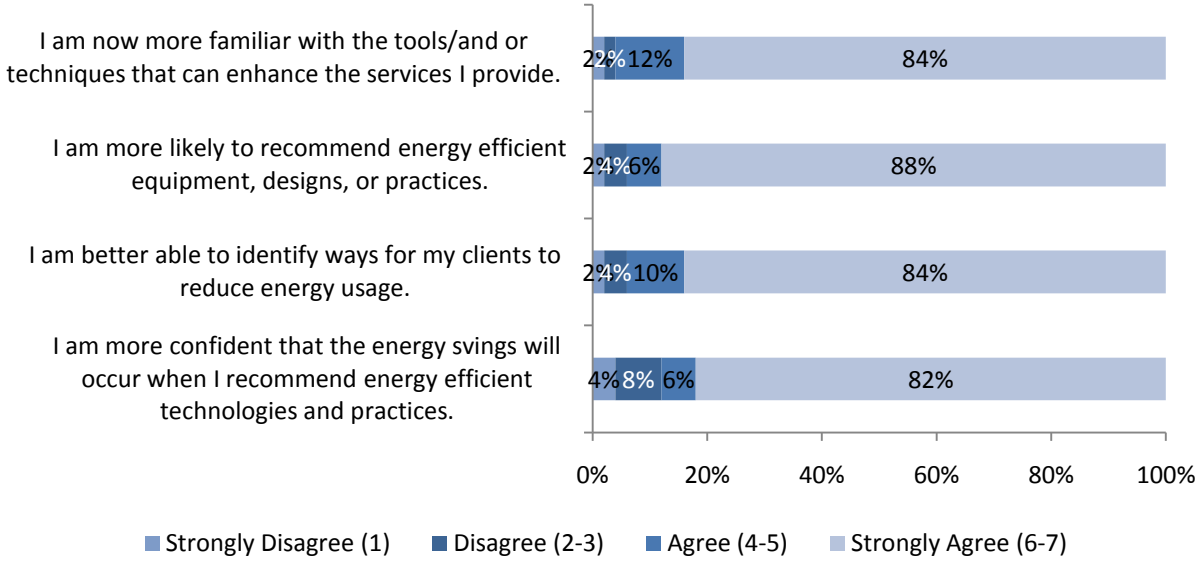
Many of the verbatim responses also reflect this great increase in confidence to complete the tasks taught in the course and the high percentage of time dedicated to these tasks.

One prevailing thread was how much this course would impact their entire business and practices:

> *This training has changed the way I will perform my future projects.*
>
> The course had *"an impact on my approach to energy conservation".*
>
> *The class was an eye opener in many areas. We are looking forward to implementing this into our company.*

Figure 22. Knowledge and Awareness Gains (n=52)

As a result of the training,…



Based on post-training surveys fielded by the program implementers, we also found that after completing the course, contractors rated themselves 45% higher on their performance on tasks requiring the skills and knowledge taught in the course

3.4.5 What behavior change occurred that indirectly influenced energy savings?

Both our phone surveys and in-depth interviews demonstrate behavior change that has occurred as a result of the program. Much of this change is related to business models, structure, and marketing, and thus indirectly influences energy savings. Our telephone survey showed that participants made changes to how they provide service in multiple ways. Table 24 shows the percentage that reported behavior changes.

Table 24. Changes in Behavior

Changes in Behavior	(n=52) % Yes
Applied training concepts to the services provided to clients	92%
Recommended energy efficient measures learned in training	90%
Made changes that became standard practice	87%
Used building or system design principles or elements that they did not know much about before	85%
Recommended energy efficient measures more frequently than before	83%
Used diagnostic tools or practices that they did not know much about before	77%

The intensity of the changes shown in Table 24 is relatively high. Participants say that in the last 12 months, they implemented something they learned about at the training an average of 57 times and a median of 13, with a range from 0 to 750.

3.4.6 What behavior change occurred that directly influenced energy savings?

Eight in ten participants (81%) believe that the changes they made resulted in significant or moderate energy savings in customers' homes. Over one quarter (27%) have estimated the average money or kWh saved per home over the last twelve months. Nine respondents recalled an average dollar amount of $857 per home and a median of $300 per home. Only one respondent recalled an average energy number, which was 150 kWh per home.

In order to find out what specific measures may be creating energy savings, we asked contractors if they had recommended specific measures, such as insulation, air sealing, or thermostats to their clients since the training. We then asked them how many of their clients decided to install each measure. It should be noted that participants were estimating the numbers of installations, rather than reporting actual jobs. The total implementations should be seen as an estimate of how many of the participants' clients undertook a specific measure. Because these measures are used to calculate energy savings, we report them based on the number of participating companies (n=47) rather than individual participants (n=52). This method avoids double-counting of measures reported by two individuals from the same company.

Table 25. Specific Behavior Change

Recommendation	Percent Companies Recommending (n=47)	Mean # Installations per Company	Total Installations
Screw-in CFLs	79%	17	629
Bulbs per home installed	*NA*	*12*	*7,548*

Recommendation	Percent Companies Recommending (n=47)	Mean # Installations per Company	Total Installations
Refrigerant charge and air flow diagnostics for existing air conditioners	70%	64	2,112
Check refrigerant charge for new air conditioners	62%	72	2,059
Programmable thermostats	83%	43	1,677
Duct replacement	77%	26	936
Duct sealing	91%	21	903
Ceiling insulation	94%	20	880
Attic, crawl space, or other shell sealing	94%	18	792
Energy efficient windows	83%	16	624
Energy efficient water heaters	77%	11	396
Replace appliances with ENERGY STAR appliances	81%	NA	NA
Refrigerator	*77%*	*6*	*216*
Clothes washer	*57%*	*3*	*81*
Clothes dryer	*51%*	*NA*	*NA*

3.4.7 What are the net energy savings as a result of the program?

The program has attempted to model energy savings for the actual jobs performed by participating contractors using a software program called TREAT (Targeted Retrofit Energy Analysis Tool). However, this method has been difficult and has not resulted in a comprehensive estimate of energy savings. The program estimated that based on the 293 retrofit projects for which they received full reports, the program saved 440 MWh; however, the program implementers believe that the actual numbers of projects and energy savings are much higher because not all jobs are reported. The difficulty in reporting seems to stem both from the fact that the incentive provided to participating contractors is not enough to cover the costs of reporting for each job, and that contractors are confused about what kinds of jobs qualify.

In an effort to avoid the problems in calculating energy savings that the program experienced, we estimated energy savings for this evaluation based on the individual behavior changes discussed in the previous section. We applied deemed savings estimates based on industry standards for each measure. In addition, we used several of the questions in the survey to calculate a cognitive change index (CCI) for the net-to-gross calculation, or a value between 0 and 1 that estimates how much of the changes reported

by respondents can be attributed to the program. The overall CCI for company participants who made a change as a result of the program was 0.91, indicating an extremely strong influence of the program and allowing us to attribute 91% of the energy savings estimated in this evaluation to the program.

Note that our energy savings estimates represent the annual savings from actions taken during a one year period, specifically the 12 months preceding the interview date in October 2009 (chosen to maximize recall). It should be noted that the program hoped to generate 2,000 MWh and 2,000 kW annual peak demand energy savings during the period 2006-2007. Because of the difference in periods, our savings estimates cannot be used to directly determine whether the program met its goal. However, it is expected that additional savings accrued prior to our period of measurement (beginning after the date of training) and will continue to accrue as long as the participants continue implementing measures that they learned about in the program and as long as measures already implemented continue to function. It is not known how the number of jobs and measures will change over time – some participants may become more active Home Performance contractors, while it is possible that others will maintain or even reduce their level. For this reason, we report only annual energy savings estimates for the one year period we measured and do not attempt to regress these numbers into the past or extrapolate them into the future.

We developed a preliminary estimate of residential energy savings created by the sample of 47 companies (Table 26).[28] Note that these figures represent savings from a variety of households in which contractors implemented these measures. We extrapolated the per-participant energy savings estimates for the respondents (17.5 MWh and 3,513.1 therms) to the total training participants representing 112 companies. This amounts to annual savings of 1,960 MWh and 393,467 therms. Although Home Performance is an SCE–only program, we presented energy savings for both electric and therms to demonstrate what the program is generating; only the electric savings accrue to SCE. In addition, these numbers are meant to demonstrate the order of magnitude of energy savings that may be created by the Home Performance program.

Table 26. Net Energy Savings (n=47 companies)

		MWh			Therms		
Measure	n	Low	Med	High	Low	Med	High
CFLs	7,548	128	255	383			
Programmable thermostat	1,677	-14	210	434	-233	32,843	65,918
Duct replacement	936	112	223	335	14,965	29,930	44,894
Ceiling insulation	880	14	28	42	44,050	88,099	132,149
Duct sealing	903	62	124	187	7,350	14,701	22,051
Shell sealing	792	8	16	25	2,217	4,435	6,652
Energy efficient windows	624	6	19	32	2,502	7,505	12,508
Energy efficient water	396	3	5	8	1,663	3,326	4,988

[28] These numbers provide a range of energy savings for those actions that were taken to account for different underlying baselines among respondents; the range is not intended to imply that every respondent took an action.

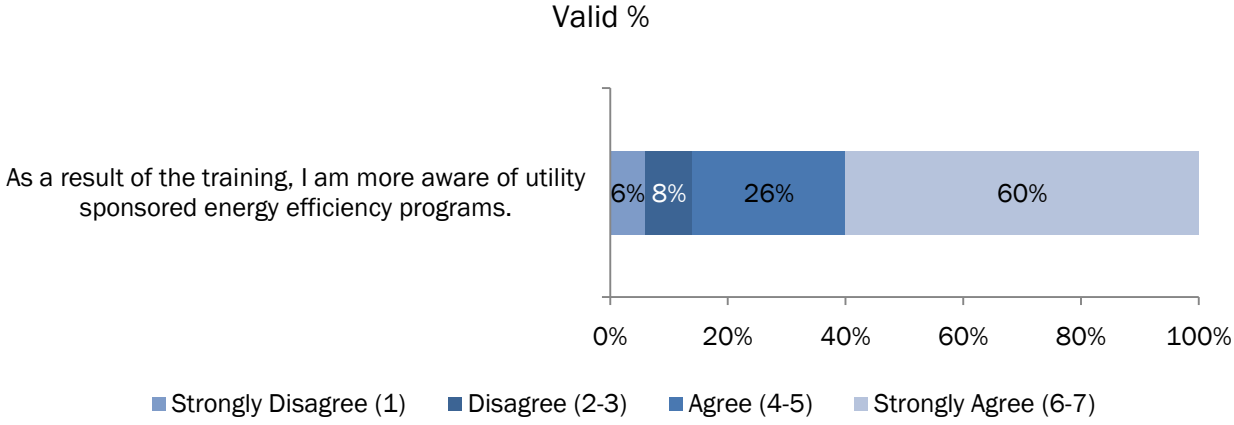
		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
heater							
ENERGY STAR refrigerator	216	11	22	32			
ENERGY STAR clothes washer	81	1	3	4	304	607	911
Gross Total		**330**	**905**	**1,480**	**72,818**	**181,445**	**290,073**
CCI=0.91							
Net Total		**301**	**824**	**1,347**	**66,264**	**165,115**	**263,933**
Average Savings Per Company Participant		**6.4**	**17.5**	**28.7**	**1,409.9**	**3,513.1**	**5,616.3**

Notes: These numbers assume an 85% gas heating fuel share, a 6% electric heating fuel share, an 85% gas water heating fuel share, a 5% electric water heating fuel share, and a 48% central air saturation based on RASS for SCG and SCE.
Estimates of savings are based on measures evaluated by Summit Blue based on industry standards.
The n for each measure is based on the number of contractors who have recommended the measure and the number of their customers who have followed through with that measure. CFLs also includes an average number of bulbs installed per home.

3.4.8 What percentage of participants was fed into resource programs, and which programs were promoted?

Program channeling was not a major focus of this program, and therefore we did not seek to understand how many of the households may have participated in a program for their measures. It is likely that there is some double-counting between the energy savings reported in this program and the energy savings reported for the resource acquisition programs since these types of programs generally feed into rebate programs. The training program discusses utility resource acquisition programs and links them to course content. Contractors are encouraged to help customers utilize these programs. About six in ten survey respondents (60%) strongly agreed (six or seven on a scale of 1 to 7) that they were more aware of utility sponsored energy efficiency programs as a result of Home Performance training (Figure 23). The mean rating was 5.4.

Figure 23. Awareness of Utility Programs (n=50)



3.4.9 What is the value of the program versus the cost of the program?

The total three-year budget provided by SCE for the program was $1,333,851, and the expenditures exceeded the budget, totaling $1,409,355.[29] The Home Performance program trained over 150 contractors in building science and a whole house approach. As mentioned previously, this program gives the contractors the tools to turn an ordinary quick-in-quick-out fix into an opportunity for increased energy savings in the residential market.

Home Performance is successfully imparting energy efficiency and building science information to its participants. We found that 92% of participants have applied concepts they learned in the training to the services they provide their clients. Participants also reported the highest cognitive change index we have seen for any information program evaluated, at 0.91. Altogether, the residential energy savings created by the 112 company participants are 1,960 MWh and 393,467 therms.

The quarterly reports, our evaluation efforts and program databases show that the program reached or exceeded all of its goals except for retrofit projects completed (Table 27). Program goals were culled from the Program Implementation Plan. It should be noted that because this was an education and information program, the energy savings goals were informal.

Table 27. Southern California Home Performance Goals and Achievements

Goal	Achievements	Goal Verification Outcome
8 Training Sessions	8	Reached
4 Business and Marketing Sessions	4	Reached

[29] The budget and expenditures are from the December 2008 monthly report, SCE.MR.200812.1.xls Version 1, uploaded 3/16/2009: http://eega2006.cpuc.ca.gov/DisplayMonthlyReport.aspx?ID=7.

Goal	Achievements	Goal Verification Outcome
150 trained contractors	158	Exceeded
200 generated customer leads	211	Exceeded
1,000 retrofit projects completed	293	Not Met
2,000 MWh saved	1,960[a]	Unknown
2,000 kW peak demand savings	Unknown	Unknown

[a]We estimated 1,960 MWh in the 12 month period preceding the survey. It is likely that additional savings accrued prior to and following this period, and as a result, we assume that the program met its goal.

In their final report and elsewhere, program implementers noted that they had difficulty collecting reports for the jobs done by the contractors they had trained. The $100 incentive for contractors was insufficient to account for the time required to compile and report the data. The implementers believe, based on informal contacts, that the number of jobs done have met the goal, but the lack of formal reporting means that they cannot verify these jobs. However, the process evaluation found that trainees were not reporting because they believed much of their work did not qualify as comprehensive Home Performance remediation. Therefore it is difficult to gauge the true reach of the program. The final report mentioned that in the 2009-2011 program cycle, new incentives for customers will be tied to reporting, which should significantly increase the reporting taking place and enable better verification of jobs and energy savings.

Despite the fact that Home Performance has struggled to verify retrofit projects completed, overall, it appears that the program fills an important role in its marketplace. Participants are upselling customers into taking whole house approaches to energy efficiency improvements which would not have been undertaken otherwise. Even on jobs that do not incorporate comrehensive retrofits, trainees are utilizing techniques learned in the progarm.

The only programs we are aware of that offer anything similar to the Southern California Home Performance program are the parallel program with Anaheim Public Utilities Commission, which services a different territory, and the SCE ENERGY STAR Residential Quality Installation program. This program provides incentives to homeowners who hire NATE certified technicians to install new air-conditioning systems according to ENERGY STAR guidelines. While this program focuses on quality installation, which is one focus of the Home Performance program, it does not provide whole house solutions or offer marketing training to contractors.

In addition, the program is affiliated with the national Home Performance with ENERGY STAR program, a partnership of the U.S. Environmental Protection Agency and the U.S. Department of Energy. The national program has strict requirements for its 33[30] local

[30] The website http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hpwes_partners shows 33 current partners as of December 2009.

partners to ensure the quality and reputation of the label. As a result, the Southern California program must ensure that its trainees are complying with Home Performance standards.

3.5 Participant Recommended Program Improvements

Although this evaluation did not seek out process-related improvements, depth interviews with participants revealed some suggestions for improvement and we have included them for consideration in the bulleted list below:

- Overall
  - The customer should receive an incentive instead of the contractor for reporting project specifications and that help the program collect the data it needs to track energy savings.
  - The CBPCA and SCE should devote more resources to building awareness among homeowners for home performance testing in Southern California.
  - The process for contractors reporting jobs to the program could be streamlined a bit and be made more standardized.
- Support Materials for Contractors in Training
  - Templates or standardized forms for owner interviews and reports.
  - Additional marketing materials that could be customized by the contractor.
  - A database of completed projects where a contractor could research a project that has been completed and provide information to a prospective homeowner customer.
  - Events planned to promote referrals and networking with other contractors
    - The Yahoo group set up by the program implementer was cited as a good example of helping the contractors stay in touch with each other and share information.
  - Tool lending library for contractors and trainers for trainings and Home Performance projects.
- Training Opportunities
  - For classroom training, providing one or more sessions on a computer-based introductory training to level playing field for classroom training and make the best use of the face to face time.
    - Contractors would need to pass the online exam before being able to attend classroom training.
  - Make the classes a little smaller – especially for the model home assessment – and group together people at the same level of experience/understanding.

- The curriculum of the program should be more focused on HVAC contractors because HVAC has the biggest effect on home energy bills. Participants should already have a very deep understanding of HVAC and construction to be able to implement the information.
- Although the testing aspect of the course was very detailed, that there was a gap in between testing and recommending measures. The course would have been more helpful if it contained more detailed guidelines on what measures to recommend with certain test results.
- Connection to further training---BPI, Green Advantage, technical colleges, universities.
- Additional opportunities for Field Training and Mentoring.
- Additional training for report writing and utility bill reading.
- Trainings should be scheduled further out in advance and publicized more.

➢ Trainers

- More clearly defined communication channels and protocol from program administrators to trainers and contractors to address a perceived lack of structure to have trainers field questions from contractors and field questions from administrators and a perceived lack of trainer role definition on contractor project teams.
- Trainers are interested in utilizing Home Performance for new construction projects – to see framing, insulation techniques, etc. – but have received feedback that new construction projects are not existing building implementation and therefore should not be used.
- The trainers would like to have their compensation re-structured to include a contract provision for mentoring in the field.

3.6 Evaluability Assessment

We performed an abbreviated retrospective evaluability assessment of Home Performance to determine the information available to help with future evaluation efforts. The participant contact information and program materials to which we had access are noted in Table 28. Overall, we generally had the information we needed to evaluate the program, including obtaining a sample of participants to interview. Future evaluations may benefit from contacting the homeowners directly however confidentiality concerns prevent some contractors from sharing customer contact information. Homeowner interviews, combined with contractor interviews, could result in better estimates of energy savings, determine the percentage of homeowners that may have participated in other utility programs for their upgrades, and explore the effectiveness of the contractor's interaction with the homeowner in terms of knowledge increase and influence on decision-making.

Table 28. Program Information Received and Desired for Evaluation

Program Information	Receipt Status
Contact Information for Contractor Participants in Training Sessions (Participant name, Date of Training, Company Name, Address and Phone #, Participant Email Address)	Received
Data from completed jobs by contractor Hartman/Baldwin (3)	Received
Examples of Completed Home Performance Reports from CBPCA contractors: EnergyWise (1), Sea Pointe (5), Sierra Home Performance(1), Westside Remodeling (1), Healing by Design (1), REAS (1)	Received
Homeowner participant list with contact information	Desired
Program materials, quarterly reports	Received

For future evaluation efforts, we recommend that the program:

- Continue to find ways to track Home Performance projects completed by contractor participants. As part of this effort, the program should try to obtain contact information, where available, for homeowners who contract with participating contractors.

4. SCG 3530: PORTFOLIO OF THE FUTURE

This chapter provides findings from our evaluation of the Portfolio of the Future (POF) Program. The program aims to develop a dynamic "Emerging Technologies and Best Practices Program." The program will inventory, characterize, assess and rank opportunities for development of new technologies, products, services and best practices; facilitate partnering with a wide variety of stakeholders; and develop an initial portfolio of pilot opportunities. This program is implemented by a third-party, Navigant Consulting Inc, under a contract with SoCalGas (SCG 3530).

We note that the methods used for evaluating this program are very different from the other indirect impact evaluations. Because of the near identical nature of this program and the statewide Emerging Technologies Program (ETP), we chose to follow the protocols for emerging technologies.

Additionally, we acknowledge the efforts of Jane Pater Salmon of Summit Blue Consulting, who performed the work for this assessment in close collaboration with us.

4.1 Introduction

Portfolio of the Future (POF) is a third-party program implemented by Navigant Consulting, Inc. (Navigant) for Southern California Gas (SoCalGas). This memo summarizes the findings of the evaluation of the Portfolio of the Future program, as operated during the 2006-08 program cycle. The program intends to provide long-term benefits to the state of California's energy efficiency (EE) efforts by accelerating the adoption of emerging energy efficient technologies into the energy efficiency resource programs, which are then responsible for increasing the market acceptance of those products. The three year budget for this program was $2.905 million. In the December 2008 quarterly report, the program expenditures were $2.492 million.

Opinion Dynamics conducted an indirect impact evaluation of the program. This evaluation seeks to answer the following research questions (numbers are from the evaluation plan): (1) What is the reach of the program? (2) What education or information is provided and what behaviors are encouraged? (6) What percentage of participants was fed into resource programs? Which programs were promoted? and (11) What is the value of the program versus the cost of the program? Additionally, we pursued a subset of the evaluation goals from the statewide ETP. More detail about these research questions is provided later.

4.2 Summary of Key Findings

This program seeks to accelerate technologies into the portfolio of measures available through the SoCalGas resource acquisition program. As such, how the program approaches this task is as important as how they assess the technologies. Below is a summary of the key findings from this evaluation.

- The program is thoughtfully choosing which types of measures to pursue. Prior to spending money on assessing a specific technology, they perform a high level of due

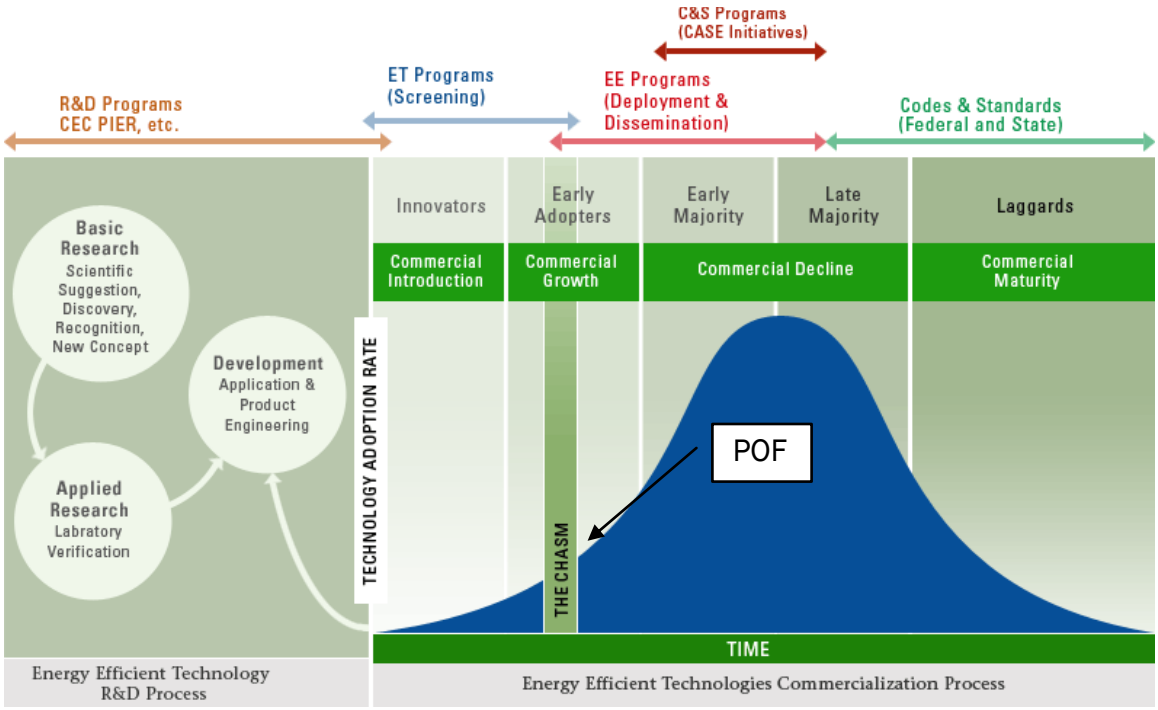
diligence and look closely at the value of the measure as a way to engender savings for the energy efficiency programs. POF's inclusion of market assessments in its projects provide important insights that frame and support the value propositions. The combination of primary and secondary data included in these market assessments provides a solid foundation for developing value propositions for the technologies included in the portfolio.

- Relative to other ME&O programs, this program reaches a small number of people in terms of actively interacting with others, but it has the potential to affect many others through moving specific measures into the SoCalGas resource acquisition portfolio.
- The program design is a good one for moving technologies into the portfolio. The program included eight different natural gas measures, spread out among different end uses. Of the eight, two have since been included in the energy efficiency portfolio and five of the remaining six are recommended for inclusion.
- This program is similar in many respects to the statewide Emerging Technology Program. However, the implementers have gone further in how they assess the market and get the products ready for the energy efficiency programs. The Program Readiness Packages designed through this program are a valuable addition to the program.

4.2.1 Background: Portfolio of the Future 2006-08

The Portfolio of the Future program is one of several efforts in California that seeks to provide a continuous pipeline of energy efficiency technologies to enable the achievement of California's energy efficiency goals. These programs seek to accomplish this goal by bridging the gap between a technology's research and development and its widespread commercialization in the marketplace. In addition to POF, California's Public Interest Energy Research (PIER) program and the California Statewide Emerging Technologies Program (ETP) also operate in this "chasm," though at different stages of the process. In the effort to cross the chasm, POF places itself after PIER and ETP in a product's path to market, just to the right of the chasm seen in Figure 24.

Figure 24. Role of POF in a Product's Market Adoption



Source: California Emerging Technologies Coordinating Council.

POF is classified as an information-only program and relies primarily on market assessments, technology assessments and demonstrations, and information dissemination to audiences within SoCalGas to achieve its goals. During the 2006-08 program cycle, POF pursued five main activities:

1. Scan: Performing a wide-ranging scan of technologies that might be appropriate for exploration through POF, resulting in a database of over 506 technologies;

2. Screen: Completing a screening of the initial technologies identified, reducing the list down to a concise list of priorities agreed upon by POF and SoCalGas staff;

3. Assess: Conducting market assessments, technology assessments, demonstration projects, and field studies on the priority technologies identified in the Screen phase;

4. Transfer: Handoff of the technologies identified as ready for energy efficiency (EE) programs after the Scan, Screen, and Assess phases. This phase involved two parts:

    a. Program Readiness Packages: Developing documentation to assist EE program staff at SoCalGas in integrating the high-performing POF technologies into the EE incentive programs;

    b. Hand-off support: Providing additional one-on-one assistance and additional documentation to EE program staff as needed to increase the likelihood that POF technologies are actually integrated into EE incentive programs.

4.2.2 Goals of the Evaluation

We provide a bit more detail than usual here because the goals of this evaluation are a hybrid of those involved in this broader Marketing, Education, and Outreach (ME&O) evaluation and those involved in the evaluation of the Statewide Emerging Technologies Program (ETP), which is implemented by the state's four investor-owned utilities (IOUs). Driven by its inclusion in this suite of ME&O program evaluations, the evaluation of POF strives to address the ME&O research questions outlined in Table 29.

Table 29. Summary of Evaluation Goals Related to ME&O Research Questions

ME&O Research Question	Relevance to POF
1. What is the reach of this program?	Are ETP / EE program staff at SoCalGas aware of (a) the technologies assessed by POF, (b) the results of the assessments, (c) the potential benefits of these technologies?
2. What education or information was provided? What behaviors are encouraged?	What materials were used to communicate to the target audiences identified in #1? What information was communicated?
3. What percentage of participants was fed into resource programs? Which programs were promoted?	Which technologies assessed by POF were moved into the SoCalGas portfolio? If any were included, when were they included?
4. What is the value of the program vs. the cost of the program?	What innovations has the POF program introduced to the implementation of an ETP program? How much has the selection, demonstration and testing of a given technology cost relative to other technologies in the portfolio? Relative to anticipated energy savings? Relative to projects in the ETP portfolio?

Note: all other ME&O research questions were not applicable to this program.

In addition, the evaluation seeks to address a subset of the evaluation goals pursued in the evaluation of the Statewide ETP. The parallels between the POF program and the ETP program cannot be ignored. The program logic models are similar, and the programs' roles in "crossing the chasm" are closely linked. As discussed later in this report, POF has worked closely with the ETP at SoCalGas throughout the 2006-08 program and directly reported to the director of SoCalGas's ETP towards the end of the cycle.

The goals from the evaluation of the Statewide ETP were pursued in the evaluation of POF. Given the relatively smaller budget of POF and the need to assess the education and outreach components of this program, executing the full ETP methodology was not appropriate. The three components of the ETP protocol pursued by the POF assessment are:

- Program Design: Determine the extent to which POF, as currently designed, is capable of meeting the needs of California for future energy efficiency technologies
- Program Implementation: Assess the effectiveness of POF program implementation, including the extent to which synergies with other market actors have been leveraged
- Program Impact: Document the extent to which the short- and long-term goals of the program are being achieved, including which technologies assessed by POF have been transferred to EE programs.[31]

4.3 Methodology

As mentioned earlier, the evaluation of POF is unique because it includes elements of both ME&O and ETP methods. This is due to the fact that POF is classified as an ME&O program but operates like an ETP. The elements of each evaluation approach that are applied to POF were selected based on the evaluation team's understanding of the program at the outset of the evaluation. These elements were determined to be most relevant to the program and feasible to complete given the evaluation resources available.

This section describes the elements of ME&O and ETP methods that are applied. The full descriptions of these methods are available (1) earlier in this memo for ME&O methods and (2) in the draft final report of the evaluation of the Statewide ETP, available on CPUC's Energy Data Website. Unless otherwise noted, these methods were applied in the same manner to POF as to the other programs which the methods were used to evaluate.

4.3.1 ME&O Methods

The evaluation team used the case study approach to understand the effectiveness of POF's approach relative to the goals that the program has established. In large part, the case study was used to describe the outcomes of the project rather than the process associated with the projects. The outcomes of the projects were defined along the lines of the researchable issues outlined in Table 29 and the ETP aspects of the program described in Table 31. To the extent that the process helps explain the effectiveness of the project, however, it was also examined. The intent was not to describe and document how a project went through the program pipeline.

The case studies included analysis of information gathered from a variety of sources. Primary data collection included interviews with POF project managers and program managers, SoCalGas staff involved with the project, and vendors whose technologies were examined in connection with the project. Secondary data collection included a review of POF's documentation for each project, of the program's periodic and final reports, and web research where appropriate. All of the information gathered for each project was then reviewed and analyzed to develop the case studies. Each case study is designed to highlight the unique aspects of the projects. A full list of interviews conducted as part of the case studies is included in Appendix B.

[31] Details of these goals are shown in Table 31.

The evaluation team selected the projects for which the case studies would be prepared based on a practical set of criteria. The criteria were intended to help capture projects that exhibited some of the characteristics of ME&O programs since the case study was intended, in large part, to document the ME&O aspects of the program. The evaluation team used the following criteria to select the two projects for the case study:

- Projects have a Program Readiness Package (PRP) prepared;
- Projects include some type of field study or demonstration;
- Projects had not previously been the subject of a case study; and
- Project lead at Navigant still working for Navigant so that they can provide feedback on the project

Table 30 demonstrates how the seven technologies for which Program Readiness Packages were prepared fit these criteria.

Table 30. Characteristics of Candidate Projects for Case Study

	PRP Prepared[a]	Field Study or Demonstration	Previous Case Study Prepared	Project Lead Still at Navigant?
Improved Commercial Dishwashers (Chosen for case study)	**Yes**	**Yes**[b]	**No**	**Yes**
Cold Water Enzymatic Detergent (Chosen for case study)	**Yes**	**Yes**	**No**	**Yes**
Tunnel Washers	**Yes**	No	**No**	**Yes**
Laundry Wastewater Recycling	**Yes**	No	**No**	**Yes**
Steam Trap Monitoring	**Yes**	**Yes**	Yes	**Yes**
Spyrocor	**Yes**	**Yes**	**No**	No
Low-Temperature Commercial Laundry Detergent	**Yes**	No	**No**	**Yes**

[a] Items in bold met our criteria for a possible case study.

[b] Note that the evaluation team discovered that Improved Commercial Dishwashers were on display at the SoCalGas Food Service Equipment Center during the in-depth interviews. This was not reported as a field demonstration as part of the POF documentation process.

Once the projects were selected, the evaluation team used a combination of methods to gather information for the case studies. Document review included quarterly reports to the CPUC, the final report submitted by Navigant to SoCalGas, completed market studies, other memos prepared within the team, and the paper that was co-authored by Navigant and SoCalGas staff. The evaluation team also conducted a series of interviews for each case study. Interviewees included Navigant's lead for the project, the Energy Efficiency program manager into whose program the product would fit, vendors of the product, and other market partners.

This information was then analyzed into the case studies included as Appendix A.

4.3.2 Methods Borrowed from Emerging Technologies Evaluation

A subset of ETP methods were selected in order to compare POF on some levels with its sister program, ETP. Table 31 reiterates the goals and identifies the methods from the evaluation of the Statewide ETP that were pursued in the evaluation of POF. It also includes a brief description of any alterations to those methods that are applied to the POF evaluation. Given the relatively smaller budget of POF and the need to assess the education and outreach components of this program, executing the full ETP methodology was not appropriate.

Table 31. Summary of Methods from ETP Protocols as Applied to POF

	ETP Method and Approach	ETP Report Section	Amendment to Approach for POF
Program Design Determine the extent to which POF, as currently designed, is capable of contributing to California's ability to meet its need for future energy efficiency technologies	Program Theory and Logic Model	4.1	High level description of program design; no new logic model developed
	Portfolio Evaluation	4.2	Data collected for all projects that had been pursued through market study or field study/demonstration Interview with one vendor out of eight (roughly the same percentage as for ETP), compared to 10 vendors out of 69
	Aggregate Analysis	4.3	Same as for ETP
Program Implementation Assess the effectiveness of POF program implementation, including the extent to which synergies with other market actors have been leveraged	Process Mapping	5.1	Not conducted
	Findings on Progress toward Recommendations in prior evaluation	5.2	Not applicable; this is the first evaluation cycle
	Assessment of nature and frequency of interactions with ETCC	5.3	Not conducted
	Stakeholder Interviews	5.4	Not conducted
	Case Studies	5.5	Focused on outcomes of program rather than on process

	ETP Method and Approach	ETP Report Section	Amendment to Approach for POF
Program Impact Document the extent to which the short- and long-term goals of the program are being achieved, including which technologies assessed by POF have been transferred to EE programs	ETP Data Tracking	6.1	Not conducted
	ETP Technologies Transferred to EE Programs	6.2	Based on Self-report rather than on extensive search of EE program measure databases
	Peer Reviews	6.3	Not conducted
The third column refers to a section in the draft-final ETP report, which provides a full description of each ETP method; it is available in the available on CPUC's Energy Data Website (www.energydataweb.com/cpuc).			

4.4 Program Design

The program design of Portfolio of the Future is described in this section. First we describe the program's activities and objectives, laying the foundation for the remainder of the evaluation. The next section summarizes the findings of the Portfolio Evaluation, which considers how effectively the program considered the market in its program design. Finally, the Aggregate Analysis describes the composition of the program by looking at data on the whole suite of technologies examined through POF.

4.4.1 Program Activities and Objectives

Portfolio of the Future sought to increase SoCalGas's portfolio of natural gas energy efficiency measures. POF focused on preparing measures for the 2010-12 program cycle. POF was designed to accelerate those technologies into the energy efficiency programs. In addition to technologies, POF considered services, best practices, and products; this write-up will refer to these collectively as "technologies" for the sake of simplicity. Emerging technologies were defined to include both technologies that still required some validation as well as those that had been introduced into the market but had not been widely adopted.

In order to increase the portfolio of measures, POF undertook activities in five main areas. These areas map very closely to the framework used to describe the efforts of the ETP, as described in Table 32.

Table 32. Summary of POF Activities in ETP Process Framework

ETP Process	POF Process	Description of POF Process
Scan	Scan Universe of Emerging Technology	• Develop list of potential emerging technologies • Review/Scan 506 potential emerging technologies • Regularly review and update the list
Screen	Evaluate/Screen Options Based on Selected Criteria	• Use selection criteria to identify technologies with the greatest potential (reduced list to 46) • Meet with SoCalGas staff to further prioritize the list of 46 (reduced list to 19) • Conduct further research on the 19 and re-visit with SoCalGas staff (reduced list to 7)
Assess	Perform Market Assessments and Pilot Demonstrations	• Conduct market assessments (6) to assess viability of technology, program approach and support market development efforts • Perform pilot demonstrations / field studies (3) to verify energy savings, provide case studies, and address other market acceptance issues
Transfer	Develop Program Readiness Packages for Priority Technologies	• Prepare information needed to facilitate introduction of the technology into the energy efficiency incentive programs: situational analysis, mini-business plan, work paper
	Hand off to SoCalGas Staff	• Hand off Program Readiness Package • Provide continued support to EE program manager as needed, including addressing lingering questions, preparing additional documentation, supporting the development of materials for Regulatory Affairs.

POF was not responsible for extensive outreach or education activities outside of SoCalGas. Early in the program cycle, SoCalGas instructed POF to re-direct its marketing and outreach budget[32] to preparing the technologies for the EE programs. SoCalGas decided to leverage its EE programs' existing infrastructure and relationships to support its marketing efforts. The funds previously dedicated to marketing were then allocated to the last two activities shown in Table 32, developing Program Readiness Packages and handing off the technologies to EE program staff.

The activities in Table 32 were designed to lead to a variety of short-term outcomes. Most importantly, POF expected to expand and strengthen the portfolio of technologies in the energy efficiency incentive programs. First, POF's activities were designed to result in an increase in the number of measures offered through the EE incentive programs. In addition to introducing new measures into the programs, POF anticipated that it would enhance the programs by strengthening the value proposition for the emerging technologies. The market research was expected to identify major market barriers, and the pilot projects were expected to help address those issues. The result would be a better targeted marketing message about a technology that had been tested and proven by POF to meet the expectations set by the marketing messages.

[32] POF was filed as an education and outreach program, but even at the time of program initiation, only 13% of the program budget was allocated to marketing and outreach.

Furthermore, POF expected to increase knowledge about and awareness of the technologies. The major focus of this awareness was within the utilities. Program staff, account executives, and strategic planners within SoCalGas were the intended targets of the information; increased awareness among this group was expected to facilitate the technology's entrance into the energy efficiency programs and its long-term success in the incentive programs. Pilot projects did increase the host sites' knowledge about the projects, but that information transfer was seen as an ancillary benefit of field testing the technologies.

Finally, POF was designed to strengthen partnerships with other organizations that shared complimentary goals. These organizations included CEC Public Interest Energy Research, research laboratories, corporations, non-profit groups, and other California IOUs. POF was intended to serve in several areas:

- As a liaison with these other organizations,
- To improve the caliber of the projects,
- To increase the likelihood that the technology would be widely available in the SoCalGas territory, and
- To create opportunities to identify additional technologies to investigate.

In some cases, POF was able to leverage funds and in-kind contributions from these organizations as well.

On the other hand, POF was not solely responsible for changing the behavior of an industry or a sector as a whole. POF was responsible for advancing information about technologies that would warrant the technologies' inclusion in the EE programs; the EE programs would then use their leverage to cause the behavior in the industry as a whole.

In the longer term, POF expected to create other market and energy savings benefits in the SoCalGas territory. Shorter commercialization time would accelerate the energy savings realized through the energy efficiency incentive programs. Accelerated acceptance into the energy efficiency incentive programs would result in accelerated market adoption of the technologies. In short, successful POF activities would eventually lead to increased market penetration in the SoCalGas territory faster than would have occurred in the program's absence.

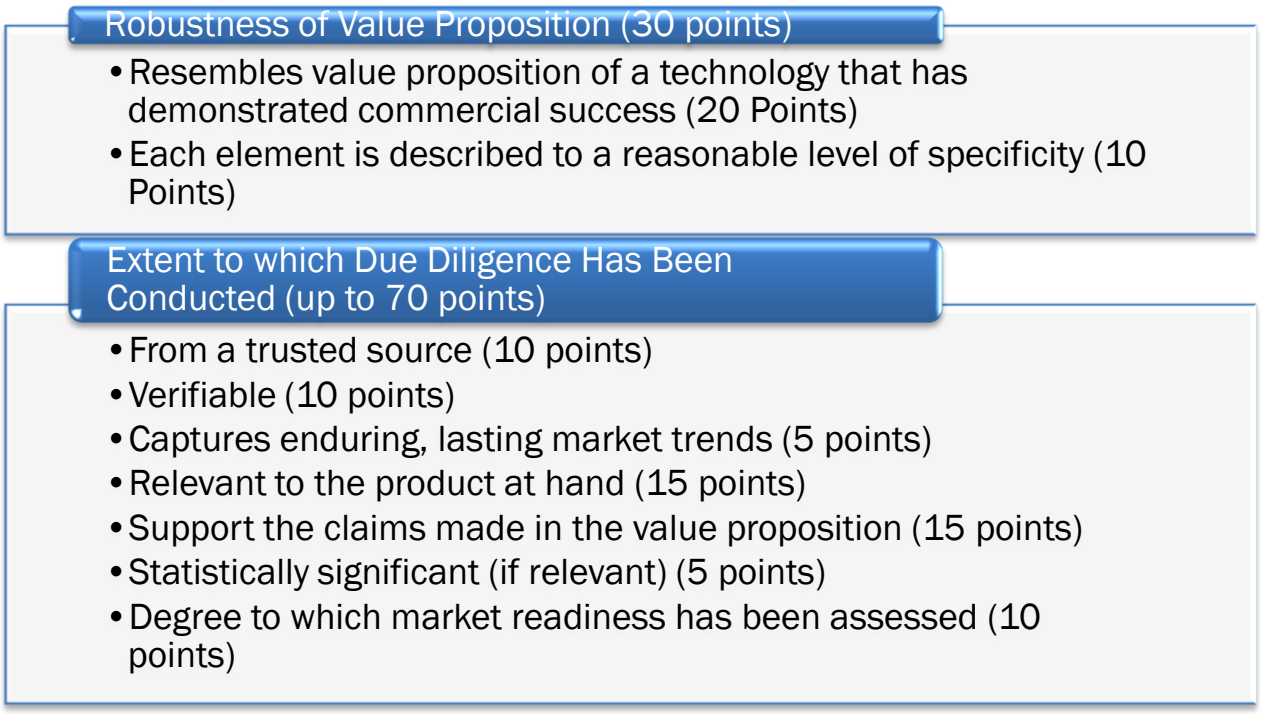
4.4.2 Portfolio Evaluation

The Portfolio Evaluation is designed to provide feedback on the likelihood that technologies in the portfolio will make a tangible net contribution to California's energy efficiency goals. Many of the technologies assessed are still in the development stage or in the early stages of commercialization, making it difficult to determine how well they will be adopted by the market and, as a result, how much they will contribute to California's energy efficiency goals. The Portfolio Evaluation enabled the evaluation team to address this challenge by examining how well the program considered fundamental market characteristics in the selection of technologies for assessment.

In essence, this method systematically looks at two components of how the implementers considered measures for assessment. First, did the implementer look closely at the

measure in terms of its possible net value to the State? Secondly, how much due diligence was done to assure that net value? Each component had a maximum score possible and items within the component that were assessed are shown in Figure 25.

Figure 25. Value Proposition / Due Diligence Scoring



This section explores the two components of the Portfolio Evaluation. First, we summarize the results of the scoring of POF's value propositions and supporting documentation. Then we discuss the value of POF's participation in its projects, as reported by POF staff.

Portfolio Evaluation Scoring: Value Proposition and Due Diligence

Summary results of the scoring of the value propositions and supporting due diligence are provided in Figure 26 through Figure 28. The first scatter plot summarizes all of the scores for the Statewide ETP (n=70) and POF (n=8), and the following plot shows the POF scores alone. The data in the scatter plots are presented as follows:

- X-axis represents the due diligence score, typically out of 65 points.[33]
- Y-axis represents the score for the Robustness of the Value Proposition, out of a possible 30 points.
- Each marker on the chart represents the score for a unique project, with each utility and POF represented by a different shape.

[33] Only two projects were scored out of 70 points due to the fact that only those two projects provided statistical data in support of the claims made in the value proposition. The five points associated with Statistical Significance were only counted towards the total if the supporting data included statistical analysis of any kind.

- The "X" marker in each plot represents the average of the data in that chart.
- The oval in the POF plot represent one standard deviation of the data in the chart (i.e., 68.2% of the projects in each chart are included in these ovals).

Scores for each individual project are included in Appendix C.

Descriptive statistics provide a more quantitative approach to analyzing the data included in the scatter plots. The descriptive statistics reveal important points about the data that are not readily apparent from the scatter plot. Using statistical measures of the average, median, mode, and standard deviation of each set of data creates a more robust understanding of the data created through the Portfolio Evaluation.

The analysis of the scatter plot and of the descriptive statistics can only be used to describe the characteristics of the projects included in the sample for the Portfolio Evaluation and not for the entire portfolio of ETP technologies. Due to the heterogeneity of the projects in the ETP portfolio, the evaluation team did not expect to arrive at an "average" for projects across the entire ETP portfolio. Determining an "average" or other characteristic of the entire ETP portfolio would require collecting and analyzing data for every project in the portfolio. The remainder of this discussion focuses on the characteristics of the sample alone rather than of the portfolio as a whole.

The scatter plot and descriptive statistics lead to similar conclusions; thus, they are discussed following the scatter plots and summary statistics.

Figure 26. Summary of All Portfolio Evaluation Scores for ETP and POF Together

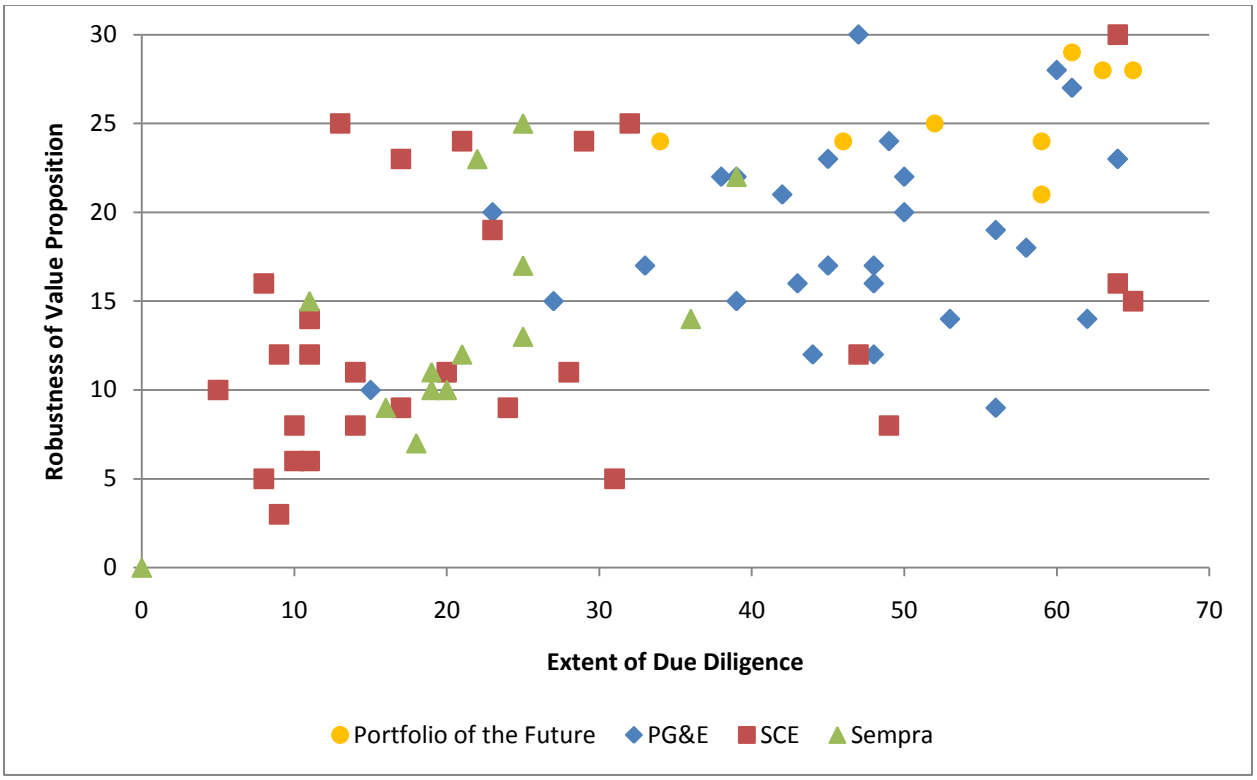


Figure 27. Summary of Portfolio Evaluation Scores for POF Only

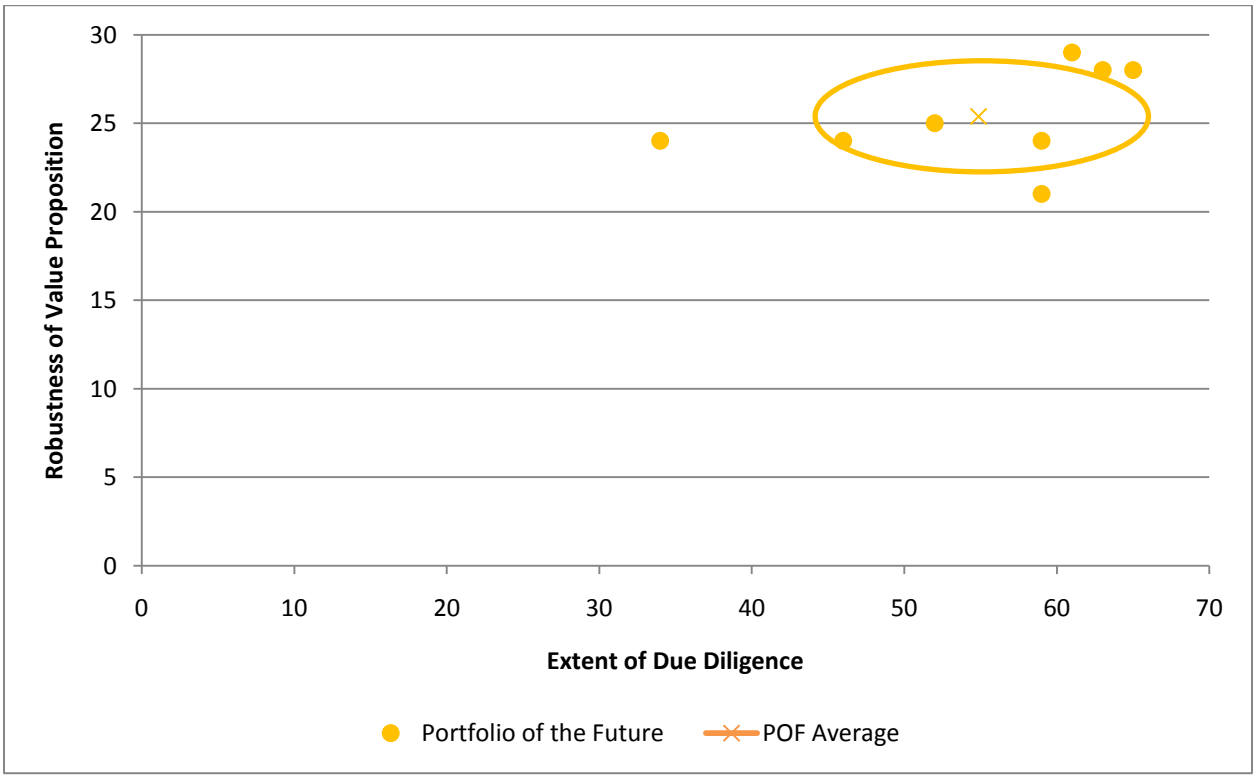


Figure 28. Summary of Portfolio Evaluation Scores for ETP Only

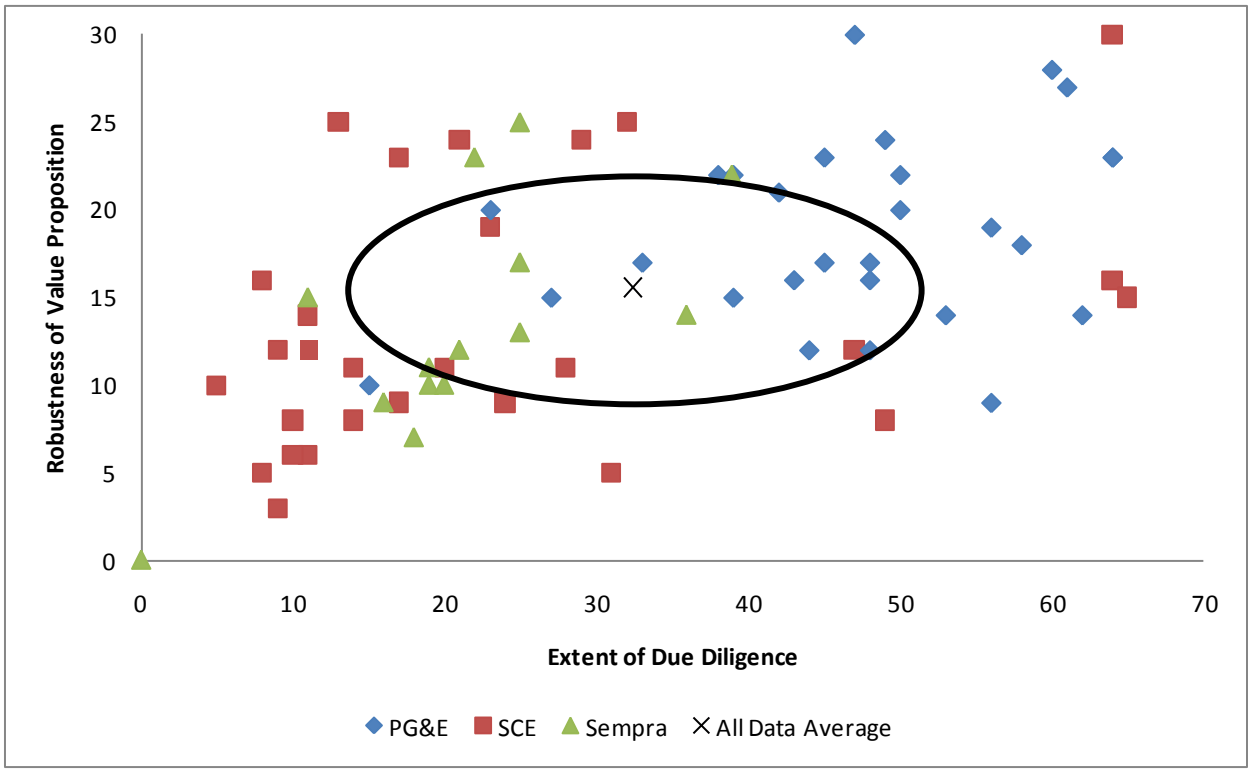


Table 33. Summary of Portfolio Evaluation Data for ETP and POF Together

	Robustness		Due Diligence		Total Points Earned	
	Absolute	Normalized	Absolute	Normalized	Absolute	Normalized
Average	17	52%	35	50%	51.3	50%
Median	16	50%	34	44%	53.5	50%
Mode	24	40%	64	98%	25	26%
Standard Deviation	7.2		19.1		24.0	

Table 34. Summary of Portfolio Evaluation Data for POF Only

	Robustness		Due Diligence		Total Points Earned	
	Absolute	Normalized	Absolute	Normalized	Absolute	Normalized
Average	25	85%	55	84%	80.3	84%
Median	25	82%	59	91%	81.5	86%
Mode	24	80%	59	91%	None	N/A
Standard Deviation	2.7		10.4		11.9	

Table 35. Summary of Portfolio Evaluation Data for ETP Only

	Robustness		Due Diligence		Total Points Earned	
	Absolute	**Normalized**	**Absolute**	**Normalized**	**Absolute**	**Normalized**
Average	16	52%	32	50%	48.0	50%
Median	15	50%	29	44%	47.5	50%
Mode	12	40%	64	98%	25	26%
Standard Deviation	6.9		18.5		22.8	

The scatter plots and descriptive statistics identify several useful conclusions about the information included in the Portfolio Evaluation data collection tools. The main findings are summarized as follows:

- **POF scored higher, on average, than ETP in all three categories**: Robustness of Value Proposition, Extent to Which Due Diligence was Conducted, and Total Points. On average, POF scored 63% better in the Robustness category, 69% better in the Due Diligence category, and 67% better in total points. POF established more compelling value propositions and did a better job of documenting the claims made in the value propositions than ETP did. POF's inclusion of market assessments in its projects provided important insights that framed and supported the value propositions. The combination of primary and secondary data included in these market assessments provided a solid foundation for developing value propositions for the technologies included in the portfolio.
- ***All of POF's scores were above the "average" score for ETP.*** POF's lowest Robustness score was 21 (compared to ETP's average of 16), and POF's lowest Due Diligence score was 34 (compared to ETP's average of 32).
- ***POF's performance was more consistent across data sets than ETP.*** As seen in Figure 27 and Figure 28, the standard deviation for the POF data was much smaller than for ETP. The scores were higher and more consistently so for POF data than for ETP data. This may be partially explained by the preparation of the data. POF used a smaller group of people to prepare the value propositions than the ETP did; as a result, the approach used to gather and present the data was more consistent for POF. In addition, POF was able to use the results of its market assessments and the final documentation for each project to support the claims made in the value propositions.

Portfolio Evaluation: Value of ETP Assessments to California Ratepayers

The final component of the Portfolio Evaluation examined the value of POF's involvement in the technology assessments. The evaluation team asked POF staff to describe how the program's role in the assessments made a difference in the technologies' progress toward market. This part of the evaluation sought to examine the skills, resources, and other benefits that POF brought to the assessments that would not have been available in the program's absence. While other steps in the assessment asked how well POF was performing at certain tasks, this step asked POF staff to define how each project contributed to the program's value in the marketplace.

The evaluation team identified categories of benefits based on the narratives developed by POF and ETP staff. In the narratives, ETP and POF staff identified a wide variety of benefits associated with their programs' involvement, giving rise to several categories. Table 36 connects these themes with some examples of specific benefits of ETP's or POF's involvement that program staff identified in the narratives.

Table 36. Specific Examples of the Value that ETP and POF Added by Involvement in a Given Assessment (as Reported by ETP and POF Staff)

Theme	Examples of Stated Values
Verify/Assess Energy / Environmental Performance	-Quantify / verify energy efficiency savings -Quantify / verify emissions reductions -Quantify / verify water savings
Address Cost-Effectiveness Issues	-Calculate incremental cost -Assess installed cost
Provide Neutral Third-Party Assessment	-Provide credible source of information in the market from a neutral third party
Support Program / Incentive Design	-Develop total resource cost information, workpapers, etc. -Develop specifications for technology in EE program design -Enable informed decisions by EE program managers -Establish / improve methods for calculating energy savings -Determine marketing, education, and training needs -Address factors important to program design -Assess manufacturers' perceptions of potential program approaches
Conduct Outreach / Increase Awareness	-Increase awareness about the technology in the utility sector and the broader market -Provide information for outreach to customers
Direct Effect on Market	-Influence manufacturer design -Influence installation / operation decisions
Address Market Concerns / Needs	-Identify and understand market needs -Validate claims about non-energy benefits -Test for specific product characteristics -Assess customer satisfaction -Understand product installation / operation -Explore alternative applications -Identify target customers

Theme	Examples of Stated Values
Contribute to a Broader Effort	-Trigger research by other organizations (e.g., PIER) -Leverage funds from other organizations -Feed codes and standards enhancement efforts -Allow ETP to establish priorities for future projects
Determine that Technology Not Ready for Incentive Program	Result of testing revealed that product was not ready for EE programs, enabling utility to avoid going any further with the technology
Describe the Value of the Technology, Not ETP's Role in the Assessment	Some forms described the technical potential for energy savings, which could represent the benefit of the technology to the ratepayers of California rather than the benefit of ETP's involvement in the assessment.
Understand Market Structure	**-Address decision-making within the industry, trends & attitudes towards energy efficiency, and typical barriers to installation** **-Verify that distribution infrastructure is sufficient**

Notes:

1, These benefits are based on self-report by ETP and POF staff. Where possible, the same language used by program staff were repeated in this table to capture their perception of the program's value.

2. Benefits in bold were reported by POF staff; they may or may not have been reported by ETP staff as well.

3. Benefits reported by ETP staff are included for comparative purposes. It is important to understand how the two programs perceive their value in the market place relative to one another; there are important learning opportunities that can be realized from doing so.

Source: Summit Blue Consulting. November 2009. *Draft-Final Report for the 2006-2008 Statewide Emerging Technologies Program Evaluation.* Prepared for the California Public Utilities Commission.

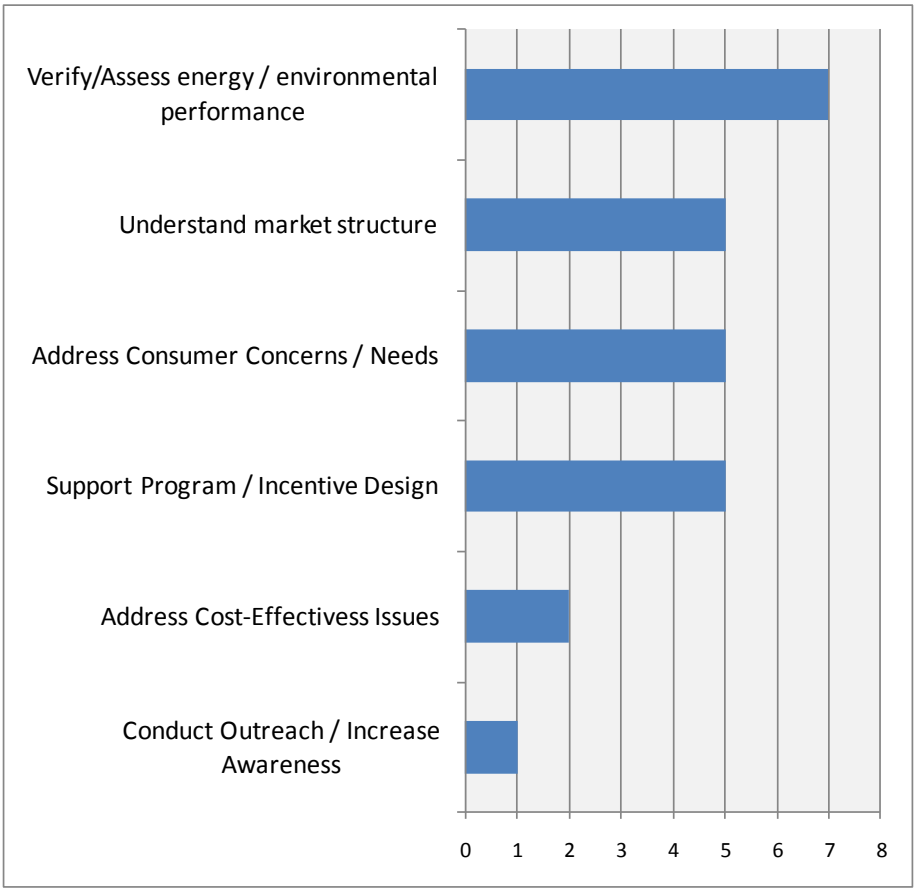
POF data sets were fairly consistent in the level of detail and documentation provided to support claims about the benefits created by the program. POF responses were brief and often pointed the evaluation team to the market assessment reports or other interviews conducted as part of the project. Though consistent, POF narratives were not as rich as some of those provided by ETP staff; in ETP's strongest narratives, significant detail was provided about the project's influence on manufacturers, customers, or EE program staff. In these instances, it appeared that the project had a tangible effect on the technology's adoption into EE programs or by customers.

The evaluation team documented how many times each category identified in Table 30 appeared in a narrative. In doing so, the evaluation team did not make judgments about the

validity of these claims. The evaluation team used the language in the second column as a guideline for categorizing the values stated in the narratives into the higher level themes.

A summary of the frequency with which each theme appeared in the narratives is included as Figure 29. A more detailed examination of the value associated with each project is included as Appendix D. It should be noted that multiple values were identified for several projects such that the sum of all occurrences does not equal 8, the number of projects for which these narratives were prepared.

Figure 29. Frequency with which POF Staff Mentioned Each Major Category of POF Value



The values cited most often by POF staff were related to the short-term outcomes of the program:

- Verify/Assess energy/environmental performance (connected to the introduction of new technologies into EE programs)
- Support incentive/program design (connected to the introduction of new technologies into EE programs)
- Address consumer/customer needs (enhancing the programs by strengthening the value proposition)

- Understand market structure (enhancing the programs by strengthening the value proposition)

As supported by other parts of this evaluation, POF placed greater emphasis on understanding the market for these technologies when compared to ETP. POF staff cited at least one of two market-related categories (Addressing Consumer Concerns/Needs and Understand Market Structure) for every one of the projects undertaken by POF. In comparison, ETP selected one of these categories for only 28% of the projects in its portfolio.

The evaluation team interviewed one of the vendors involved in a POF project about its staff's perception of the value of POF's role. The vendor identified similar values and broadened the list of values introduced by POF's involvement in the project, as shown in Table 37. This may indicate that POF's benefits are broader than those indicated by POF staff in some cases. It is difficult to generalize in this case, however, because the evaluation team only verified through a vendor interview POF's assessment of its value on one of the eight projects; this is likely not a representative sample.

Table 37. Comparison of Assessment of POF Value by POF Staff and by Vendor for Cold Water Detergent Project

Category of Value	POF Staff See Value	Vendor Sees Value
Verify/Assess energy / environmental performance	X	X
Address Consumer Concerns / Needs	X	X
Address Cost-Effectiveness Issues	X	
Support Program / Incentive Design		X
Conduct Outreach / Increase Awareness		X
Direct Effect on Market		X
Contribute to a Broader Effort		X

4.4.3 Aggregate Analysis

The Aggregate Analysis is designed to characterize the POF portfolio. It provides a high-level snapshot of how the program operates, considering the methods used, the partnerships developed, the types of technologies considered, and the outcomes of the projects, among other factors. It is important to remember that the Aggregate Analysis captures the status of the program at a given point in time – the time at which the survey is conducted. As such, it does not capture the evolution of activities associated with each project. That type of analysis is captured in the two case studies included as Appendix A.

The Aggregate Analysis provides the opportunity to compare the POF portfolio with the ETP portfolios of the IOUs. The data are collected in the same format and can be analyzed using the same metrics. To date, however, POF has conducted a much smaller number of assessments (8) than ETP (149 for the four IOUs combined) due to both strategic and practical factors. In this inaugural analysis of POF, the comparisons will be limited to a subset of the factors that are relevant given the small number of technologies in the POF

portfolio. In the future, this comparative analysis can be expanded as the number of technologies in the POF portfolio increases.

The Aggregate Analysis is organized around the four phases of program implementation: scan, screen, assess, and transfer. Each of the following sections provides a description of the findings of the Aggregate Analysis for that phase.

Scanning Phase

Unlike ETP, POF program staff is actively involved in a defined set of tasks during the Scanning phase. At the program outset, Portfolio of the Future compiled a database of 506 emerging energy efficient natural gas technologies. The database framework and content was developed specifically for POF and included a range of technologies for the industrial, commercial, and residential sectors.

This initial scan was developed using a variety of sources. National laboratories, manufacturers with R&D programs, and industry organizations such as the American Council for an Energy Efficient Economy (ACEEE) provided input on the technologies that they saw as leading candidates. POF team members identified other technologies based on other engagements, such as those with the New York Research and Development Authority (NYSERDA), the Department of Energy, and PIER.

The eight technologies that were analyzed as part of the Aggregate Analysis revealed a range of sources similar to ETP. The manufacturers of the products assessed accounted for 37.5% of the sources, while referrals from other vendors in the industry accounted for 12.5% of the project ideas. Federal agencies and non-profits accounted for another 37.5%. A report submitted to CALMAC served as the last source.

POF was similar to the ETP program implemented by PG&E in that customers played a minimal role in identifying technologies for assessment. PG&E found only 3% of its technologies through referrals from customers, and POF found none through customers. This is likely due to the delayed integration of POF with the SoCalGas staff. Early in the program, there was some confusion about the level of commitment needed from SoCalGas staff; as a result, POF directed the Scan with minimal input from SoCalGas Account Executives or EE Program Managers and therefore had little access to SoCalGas's customers.

Screening Phase

The Screening process for POF involved three separate phases of screening to narrow the number of technologies from 506 to 8[34]. Table 38 summarizes criteria used in each phase. The initial screening phase used several binary (Yes/No) criteria to narrow down the initial list to 46 technologies; documentation for this phase was provided for all 506 technologies in the comprehensive measure database collected by POF.

The second screen involved more rigorous analysis and a weighting system, which was similar to the approach taken by ETP at PG&E. The second screen considered eight weighted criteria (as shown in Table 38), some of which added detail to the issues considered in the

[34] Note that that budget was limited to 8 projects.

first screen. It involved formal documentation in a format unique to POF, including more detailed descriptions of the issues associated with each of the 46 technologies remaining after the initial screen.

POF captured the results of the second phase of screening analysis in a PowerPoint presentation (presented to SoCalGas on April 25, 2007) and documented the analysis in a spreadsheet, both of which POF shared with the evaluation team. These files included documentation for 63% of the Aggregate Analysis projects. Despite the development of a consistent format for presenting the results of the second phase, the response to the Aggregate Analysis question about documentation in this phase indicated that no documentation was available. This may be due to the fact that the format was not given an official name. The multiple-choice answers provided lists the names of each IOU's screening document, but POF may not have been familiar with these terms. This may be addressed by including an option with a name given to POF's screening format.

The third and final screen involved subjective assessments by POF and SoCalGas staff to identify the projects with the most value to SoCalGas for which POF could add the most value. The ultimate selection of 19 high-priority projects involved the weighted scores from the second screen and the subjective assessments contributed by SoCalGas and POF staff. From the list of 19 priority projects, POF and SoCalGas agreed to have POF pursue eight of the projects through market or technology assessments. Documentation of this final phase is not available.

Table 38. Criteria Used in Each of the Three Screens

	Criteria (Weighting, if appropriate)	Assessment Method	Resulting Technologies (n=506)
1st Screen	• Stage of commercial development: eliminated if still in the R&D phase or already commercialized • Applicability in SoCalGas service territory: eliminated if small market potential in SoCalGas territory or if inappropriate due to climate issues, industry types, etc. • EE savings potential in SoCalGas service territory: Eliminated if potential was low • Cost effectiveness in SoCalGas service territory: Eliminated if payback period greater than 10 years • Previous coverage by SoCalGas EE program: Eliminated if already covered • Suitability to EE program: Eliminated if integration in an EE program would not make a difference • Industry sophistication: Eliminated if the industry had already evolved to incorporate energy efficient technologies	Binary (Yes/No)	46
2nd Screen	• Cumulative market potential (2009-11) (20%) • Market risk (15%) • Technical risk (15%) • Criticality of SoCalGas involvement (15%) • Annual technical savings potential in SoCalGas territory (10%) • Non-energy benefits (10%) • Simple payback (10%) • Potential customers (5%)	Weighted points system	19
3rd Screen	Subjective assessment of POF and SoCalGas staff, considering factors such as ongoing assessments, strategic plans, budget constraints, and ability to leverage resources.	Subjective, discussions	8

Assessment Phase

The Assessment phase refers to the stage in the program during which POF conducts the analysis necessary to determine if a technology should be proposed to the EE incentive programs. Each assessment project is unique and designed to address the gaps in knowledge associated with a specific technology. POF undertook projects that included market evaluation and field tests. Both of these types of studies are considered "assessments." Table 39 includes a brief overview of the eight technologies that were assessed by ETP during the 2006-08 program cycle.

Table 39. Summary of All Assessments Undertaken by Portfolio of the Future

Assessment Name	Type of Assessment	Sector(s) Addressed	Date Complete
Advanced Tunnel Washers	Market / Hardware*	Industrial/Commercial	August 2008
Automatic Steam Trap Monitoring	Field (Hardware)	Industrial/Commercial	December 2008
Coldwater Detergent	Market/Field (Hardware)	Residential	June 2009
Flame Intensity Analysis (includes a set of sensors and a control system)	Market	Industrial	May 2009
Improved Commercial Dishwashers	Market	Commercial	July 2008
Laundry Wastewater Recycling	Market/Hardware*	Industrial/Commercial	November 2007
Low-Temperature Detergent	Market	Industrial/Commercial	October 2008
Radiant Heat Transfer Inserts	Field (Hardware)	Industrial	Expected completion: end of 2009
* indicates that POF self-reported that these projects involved a hardware assessment but that this response was not supported by other documentation about the projects. It is likely that the evaluation team should have provided definitions of some terms in the survey in order to get more accurate responses. (This was not done as part of the ETP evaluation because ETP staff were involved in the development of the survey instrument.)			

Some inconsistencies in documentation between the data submitted as part of the Aggregate Analysis and that included in POF's Final Report.[35] This may be a function of using different sources to complete the two reports, differences in the timing of the two reports (November 2009 and December 2008, respectively), or something else. A central resource for collecting this information (e.g., the ETP Database) may help to avoid this situation in the future.

[35] Navigant Consulting. December 31, 2008. "Portfolio of the Future Program: Summary 2006-08 Program Cycle Report. Program Status, Accomplishments, and Process Improvements."

Types of Projects and Project Status

As shown in Table 39, the final reports for five of these assessments were completed by the end of 2008. Two additional final reports were completed during the first two quarters of 2009, and one final report remains outstanding as of early November 2009. Despite the fact that POF started two quarters behind schedule (on July 1, 2006) due to delays in the contracting process, these rates of completion are higher than those of ETP. ETP reported that 63% of projects were either complete or cancelled at the time of the survey.

POF focused more on the market assessments than ETP did. Whereas POF incorporated market assessments into 75% of its projects, ETP only incorporated market assessments into 15% of its total projects. Conversely, ETP reported conducting hardware assessments in 81% of its projects while POF reported conducting hardware assessments in 63% of its projects; other project documentation indicates that POF actually conducted hardware assessments on 33% of the projects in the Aggregate Analysis. In this case, it appears that the term "Hardware Assessment" meant different things to POF and ETP staff; whereas ETP classified a Hardware Assessment as one in which some type of testing occurred on the actual equipment, POF classified any project that involved hardware (rather than software or a service) as a Hardware Assessment. POF reported no software assessments and one other type of assessment: a behavioral assessment. This may be an option to add to the survey tool in the next evaluation cycle due to the increasing focus on behavioral aspects of energy use.

Primary Research Data Collection

POF reported collecting primary data in 75% of its projects, the same frequency with which ETP conducts primary data. POF used customer surveys more often (50%) than ETP (14%) and tested at customer sites less frequently (33% compared to 66%). POF didn't use any laboratory testing.

These results are consistent with POF's greater emphasis on the market assessments and the short-term objective of improving the value proposition of emerging technologies. Direct connection with the end user enables POF to understand the barriers to market adoption and the approaches needed to overcome those barriers. For example, on-site demonstrations are appropriate when customers identify specific performance issues, overall credibility of the technology, or in some cases lack of familiarity as barriers to adoption. In addition, the higher level of end-user contact enables POF to gather information that is useful to energy efficiency program managers, who can use this type of input to develop effective marketing messages.

Partnerships

Partnerships can have a dramatic effect on the success of projects. The Coldwater Detergent project, for example, leveraged funds from three IOUs and a Fortune 50 company; in one of the field tests at an industrial site, partnership with the manufacturer facilitated problem-solving that would have been more difficult in the absence of the manufacturer's involvement. Like ETP, POF leveraged resources from partner organizations in about one-third of its projects. In one project, POF leveraged funding and in-kind support from three

other organizations. In two others, manufacturers of the technologies provided in-kind support as part of a field study.

Project Duration

POF reports that its projects take longer than those of ETP. On average, POF's completed projects lasted 19.8 months, compared to ETP's average of 10.5 months. Part of this discrepancy may be explained by the process used to encumber funds in these two programs. ETP typically waits to encumber the funding until all or most of the partners (including host sites and vendors) have agreed to undertake the assessment. In contrast, POF makes a strategic decision to pursue a project and encumbers the funds before the details of the assessment (e.g., the partnerships) are determined. This is evidenced by the fact that over half of the POF projects were reported to have funds encumbered in the same month, February 2007. That was the same month in which the screening process came to an end and POF agreed with SoCalGas on the technologies to pursue in the Assessment phase.

Technology Category

POF explored a set of technology categories that were much different than ETP, as shown in Figure 30 and Figure 31. In large part, this is because POF focused solely on natural gas energy efficiency rather than on natural gas and electrical energy efficiency, as ETP did. The end-use applications of natural gas are inherently different than those that use electricity. As a result, this difference in scope is not surprising.

Figure 30. Technology Categories Included in ETP Assessments

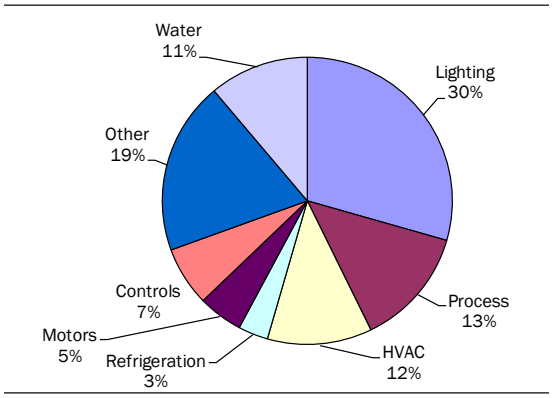
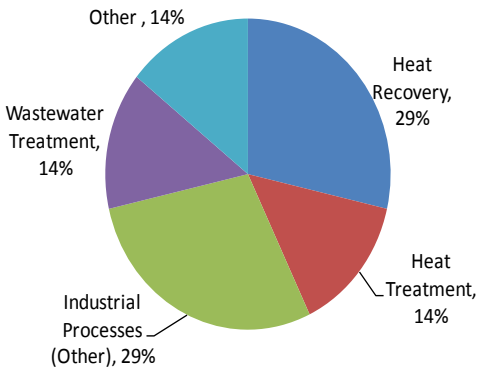


Figure 31. Technology Categories Included in POF Assessments



Another important finding from these figures is that POF is exploring a different set of technologies than the ETP at Sempra.[36] As reported in the final ETP Evaluation, 69% of Sempra's assessments involved natural gas technologies. According to the data reported,[37]

[36] The findings of the Aggregate Analysis for ETP combined the responses related to SDG&E and SoCalGas projects into one category called Sempra, to reflect the close connection between those two programs.

[37] It is possible that there is some difference in the way that different respondents categorize the technologies. As such, the findings are limited by the quality of data provided by the respondents and the consistency with which they view the technology categories.

there was minimal overlap between Sempra's ETP assessments and those of POF. Avoiding duplication of efforts was one of the considerations in selecting the technologies for POF; this finding confirms that such duplication was avoided.

Transfer Phase

The Transfer phase is most closely linked to the short-term outcomes for POF. Expanding the portfolio of measures in the EE programs, increasing awareness of the technologies internally, and strengthening the value proposition all come together in the Transfer phase. As described earlier, POF developed a two-stage process to increase the likelihood that the Transfer phase resulted in a measure within an EE incentive program. This section will explain the first stage – documenting the results of the project – in more depth. The results of the second stage – handing off the technology to SoCalGas – are described in more depth in the last part of this discussion.

Documentation of Results

In collaboration with a key contact at SoCalGas, POF developed an innovative set of tools for facilitating the transfer phase. The Program Readiness Packages (PRPs) include resources to support EE program managers and account executives in developing the incentive program, creating effective marketing messages, and communicating directly with end users. Other resources provide the technical analysis that is a precondition for a measure's inclusion in an EE incentive program. The three components of the PRP are as follows:

- Situational Analysis
- Work Paper

Mini-Business Plan

Table 40 summarizes the goal of each of these components, the target audience, and the intended use.

Table 40. Summary of Program Readiness Package Components

Document Name	Goal	Target Audience	Use
Situational Analysis	Provide a primer on the technology	Program Managers, Directors, Account Executives, External Stakeholders	To bring stakeholders up to speed on the technology quickly
Work Papers	Present detailed technical analysis of the measure needed to gain CPUC approval	SoCalGas Engineering team, SoCalGas Regulatory Affairs staff, CPUC	To convince internal engineering and CPUC staff that the technology is technically worthy of inclusion in EE programs

Mini-Business Plan	Describe the market for the technology and outline a plan for reaching the target market	Program Managers, Market Analysis and Planning staff	Facilitates program planning by matching the format of information required for more general business plans required for the internal planning process

The material included in the PRPs is presented to specific target audiences to facilitate the technology's adoption into EE programs. There is some overlap among the target audiences in the specific information required, but each audience needs it to be presented in a slightly different way. For example, engineers want to know about the cost or incremental cost of a measure, while the program managers need to know about its price. In effect, the two groups need the same information, but they are concerned about different aspects of it. In other cases, the groups require very different information, such as technical calculations of energy savings for engineers compared to a description of non-energy benefits for program managers. Table 41 summarizes the types of information provided in each of the components of the PRP.

Table 41. Comparison of Program Readiness Package Components

	Situational Analysis	Work Paper	Mini-Business Plan
Product/Measure Description	♦	♦	♦
Market and Industry Analysis			
Target Market Definition + Characteristics	♦		♦
Decision Makers			♦
Non-Energy Benefits for Customer			♦
Estimated Market Penetration and Market Potential	♦	♦	♦
Market Readiness / First-Year Market Challenges	♦		♦
Marketing Plan and Strategy			
Value Proposition			♦
Place[a]			♦
Price / Measure Cost	♦	♦	♦

	Situational Analysis	Work Paper	Mini-Business Plan
Promotion[b]			♦
Energy Savings			
Baseline Data		♦	♦
Effective Useful Life		♦	♦
Net-to-Gross Ratio	♦	♦	
Energy Savings Calculation Methodology		♦	
Payback Period	♦		♦

Notes:

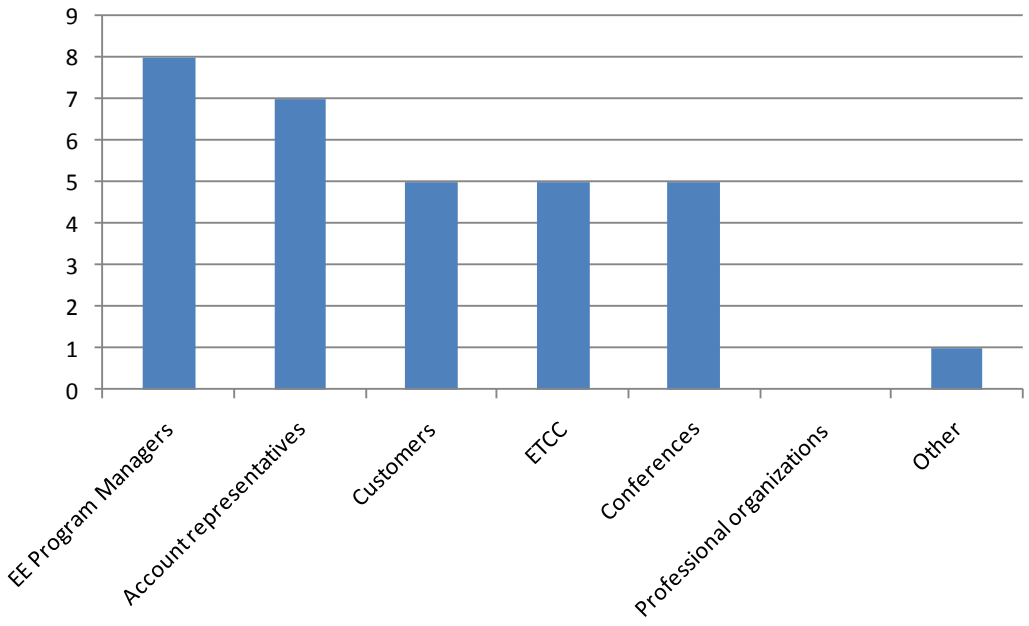
[a] Place indicates the channels that can be used to distribute information about the technology when it is included in an EE incentive program.
[b] Promotion describes the education and preparation needed for stakeholders at SoCalGas as well as external promotion channels that can be used to market the technology.

PRPs had been developed for 88% of the technologies in the POF Aggregate Analysis. The final project is waiting further verification of energy savings before determining if it is program ready. If it is deemed to be program ready, a Program Readiness Package will be prepared.

Communicating about the Technology

POF presented information about these eight projects to a range of audiences. As indicated by its short-term objective, POF's main focus was on the internal audience at SoCalGas. POF's quarterly meetings at SoCalGas provided a venue to engage several different internal audiences on each technology. Account executives, program managers, directors of energy efficiency programs, strategic planners, and ETP staff attended these quarterly meetings. Attendance at any given meeting varied depending on the technologies being discussed, but interviews of several different stakeholders reveal that these internal stakeholders were dynamic and engaged during these meetings. These meetings also helped develop traction for the technologies within the utility. POF staff self-reported about the audiences to which they presented information about the POF technologies; these results are included in Figure 32.

Figure 32. Recipients of POF's Messages (Multiple Responses Allowed)



In addition to the quarterly meetings, POF staff were also given access to stakeholders who were important to specific projects. For example, the SoCalGas lead on the Coldwater Detergent project used his internal networks and credibility to promote the technology to Directors and Program Managers. After generating sufficient interest in the project, he connected POF staff with the individuals who needed to support the technology if it were to succeed in the Transfer phase. He also leveraged his internal contacts to secure another staff member's time to walk the technology through the Transfer phase; the second individual then facilitated meetings for POF and the private sector partner with the individuals who needed to sign off on the approval paperwork. These more formal meetings provided a structured environment in which POF staff could address concerns and build support for the technology.

POF engaged external audiences on all of the projects in the portfolio. These engagements ranged from interactions with customers who hosted projects, to interviews with customers with appropriate applications for the technology, to the Emerging Technologies Coordinating Council, to a presentation at the American Council for an Energy Efficient Economy. Flex Your Power was also contacted regarding the Coldwater Detergent project. With the exception of the host site customers, these engagements were not as deep as the contacts with the SoCalGas stakeholders. There was no formal contact with the Energy Centers.

Recommendations for Transfer and Successful Placement within EE Programs

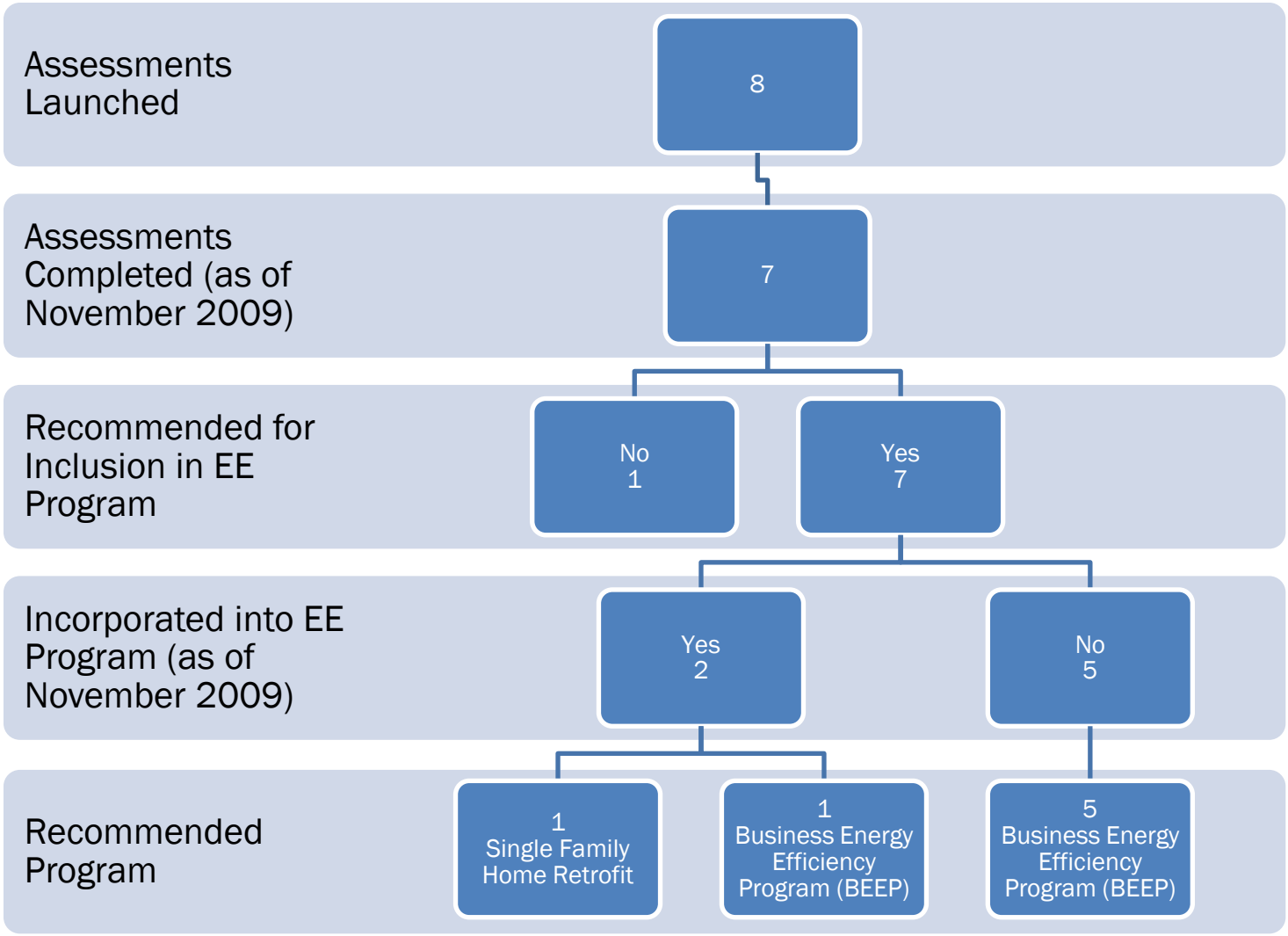
As of November 2009, two of POF's technologies were already included in incentive programs, and POF had recommended that five of the six remaining technologies be included in an EE program. Figure 33 summarizes the path that the eight technologies in the Aggregate Analysis have taken through the program.

When POF has recommended a technology for inclusion in the EE program, they have created a PRP as well as following up with the program managers. This follow-up includes meeting with the program manager and other internal stakeholders (e.g., Engineering, Regulatory Affairs) to understand what additional questions need to be addressed before the technology is considered program ready in the eyes of the EE program manger. While many questions would have been identified during POF's quarterly meetings and other contact with the program manager, there are often lingering questions.

At some point, POF's involvement in the Transfer phase is eclipsed by an internal Energy Programs Advisor. The Energy Programs Advisor is responsible for obtaining all necessary signatures to introduce the measure to CPUC. This job is only performed by someone within the SoCalGas staff. This job requires substantial patience, an understanding of protocols, and a good sense of the most important information for each individual who is required to sign off. POF worked closely with the individual who held this role in the Coldwater Detergent project, and the paperwork was eventually completed (within a few months).

It should be noted that CPUC approval of these measures is another step in the process toward inclusion in programs in which POF has a very limited role. Currently, parties involved in POF, including both POF and utility staff, are unclear about some aspects of the process by which CPUC will approve new measures; for example, these individuals were not aware of the timeline for review or the criteria that will be used to prioritize the standing applications. Understanding how this process will work in the next program cycle may be important to the acceptance of any legacy projects from the 2006-08 cycle into EE programs.

Figure 33. Projects Traced from Assessment to Transfer to EE Programs



4.5 Conclusions and Recommendations

Overall, Portfolio of the Future has made progress, some significant, towards the program's stated goals. One of the most significant successes identified by both POF and SoCalGas staff is that the program is more integrated with SoCalGas than it was in the first few months of program implementation. This collaborative relationship enables the sharing of knowledge and leveraging of resources, which were not possible when POF had an arms-length relationship with SoCalGas, a more typical third-party relationship.

This section summarizes the findings of the report and provides recommendations for moving forward. First we summarize the program's progress toward the stated goals and objectives, and then we identify the value brought by this third-party program. Lastly, we summarize the recommendations for the program in the future.

4.5.1 Program's Progress toward Stated Objectives

Here we document the program's progress toward each of their objectives.

Increase the Number of Measures in the Portfolio

To date, the energy efficiency incentive programs have accepted two of the technologies investigated by POF and are offering rebates for them. Coldwater Detergent is eligible for immediate rebates at the register of one of the big box stores in California. Laundry Wastewater Recycling is currently eligible for a rebate through the Business Energy Efficiency Program. This is a 25% success rate to date for the first program cycle.

Although the Coldwater Detergent measure was introduced fairly recently, the manufacturer of the largest product in this category reports an increase in sales. This increase reflects sales at the national level rather than just in the SoCalGas territory, but the national ad campaign that led to that increase in sales is a result of the manufacturer's engagement with POF (as detailed below).

In addition, POF has recommended five additional technologies for inclusion in the Business Energy Efficiency Program (BEEP). BEEP requires an application from the business owner in order to determine the level of incentives; it is less straightforward than some of the other rebates provided by SoCalGas programs, many of which market the incentive levels on the website (often on a $/unit basis). BEEP is likely the most expedient route to introduce technologies into the program, but it is unclear how the extra step of determining the incentive level will affect customers' willingness to pursue these incentives.

Strengthen the Value Proposition for the Emerging Technologies

POF prepared documentation about the energy and non-energy benefits of seven technologies. The Mini-Business Plans provided the information needed by the EE program manager to make a stronger case for purchasing these products to a customer. Based on the research conducted during the market and field assessments, the Mini-Business Plans address the concerns identified by potential end users. The projects that included field

studies provide additional documentation that the energy and non-energy benefits exist as claimed.

The project with the clearest effect on the market is the Coldwater Detergent project. With the help of the major manufacturer of the product, POF teamed with three of the IOUs in California to conduct the field study. As a result of the study, the manufacturer better understood the value proposition as perceived by the end user and how to target that market better. The information gathered during the study was used to develop a national ad campaign for the product. In parallel, SoCalGas and SDG&E began offering incentives for this product, demonstrating that the value proposition for the technology was also clear to EE program staff.

An example of how POF used market research to leverage the value proposition is shown in its approach to the commercial laundry subsector. POF leveraged broad market research about this subsector to improve the value proposition for several technologies. POF identified a sub-sector, commercial laundry, in which several opportunities for energy savings existed. Initially, POF commissioned a single market research study to address the entire sub-sector and used the results to prioritize additional research on specific technologies. As such, POF was able to conduct a more comprehensive market assessment on the subsector than it could have if it had focused on market assessments for each of the individual technologies. The result was three technologies recommended for inclusion in the EE programs, one of which is already eligible for incentives.

Increase Knowledge about and Awareness of the Technology

POF reached a broad audience of stakeholders within SoCalGas. Program managers, account executives, directors of the EE programs, engineering, and market analysis staff were involved at different points. Quarterly meetings held at SoCalGas for POF projects provided a regular venue for updates and exchange of ideas. SoCalGas staff organized meetings for POF staff to facilitate discussion about specific projects, enabling a deeper understanding, by other SoCalGas staff, of the technologies and, by POF staff, of the concerns of the utility staff. The Program Readiness Packages presented critical information about the projects in a variety of formats and were available to the entire EE team on the network drive at SoCalGas.

The level of knowledge and awareness about the technologies resulting from POF activities was deeper for some projects than for others. In some cases, a well-networked individual at SoCalGas served as a point person for the POF project. When this type of person was in that role, POF was able to access the necessary stakeholders and engage them at a deeper level. These types of relationships and communication were an important factor in the success of the Coldwater Detergent project. Commercial laundry technologies are also reported to have gained significant traction internally.

At the same time, there were some gaps in communication about at least one of POF's projects. SoCalGas and POF staff realized some duplication of effort on this technology after POF prepared a draft work paper for this project. While the market assessment completed by POF was viewed as useful, the engineering staff at SoCalGas had already decided to pursue a different approach to the work paper. It is unclear if SoCalGas staff were already

aware of this technology in advance of POF's engagement, but it is clear that they pursued the work paper independently of POF. It appears that POF and the main points of contact at SoCalGas had followed established procedures for soliciting feedback from internal stakeholders but that the internal stakeholders with relevant information did not respond to these requests; in part, this was due to the internal stakeholders' perception that POF was not relevant to the resource programs. This was an early project pursued in the 2006-08 program cycle, and POF had not yet gained sufficient traction internally.

In most cases, POF's communication efforts within SoCalGas were supplemented by SoCalGas staff engaged in the process. Internal stakeholders leveraged their networks and credibility within the organization to build support for their priority projects. These internal stakeholders were able to attend regularly-scheduled staff meetings which most EE program staff attended. The materials prepared by POF, especially the PRPs, served as resources that the internal stakeholders could distribute or use as talking points to effectively communicate the messages within SoCalGas.

In addition, POF reached audiences outside of SoCalGas. Vendors became more aware of the market potential in Southern California, resulting in a greater focus of marketing efforts and support in the region in at least one case. Host sites and study participants (about 1,600 in the Coldwater Detergent project) became more aware of the technologies, their functionality, and their benefits through their involvement in the process. In addition, POF staff and subcontractors presented the material to industry organizations, including the American Council for an Energy Efficient Economy (ACEEE) (on August 19, 2008), the Emerging Technologies Coordinating Council (ETCC), and the California Sustainability Alliance (on October 8, 2007).

Most prominently, POF's Coldwater Detergent project was a major factor in Procter and Gamble's (P&G) decision to launch a national ad campaign promoting their product in this category. Prior to involvement in the POF project, P&G had not planned to highlight the product in the following three to five years other than some nominal coverage during April for Earth Day. After the engagement with POF and the three IOUs involved in the project, P&G decided to feature its product in a national ad; this was a major accomplishment for P&G staff involved in the project, due to the large number of products competing for P&G's marketing resources. Since the campaign's launch, sales have increased, which P&G relates to the ad campaign.

Strengthen Partnerships with Organizations with Complimentary Goals

POF built on SoCalGas's existing partnerships and introduced some new partners into the mix. The Coldwater Detergent project re-energized a link with PG&E that had been developing since the inception of the Statewide ETP. In addition, POF's recruitment of P&G for the Coldwater Detergent study introduced a new player into the utility efficiency programs and set the stage for future engagements with large firms. There was a significant learning curve for P&G, for POF, and for the utilities regarding what is necessary to make relationships like these work; the issues resulted from differences in organizational decision authorities, the unique regulatory conditions in which the utilities operate, and different expectations about project timelines. If the lessons from this partnership are captured and

disseminated broadly, the steepness of the learning curve could decrease with the next partnership with a large private-sector company.

However, POF's engagement with the ETCC could have been more robust. During the 2006-08 program cycle, ETP staff at SoCalGas served as the intermediary between POF and the ETCC for most meetings. POF would provide updates about the technology, which ETP staff would then have available to use at ETCC meetings at their discretion. It is not clear how much of this information was presented. POF did present at least once at the ETCC meetings, but regular participation by POF staff could have furthered POF's collaboration with the Statewide ETP. In addition, inclusion of POF technologies in the ETCC database would help to further disseminate the results of the studies for the benefit of a broader audience.

Long-Term Objective: Acceleration

In at least one case, POF's involvement with a technology resulted in a faster adoption into the EE programs than would have occurred in its absence. SoCalGas staff report that POF's involvement in the Coldwater Detergent project was critical to introducing the technology into an incentive program quickly. POF's completion and revision of the work paper and its participation in regular meetings with the internal staff member charged with obtaining authorization for the measure enabled the technology to become a measure more quickly than would have occurred if the entire process were left up to SoCalGas staff. In addition, the POF effort accelerated P&G's efforts to market the product.

However, with the other six technologies recommended for program adoption, it is not clear how critical POF's role will be. It is expected that the additional person-hours that can be committed by POF will facilitate the work papers; POF's staff resources can also be used to address questions raised by the stakeholders who must sign off on the authorization of the technology. The extent to which SoCalGas is deploying POF resources in this manner for the other six projects was not investigated.

4.5.2 Value Created by POF

A third-party program is under special pressure to demonstrate that it brings distinct value to the table. POF is in a unique situation because its objectives are so closely related to those of the ETP. POF's deliberate approach to this program has added value in several areas.

- **Innovations: POF has introduced innovative aspects that document the program's work in formats that are useful to the target audiences.**
  - ***The technology Scan and Screen were methodical, extensive, and well documented.*** The Scan captured 506 technologies from the outset that had potential application to natural gas energy efficiency. This is significant given that energy efficiency savings in the natural gas sector are hard to find, according to ETP program staff. Each of the technologies in the database is reviewed against the first, high-level screen; the database is a record of this assessment for each technology. The database can be regularly updated with new information about the technologies and provides a record of previous investigation of the technology by POF staff. POF staff report that the database grew to 730 technologies by the end of the 2006-08 program cycle.

- ***Program Readiness Packages (PRPs) made a concise case for the technology's inclusion in EE incentive programs.*** Co-developed with SoCalGas staff, these documents provide information tailored to the unique needs of the stakeholders who are involved in deploying the technology into the EE programs. The two-page Situational Analysis could be used to bring new stakeholders up to speed quickly and served as a "leave behind" for POF and SoCalGas staff when building support for the technology within the IOU. The Mini-Business Plan targeted program managers and strategic planning staff, describing the business case for the technology and outlining a marketing plan that could be used to target end users. The Work Papers targeted SoCalGas engineering staff and CPUC staff, providing the detailed technical analysis of the energy savings and other required data.

- ***Market assessment reports provide a reliable source of information for the Portfolio Evaluation.*** The market assessment reports assemble information from a wide variety of sources about a market's structure, decision-making channels, motivations for change, and market segmentation. These pieces of information are useful in building a compelling value proposition for a product, which is the first component of the Portfolio Evaluation. In addition, the methodology used to prepare the market assessments that the evaluation team reviewed incorporated many of the fundamental principles highlighted in the Portfolio Evaluation scoring criteria. These market assessments were examples of appropriate and robust due diligence.

➢ **Driven by needs of end users: POF's activities are designed to build a case for the technologies that addresses the needs and concerns of end users.**

- ***POF projects generally began by learning about the needs of the end users.*** Three-quarters of POF projects involved market assessments, which document the needs of the end user and identify opportunities for serving those needs. These market assessments help to determine which technologies to pursue and which ones will encounter major barriers to adoption. They also help to develop marketing messages that can be used by EE program staff to promote the technologies once they are in the resource programs. This approach was appropriate given that most of the technologies pursued by POF had low levels of market adoption while being technically proven.

- ***POF engaged deeply in a small number of projects rather than spreading its efforts broadly over many projects.*** This approach enabled POF staff to better understand the needs of the market, which then resulted in a more strategic approach to addressing those needs. In addition, the deep focus enabled POF to identify multiple solutions to customer needs in a given sector; all of the solutions saved energy but addressed the nuanced needs of customers in different subsectors, using different technologies.

- *The market research produced as part of POF was very strong.* Multiple SoCalGas staff members commented on the quality of the POF research. The analysis was well-structured and presented in a useful format. The findings will be helpful to program staff as they develop marketing strategies for the measures that result from POF.

- *POF projects ended by thinking about the end users of POF reports: EE program managers.* The PRPs provided information in a format and level of technical detail that supported the efforts of several groups of SoCalGas stakeholders. This was an important step in facilitating the transfer of the technologies to the EE programs.

➢ Sufficient and appropriate staff: POF provided a well-staffed program that could draw on diverse types of expertise and take on the various responsibilities required of the program.

- *POF's interdisciplinary team was able to identify a comprehensive set of customer needs and potential solutions.* Engineers identified technical limitations of existing systems while MBAs considered the financial implications of different solutions. Experts in market research were able to clearly define the needs and limitations in a given sector, while policy experts considered how changes in policy might affect the success of the technology. Meanwhile, experienced program managers activated the specific resources needed, depending on the situation. The combined expertise resulted in thoughtful analysis and deployable knowledge.

- *POF staffing levels were sufficient to provide the support needed to achieve adoption in the EE programs.* The Transfer phase is the most tenuous phase of POF and ETP. It requires that a champion consistently push the technology forward, ensuring that all questions are addressed and all necessary stakeholders brought on board. POF requires an internal SoCalGas staff person to facilitate the process internally, but POF's role in supporting the Transfer phase is critical. Access to experts and persistent follow-up on requests for additional information increases the likelihood that a technology will get into the programs, though it does not guarantee it. POF provided that support on several projects.

➢ Networking ability: POF's ability to network at many levels expanded the realm of the possible.

- *Externally, POF's national reach and connections with other organizations involved in sustainability helped engage parties that rarely work with the IOUs.* The work with P&G was initiated by POF and positioned the Coldwater Dishwashers program for success. In addition, the Scan phase was informed by Navigant's work in efficiency in other parts of the country. POF leveraged existing networks at national laboratories, federal agencies, and industry

trade associations to inform the preliminary Screen. These new partners increased the range of information that informed the program's activities.

- ***Within SoCalGas, POF made connections and stimulated internal discussion about emerging technologies.*** The connections facilitated the work of POF but also re-engaged internal networks, some of which had been dormant following a reorganization early in the 2006-2008 program cycle. POF's quarterly meetings also provided a forum for stakeholders from different parts of SoCalGas to discuss and debate the viability of individual emerging technologies. Those involved in the internal dialogue stated that it was productive.

4.5.3 Findings Specific to ME&O Research Questions

While the program had a number of objectives that were specific to an emerging technology type of program, there were also ME&O research questions. These have been identified and answered in Table 42. This is different than the results described earlier, which highlights the program's progress towards its stated short-term objectives, because the design of the POF program did not lay out a program focused on Marketing, Education, or Outreach. This section does include several previous excerpts, but the details are not repeated. Since this program is included in the ME&O program evaluation, however, an assessment of the program's performance in the areas of the ME&O research questions is included.

Table 42. POF's Performance in ME&O Research Areas

ME&O Research Question	Key Findings
1. What is the reach of this program?	The vast majority of POF's efforts focused on reaching audiences within SoCalGas: • POF reached a broad audience of stakeholders within SoCalGas. Program managers, account executives, directors of the EE programs, engineering, and market analysis staff were involved at different points. • The level of knowledge and awareness about the technologies resulting from POF activities was deeper for some projects than for others. There were some gaps in communication about at least one of POF's projects. • In most cases, POF's communication efforts within SoCalGas were supplemented by SoCalGas staff engaged in the process. Internal stakeholders leveraged their networks and credibility within the organization to build support for their priority projects. In addition, POF reached several external audiences: • POF's Coldwater Detergent project was a major factor in Procter and Gamble's (P&G) decision to launch a national ad campaign promoting their product in this category. • Host sites and study participants (about 1,600 in the Coldwater Detergent project) became more aware of the technologies, their functionality, and their benefits through their involvement in the process. • The Coldwater Detergent project involved a highly collaborative partnership among POF, SoCalGas, SDG&E, PG&E, and Procter and Gamble. • Product vendors became more aware of the market potential in Southern California, resulting in a greater focus of marketing efforts and support in the region in at least one case. • POF staff and subcontractors presented the material to industry organizations, including the American Council for an Energy Efficient Economy (ACEEE) (on August 19, 2008), the Emerging Technologies Coordinating Council (ETCC), and the California Sustainability Alliance (on October 8, 2007).
2. What education or information was	Program Readiness Packages (PRPs) made a concise case for the technology's

ME&O Research Question	Key Findings
provided? What behaviors are encouraged?	inclusion in EE incentive programs. Co-developed with SoCalGas staff, these documents provide information tailored to the unique needs of the stakeholders who are involved in deploying the technology into the EE programs: • The two-page Situational Analysis could be used to bring new stakeholders up to speed quickly and served as a "leave behind" for POF and SoCalGas staff when building support for the technology within the IOU. • The Mini-Business Plan targeted program managers and strategic planning staff, describing the business case for the technology and outlining a marketing plan that could be used to target end users. • The Work Papers targeted SoCalGas engineering staff and CPUC staff, providing the detailed technical analysis of the energy savings and other required data. POF staff and subcontractors presented material about the program's goals and high-level information about specific projects to industry organizations. These included the American Council for an Energy Efficient Economy (ACEEE) (on August 19, 2008), the Emerging Technologies Coordinating Council (ETCC), and the California Sustainability Alliance (on October 8, 2007). Quarterly meetings held at SoCalGas for POF projects provided a regular venue for updates and exchange of ideas. During these meetings, POF would prepare presentations, some of which included detailed analysis about the opportunities and drawbacks of getting involved in different technologies.
6. What percentage of participants was fed into resource programs? Which programs were promoted?	To date, the EE incentive programs have accepted two of the technologies investigated by POF and are offering rebates for them. Coldwater Detergent is eligible for immediate rebates at the register of one of the big box stores in California. Laundry Wastewater Recycling is currently eligible for a rebate through the Business Energy Efficiency Program. This is a 25% success rate to date for the first program cycle. In addition, POF has recommended five additional technologies for inclusion in the Business Energy Efficiency Program (BEEP).
11. What is the value of the program vs. the cost of the program?	POF introduced a different approach to implementing an emerging technologies program. Several innovations and good management practices have assisted in the program's progress toward its objectives:

ME&O Research Question	Key Findings
	➢ Innovations: POF has introduced innovative aspects that document the program's work in formats that are useful to the target audiences. ➢ Driven by needs of end users: POF's activities are designed to build a case for the technologies that addresses the needs and concerns of end users. ➢ Sufficient and appropriate staff: POF provided a well-staffed program that could draw on diverse types of expertise and take on the various responsibilities required of the program. ➢ Networking ability: POF's ability to network at many levels expanded the realm of the possible. A significant amount of time (25% of the program length during the 2006-08 program cycle) was allocated to performing the market scan and conducting the screen. The resulting database is regularly updated at a fraction of the initial cost. The up-front effort and funds spent developing this tool were key to documenting the justification for selecting the technologies that POF did. On average, POF spent $149,064 per project (number is based on the response to the aggregate analysis). The program went deeper into a few areas and put a priority on successful transfer into the EE programs. POF identified a subsector with energy savings potential and several different methods available to achieve that potential (commercial laundries). This approach was included in ETP's 2010-12 Program Implementation Plans.

4.5.4 Recommendations

In the future, there are several steps that POF and SoCalGas can take to improve the program's progress toward its stated objectives. Some of the items described below are amplifications of processes already in place within the program, while others suggest opportunities to make changes. These recommendations are organized to align with the short-term outcomes of the program outlined in Section 4.4.1. In addition, there are recommendations that will facilitate the evaluation of POF after the 2010-12 cycle.

Increase Measures / Increase Knowledge and Awareness

The link between increasing the number of measures in the program and increasing the knowledge and awareness of emerging technologies among SoCalGas staff is strong. Savvy negotiation of the SoCalGas organizational structure is an important aspect of introducing a technology into an EE program. These recommendations build on POF's successful integration of the Coldwater Detergent technology into the EE programs:

- Ensure that POF's primary point of contact at SoCalGas is in a position to pull the levers necessary to obtain buy-in from necessary stakeholders and to secure internal resources. Since POF is a third-party program, its ability to move technologies into EE programs depends heavily on its primary point of contact's facility with negotiating the internal organizational structure. Ensuring that the point of contact has access to the stakeholders needed to support a technology through the Transfer phase is a critical component. In addition, a successful transfer requires an internal staff person to obtain the necessary approvals; in other words, a SoCalGas manager must be willing to assign one of his staff to walk the POF technology through the internal approval process. POF's primary point of contact must be able to convince the appropriate SoCalGas manager to assign the appropriate SoCalGas staff member (a portion of a full-time equivalent) to facilitate that internal process. A point of contact who has relationships with managers at SoCalGas who are able to free up that staff resource is critical.
- Improve communication between POF and internal and third party energy efficiency programs to ensure that incentives are obtained for POF technologies. This can be accomplished by 1) allocating adequate POF staff time and budget for the transfer phase to maintain continuity of people involved and leverage existing relationships, or 2) requiring involvement of energy efficiency program managers throughout the POF process in order to build relationships and credibility as well as ensure that issues are addressed as early as possible.
- Consider soliciting involvement from staff in the Market Planning and Strategic Analysis group at SoCalGas for each POF project. The Market Planning and Strategic Analysis group is responsible for identifying new technologies and program opportunities. Staff in this group would be in a position to determine the appropriate program for a technology, to assess its fits with the overall portfolio, and identifying the needs of program managers. Continued engagement of program managers is necessary for long term success, but their focus is on the day-to-day implementation of their programs; emerging technologies are not a high priority. Deeper engagement by the Market Planning and Strategic Analysis group could facilitate the Transfer phase.

- Re-visit the program logic model with staff at SoCalGas. There is currently some variance in the perceived role of POF. This variance occurs between POF and certain internal stakeholders at SoCalGas and also among internal stakeholders at SoCalGas. Re-visiting the program's logic model before launching into the 2010-12 program cycle would provide an opportunity to clarify expectations and roles for SoCalGas and POF at each stage of the process.

Expand Partnerships / Improve the Value Proposition for Emerging Technologies

The expansion of partnerships is closely linked to the improving the value proposition for the emerging technologies investigated by POF. These partnerships can open doors to different market actors and different perspectives on market needs. Together, POF and its partners build a stronger case for the technologies in its portfolio. The recommendations for strengthening partnerships and the value propositions for emerging technologies are as follows:

- *Engage more deeply with the Emerging Technologies Coordinating Council (ETCC).* ETCC provides a forum for all of the organizations promoting emerging technologies in the state of California to exchange ideas and build on one another's work. POF's attendance at such meetings would benefit its staff as well as the Statewide Emerging Technologies Program as a whole. In addition to regular attendance at ETCC meetings, posting final POF reports on the ETCC database would help to expand the level of knowledge about the market for emerging technologies in California. The transparency in the process adds value to all of the stakeholders in the emerging technologies realm in California.

- *Continue to use market assessments to inform decisions about which technologies to introduce into programs and which technologies to pursue further.* Market assessments enable POF to incorporate knowledge about the risks associated with the technology, team, and market traction into the prioritization of technologies. Information about the needs of the market, the structure of the market and industry, and the market size (among other factors) provide a basis for understanding the likelihood that a given technology's success in attaining significant market adoption. This is an important component of POF's program.

4.5.5 Evaluation Recommendations

Moving forward, there are steps that POF can take that will facilitate the evaluation of the 2010-2012 program. These steps are related to the Statewide Emerging Technologies Program evaluation approach and results. Aligning POF's recordkeeping with the processes resulting from the ETP evaluation will facilitate a more straightforward comparison of the two programs and a better idea of the technologies available for the ratepayers in California.

Documenting the program's activities is important for the evaluation as well as for the transfer and sharing of knowledge throughout the state. The state will increasingly rely upon emerging technologies to help meet the aggressive energy efficiency savings goals. As such, it will be important to leverage resources where possible and minimize the duplication of efforts. The documentation of the process and the sharing of information across many

organizations are critical to communicating information about the program. To date, POF has documented its decision-making process and the results of its work. Moving forward, some additional steps can be taken:

- ***Develop procedures for updating the Statewide ETP evaluation database that parallel those established by ETP.*** The Statewide ETP agreed to update the evaluation database on a quarterly basis in their Program Implementation Plans (PIP) for the 2010-12 program cycle. Including information about POF's projects in that database will allow for further transparency among the organizations pursuing emerging technologies in the state and assist in evaluation of the program.

- ***Ensure that technologies that are adopted into the EE programs use the same naming convention as those technologies that originated in ETP.*** The naming convention is included in the PIPs for the Statewide ETP. It facilitates tracking of the technologies that originated in the ETP in the EE measure databases. In the future, this will enable the evaluation team to determine the effect of the emerging technologies programs on the overall energy savings realized by the EE programs. Coordinating with the Statewide ETP on this convention will ensure that POF is informed of any adjustments to the protocol.

- ***Include POF in the evaluation of the Statewide Emerging Technologies Program for the 2010-12 program cycle.*** The intent of POF and ETP are more closely aligned than the POF and the ME&O programs. While POF is a third-party program and not part of the Statewide ETP, its efforts are complimentary and sometimes directly involved with those of the ETP. At a minimum, the evaluation team recommends using the full set of ETP evaluation protocols to evaluate POF's performance in the 2010-12 program cycle.

Appendix A: Case Studies

(1) Coldwater Detergent

(2) Improved Commercial Dishwashers

The evaluation team used the case study approach to understand the effectiveness of POF's approach relative to the goals that the program has established. In large part, the case study was used to describe the outcomes of the project rather than the process associated with the projects. The case studies, which were selected by a practical set of criteria, included analysis of information gathered from a variety of sources. Primary data collection included interviews with POF project managers and program managers, SoCalGas staff involved with the project, and vendors whose technologies were examined in connection with the project. Secondary data collection included a review of POF's documentation for each project, of the program's periodic and final reports, and web research where appropriate. All of the information gathered for each project was then reviewed and analyzed to develop the case studies. Each case study is designed to highlight the unique aspects of the projects.

Coldwater Detergent

A partnership of three utilities, Navigant Consulting, and a Fortune 50 company resulted in two rebate programs and a national ad campaign to promote coldwater detergent. Quantifying the energy savings and behavior change resulting from educational messages enabled this team to increase sales of a commercially available technology that had not been widely adopted.

Description of Technology

Laundry detergent that is specially formulated to perform in cold water.

Project Goals

To assess the value of promoting the use of coldwater detergent as a means of reducing water heater energy consumption among residential customers.

Determine whether the use of coldwater detergent results in more loads washed in cold water and fewer loads washed in warm and hot water.

Estimate the reduction in hot water consumption associated with a higher percentage of coldwater loads and the resulting reduction in natural gas usage.

Project Approach

Leveraging the varied sets of expertise and resources that each partner brought enabled the team to meet individual goals while contributing to the overall success of the project.

PROJECT NAME
COLDWATER DETERGENT

CO-FUNDING SOURCES
PG&E
SDG&E
PROCTER AND GAMBLE

TYPE OF ASSESSMENT
MARKET, FIELD

ANNUAL ENERGY SAVINGS POTENTIAL:
27.2 MILLION THERMS

PROJECT COST (INCL. CO-FUNDING)
$865,026

RECOMMENDED TO EE PROGRAM?
YES

EE PROGRAM FOR MEASURE
SINGLE FAMILY HOME RETROFIT PROGRAM

Partners

The project attracted a team of partners, each motivated by the opportunity to be part of something innovative with the potential to significantly impact energy use by residential customers. Each co-funding party brought important resources to the project:

Navigant Consulting: Development of project and partnership, project management, technical analysis, technical resource development.

SoCalGas, SDG&E, PG&E: Access to energy efficiency incentive programs, knowledge of regulatory processes, access to key internal stakeholders, credibility in the marketplace.

Procter and Gamble: Understanding of the technology, expertise in market research, insights into customer decision making, experience with the technology in other markets.

Scope of Study

The market study revolved around an eight-week in-home field test supplemented with surveys of study participants. The independent market research firm used to conduct the study recruited roughly 2,400 participants, about two-thirds of which were in the Test Group. Both the Test Group and the Control Group maintained a diary of laundry practices for an eight-week period. After the first two weeks, the Test Group received a package of coldwater detergent and educational materials about the benefits of washing in cold water. The Test Group received two additional educational messages during the remaining diary period.

Surveys of study participants provided additional information about laundry practices. All survey participants were surveyed before the diary period began, at the end of the eight-week diary period, six weeks after the diary period ended, and six months after the diary period ended.

Study Findings

The study revealed significant changes in behavior among the Test Group resulting in energy reductions:

DHW natural gas energy use was reduced by 58% after six months by repeat purchasers; and

The behavior change of washing in cold water persisted even for customers that did not purchase the coldwater detergent after the study period; their energy use was reduced by 51% after six months.

The study also identified messages most likely to motivate consumers to switch to coldwater detergent.

Communication about the Study

The results of the coldwater detergent study were communicated widely within each of the partner organizations and to broader audiences during and after the study.

Bi-weekly calls hosted by the project team (SoCalGas, POF, and P&G) and quarterly update meetings held by Navigant provided venues for key utility stakeholders to ask questions related to their areas of expertise. Learning about and addressing these issues early on set the stage for obtaining formal buy-in later.

Team members from SoCalGas communicated regularly in other internal forums, including regular staff meetings that included most of the Energy Efficiency Program staff.

To obtain sign-off to present this measure to the CPUC for approval, SoCalGas staff was required to engage more deeply with internal staff. Staff from Engineering; from the Energy Efficiency programs; from Evaluation, Measurement and Verification; and from Regulatory Affairs were required to verify that they supported the claims in the measure. A dedicated staff person built the internal consensus for this measure. Materials provided by Navigant, including the Mini-Business Plan, Work Paper, and Situational Analysis were critical to obtaining the necessary support.

In addition, P&G built awareness about this assessment among their management. Securing approval for budget and in-kind resources required significant buy-in at higher levels of

management. Communicating about the benefits of the partnership to the right people was key to obtaining approval.

Current Status of the Technology

SoCalGas and SDG&E are currently offering rebates for the product at one big box retailer. While awaiting approval from CPUC to move forward with the measure, these utilities used a Director Approval to launch the program to coincide with a nationwide marketing effort by P&G. PG&E will launch the measure within a rebate program, pending approval by CPUC.

P&G has launched a national ad campaign as a result of their engagement in the POF project. Prior to engagement with POF, P&G had no plans to prioritize its coldwater detergent in the next three to five years. Motivated by the utilities' commitment to the technology, P&G launched a national campaign targeting impressions on 60% of the U.S. Since the launch of the campaign, sales have increased.

Lessons Learned

This project was viewed as successful by all parties involved with it. The energy of the project team for this technology contributed to that success along with these other factors:

Champions with political savvy and clout within each organization led the effort. These individuals knew who to bring on board at which points and had access to them. They were able to secure resources when needed and make commitments for their organizations.

The partners understood each other's strengths and limitations. In a discussion early on, each organization outlined what they were able to commit and areas in which they were limited. This unique partnership brought together companies with different goals, corporate structures, and decision authorities. Understanding how to leverage strengths and overcome limitations was critical.

The value proposition for each partner was compelling. Each partner could see tangible benefits from this partnership and committed resources based on the potential of being part of something big.

Effective communication with the relevant parties built consensus early on. In addition to maintaining open and regular lines of communication for the project team, stakeholders in each of the organizations were integrated into the discussion early.

Improved Commercial Dishwashers

Navigant Consulting pursued a study on improved commercial dishwashers to address a technology that currently accounts for two-thirds of the natural gas energy used in commercial kitchens. Several manufacturers already offered high efficiency dishwashers, and the project sought to identify opportunities for SoCalGas to further the technology's market penetration. This project built on research on the technology undertaken at PG&E's Food Service Technology Center.

Description of Technology

Commercial dishwashers that maintain performance while reducing water and energy use; includes several dishwasher types: under counter, door, rack conveyor, and flight.

Project Goals

Identify sectors in which dishwashers are used and types of equipment used

Identify usage patterns, computed hours of usage and variations by sector, season, etc.

Assess decisions drivers and decision makers affecting purchase and operation

Project Approach

Navigant Consulting focused on the market-related aspects of this technology since other efforts in California were already investigating the technology.

PROJECT NAME
IMPROVED COMMERCIAL DISHWASHERS

CO-FUNDING SOURCES
NONE

TYPE OF ASSESSMENT
MARKET

TARGET SECTOR
COMMERCIAL

ANNUAL ENERGY SAVINGS POTENTIAL:
1.4 MILLION THERMS

PROJECT COST (INCL. CO-FUNDING)
$124,927

RECOMMENDED TO EE PROGRAM?
YES: BUSINESS ENERGY EFFICIENCY PROGRAM

EE PROGRAM FOR MEASURE
NONE TO DATE

Partners

Portfolio of the Future was the only funding organization for this project.

Scope of Study

Navigant Consulting hired an independent market research firm, Skumatz Energy Research Associates (SERA), to conduct the market assessment. The research firm used document review and interviews with manufacturers and over 100 end users to inform the study.

Initial plans also included a field test if the market research revealed a promising opportunity. The field test intended to gather data at four food service establishments from

different subsectors about usage patterns and to overcome barriers related to non-energy performance.

Study Results

SoCalGas staff indicated their pleasure with the high quality of the market research study. The study identified a strong market opportunity for the improved commercial dishwashers and the role that SoCalGas could play in enhancing market adoption. The study included information about non-energy benefits, customer perceptions, decision drivers, industry structure, and usage characteristics. Potential sites for the field study were also identified.

SoCalGas directed Navigant not to pursue the field study. SoCalGas had decided to work with another utility in the state and a different consulting firm to complete the work paper needed to introduce the technology in the Energy Efficiency programs. The other consultant's work was based on research at PG&E's Food Service Technology Center, which tested the equipment in a lab setting. Information about the non-energy performance has not been published.

Communication about the Study

Communication about this technology within SoCalGas was limited to a relatively small group. Navigant Consulting interfaced primarily with their main contact at SoCalGas and with a representative of the Emerging Technologies Program. An account representative that serves commercial food service facilities was also engaged to provide a comprehensive list of commercial kitchens. Navigant and the SoCalGas point of contact attempted to engage the Engineering team at several points in the process but did not receive the requested feedback.

Upon completion of the market study, Navigant submitted the market study and a draft work paper to the main contact at SoCalGas. In October 2008, a mini-business plan was also submitted.

Information about the project was communicated to external organizations at two points. Navigant Consulting presented information about the study to the California Sustainability Alliance in October 2007. In addition, SERA presented information about the sector's structure to the American Council for an Energy Efficiency Economy's 2009 Summer Study on Energy Efficiency in Industry; the related paper is published in the conference proceedings.[38]

Current Status of the Technology

SoCalGas is on the verge of submitting a work paper on this technology to the CPUC for approval; the work paper was prepared by the other consulting firm hired by SoCalGas and its partner utility. Pending approval of the work paper by the CPUC, SoCalGas is anticipating a 2010 program rollout. It is not clear if the program design has already been completed.

[38] Skumatz, L. and D.J. Freeman. August 2009. **"Tapping Into" Commercial Energy Savings: Two Non-Traditional Commercial Sector Energy Users." 2009 American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Industry Proceedings, No. 108.**

Lessons Learned

The results of this market study indicated a promising market potential, but SoCalGas decided to pursue the technology with other partners in the state. As a result, some of POF's efforts were duplicated. Some of the lessons learned from this project include the following:

Leveraging the strengths of different organizations requires effective communication. The research conducted by SERA on behalf of POF limited the scope to market-related issues because Navigant knew that other organizations in the state had already research the technology. When SoCalGas decided to use another organization to prepare the work paper, however, the other organization was not informed of the research prepared by Navigant. As a result, some efforts were duplicated.

It takes some time for third-party programs to gain traction within the utility structure. This project took place early in the POF program cycle at a time of significant organizational change. Effective communication practices between POF and SoCalGas and for staff within SoCalGas were in the process of being established. As a result, some internal stakeholders did not recognize the importance of their input in the project's early stages. This hampered the project's long-term impact.

Establishing the right relationships at the outset of a project is critical. Without the buy-in of key stakeholders, even well-designed projects can result in sub-optimal outcomes. Taking the time to build those relationships may initially delay a project but can produce more dynamic results.

Appendix B:
List of Interviews Conducted for Case Studies

Name	Organization	Related Project
Ed Becker	Southern California Gas	Coldwater Detergent, Improved Commercial Dishwashers
Craig McDonald	Navigant Consulting, Inc.	Coldwater Detergent, Improved Commercial Dishwashers
Laurie Park	Navigant Consulting, Inc.	Coldwater Detergent, Improved Commercial Dishwashers
Jay Luboff	Navigant Consulting, Inc.	Coldwater Detergent, Improved Commercial Dishwashers
Kanishka Das	Procter and Gamble	Coldwater Detergent
Amanda Treeby	Procter and Gamble	Coldwater Detergent
Lauren Thaman	Procter and Gamble	Coldwater Detergent
Steve Hastie	Navigant Consulting, Inc.	Coldwater Detergent
Darrell Brand	Southern California Gas	Coldwater Detergent
Ganesh Venkat	Southern California Gas	Coldwater Detergent, Improved Commercial Dishwashers
Judy Reich	Navigant Consulting, Inc.	Improved Commercial Dishwashers
Juri Freeman	Skumatz Economic Research Associates	Improved Commercial Dishwashers
Lisa Skumatz	Skumatz Economic Research Associates	Improved Commercial Dishwashers
Phil Ratermann	Hobart Corporation	Improved Commercial Dishwashers

Appendix C:
Portfolio Evaluation Scores by Project

	Robustness of VP		Extent to Which Due Diligence Has Been Conducted						
Project Name	**Resembles a VP of a technology that has demonstrated commercial success**	**Each element is described to a reasonable level of specificity**	**From a trusted source**	**Verifiable**	**Captures enduring, lasting market trends**	**Relevant to the product at hand**	**Supports the claims made in the VP**	**Statistically Significant** ***If relevant: Type Score. If not relevant: Leave Blank.***	**Degree to which market readiness has been assessed**
Advanced Tunnel Washers	19	9	10	10	4.5	15	15		8.5
Automatic Steam Trap Monitoring	19	10	10	10	4	15	14		7.5
Cold Water Detergent	18	10	10	10	5	15	15		10
Flame Intensity Analysis	14.5	9	3.5	8	3	10	6		3.5
Improved Commercial Dishwashers	14	7	10	10	3	15	12.5		8
Laundry Wastewater Recycling	16	8	10	10	4	15	12.5		7.5
Low Temperature Detergent	15.5	8	8	10	4	10	8.5		5
Spyrocor Radiant Heat Transfer Inserts	16.5	8	10	8	3	8.5	15		7

	Official Scoring		
Project Name	**Subtotal: Robustness of VP**	**Subtotal: Due Diligence**	**Total Points Earned**
Advanced Tunnel Washers	28	63	91
Automatic Steam Trap Monitoring	29	61	90
Cold Water Detergent	28	65	93
Flame Intensity Analysis	24	34	58
Improved Commercial Dishwashers	21	59	80

	Official Scoring		
Laundry Wastewater Recycling	24	59	83
Low Temperature Detergent	24	46	70
Spyrocor Radiant Heat Transfer Inserts	25	52	77

Appendix D:
Self-Report Value of POF Involvement in Projects

	Verify/Assess energy / environmental performance	Address Cost-Effectivess Issues	Provide Neutral Third-Party Assessment	Support Program / Incentive Design	Conduct Outreach / Increase Awareness	Direct Effect on Market
Advanced Tunnel Washers	•			•		
Automatic Steam Trap Monitoring	•	•				
Cold Water Detergent	α	•		*	*	*
Flame Intensity Analysis	•			•	•	
Improved Commercial Dishwashers	•			•		
Laundry Wastewater Recycling	•			•		
Low Temperature Detergent	•			•		
Spyrocor Radiant Heat Transfer Inserts	•					

	Address Consumer Concerns / Needs	Contribute to a Broader Effort	Determined That Technology Not Ready for Incentive Program	Described the Value of the Technology, not the Assessment	None Stated	Understand market structure
Advanced Tunnel Washers	•					•
Automatic Steam Trap Monitoring	•					•
Cold Water Detergent	α	*				
Flame Intensity Analysis	•					
Improved Commercial Dishwashers						•
Laundry Wastewater Recycling	•					•
Low Temperature Detergent						•
Spyrocor Radiant Heat Transfer Inserts						

5. SCG 3531: PACE ENERGY EFFICIENT ETHNIC OUTREACH PROGRAM

5.1 Introduction

The PACE Energy Savings Project (PACE) targets Chinese, Korean, Vietnamese, and Hispanic customers in the residential and business sectors for Southern California Gas Company (SCG). The program provides in-language information to these customers in the form of collateral, outreach booths at community events, cold call walk-ins to businesses, and in-language food service industry seminars. The program encourages customers to save energy through behavior changes, participate in utility programs such as Home Energy Efficiency Surveys and rebate programs, install free measures provided by the program, and, when applicable, attend an in-language food service seminar. The three-year adopted program budget was $2.9 million.[39]

This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavioral change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants were fed into resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program?

In addition to these research questions, we also comment on the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on this area in a section called Evaluability Assessment toward the end of this report.

5.2 Summary of Key Findings

While our evaluation sought to determine the extent of the energy savings provided by PACE in PY2006-2008, PACE was implemented as an education and information program and consequently did not have explicit energy savings goals. Its primary value lies in its role in the marketplace (i.e., reaching out to non-English-speaking populations that otherwise would not have received as much energy efficiency information as the general population) and in its ability to channel the individuals touched by the program into other utility programs.

PACE performs outreach at community events, community organizations, culturally appropriate media, and cold call walk-ins or contacts with small businesses. PACE uses these contacts to distribute in-language energy efficiency and rebate information and applications, free aerators and showerheads, and Home Energy Efficiency Surveys. PACE provides collateral and one-on-one conversations at events or at individual businesses. PACE also tries to channel the food service sector into translated food service seminars,

[39] Utility energy efficiency monthly reports: SCG.MR.200812.2xls, version 2, uploaded 4/24/2009

where the program gives a PowerPoint presentation describing the benefits of energy efficiency, how to save energy in the food service industry and the utility rebates available. These seminars occur both at SCE's Educational Resource Center[40] and at other locations in the community that are convenient to the expected participants.

While the program conducts many types of outreach, this evaluation predominantly focuses on the impact of booths at community events as well as direct outreach to businesses and in-language food service seminars. Below is a bulleted summary of our key findings:

- Over the three-year period, we estimate that PACE has been able to directly reach approximately 18,062 customers (3,969 Hispanic, 2,108 Vietnamese, 1,974 Chinese, 481 Korean, and 9,530 unknown ethnic customers). These participants may have received one of several types of PACE information: taken a Home Energy Efficiency Survey HEES at a booth, received a packet of information at their business, received free measures or attended an in-language food service seminar. PACE's information likely extends further than the participants it directly touches. Survey results show that two-thirds of residential participants and 55% of nonresidential participants say they shared PACE information with others. However, neighborhood analysis maps show that PACE held very few events in areas with high concentrations of at least one of the targeted ethnicities. Because CLEO targets similar groups (the same ethnicities except Hispanic) in the SCG service area, PACE and CLEO coordinate both to avoid attendance at the same events or to use the same training locations.
- One of the most valuable aspects of this program is that it channels people into the HEES program and other utility programs. At community events, participants are encouraged to take a short version of the HEES.
    - PACE's quarterly reports show that 7,024 participants completed the HEES, 39% of the total participants. This is consistent with the fact that two-fifths of residential survey respondents (41%) recalled completing the HEES. Further, 21% of residential and 30% of nonresidential participants claim to have participated in a utility program since participating in PACE. The most common residential program is the Low Income Energy Efficiency program (52%).
- The program is increasing knowledge and awareness and inducing behavior change in its targeted population, likely because it overcomes the language barrier that prevents this population from accessing energy efficiency information directly from the utilities.
    - Many of the people touched by the program did not previously know about energy efficiency. One-third of residential respondents and 43% of nonresidential respondents said they had no knowledge or very little knowledge of energy efficiency prior to participating with PACE. No matter the level of prior knowledge, PACE participants believed they learned a lot about

[40] SCE's Customer Technology Application Center (CTAC) is an educational resource center, using the latest in technologies for teaching. The center provides energy management and energy efficiency solutions to help organization save energy, money, and the environment. CTAC offers hands-on demonstrations of the latest state-of-the-art technologies as well as workshops, classes, and interactive displays.

saving energy as a result of this program, with a mean rating of 5.7 for residential participants and 5.8 for nonresidential participants on a scale of one to seven.

- The information engendered change as 85% of residential participants and 95% of nonresidential participants reported changing their behavior with respect to using energy. Just over half (51%) of residential participants installed the free aerator, and 37% installed the free showerhead. In addition, 85% of residential and 61% of nonresidential participants reported installing CFLs or energy efficient lighting. On average, residential participants installed eight CFLs in their homes.

- Not only are people installing energy efficient equipment, but they are seeking more information and spreading the word. Approximately four in ten residential (37%) and nonresidential (41%) participants said they searched for additional information after participating with PACE.

- This evaluation calculated energy savings for the sample of 100 residential and 44 nonresidential participants, and extrapolated it the 3,413 residential and 669 nonresidential Chinese and Vietnamese program participants. The net energy savings for these participants averages 1,559 MWh and 24,633 therms, the majority of which comes from installation of lighting measures. Given that our survey efforts targeted the Chinese and Vietnamese program participants, we only extrapolated the energy savings to the known number of these participants (4,082) to provide the most conservative estimate. Because our survey did not target Korean or Hispanic participants, we cannot be certain that they would have behaved similarly or taken similar actions due to the program's intervention. If we assume that Korean and Hispanic participants, behaved similarly then the energy savings for this program would be 4.5 times larger.

5.3 Methodology

Opinion Dynamics utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program materials, databases, quarterly reports, and past process evaluations[41]. For primary data collection, we observed four booths at community events, conducted intercepts at those events, and fielded a telephone survey to participants in PACE booths and recipients of direct business outreach and/or seminars.

We observed four events in October and November 2008 that in combination targeted all four ethnicities, and we intercepted Hispanic, Chinese, and Vietnamese participants (Table 43). Each event was observed by a team member fluent in one or more of the languages spoken by the targeted ethnicities. These observations allowed us to further explore what

[41] The process evaluation for PACE residential was undertaken by ECONorthwest as part of the *Process Evaluation of the Southern California Gas 2006-2008 Residential Customer Programs Final Report*, published February 15, 2008. The process evaluation for PACE nonresidential was undertaken by Opinion Dynamics Corporation as a subcontractor to KEMA for the *Process Evaluation of SoCalGas' 2006-2008 Non-Residential Programs*, published March 15, 2008.

the program accomplishes at community events, who typically approaches the booths, and the level of interest in the information. The intercepts help to understand the potential impact of program efforts on participants' energy usage behavior.

Table 43. Event Observations and Intercepts

Community Event	Attendees	Groups Present	Target Group	Intercepts
Garden Grove Event (Garden Grove)	300-500	Korean, Vietnamese	Vietnamese	20 Vietnamese
Accessible City Expo (Los Angeles)	1,000-1,200	Hispanic	Hispanic	6 Spanish and 6 English
Magnolia Place Community Celebration (Los Angeles)	500	Hispanic	Hispanic	6 Spanish
PACE Asian Business & Career Expo (Pasadena)	5,000	Chinese, Korean, Vietnamese	Chinese	5 Chinese and 12 English

The Opinion Dynamics evaluation team also developed and fielded a telephone survey in two of the languages reached by this program (Chinese and Vietnamese). In an effort to limit the evaluation cost, we focused on the two languages prominent in the program. Furthermore, many of the program's participants could be identified in the program database as Chinese or Vietnamese. The survey included a range of questions on awareness and knowledge of energy efficiency, and elicited information about behavioral changes stemming from the program, including channeling into utility resource acquisition programs. The sample was drawn from a list of residential and nonresidential participants provided by PACE.[42] A random sample was drawn from two strata based on the language of the participants. The residential participants in the sample attended one of 123 different community events that took place in 2007 and 2008. The nonresidential participants either attended a food service seminar or received outreach from PACE at their small businesses or at a community event during this same time frame. While the participant databases did not explicitly note the type of outreach received by each nonresidential participant, we estimate that half of nonresidential respondents attended a food service seminar while the other half received outreach[43]. The survey was fielded in May 2009.

[42] The numbers of participants nor the number of events they attended do not total the number of participants or events reported by PACE. However, we did not receive contact information for all participants.

[43] The participant database noted whether a nonresidential participant attended a seminar or received outreach. However, the nature of the outreach (whether it was at a booth event or received via a walk-in to the business) was not included.

Table 44. Telephone Interview Completes

Residential	Chinese	Vietnamese	Total
Total Participants	1,700	1,713	3,413
Completed Interviews	50	50	100
Nonresidential	Chinese	Vietnamese	Total
Total Participants	274	395	669
Completed Interviews	25	19	44

Note: PACE did not start tracking participants until December 2007, and over half of tracked participants are listed as other or blank for ethnicity; therefore these participant numbers are likely underestimates.

5.4 Detailed Findings

5.4.1 What education or information is provided and what behaviors are encouraged?

PACE mainly educates the market about utility programs and inexpensive ways to save energy to ethnic minority populations. PACE's primary efforts are in-language direct outreach through booths at community events and cold call walk-ins to businesses. At community events, PACE distributes in-language information and efficiency measure giveaways. It also provides an opportunity to easily take an energy audit in the form of an online or paper in-language Home Energy and Water Efficiency Survey (HEES).[44] PACE utilizes media outreach primarily to advertise its presence at events such as the Fundamental of Energy Efficiency in Food Service seminars where PACE provides in-language translation.[45]

Below we describe the information provided in residential and nonresidential outreach.

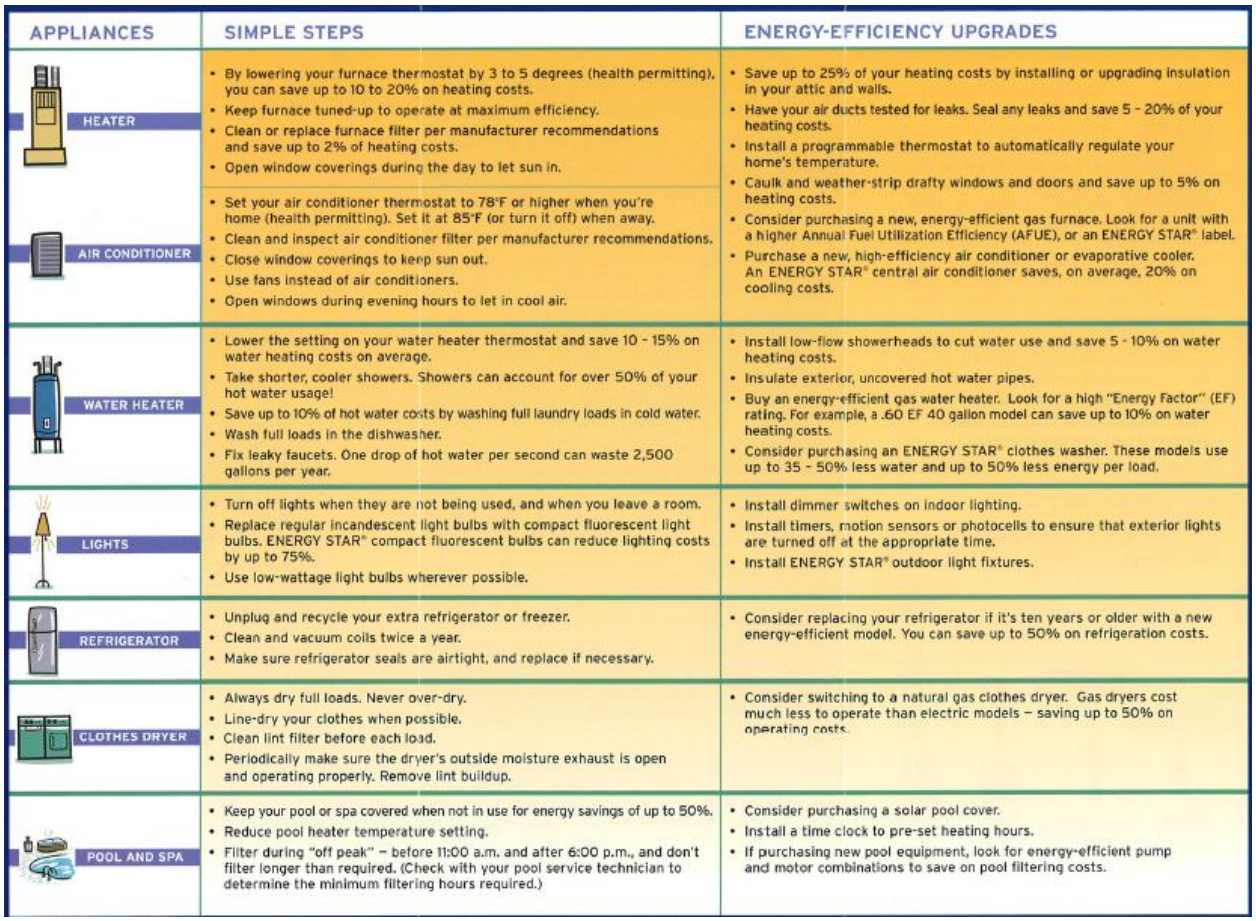
Residential

At community events, PACE sets up booths where it recommends participation in available IOU rebate programs, installation of energy efficient appliances and technology (including thermostats, showerheads, and aerators), and simple energy saving behavior changes (such as turning off lights, lowering thermostat and furnace settings, etc.). In addition, the program distributes a free low-flow showerhead and three faucet aerators to participants. Figure 34 below shows an example of information about energy efficiency distributed at the events. Notably, the program did not have translated materials available until more than halfway through the program cycle.

[44] The HEES is presented by SoCalGas and SCE and is designed to give participants customized gas, electric, and water savings tips. PACE collects completed surveys, sends them to the utilities, and then the utilities send participants their customized reports.

[45] The food service seminars are generally held at SCE's Educational Resource Center; however, PACE often holds their translations at locations familiar to the ethnic communities they target. The seminars give an overview of energy terms, the relationship of energy use to cost, energy use of various food service appliances and lighting, and between efficiency levels and types of appliances. The seminars also offer tips for reducing energy usage and a brief introduction to rebates available.

Figure 34. Example of Information Handout – "45 Ways to Save Energy"



APPLIANCES	SIMPLE STEPS	ENERGY-EFFICIENCY UPGRADES
HEATER	• By lowering your furnace thermostat by 3 to 5 degrees (health permitting), you can save up to 10 to 20% on heating costs. • Keep furnace tuned-up to operate at maximum efficiency. • Clean or replace furnace filter per manufacturer recommendations and save up to 2% of heating costs. • Open window coverings during the day to let sun in.	• Save up to 25% of your heating costs by installing or upgrading insulation in your attic and walls. • Have your air ducts tested for leaks. Seal any leaks and save 5 – 20% of your heating costs. • Install a programmable thermostat to automatically regulate your home's temperature. • Caulk and weather-strip drafty windows and doors and save up to 5% on heating costs. • Consider purchasing a new, energy-efficient gas furnace. Look for a unit with a higher Annual Fuel Utilization Efficiency (AFUE), or an ENERGY STAR® label. • Purchase a new, high-efficiency air conditioner or evaporative cooler. An ENERGY STAR® central air conditioner saves, on average, 20% on cooling costs.
AIR CONDITIONER	• Set your air conditioner thermostat to 78°F or higher when you're home (health permitting). Set it at 85°F (or turn it off) when away. • Clean and inspect air conditioner filter per manufacturer recommendations. • Close window coverings to keep sun out. • Use fans instead of air conditioners. • Open windows during evening hours to let in cool air.	
WATER HEATER	• Lower the setting on your water heater thermostat and save 10 – 15% on water heating costs on average. • Take shorter, cooler showers. Showers can account for over 50% of your hot water usage! • Save up to 10% of hot water costs by washing full laundry loads in cold water. • Wash full loads in the dishwasher. • Fix leaky faucets. One drop of hot water per second can waste 2,500 gallons per year.	• Install low-flow showerheads to cut water use and save 5 – 10% on water heating costs. • Insulate exterior, uncovered hot water pipes. • Buy an energy-efficient gas water heater. Look for a high "Energy Factor" (EF) rating. For example, a .60 EF 40 gallon model can save up to 10% on water heating costs. • Consider purchasing an ENERGY STAR® clothes washer. These models use up to 35 – 50% less water and up to 50% less energy per load.
LIGHTS	• Turn off lights when they are not being used, and when you leave a room. • Replace regular incandescent light bulbs with compact fluorescent light bulbs. ENERGY STAR® compact fluorescent bulbs can reduce lighting costs by up to 75%. • Use low-wattage light bulbs wherever possible.	• Install dimmer switches on indoor lighting. • Install timers, motion sensors or photocells to ensure that exterior lights are turned off at the appropriate time. • Install ENERGY STAR® outdoor light fixtures.
REFRIGERATOR	• Unplug and recycle your extra refrigerator or freezer. • Clean and vacuum coils twice a year. • Make sure refrigerator seals are airtight, and replace if necessary.	• Consider replacing your refrigerator if it's ten years or older with a new energy-efficient model. You can save up to 50% on refrigeration costs.
CLOTHES DRYER	• Always dry full loads. Never over-dry. • Line-dry your clothes when possible. • Clean lint filter before each load. • Periodically make sure the dryer's outside moisture exhaust is open and operating properly. Remove lint buildup.	• Consider switching to a natural gas clothes dryer. Gas dryers cost much less to operate than electric models – saving up to 50% on operating costs.
POOL AND SPA	• Keep your pool or spa covered when not in use for energy savings of up to 50%. • Reduce pool heater temperature setting. • Filter during "off peak" – before 11:00 a.m. and after 6:00 p.m., and don't filter longer than required. (Check with your pool service technician to determine the minimum filtering hours required.)	• Consider purchasing a solar pool cover. • Install a time clock to pre-set heating hours. • If purchasing new pool equipment, look for energy-efficient pump and motor combinations to save on pool filtering costs.

Note: This is an English-translated version of this report, but PACE provides this information in all of the languages targeted by the program.

At each of the four events observed, when discussing energy efficiency options with program participants, PACE representatives placed particular emphasis on installation of the showerhead and faucet aerators, purchase and installation of ENERGY STAR appliances, as well as taking advantage of utility rebate programs.

In an effort to identify the key points participants heard at the booth, during the event intercepts, participants were asked to identify three home energy efficiency improvements. Half reported installation of energy efficient lighting or CFLs, 29% said using less hot water/water, 25% said using less gas/electricity in general, 21% said turning off lights when leaving a room, and 21% said purchasing energy efficient appliances.

Nonresidential

PACE contacts nonresidential participants through either community events or cold call walk-ins to businesses that PACE has identified as part of their target market.[46] Interactions

[46] PACE's contract requires them to target the following sectors: real estate, home improvement contractors, institutions, appliance retailers, escrow/home inspection, financial institutions that serve residential customers, multi-family owners, multi-family contractors, financial institutions that serve the multi-family

with the nonresidential customer generally seem to be brief and one-on-one, and include an introduction of the PACE Energy Savings Project and distribution of program materials. The nonresidential materials include a Commercial Food Service Rebate program flyer, flyers about other rebates for certain business types, and applications for some rebate programs. PACE also attempts to sign up food service industry participants (who make up more than 40% of the nonresidential contacts) for upcoming translated seminars. PACE sometimes holds in-language food service seminars in locations familiar to the ethnic community, rather than at SCE's Educational Resource Center[47], which increases attendance because of the convenience level.

5.4.2 What is the reach of the program?

PACE reaches its residential and nonresidential customers through a variety of methods, as described in the previous section. Accurate program reach numbers are difficult to obtain as the program did not start tracking residential or business participants until December 2007 (note that this is discussed further in the Evaluability section). Although many people may visit a PACE booth, we define reach in this evaluation as those people that engaged with PACE long enough to provide their contact information, often by filling out a survey or receiving a free item. Based on program databases, we estimate that PACE reached over 18,000 people[48] through a total of 143 booth events and presentations as well as through direct walk-ins to businesses and food service seminars.

Table 45. Reach of PACE Energy Savings Project

Outreach Type	Hispanic Participants	Vietnamese Participants	Chinese Participants	Korean Participants	Other/ NA*	Total Participants
Residential	3,686	1,713	1,700	211	5,917	13,227
Nonresidential	283	395	274	270	3,613	4,835
Total Participation	**3,969**	**2,108**	**1,974**	**481**	**9,530**	**18,062**

*The participant lists include many records in which ethnicity is identified as "N/A" or "OTHER," or left blank.

PACE's reach also extends beyond its direct participation. Two-thirds of booth participants share information with others, most commonly with friends (Figure 35).

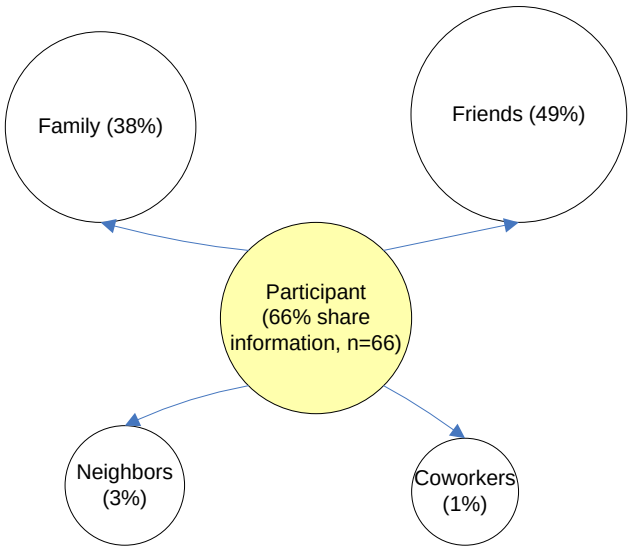
industry, food services, laundromats/drycleaners, hotels and motels, small buildings, beauty shops and nail salons, and financial institutions that serve businesses

[47] SCE's Customer Technology Application Center (CTAC) is an educational resource center, using the latest in technologies for teaching. The center provides energy management and energy efficiency solutions to help organization save energy, money, and the environment. CTAC offers hands-on demonstrations of the latest state-of-the-art technologies as well as workshops, classes, and interactive displays.

[48] Participants are defined as people who provided contact information to the program as these people likely engaged in the program long enough to absorb information.

Figure 35. Residential Participant Information Sharing by Group (n=100)

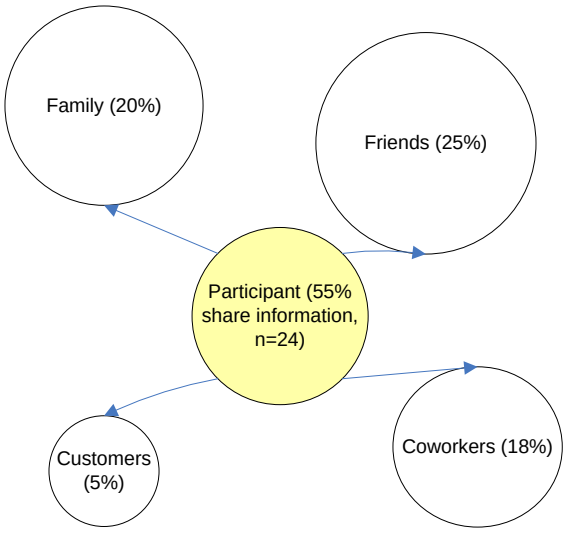
Multiple Response



Just over half (55%) of nonresidential participants reported sharing information with others, primarily friends (Figure 36).

Figure 36. Nonresidential Participant Information Sharing by Group (n=44)

Multiple Response



What populations are being reached by PACE?

Residential

PACE is mostly reaching SCG residential customers that speak Chinese, Korean, Vietnamese, or Spanish and who are interested in ways to save energy. When we conducted

the event intercepts, more than half of respondents (53%) said they had visited the PACE booth because they wanted more information on energy efficiency. 22% wanted to talk to a representative, 18% wanted to receive a giveaway, and 16% were just walking by the booth. In addition, at the Asian community events, observers noted that attendees seemed to be drawn to the booth when they heard their language being spoken – unlike the other booths that had only English speakers. This observation provided evidence that the in-language information dissemination approach is effectively attracting interest amongst this target population. Observers also noted that attendees were drawn by the giveaways, providing evidence that the free measures are also effectively driving interest.

Our intercepts and surveys of participants demonstrated some unique attributes of the people reached at community events. Both intercept and survey respondents skewed older, with over half at least 45. The population reached seems also to be relatively low-income – at least one-third of survey respondents earn less than $20,000, and 75% of intercepts were renters.

PACE's reach primarily extends into Los Angeles areas with concentrations of Asian or Hispanic customers. We mapped PACE's residential event locations to analyze the appropriateness of PACE's event location selections by comparing the event locations to concentrations of the targeted ethnicities (Figure 52 through Figure 55 in the appendix).[49] Only a few of PACE's events seem to have been held at the center of concentration of a single ethnicity. However, approximately two-thirds of their events targeted multiple ethnicities and therefore could not be in an area of high concentration for all ethnicities.

Nonresidential

PACE is reaching primarily small businesses (82%), and the type varies by ethnicity – for Vietnamese it is mainly food service businesses (79%) with multiple locations, while for Chinese the type was more dispersed but was most commonly office (36%). PACE's contract with SCG required them to target a variety of business types including restaurants; laundromats and drycleaners; beauty shops and nail salons; multi-family building owners and managers; contractors; and financial institutions. Our survey data and program databases indicate that the program reached these sectors.

5.4.3 How likely is the program to induce behavioral change?

PACE addresses the language barrier of Chinese, Korean, Vietnamese, and Spanish speaking customers, which is believed to be one of the main factors that prevents them from accessing utility and third-party energy efficiency offerings. PACE's aim is to increase awareness and knowledge of energy efficiency in this population by addressing these language and cultural issues. According to the program theory, leveraging familiarity of the ethnic communities is the key to gaining access to them, and addressing language and cultural barriers is the key to its ability to induce behavior change. The program speaks to participants in their language, which earns their trust and makes them more likely to listen

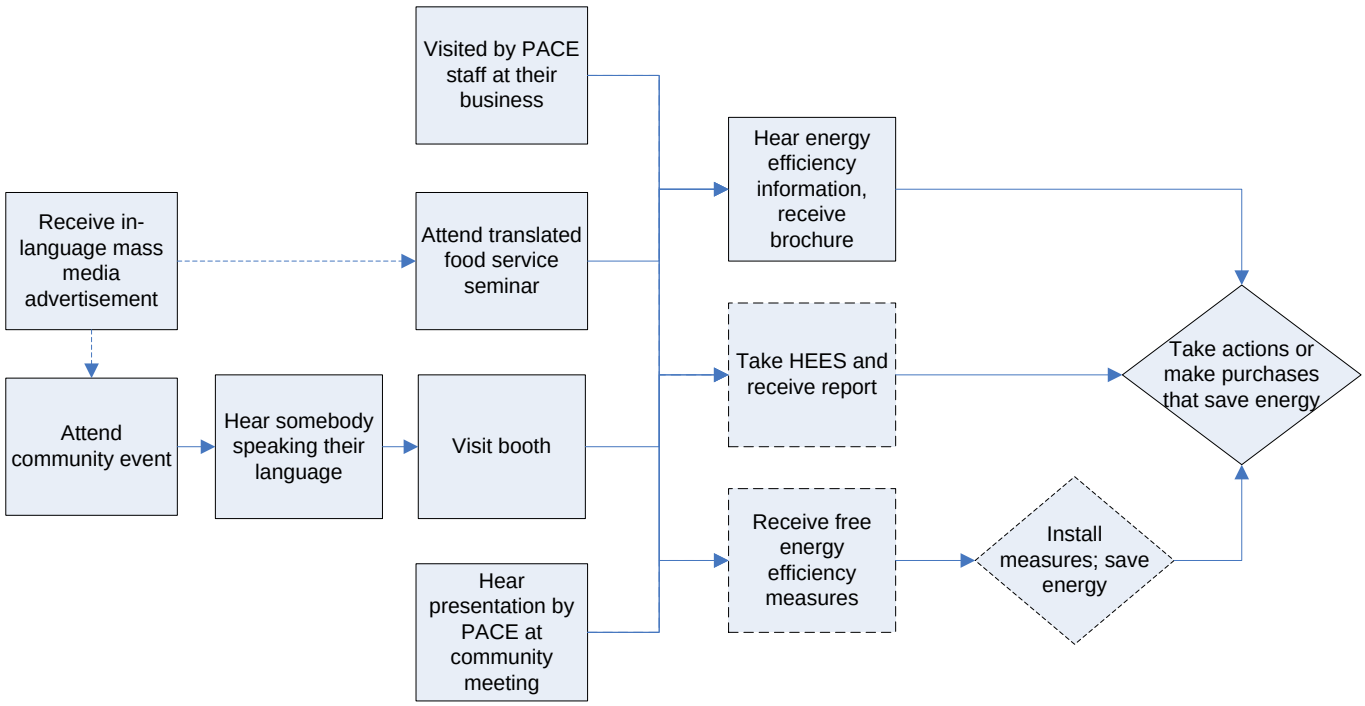
[49] These maps were created using the program information that was provided to us under one or more data requests through EEGA, in which we asked for a list of all residential events and their locations.

and absorb information. In theory, this knowledge will lead to energy saving actions. However, PACE does not have explicit energy savings goals.

Because of the linguistic isolation of members in these communities, they would likely not gain knowledge regarding energy saving opportunities through English-only mediums. PACE provides an opportunity for non-English-speaking populations to gain knowledge of how they might save energy in their homes and businesses through: installing free measures, taking a HEES in their language and receiving a report in return in their language, learning about energy saving options at community events, or participating in resource acquisition programs.

Based on the information we have obtained and reviewed in this evaluation, PACE is likely to induce behavior change through a few different paths (Figure 37). Participants may change behavior either by being visited by PACE staff at their business, hearing about energy efficiency when visiting a booth, attending an in-language seminar, acquiring free energy efficiency measures, completing a HEES survey, or a combination thereof.

Figure 37. Potential Primary Paths to Behavior Change



Note: Dotted lines indicate that a step does not always take place.

Notably, this program did not have translated educational materials and presentations until the third quarter of 2007, more than halfway through the program cycle. The in-language materials are a key component of the program's strategy to induce behavior change and therefore the program was not likely to induce behavior change until late in the program cycle.

Other programs such as Flex Your Power-Ethnic and CLEO (Custom Language Efficiency Outreach) offer energy education in this area to some of the same target audiences. CLEO targets similar groups (the same ethnicities except Hispanic) in the SCG service area, but

PACE and CLEO coordinate to avoid attending at the same events or using the same training locations. In addition, CLEO focuses more on providing seminars to the residential sector, whereas PACE places more emphasis on booths at community events for the residential sector as well as outreach to the nonresidential sector. The Flex Your Power program (ethnic component of the program) also targets hard-to-reach ethnic customers by disseminating print, radio, and TV advertisements in the same languages as PACE. This program only provides media advertisements regarding energy efficiency purchase and conservation behaviors. Its coverage does overlap with that of PACE, but it does not provide direct contact through presence at community events.[50] In addition, PACE is the only one of these programs that targets nonresidential customers that primarily speak Chinese, Vietnamese, Korean, and Spanish.

5.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

Residential

Our survey results demonstrate that PACE participants do in fact learn about energy efficiency through the booths at community events (as hypothesized in the paths shown in Figure 37). While there was a range of knowledge prior to the seminars (from none to a lot), all learned what they considered a high amount during their interaction with PACE (Figure 38).

[50] Other hard-to-reach residential programs in the state include SDG&E's Hard-to-Reach lighting turn-in program and an Energy Efficiency on Wheels program in San Francisco. However, these programs are not in language or in SCG or SCE territory. Other nonresidential hard-to-reach programs include SCE Small Business Energy Connection Program, SCE Emerging Communities Energy Efficiency Program, PG&E and SCE's Business Energy Services Team Program, PG&E's Energy Fitness Program, and SDG&E's Small Business Energy Efficiency Program. However, only some of these programs target SCG customers, and the nonresidential programs focus on direct install rather than education. The programs in areas that overlap with SCG's territory also focus on electric savings. These programs are also not in-language.

Figure 38. Residential Energy Efficiency Knowledge Increase

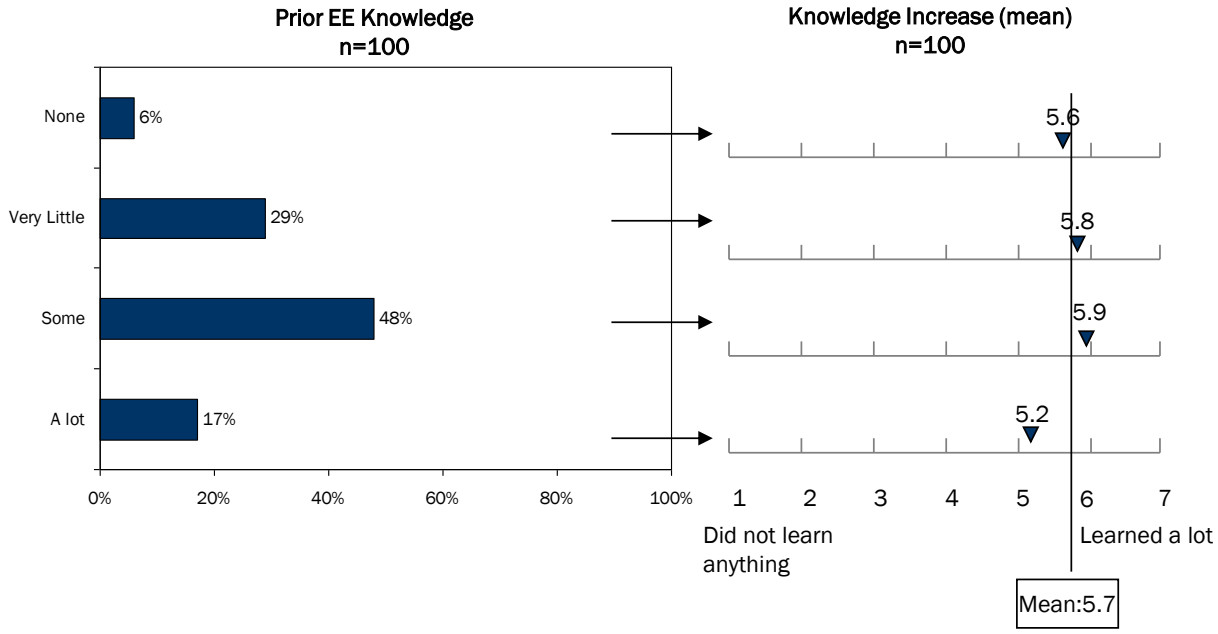
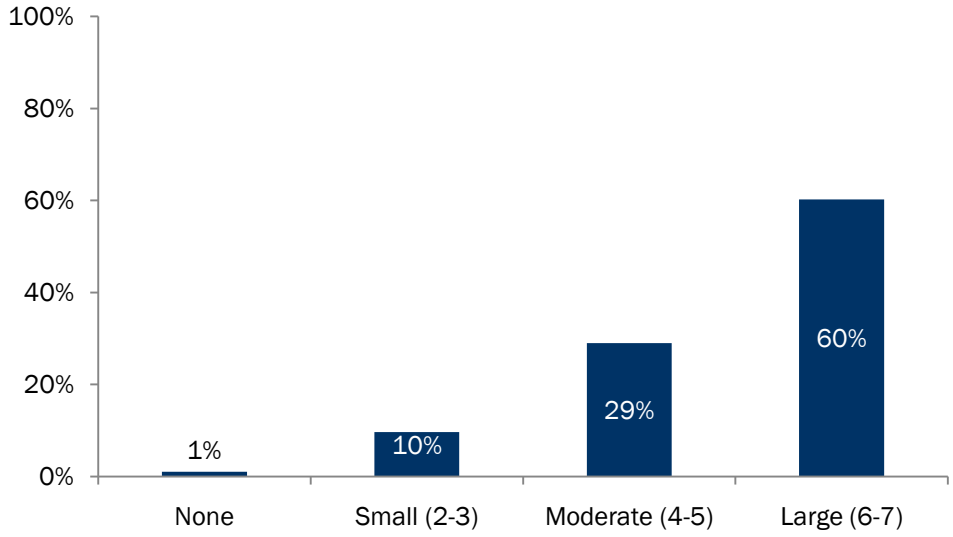
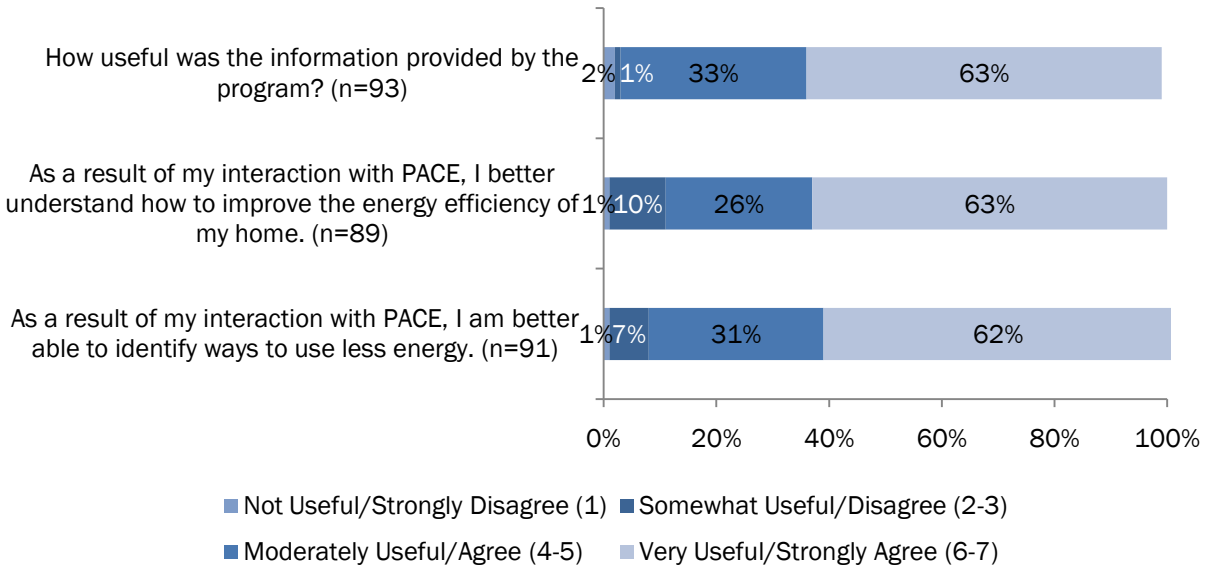


Figure 39. Overall Residential Knowledge Increase (n=93)



Nearly two-thirds of booth participants found PACE booth information to be very useful. Comparatively, our survey of CLEO seminar participants revealed that more (72%) people found the seminar information useful than the PACE booth information. Further, 63% of PACE participants better understand how to improve the energy efficiency of the home and are better able to identify ways to use less energy (Figure 40). Given that these participants likely only had a short contact with PACE, perhaps five minutes at a booth, these numbers seem to be in an acceptable range.

Figure 40. Residential Knowledge and Awareness Gains



Nonresidential

There was also a wide range of prior knowledge for nonresidential participants (Figure 41), but all felt they learned a lot about saving energy as a result of the program – whether they attended a food service seminar or simply received program information at a community event or at their business. We looked for differences between these two methods of knowledge transfer, but there were no differences in the amount of information they reported learning.

Figure 41. Nonresidential Energy Efficiency Knowledge Increase

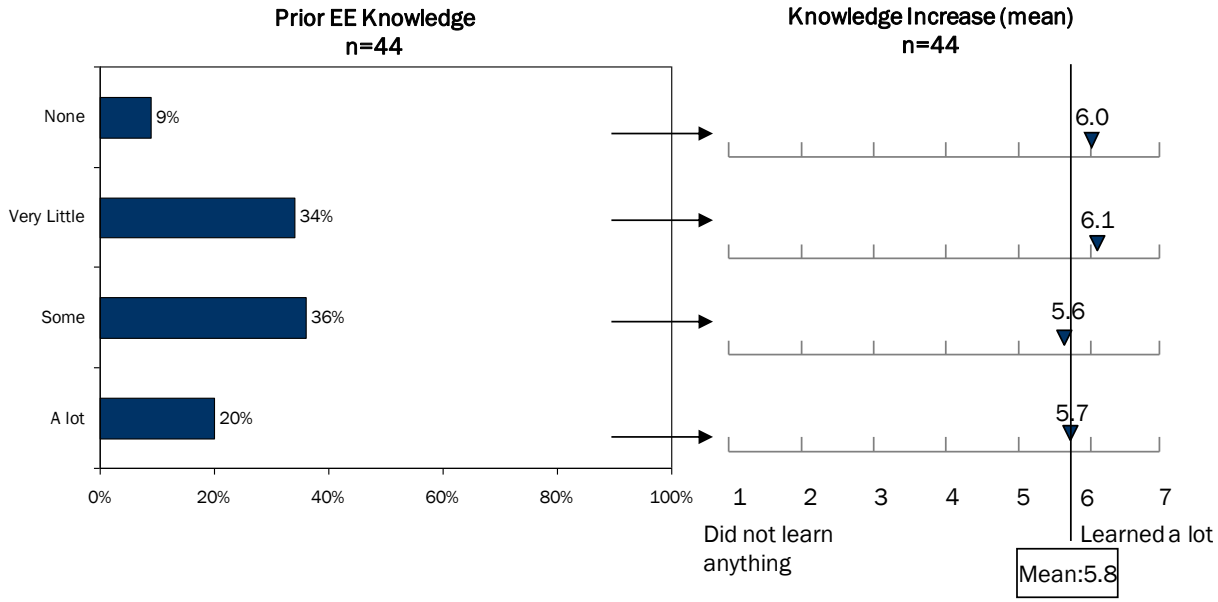
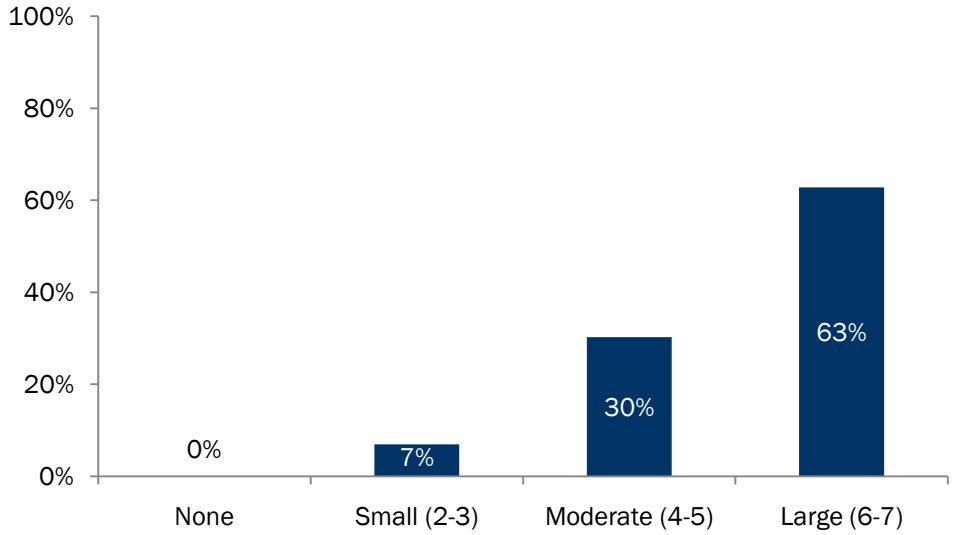
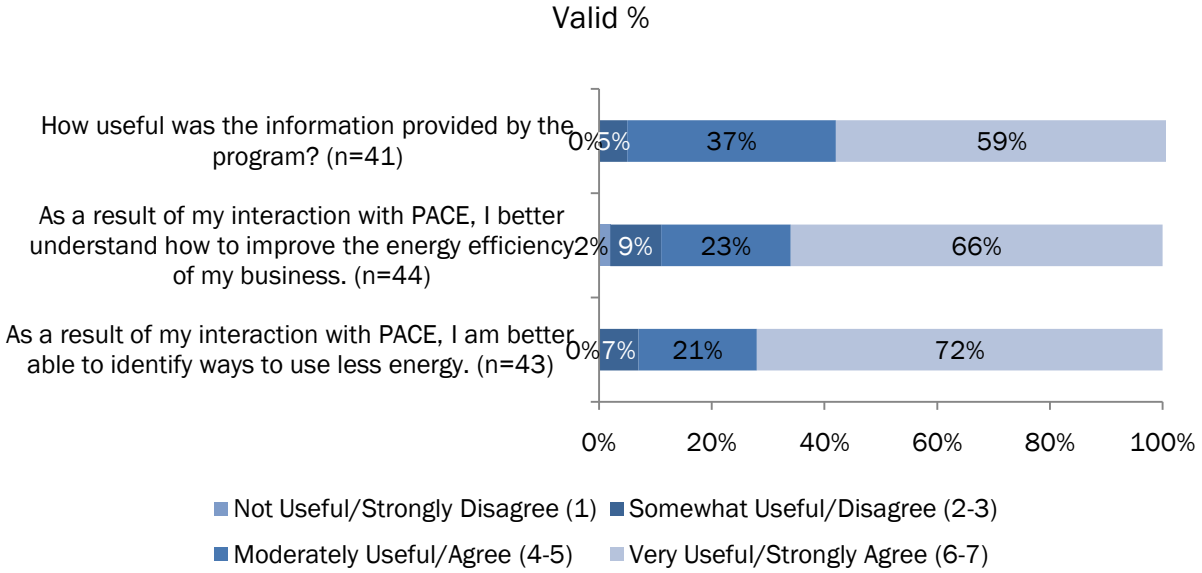


Figure 42. Nonresidential Overall Knowledge Increase (n=44)



Three in five participants found the information to be very useful, and even more better understand how to improve the energy efficiency of the business (66%) and are better able to identify ways to use less energy (72%) (Figure 43). Again, there were no differences between those participants who likely have a short interaction with PACE (booth or business outreach) and those who have a longer interaction (food service seminar). However, in both cases, perhaps PACE could improve the perceived usefulness of the information.

Figure 43. Nonresidential Knowledge and Awareness Gains



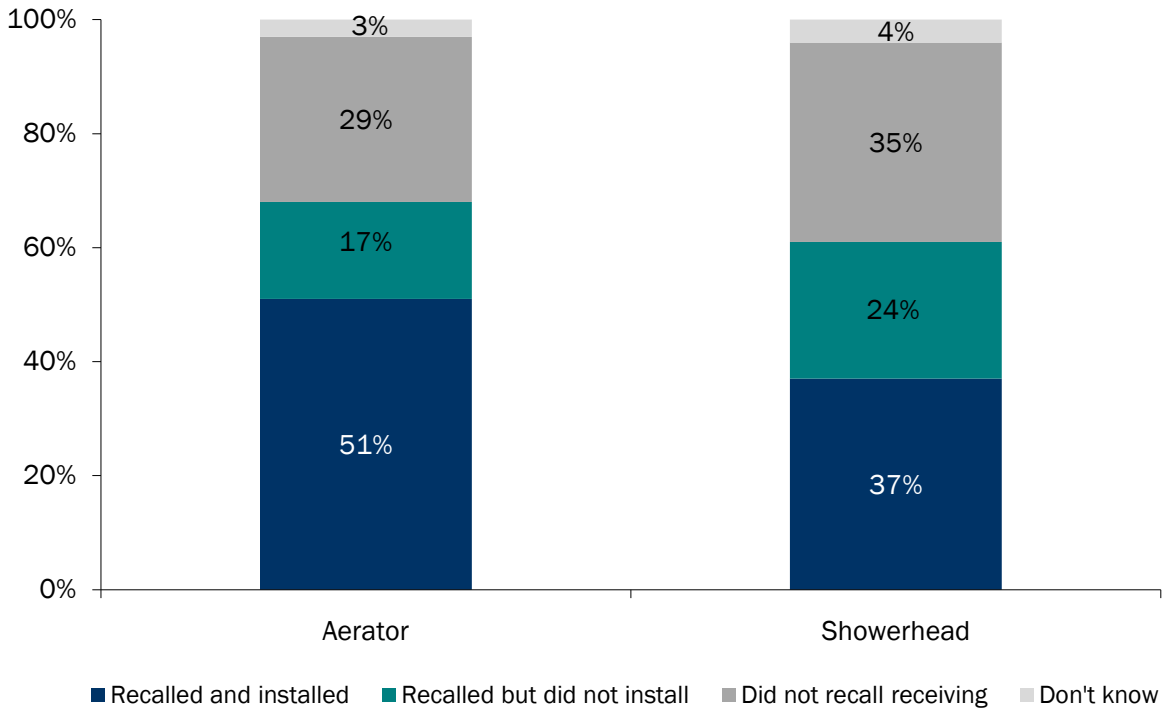
5.4.5 What behavior change occurred as a result of the program?

PACE encourages many energy saving measures and actions through their direct outreach. More than eight in ten (85%) residential participants reported changing their behavior, which we described in the survey as "turn off lights more frequently, change appliance or electrical equipment use patterns, alter operations and maintenance, etc." Notably, the percent who reported changing behavior is higher than the 78% of event intercept respondents who reported they were likely to change behavior. In addition, this number was even higher (95%) for nonresidential participants. We also asked survey respondents a variety of questions to find out what actions they took as a result of the program. Participants reported a variety of direct energy saving behaviors, including installing free measures provided by the program as well as independent measures such as CFLs and refrigerators.

Residential

PACE gives its participants free faucet aerators and low-flow showerheads at its booths. Figure 44 shows the percent of participants who remembered receiving these measures and actually installed them. A significant number of participants do not remember receiving a device, and even fewer reported installing them. Those that did install them produce energy savings directly attributable to the program. It is possible that PACE did not give away these items at every booth; however, installation rates of devices such as showerheads and aerators are often low compared to other measures. For instance, CLEO participants reported installing 98% of the CFLs they received. However, CFLs are simple to install, requiring only unscrewing and screwing in a light bulb. On the other hand, installation of a showerhead (as provided by PACE) may require a wrench and plumber's tape, which can be off-putting. The most common place to install aerators was in the bathroom. Respondents reported installing 69 aerators in bathrooms and 29 in kitchens.

Figure 44. Residential Received and Installed Free Devices (n=100)



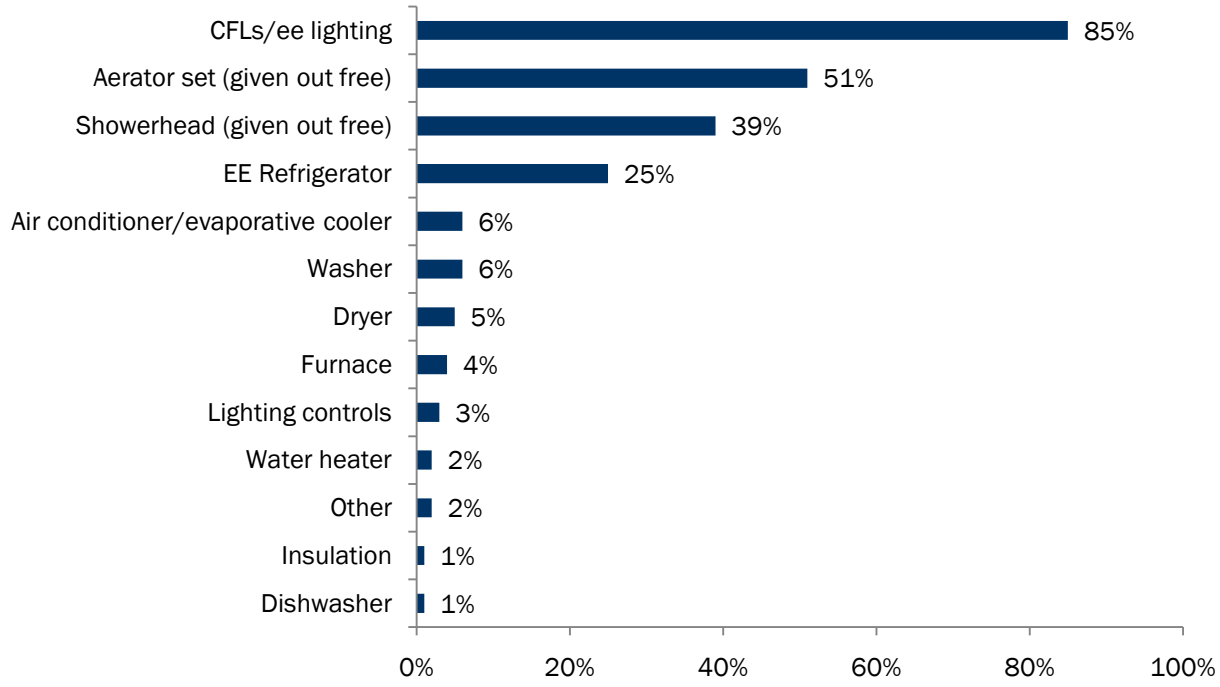
We also asked respondents what other items they have installed since the PACE event they attended (Figure 45). More than eight in ten reported installing CFLs (one of the simple steps indicated in Figure 37) – this is higher than the seven in ten event intercept respondents who reported they were likely to do so. This number is also significantly higher than the number of those who reported installing the free faucet aerators and showerheads. This may indicate that participants did not clearly understand how saving water could save energy. On average, participants installed eight CFLs in their homes.

Furthermore, one-quarter reported installing an energy efficient refrigerator. This is a significantly large percentage given that only 6% of the general population installed an energy efficient refrigerator in the state of California[51]. This large percentage of installs may be in part due to our evaluation survey design (potentially producing a false response or socially acceptable response bias) and in part due to the programs promoted at the events. Per survey design, participants were asked about CFLs and refrigerators in an aided fashion, while the other items were mentioned unaided. CFLs and refrigerators were intentionally asked in an aided fashion given that in the PY2006-2008 process evaluation participants stated that those were the two measures they were most likely to install after participating with PACE. Only 1 of the 25 survey participants that installed an energy efficient refrigerator said they participated in a utility program; however the program's education regarding the value of an energy efficient refrigerator upgrade likely instigated this action. Because the

[51] Data collected in the General Population tracking study for the Flex Your Power campaign between July 2008 and February 2009.

SCE Energy Management Assistance Program and the LADWP Refrigerator Exchange Program were also available to these people, it is possible that they did not realize these were utility programs when asked. These two programs provide free refrigerators based on income. Earlier we indicated that there were a high percentage of low-income people at the events. Combined, these could account for the unusually high percentage of refrigerators installed by PACE participants.

Figure 45. Residential Items Installed Since PACE Event (n=100)

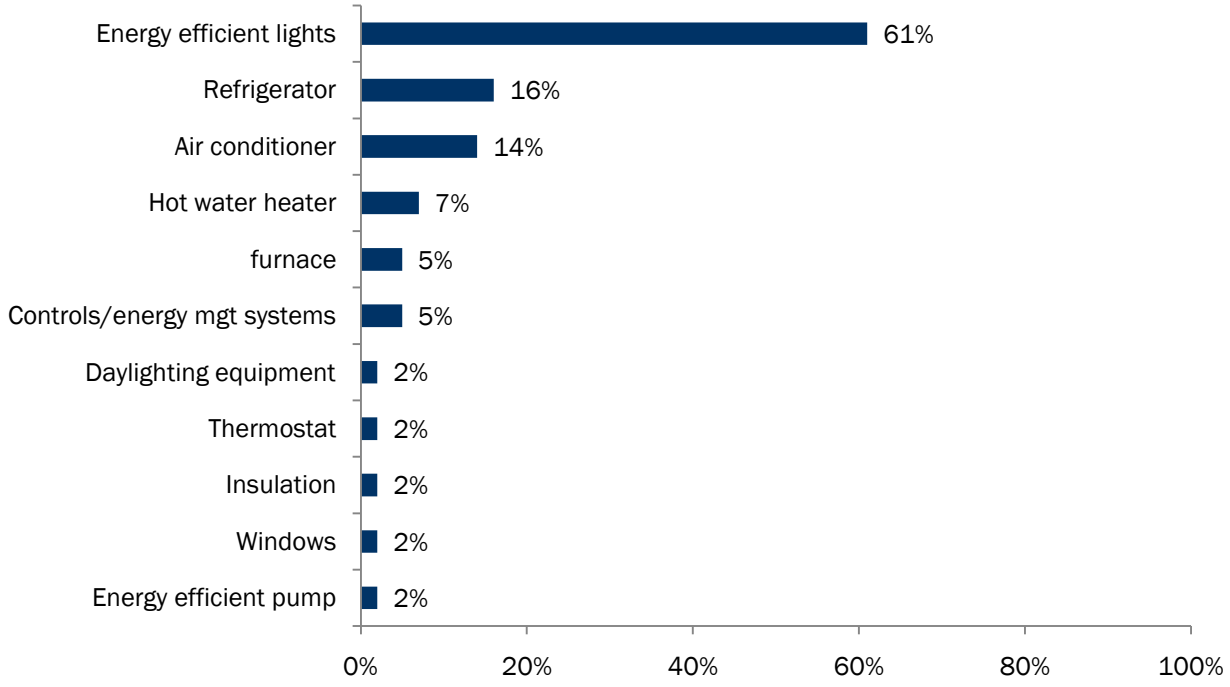


Note: Other includes a TV and solar panels.

Nonresidential

PACE nonresidential participants do not receive free devices from the program. However, more than three in five (61%) reported installing energy saving measures at their business since participating with PACE. All of these respondents installed energy efficient lighting, and some installed additional measures (Figure 46). Seven respondents said they installed a new refrigerator; these respondents owned food service establishments and almost all of them attended an in-language food service seminar. One-quarter of nonresidential participants said they have plans to improve the energy efficiency of their business in the next 12 months.

Figure 46. Nonresidential Items Installed Since PACE Interaction (n=44)



Indirect Behaviors

We also asked questions of respondents to determine what indirect behaviors they may have taken as a result of the program. In addition to sharing information with others, as described previously in the reach section, over one-third of residential survey respondents (37%) reported searching for additional information, and just over two in five (41%) nonresidential participants did so. Some of PACE's outreach materials encourage this action, for instance suggesting logging on to www.socalgas.com to learn more ways to save.

5.4.6 What are the net energy savings as a result of the program?

The PACE program does not have any direct energy savings goals associated with it. However, we have seen throughout this report that participants reported an increase in knowledge and awareness as well as many direct energy saving behaviors following participation in PACE. We used several of the questions in the survey to calculate a cognitive change index (CCI), or a value between 0 and 1 that estimates how much of the changes reported by respondents can be attributed to the program. The CCI for those reporting taking action for residential was 0.84, and for nonresidential was 0.83, indicating a strong influence of the program.

We used the CCI along with several of the questions about behavior changes to calculate energy savings. By combining this information, we developed a preliminary estimate of energy savings for the 100 residential and 44 nonresidential survey respondents: the medium amount of savings was 61 MWh and 738 therms with a range of 31 to 91 MWh and 369 to 1,107 therms (Table 46 and

Table 47).[52] We surveyed 100 Chinese and Vietnamese booth participants out of 3,413 reached by PACE. We also surveyed 44 Chinese and Vietnamese nonresidential participants out of 669 reached over the three years of the program. We extrapolated the per-participant energy savings estimates for the respondents to these 3,413 residential and 669 nonresidential Chinese and Vietnamese participants. This amounts to savings of 1,559 MWh and 24,633 therms with a range of 609 to 2,168 MWh and 12,147 to 36,847 therms. We present these numbers simply to demonstrate the order of magnitude of energy savings that may be created by PACE. Furthermore, the CFL and lighting energy saving estimates are based on energy efficient lighting adopted by participants on their own, i.e. these measures were not given to customers as part of the PACE program. It is likely that the lighting measures were purchased or acquired through other programs and the savings may be counted as part of other program evaluations.

Table 46. Net Residential Energy Savings (n=100)

		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
CFL/lighting	655[1]	11.07	22.14	33.21			
EE refrigerator	20	1.00	2.00	3.00			
EE AC	4	1.35	2.69	4.04			
EE clothes washer	5	0.05	0.10	0.15	17.60	35.20	52.80
EE water heater	1				4.93	9.87	14.80
Lighting controls	3	1.40	1.65	1.90			
Insulation	1				39.46	78.91	118.37
Furnace	3				59.66	119.32	178.98
Pool pump/motor	1	0.51	1.03	1.54			
Dishwasher	1	0.02	0.03	0.05	1.00	2.00	3.00
Gross Total		**15**	**30**	**44**	**123**	**245**	**368**
CCI=0.84							
Net Total		**13**	**25**	**37**	**103**	**206**	**309**
Aerator	51	0.11	0.21	0.32	124.45	248.90	373.35
Showerhead	39	0.09	0.19	0.28	127.35	254.69	382.04
Overall Total		**13**	**25**	**37**	**355**	**710**	**1064**
Average Savings Per Participant		**0.1**	**0.3**	**0.4**	**3.5**	**7.1**	**10.6**

[1] 85 respondents multiplied by average number of bulbs installed (7.7). Savings were calculated per bulb.

Notes: These numbers assume an 85% gas heating fuel share, a 6% electric heating fuel share, an 85% gas water heating fuel share, a 5% electric water heating fuel share, and a 48% central air saturation based on RASS for SCG and SCE.

Estimates of savings are based on measures evaluated by Summit Blue based on industry standards.

Five of the 25 respondents that replaced their refrigerator were removed from the energy savings, as these respondents likely acquired their refrigerator through a rebate program or the LIEE program. We also removed one of six clothes washer respondents, one of two water heater respondents, two of six AC respondents, and one of four furnace respondents for the same reasons.

[52] These numbers provide a range of energy savings for those actions that were taken to account for different underlying baselines among respondents; the range is not intended to imply that every respondent took an action.

Table 47. Net Nonresidential Energy Savings (n=44)

		MWh			Therms		
Measure	n	Low	Med	High	Low	Med	High
EE lighting	23	10.07	20.14	30.21			
Refrigerator	6	3.59	7.18	10.77			
AC	6	6.57	13.15	19.72			
Water heater	2	0.00	0.00	0.00	2.66	5.33	7.99
Controls/EMS	2	1.24	2.47	3.71	11.03	22.07	33.10
Insulation	1	-0.01	-0.01	-0.02	3.39	6.78	10.16
Gross Total		**21**	**43**	**64**	**17**	**34**	**51**
CCI=0.83							
Net Total		**18**	**36**	**53**	**14**	**28**	**43**
Average Savings per Participant		**0.4**	**0.8**	**1.2**	**0.3**	**0.6**	**1.0**

Notes: These numbers assume an 58% gas heating fuel share, a 47% electric heating fuel share, 50% gas heating fuel share, and 38% electric heating fuel share, based on CEUS for SCE.
Estimates of savings are based on measures evaluated by Summit Blue based on industry standards.
Respondents also reported installing furnace (2), windows (1), energy efficient pump (1), daylighting equipment (1), and thermostat (1). We have not requested savings estimates for these measures because of the low incidence.
Four of the 27 lighting respondents were removed from the energy savings, as these respondents likely did so through a Standard Performance Contract or Multi-family program. We also removed one of three water heater respondents and one of seven refrigerator respondents for the same reasons.

5.4.7 What percentage of participants was fed into resource programs, and which programs were promoted?

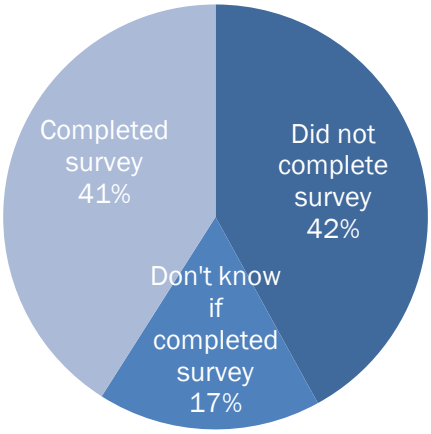
In addition to encouraging energy saving behaviors, PACE also attempts to increase this population's awareness of energy efficiency programs. PACE allows its participants to participate in online and paper HEES. After PACE sends the completed surveys to the utilities, the utilities mail or email reports to the participants that discuss energy saving tips and rebate programs. PACE also provides its participants with information about utility programs. These activities serve to further channel participants into resource acquisition programs.[53]

Residential

Our survey of booth participants shows that 41% of respondents recall completing the HEES (Figure 47). The program database also shows that not all participants completed the HEES; some people became participants by receiving free measures.

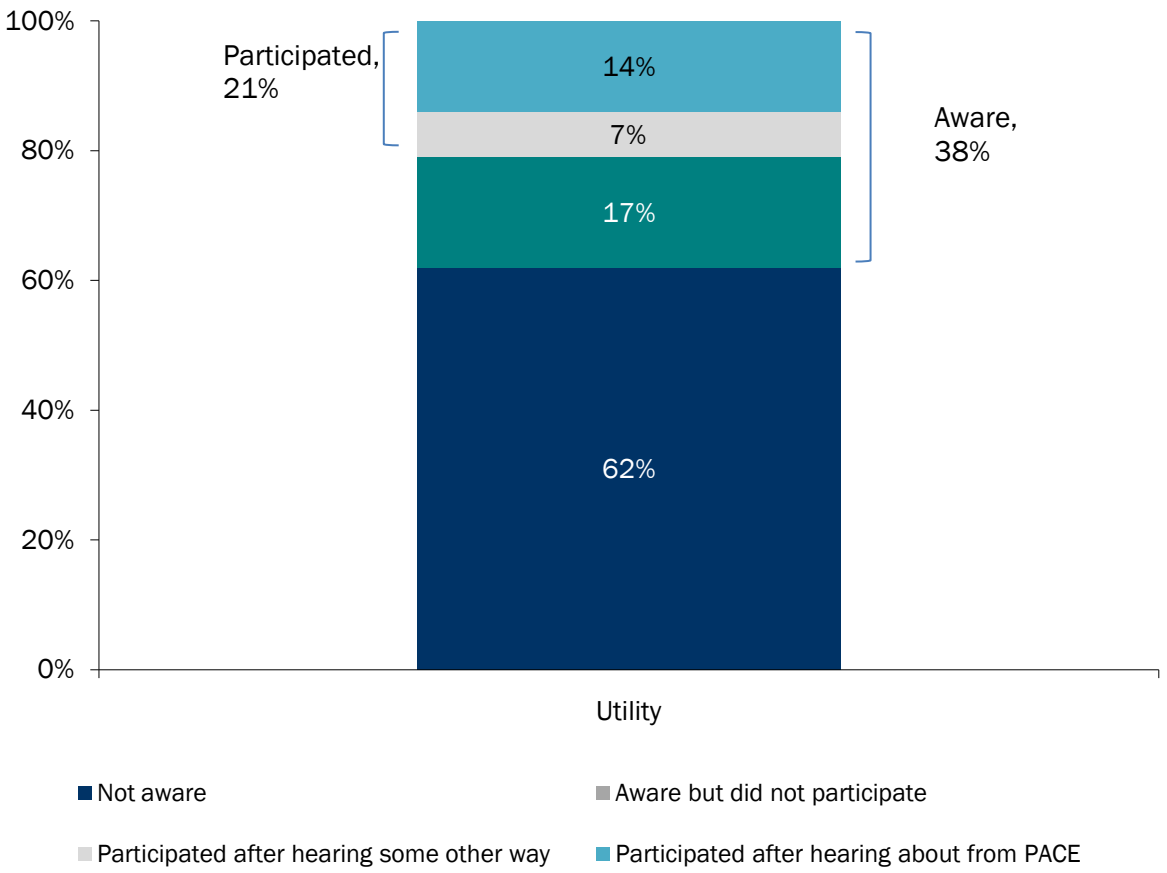
[53] Note that our evaluation shows the percentage of Chinese and Vietnamese participants that are channeled into resource acquisition programs after participating in a booth or receiving outreach at their business. This information may not be representative of other types of participants or other ethnic minorities.

Figure 47. Residential HEES Survey Completion (n=100)



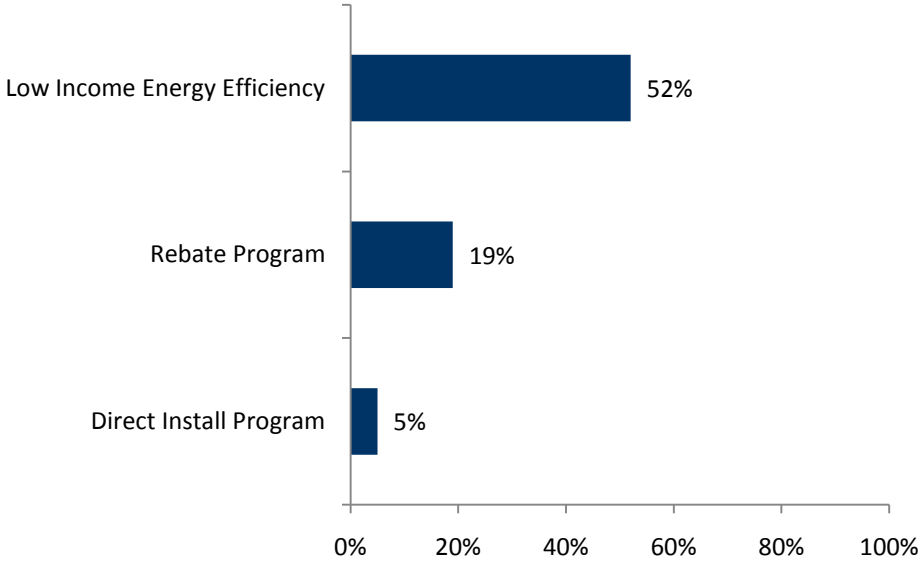
We also asked survey respondents questions about their awareness of utility programs. Fewer than two in five respondents reported being aware of a program (Figure 48), which is somewhat low given that program information is a primary focus for PACE. However, 21% of respondents said they participated in a utility program since attending the booth; 14% did so after they heard about it from PACE. Therefore 14% of PACE booth participants were fed into resource acquisition programs. We note that the HEES program is heavily intertwined with the PACE program and therefore some the energy saving estimates in this report are likely double-counted in the HEES program estimates if the HEES program conducted an impact evaluation and included non-English speaking participants.

Figure 48. Residential Awareness of and Participation in Utility Programs (n=100)



The most common programs that PACE is channeling participants into are the low income energy efficiency programs, rebate programs, and direct install programs (Figure 49). We note that we removed the LIEE program participants from our energy saving estimates. However, we include the other program participants because we were unable to determine which measures participants received assistance for.

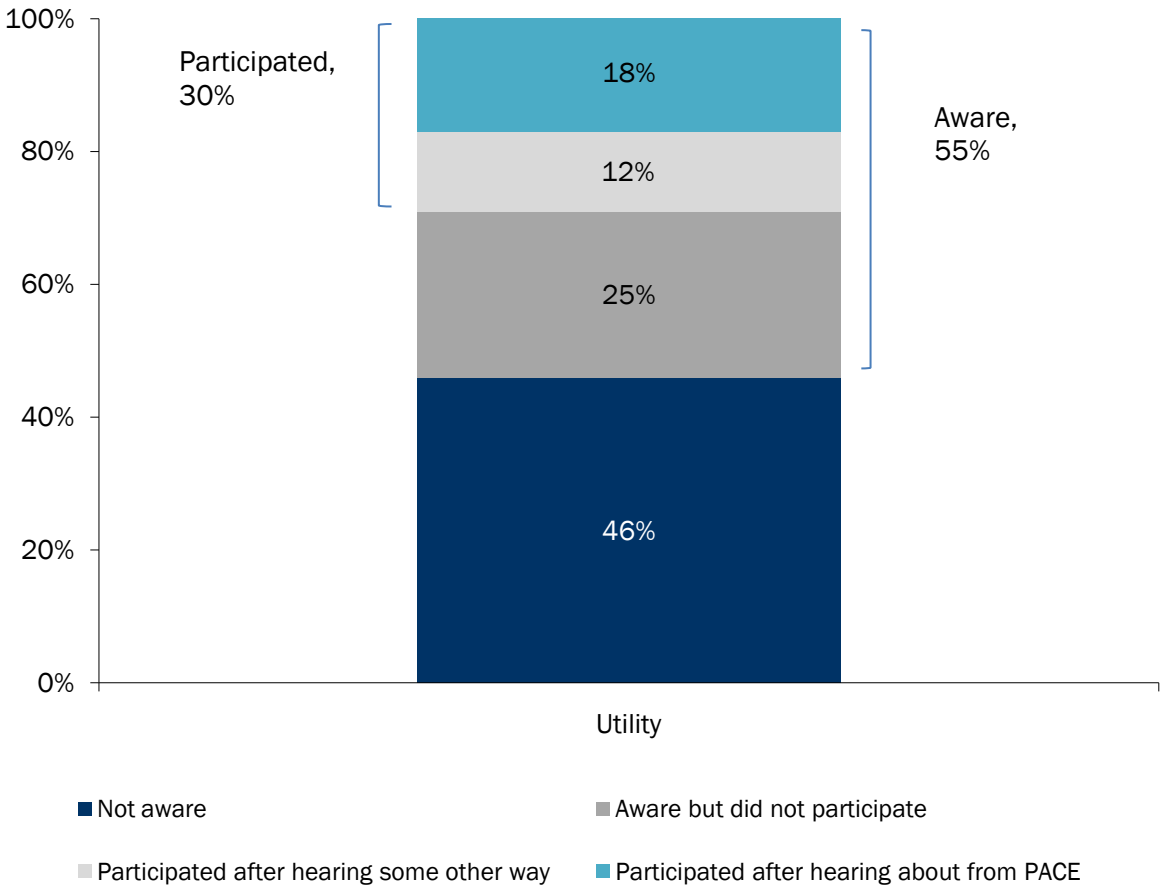
Figure 49. Residential Utility Program Participation (n=21)



Nonresidential

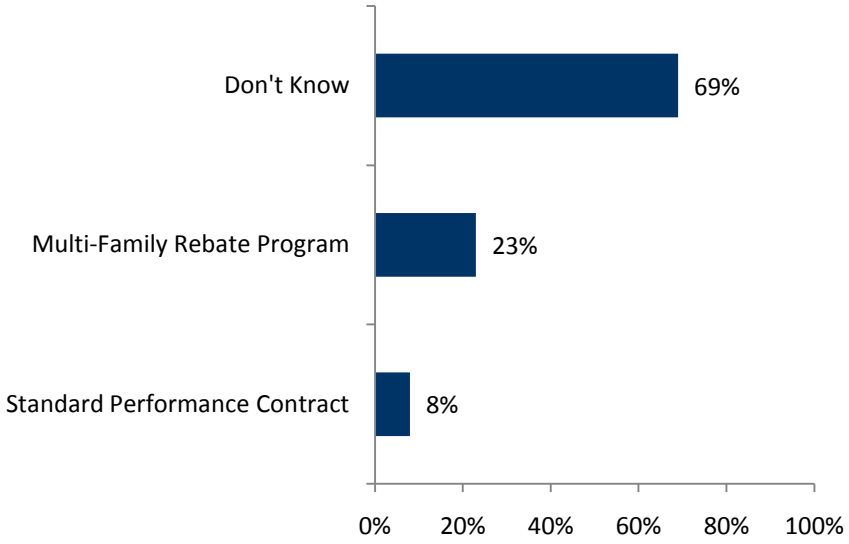
In the nonresidential sector, awareness of utility rebate programs was higher than in the residential sector, at 55% (Figure 50). In addition, 30% reported participating in a program. Furthermore, 18% or one in five reported participating after hearing about it from PACE. In other words, 18% of PACE business outreach participants were fed into resource acquisition programs. There were no significant differences between seminar and outreach participants overall, although more of the seminar participants who were aware of a utility program had heard about it from PACE.

Figure 50. Nonresidential Awareness of and Participation in Utility Programs (n=44)



Most nonresidential participants did not recall in which program they had participated (Figure 51).

Figure 51. Nonresidential Utility Program Participation (n=13)



5.4.8 What is the value of the program versus the cost of the program?

The total three-year budget provided by SCG for the program was $2,915,629, and the expenditures exceeded the budget, totaling $3,037,863.[54] The PACE program directly touched over 18,000 participants during the three-year period of this study through multiple outreach methods. As mentioned previously, the program theory indicated that this population would likely not have received information on energy efficiency had it not been provided to them in-language by PACE. This hypothesis was found to be somewhat supported by the fact that 39-43% had little to no energy efficiency knowledge prior to participation.

In addition to reaching its target population, PACE seems to be successfully imparting energy efficiency information. In our participant survey with 100 residential and 44 nonresidential respondents, we found that 85% and 95% respectively changed their behavior related to energy use, and 85% and 61% respectively installed energy efficient lighting. In addition, 41% of residential participants took the HEES and 14% of residential and 18% of nonresidential respondents participated in a utility resource program after hearing about it from PACE. Altogether, the energy savings for the 4,082 Chinese and Vietnamese participants are estimated to range from 609 to 2,168 MWh and 12,147 to 36,847 therms.

The quarterly reports show that the program reached or exceeded almost all of its goals. We attempted to verify the program's goal accomplishments by reviewing program databases and information. This verification process revealed that PACE successfully reached or exceeded about half of its program goals, contrary to what was stated in the quarterly reports (Table 48).

[54] The budget and expenditures are from the December 2008 monthly report, SCG.MR.200812.2.xls Version 2, uploaded 4/24/2009: http://eega2006.cpuc.ca.gov/DisplayMonthlyReport.aspx?ID=8.

Table 48. PACE Goals and Achievements

Goal	Achievement Verification	Goal Verification Outcome
Non-Residential		
10 small business presentations to social, education, trade, religious or professional organizations	11	Exceeded (+1)
Outreach to 352 multifamily owners/managers/contractors/ financial institutions	363	Exceeded (+11)
Outreach to 3,376 small businesses	3,461	Exceeded (+85)
Outreach to 1,105 organizations, institutions, events, and businesses (including 103 events)	1,006	Not Met (-99)
Residential		
Distribute 7,000 low-flow showerheads	11,455	Exceeded (+4455)
Attend and set up booth at 70 community events and attend 33 ethnic community events	124	Exceeded (+21)
8 in-language food service seminars	8	Reached
2,000 Residential Online HEES	1,594	Not Met (-406)
5,000 Residential paper-based HEES	645	Not Met (-4355)
Make direct contact with and provide EE program information to 15,000 residential SoCal Gas customers	13,227	Not Met (-1773)
Distribute 13,000 faucet aerators	11,914	Not Met (-1086)

Note: Goals are based on contract amendments. Achievement verification relied upon information provided to the team that was obtained through data requests. Goal verification outcome was based on our achievement verification.

PACE noted in the process evaluation that outreach measures had been slow to start because of the lack of trust of government programs in the cultures they serve, an excess of paperwork required for participation, and a lack of ethnic community leaders. PACE also had difficulty targeting their outreach to SCG customers only, especially at community events, which by their nature prevent control of who visits the booth. In addition, the website, which was supposed to serve as a portal to the HEES, was not available through at least November 2007. SCG worried that PACE was employing too many five-minute HEES surveys rather than

15-minute surveys[55] and felt PACE was not really a full-service organization but rather grassroots, that they had trouble developing marketing and media plans, that they marketed too generally, and that they focused too much on "checking off task boxes."

The residential process evaluation also noted that as of November 2007, the PACE program was not on track to meet some of its goals, and both the program goals and outreach strategies were being revised. The delay seems to have been a result of "layout, translation, and printing problems [that] continued into the third quarter of 2007." Seminars were still not being held as of November 2007 because translated versions of the PowerPoint had not yet been approved. In addition, the nonresidential process evaluation noted that outreach to business customers did not really start until March 2007.

Furthermore, the nonresidential process evaluation suggested hiring a marketing specialist with a focus on business to help develop the nonresidential side of the program. It also noted that the nonresidential outreach materials were not in-language, and 91% of respondents would have preferred that it be so. The program materials we received through our data requests are translated into all the targeted languages; however most of these materials are residential or food service related. It is not clear if all nonresidential materials have been translated.

Despite the fact that PACE struggled at the start of the program and had many goals revised downward, overall, it appears that PACE fills an important role in its marketplace, directly touching thousands of participants who may not be reached otherwise. We know of only two other SCG programs that target these residential hard-to-reach ethnic groups regarding energy efficiency programs: CLEO and Flex Your Power-Ethnic. In addition, PACE appears to be the only program in SCG territory that focuses on energy efficiency education of linguistically isolated business owners. PACE fills language gaps that allow these participants to access energy resources that may not have otherwise been available to them.

5.5 Evaluability Assessment

We performed an abbreviated retrospective evaluability assessment of PACE to determine the information available to help with future evaluation efforts. The participant contact information and program materials to which we had access are noted in Table 49 and Table 50, below. Overall, we generally had the information we needed to evaluate some parts of the program, including finding events to observe and obtaining a sample of participants to interview. However, the program database did not clearly describe the type of outreach that each nonresidential participant received, i.e. outreach via a booth at an event or outreach via an in-person visit to a business. This distinction would have helped in the evaluation to understand whether one type of outreach was more effective at inducing behavior change than another.

[55] The short survey asks a limited number of questions about appliances and energy usage in the home; it does not require actual billing information. The report presents estimated energy usage based on the information supplied and provides tips to help save energy. The longer survey asks more detailed questions about how appliances are used, gathers actual billing data, and presents more detailed results about which appliances use the most energy and more tips for saving energy than the short version.

Table 49. Program Information Available: Contact Information for Participants

Contact Information	Dates Covered	Electronic or Hard Copy
Residential Participants (surveys, aerators, showerheads, name, address, phone #, email, date, event, ethnicity)	12/2007–12/2008	Electronic
Business Participants (type, category, client name, title, business, address, phone #, date, ethnicity, type of contact)	10/2006–12/2008	Electronic

Table 50. Program Information Available: Program Materials

Program Materials	Dates Covered	Electronic or Hard Copy
Program Implementation Plan	2006	Electronic
Quarterly Reports	2Q 2006 – 4Q 2008	Electronic
Residential and Nonresidential presentations and seminars (date, organization, location, audience)	2006-2008	Electronic
Outreach Events (name, ethnic group, date, location, contact info, event info, expected attendees, status)	2007-2008	Electronic
SCG Faucet Aerator Mail-in Card (English, Korean, Spanish, Vietnamese, Chinese)	2006-2008	Electronic
SCG Faucet Aerator and Low-Flow Showerhead Mail-in Card (English, Korean, Spanish, Vietnamese, Chinese)	2006-2008	Electronic
Residential PowerPoint (English, Korean, Spanish, Vietnamese, Chinese)	2006-2008	Electronic
Food Service PowerPoint (Spanish, Chinese, Vietnamese)	2006-2008	Electronic
SCG “45 Ways to Save” Brochure (English, Korean, Spanish, Vietnamese, Chinese)	2006-2008	Electronic
SCG 2008 Home Energy Efficiency Rebate Program Application (English, Korean, Spanish, Vietnamese, Chinese)	2008	Electronic
Various SCG Nonresidential Express Efficiency and Commercial Foodservice Program Factsheets	2006-2008	Electronic
Food Service Program Flyer (English, Korean, Spanish, Vietnamese, Chinese)	2006-2008	Electronic
PACE News Vol. V Issue I: Profile of Energy Savings Project	01/2007-03/2007	Electronic

The program databases and information we received from the implementer through data requests did not always add up to the overall numbers reported by PACE in quarterly reports – as in the case of the number of booths at community events, number of residential contacts, HEES participants, and more (Table 51). Furthermore, we received partial participant information relative to the total number of events that occurred, likely because the program did not seem to start tracking participants until December 2007. In addition, it was often difficult to match up the numbers provided in quarterly reports to both the goals in the contract and amendments as well as the databases we received.

Table 51. Goal Accomplishments: Program Reports Vs. Databases

Goal	Achievements (Q4 2008 Report from Implementer)	Achievement Verification
10 small business presentations to social, education, trade, religious or professional organizations	10	11
Outreach to 352 multifamily owners/managers/contractors/ financial institutions	385	363
Distribute 7,000 low-flow showerheads	11,516	11,455
Attend and set up booth at 70 community events and attend 33 ethnic community events	184	124
Outreach to 3,376 small businesses	3,309	3,461
8 in-language food service seminars	8	8
2,000 Residential Online HEES	1,994	1,594
5,000 Residential paper-based HEES	5,030	645
Make direct contact with and provide EE program information to 15,000 residential SCG customers	15,484	13,227
Distribute 13,000 faucet aerators	16,589	11,914
Outreach to 1,105 organizations, institutions, events, and businesses (including 103 events)	933	1,006

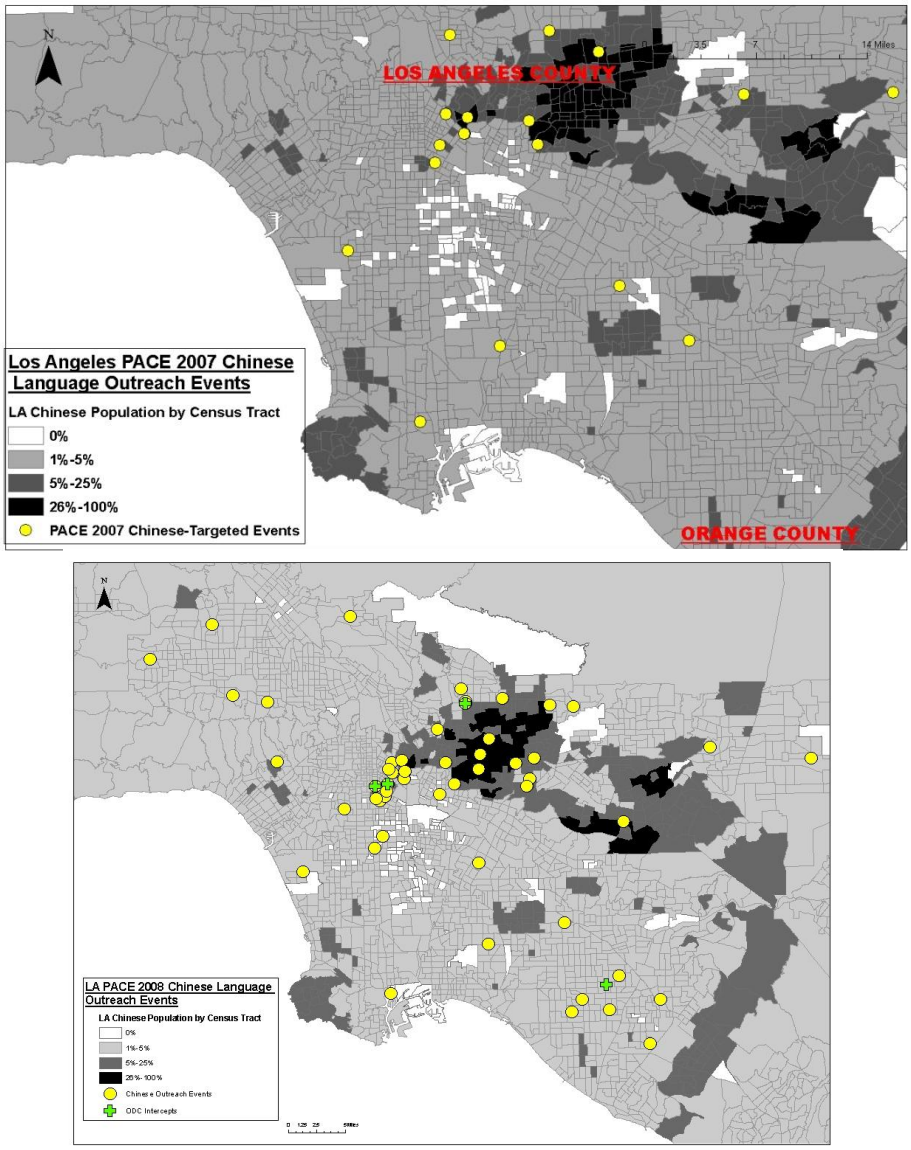
For future evaluation efforts, we recommend that the program:

- Improve event and participant databases to ensure that all program information aligns with what is reported in quarterly reports and that that information aligns with the goals specified in the contract and/or amendments.
- Improve participant information to include: participant name, telephone number, address, and email address; participant ethnic group/language spoken.

- Improve participant and program tracking information to distinguish how the program reached each participant: i.e. outreach at a booth, in-person contact at a business, a seminar held at SCE's Education Resource Center and/or a seminar held at an independent location by PACE.

5.6 Appendix[56]

Figure 52. 2007 and 2008 Chinese Language Outreach Events



[56] The population data is taken from the 2000 census. The dots on each map indicate the location of events in each program year, not the number of events at each location.

Figure 53. 2007 and 2008 Vietnamese Language Outreach Events

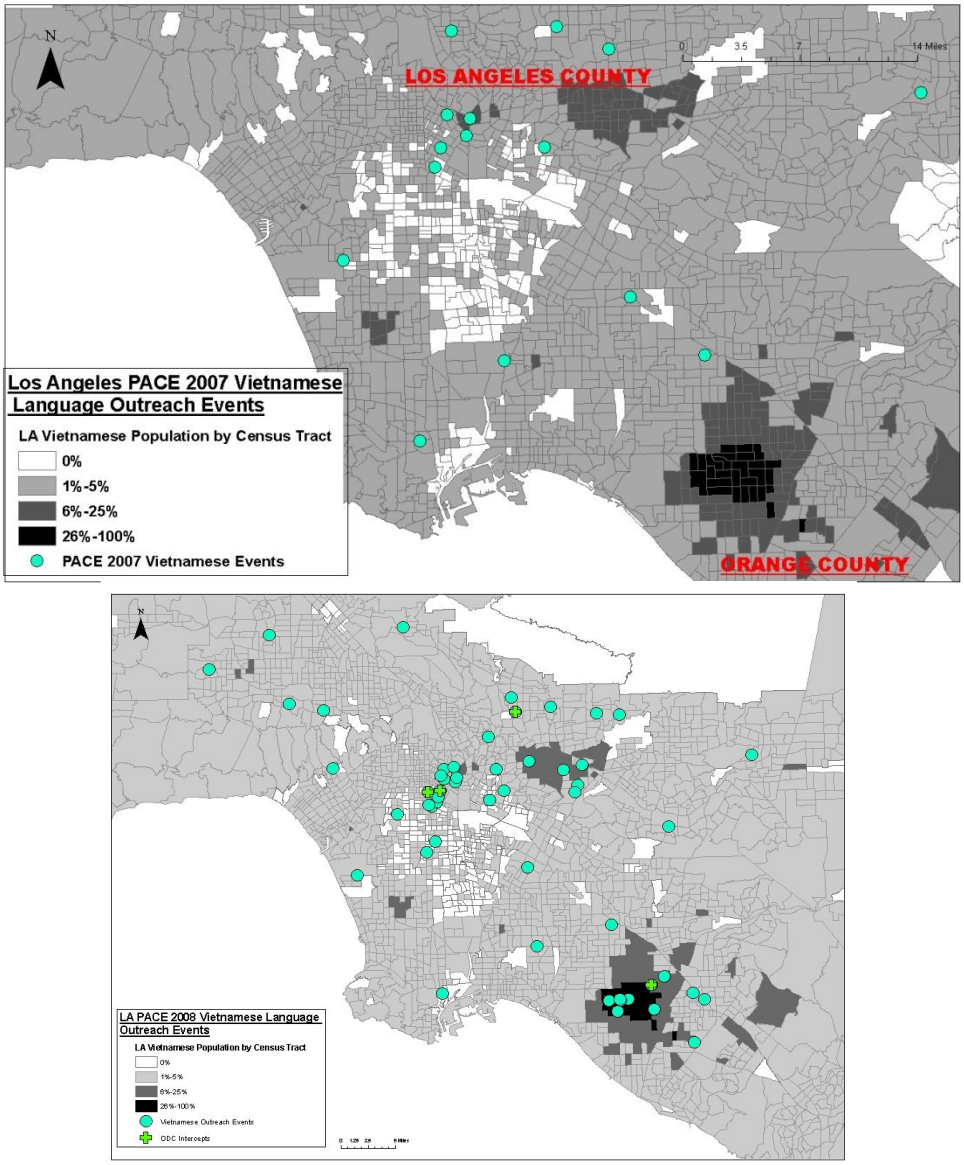
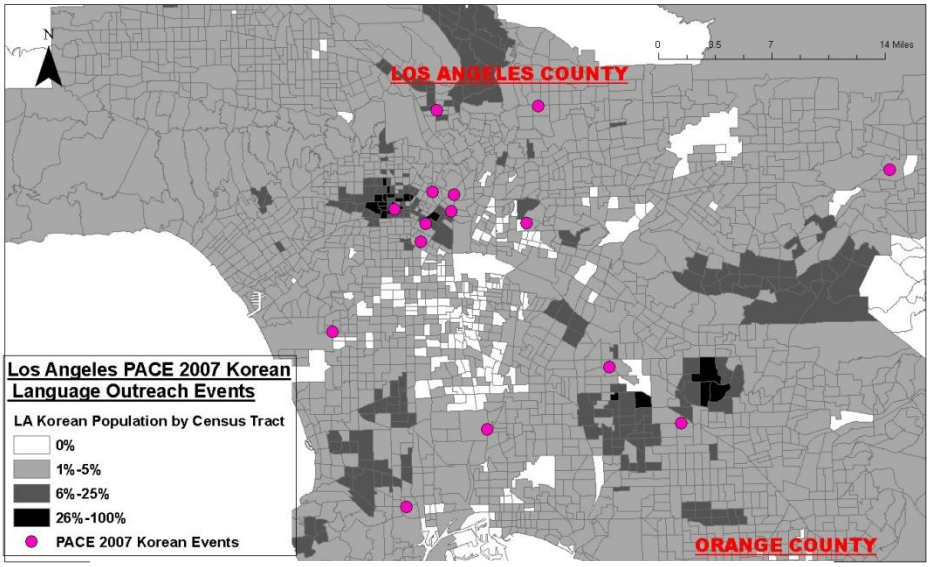


Figure 54. 2007 and 2008 Korean Language Outreach Events



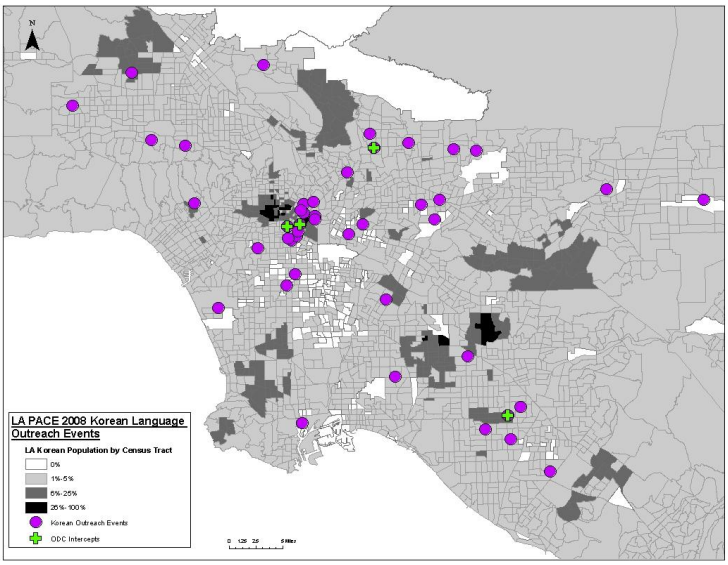
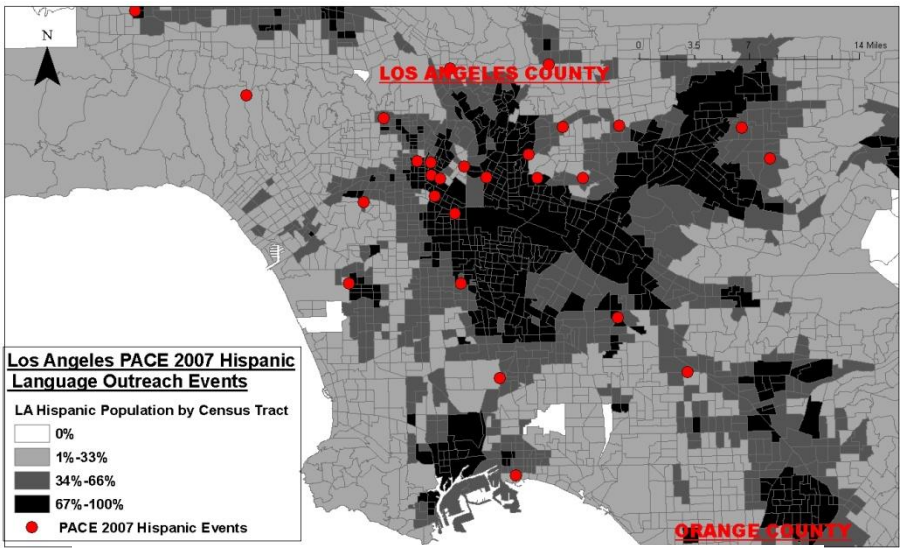
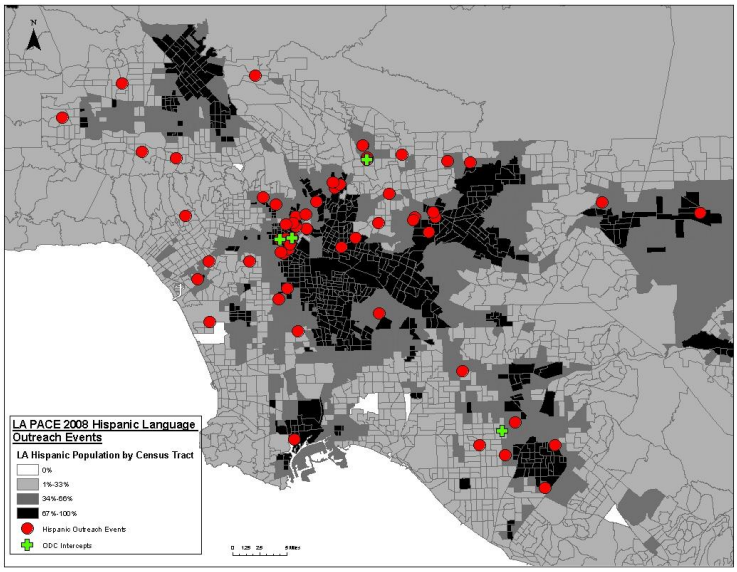


Figure 55. 2007 and 2008 Hispanic Outreach Events





6. SCG 3532/SCE 2513: CLEO Custom Language Efficiency Outreach Program

6.1 Introduction

The Custom Language Efficiency Outreach (CLEO) program is a residential, targeted energy efficiency education program that reaches out to Vietnamese, Indian, Chinese, and Korean speaking residential customers of Southern California Edison (SCE) and Southern California Gas Company (SCG). The program markets other SCE and SCG resource and non-resource programs and its own energy efficiency education seminars using local ethnic media (TV, radio, and newspapers), local community organizations, and community events. This program is implemented by a third-party, Global Energy Services (GES) and implemented under two contracts; one with Southern California Gas Company (SCG3532) and the other with Southern California Edison (SCE) under the umbrella Education and Training program (SCE2513). The program's marketing efforts attempt to promote participation in CLEO community events, seminars, and energy audits. The three year program implementation budget funded by SCE and SCG was $1.4 million.

This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavioral change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants was fed into resource or non-resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program?

In addition to these research questions, we discuss the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on the available data in a section called Evaluability Assessment toward the end of this report.

6.2 Summary of Key Findings

While our evaluation sought to determine the extent of the energy savings provided by CLEO, in PY2006-2008, CLEO was implemented as an education and information program and consequently did not have explicit energy savings goals. Its primary value lies in its role in the marketplace (i.e., reaching out to non-English-speaking populations that otherwise would not have received as much energy efficiency information as the general population) and in its ability to channel the individuals touched by the program into other utility programs, primarily the Home Energy and Water Efficiency Survey (HEES) Program. While the program conducts many types of events, this evaluation predominantly focuses on the impact of the

seminar events given that seminars provide a deeper level of education and information.[57] Below is a bulleted summary of the key findings from this evaluation:

- Over the three-year period, we estimate that CLEO has been able to directly reach approximately 6,500 people (primarily Chinese and Vietnamese customers). Neighborhood analysis maps show that CLEO held events and seminars in areas with high concentrations of the target ethnicities.
    - Outreach to Indian and Korean populations has presented a challenge for the program. These populations are very fragmented; the Indian population alone speaks 14 different languages. The program has had difficulty identifying good media sources for these populations as they tend to obtain their media directly from Indian and Korean sources via satellite communications. As a result, the program has focused its Indian and Korean efforts on faith-based organizations to help market the program's informational sources and seminars. Additionally, CLEO substituted its Indian Television and Radio campaigns with an E-mail campaign to members of different faith-based organizations in the Indian community, and will also have marketing literature available at local Indian grocery stores in various communities. The Korean community outreach targets senior centers and works with community organizations in reaching out to senior citizens and other community members. Additionally, information was disseminated in booths during an Indian Independence Day Festival and the Annual Orange County Korean Festival.
- One of the most valuable aspects of this program is that it channels people into the HEES program and other utility programs. As part of the seminars and community events, all participants are encouraged to take a short version of the HEES survey.
    - We calculate that 3,234 people took the HEES survey at a booth event.[58] Over half of seminar participants in our survey (58%) recalled completing a HEES. Further, 25% of seminar participants claim to have participated in a utility program since attending a seminar. The most common programs are the Low Income Energy Efficiency program (56%) and rebate programs (28%).
- The program is increasing knowledge and awareness and inducing behavior change in the majority of its participants, likely because it overcomes the language barrier that prevents the population from accessing energy efficiency information directly from the utilities.
    - Many of the people attending the seminars did not previously know about energy efficiency. Four in ten respondents said they had no knowledge or very little knowledge of energy efficiency prior to participating in the seminars

[57] Given the program budget for this evaluation, the limitations of the contact information, and the high cost of conducting interviews with Asian languages, we did not conduct follow-up interviews with booth visitors.

[58] Program databases do not provide enough information to report on the percentage of booth event participants that took a HEES. Program databases only document the number of HEES surveys completed per event, not the number of event attendees.

(Figure 59). No matter the level of prior knowledge, CLEO seminar participants believed they learned a lot about saving energy as a result of this program, with a mean rating of 5.5 on a scale of one to seven.

- The information provided in the seminar engendered change as nine in ten seminar participants reported changing their behavior with respect to using energy. Almost everyone who recalled receiving a free item at a seminar reported installing that item in their home. In addition, 80% of seminar participants reported installing CFLs in addition to the one they received free. On average, participants installed 9 CFLs in their homes. Furthermore, over one-quarter reported installing an energy efficient refrigerator after attending a seminar.

- Not only are people installing energy efficient equipment, they are seeking more information and spreading the word as four in ten seminar participants said they searched for additional information after the seminar and two-thirds said they shared information with others.[59] This indicates that the benefits of the CLEO program may accrue from a wider population than the 3,268 people directly touched in seminars.

- This evaluation calculated energy savings for the 2,660 Chinese and Vietnamese seminar participants, which provides a sense of the savings that could be accruing due to the program. The net energy savings per participant ranged from 0.2 to 0.5 MWh per participant and 0.5 to 1.8 therms per participant, with a medium estimate of 0.3 MWh and 1.2 therms. The net energy savings for these participants ranges from a low end of 532 to 1,330 MWh and 1,330 to 4,788 therms, with medium savings estimates of 798 MWh and 3,192 therms.

6.3 Methodology

Opinion Dynamics utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program materials, databases, quarterly reports and past process evaluations.[60] For primary data collection, we observed a community event and fielded a telephone survey to participants in the Chinese and Vietnamese seminars.

We observed one booth event, the Harvest Moon Festival, which was attended by a mix of Chinese, Korean, and Vietnamese speakers, in Acadia County Park to gain a better understanding of the program. This observation allowed us to further explore what the program accomplishes at community events, who typically approaches the booths, and the level of interest in the information.

The Opinion Dynamics evaluation team developed and fielded a telephone survey in the languages of the customers predominantly reached by this program (Chinese and Vietnamese). The survey included a range of questions on awareness and knowledge of

[59] The survey results do not reveal where the participants went for additional information.

[60] We reviewed the process evaluation for CLEO which was undertaken by ECONorthwest as part of the *Process Evaluation of the Southern California Gas 2006-2008 Residential Customer Programs Final Report*, published February 15, 2008.

energy efficiency, and elicited information about behavioral changes stemming from the program, including channeling into utility resource acquisition programs. A random sample was drawn from two strata based on the language of the participants. These participants attended several different seminars that took place in 2007 and 2008. The survey was fielded in May of 2009.

Table 52. Telephone Interview Completes

	Chinese	Vietnamese	Total
Total Seminar Participants	1,900	760	2,660
Completed Interviews	50	50	100

6.4 Detailed Findings

6.4.1 What education or information is provided and what behaviors are encouraged?

CLEO mainly markets utility programs and ways to save energy to ethnic minority populations. CLEO's primary efforts are direct outreach in-language through booths at community events, as well as in-language seminars. At both of these events, CLEO distributes in-language energy efficiency information and measure giveaways, such as CFLs. It also provides an opportunity to take an energy audit in the form of a five-minute in-language Home Energy and Water Efficiency Survey (HEES).[61] CLEO's HEES activities contribute to the goals of the Home Energy Efficiency Survey Program. CLEO also utilizes community organizations (such as churches and schools) and media outreach, primarily to attract participants to its seminars.

Below we describe the information provided by the two primary methods of outreach.

Seminars

Seminars are conducted in a classroom-type setting in hotels, senior centers, churches, and community centers. These are primarily held during the day on weekends, but some seminars at senior centers take place during the day on weekdays. The program discusses energy saving opportunities and programs that can help customers save energy. These seminars are meant to be interactive, where customers can ask questions and share concerns.

At the seminars, which are approximately two hours, CLEO uses a PowerPoint presentation to offer a wide range of information about energy saving opportunities across all areas of the home: lighting, heating, air conditioning, water heating, appliances, and pools/spas. These

[61] The HEES is presented by SCG and SCE and is designed to give participants customized gas, electric, and water savings tips. CLEO collects completed surveys, sends them to the utilities, and then the utilities send participants their customized reports.

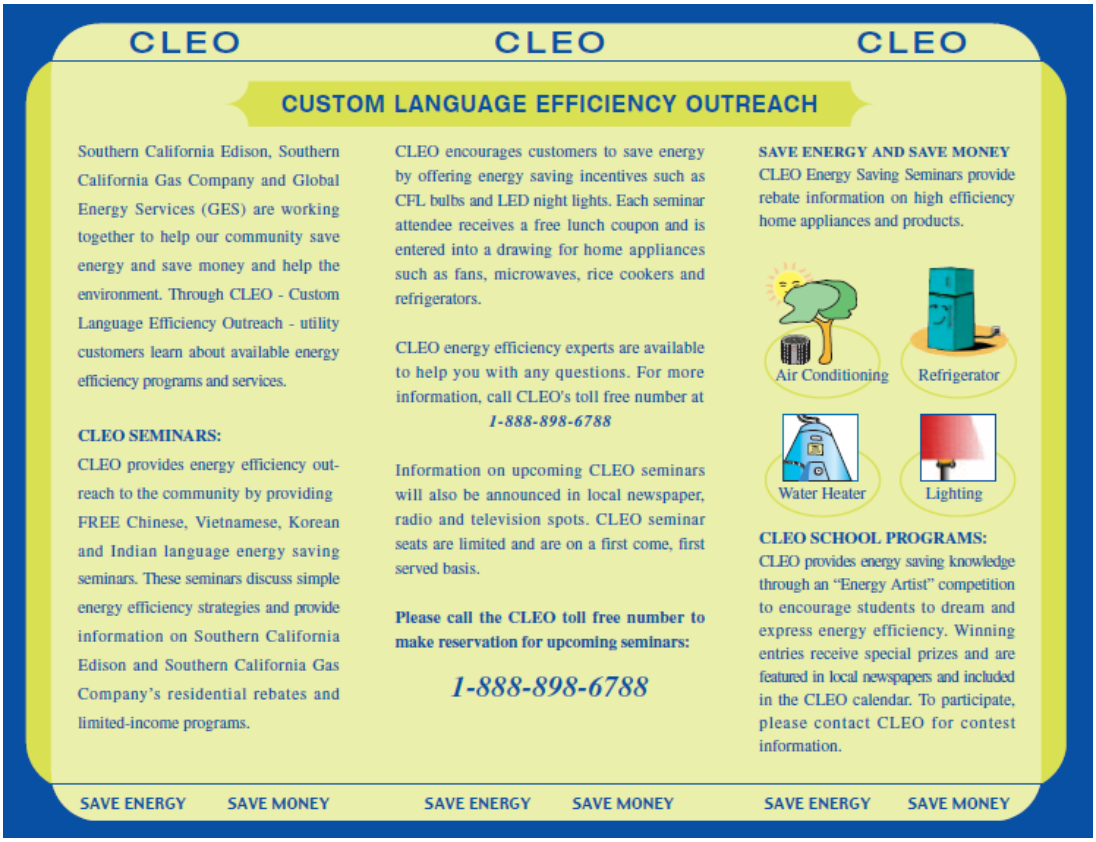
energy saving tips include a wide range of high-cost and low-cost measures. Examples of low-cost measures include turning the furnace off while you are away, using a fan instead of air-conditioning, and cleaning coils on refrigerators. High-cost measures generally include replacing appliances with high efficiency versions.

The presentation describes also the various rebates and savings available from SCE and SCG, including low income assistance programs for qualified customers. For each program discussed, the value of the rebate, as well as some information about how to qualify is presented. In addition, seminar participants are encouraged to take the five-minute HEES at the end of class and receive a free gift in return., such as a CFL, In-language, toll-free contact numbers are also presented for one-on-one consultations.

Community Events

At community events, CLEO sets up booths where it distributes free CFLs and LED night lights, as well as brochures about its seminars. CLEO also tries to have attendees complete a five minute in-language HEES. Typically, participants must fill out the HEES in order to receive the free items and to be entered in a raffle for a kit with multiple CFLs and outdoor solar lights. Figure 56 below shows an English-language example of the brochure distributed at events, which is designed to attract participants to seminars to learn more about energy efficiency. Note that this brochure is distributed in Asian languages at these events. These community events appear to give very little information beyond the one-page brochure below and mostly attempt to channel participants into the seminars.

Figure 56. Example Page of Brochure



6.4.2 What is the reach of the program?

CLEO reaches its target population through a variety of methods, as discussed in the previous section. Although many people might brush by a CLEO booth at a community festival, we define reach in this evaluation as those people that engaged with CLEO at a booth by filling out a HEES survey and receiving a free item. CLEO engagement with participants at booths is much shorter than the seminars and do not impart as much information. Furthermore, the number of unique program participants is impossible to determine for this program as there is likely some cross-over between the participants in events and in seminars, i.e. a person might visit a booth and attend a seminar. Based on program databases, we estimate that CLEO reached 6,502 people through a total of 76 booth and seminar events.

Table 53. Reach of CLEO Events and Seminars

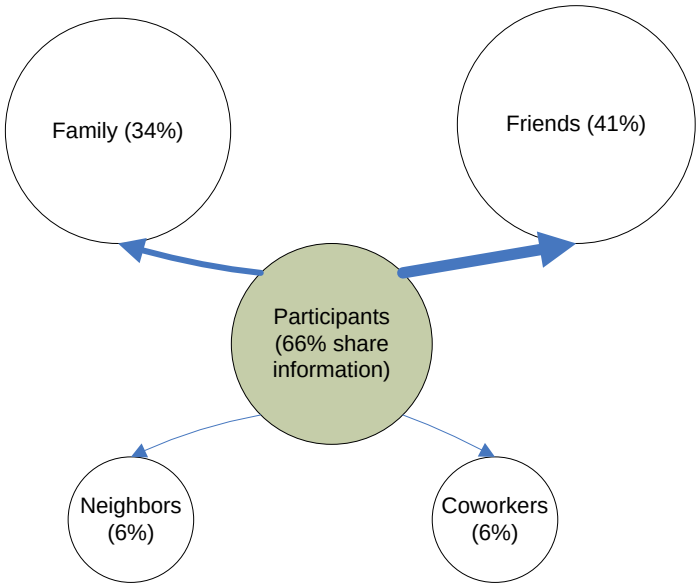
Outreach Type	Indian Participants	Vietnamese Participants	Chinese Participants	Korean Participants	Total
Total Booth Events	2	9	20	2	33
Booth Reach	**196**	**882**	**1960**	**196**	**3,234**
Total Seminar Events	--	10	25	8	43
Seminar Reach	**–**	**760**	**1,900**	**608**	**3,268**
Total Events	2	19	45	10	76
Total Event Reach	**196**	**1,642**	**3,860**	**804**	**6,502**

Note: Reach is calculated by the total number of events multiplied by the average number of HEES survey participants per event (98) or the average number of seminar attendees (76).

CLEO's reach also extends beyond its direct participation. Almost half of survey respondents (46%) reported searching for additional information. Two-thirds of seminar participants share information with others, most commonly with friends. This indicates that the benefits of the CLEO program may accrue from a wider population than the 3,268 people directly touched in seminars.

Figure 57. Seminar Information Sharing by Group (n=100)

Multiple Response



In addition to the program reach through events and seminars, CLEO conducts an aggressive mass media campaign prior to each seminar. CLEO uses mass media primarily to advertise its seminars; the PY06-08 process evaluation conducted by ECONorthwest, indicated that ethnic or core language newspaper[62] advertising is the most effective way to attract Chinese and Vietnamese participants. The media spots announce an upcoming seminar and provide the toll-free number to sign up. In total, CLEO placed 674 advertisements in 10 different Chinese and Vietnamese newspapers, radio stations and television stations. These advertisements went to a maximum of 860,000 people (there is likely much overlap in the circulation as one person likely received advertisements from multiple media types).

[62] Publications included: Chinese Daily News, Sing Tao Newspaper, Taiwan Daily and local Vietnamese Newspapers Nguoi Viet and Viet Bao

Table 54. Potential Chinese and Vietnamese Media Reach

Language	Media	Frequency (Number of Spots)	Reach (circulation)
Chinese	Newspaper	99	50,000
	Newspaper	56	40,000
	Radio	140	170,000
	Radio	56	140,000
	TV	120	250,000
Vietnamese	Newspaper	43	22,000
	Newspaper	42	20,000
	Newspaper	7	18,000
	Radio	71	70,000
	TV	40	80,000
	Total	**674**	**860,000**

What populations are being reached by CLEO?

Our event observation provided some insight into the makeup of those people the program reaches through booths at community events. At the Harvest Moon Festival, we observed 650 people visit the CLEO booth in a two hour span, demonstrating a large degree of interest. The event was attended by a mix of Asian ethnicities – Chinese, Korean, and Vietnamese – however the vast majority of booth attendees were Chinese, as this was the language targeted by CLEO and the language of the information handouts. The event also featured a mix of adults, families, seniors, and teens, although adults most often approached the booth.

Our survey of seminar participants demonstrated some unique attributes of the people reached through seminars. They skew to the older age range, with 62% reporting they are 65 or older; this may be partly a result of the fact that many senior centers host seminars and help market the program. In addition, although CLEO does not target low-income segments, 55% of survey respondents reported an income of less than $20,000.

CLEO's reach primarily extends into Los Angeles areas with high concentrations of Asian customers. We mapped several event and seminar locations to analyze the appropriateness of CLEO's event and seminar locations and by comparing the event locations to concentrations of the targeted ethnicities (event maps can be found in Appendix A).[63] These maps demonstrate that CLEO held events and seminars in or near locations with high concentrations (26-100%) of Chinese and Vietnamese populations. However, CLEO events targeting Koreans tended to take place in areas where Koreans made up 25% or less of the population, even though more highly concentrated areas exist. This is justified given that the

[63] These maps were created using the program information that was provided to us under one or more data requests through EEGA, in which we asked for a list of all seminars and booths and their locations. The population data is taken from the 2000 census. The dots on each map indicate the location of events in each program year, not the number of events at each location.

booth events happened during Korean festivals and seminars took place at churches or senior centers where many Koreans attend, thus appropriately targeting the Korean population. Based on program records, only two Indian outreach events took place. Both of these occurred at India Independence Day events, and thus appropriately targeted the Indian population.

The program is predominantly reaching the Chinese and Vietnamese communities. According to the program implementer, there is a higher percentage of these two communities participating in the program due to a large concentration in the Los Angeles area and because they still connect with local ethnic media. Through our interviews with program implementation staff, the Indian and Korean populations have presented a challenge for the program. These populations are very fragmented; the Indian population alone speaks 14 different languages. One or several local media sources have not been identified for these populations as they tend to obtain their media directly from Indian and Korean sources via satellite communications. Instead, the program has focused its Indian and Korean efforts on faith-based organizations to help market the program's informational sources and seminars.

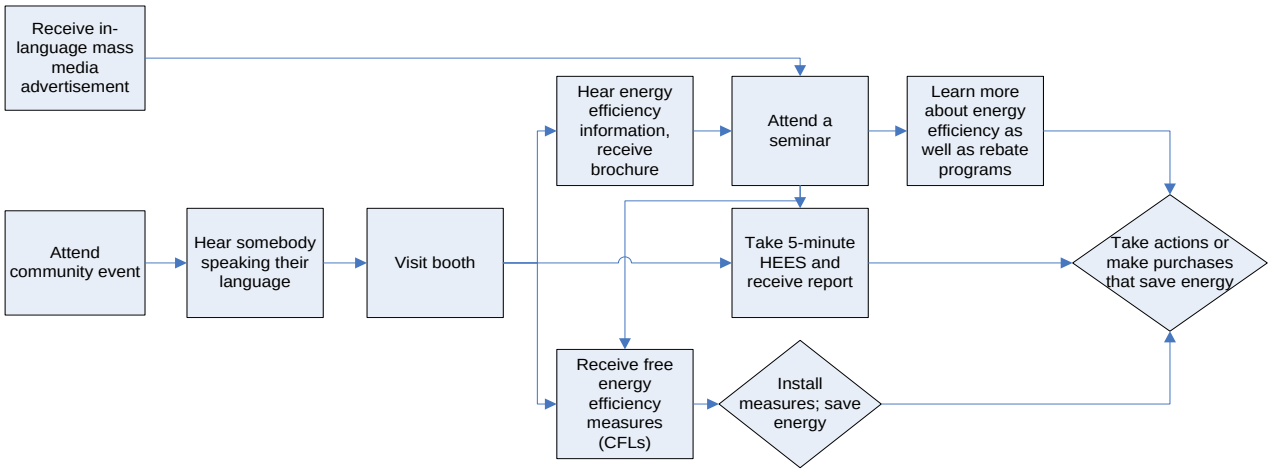
6.4.3 How likely is the program to induce behavioral change?

CLEO addresses the language barrier of Vietnamese, Indian, Chinese and Korean speaking customers, which, as expected, prevents them from accessing utility and third party energy efficiency offerings. By increasing awareness and knowledge of energy efficiency within this population and giving away inexpensive energy efficient items, CLEO expects that participants will install free measures in the home, upgrade to energy efficient appliances, take more energy-saving actions (such as turning off lights or lowering their thermostat), share information on how to save energy with friends/family, and participate in utility programs. According to the program theory, addressing the language barrier is the key to its ability to induce behavior change. The program speaks to participants in their primary language, which earns their trust and makes them more likely to listen and absorb information. By increasing awareness and knowledge of ways to save energy, the program hopes that will transfer to actual behaviors and purchases that can create energy savings.

Because of the linguistic isolation of members in these communities, they would likely not gain knowledge regarding energy saving opportunities through English-only mediums, so CLEO provides an opportunity for non-English-speaking populations to gain knowledge of how they might save energy in their homes: through installing free measures, taking a HEES survey, learning about energy saving options in a seminar presentation, or participating in resource acquisition programs. CLEO, therefore, seeks to overcome this barrier in the marketplace.

Based on the information we have obtained and reviewed in this evaluation, CLEO is likely to induce behavior change through a few different paths (Figure 58). Participants may change behavior either by hearing about energy efficiency when visiting a booth, attending a free seminar presentation, acquiring free energy efficiency measures, completing a HEES survey or a combination thereof.

Figure 58. Potential Paths to Behavior Change



Other programs such as Flex Your Power-Ethnic and PACE, offer energy education in this area to some of the same target audiences, however CLEO is the only program that offers in-depth education through seminars. The PACE Energy Efficient Outreach Program targets similar groups (three of the same ethnicities) in the SCG service area, but PACE and CLEO communicate in order to not attend the same events or use the same training locations. In addition, CLEO focuses more on providing seminars, whereas PACE focuses on community events. The Flex Your Power program (ethnic component of the program) also targets hard-to-reach ethnic customers by disseminating print, radio, and TV advertisements in three of the same languages as CLEO. This program only provides media advertisements regarding energy efficiency purchase and conservation behaviors. Its coverage does overlap with that of CLEO, but it does not provide direct contact through seminars or presence at community events.[64]

6.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

Our survey results demonstrate that CLEO participants do in fact learn about energy efficiency through the seminars (as hypothesized in the paths shown in Figure 58). While there was a range of knowledge prior to the seminars (from none to a lot), all learned what they considered a high amount during the seminars. (see Figure 59) When examining the knowledge increase data, it follows a trend showing that the more prior knowledge a participant had the less they learned about energy efficiency from the seminar. Following this trend, we would expect that participants with “a lot” of prior energy efficiency knowledge would learn the least from the seminars. However, as shown by the figure below, participants with “a lot” of prior knowledge claimed to have learned more than those with “very little” or “some” knowledge. The n value for the “a lot” category is 11 out of a sample

[64] Other programs in the state include SDG&E’s Hard-to-Reach lighting turn-in program and a PGE? Energy Efficiency on Wheels program in San Francisco. However, these programs are not in SCG or SCE territory.

of 100 participants, However, the small sample size in the "a lot" category is expected given that residents who know a lot about energy efficiency are less likely to attend a seminar.

Figure 59. Energy Efficiency Knowledge Increase

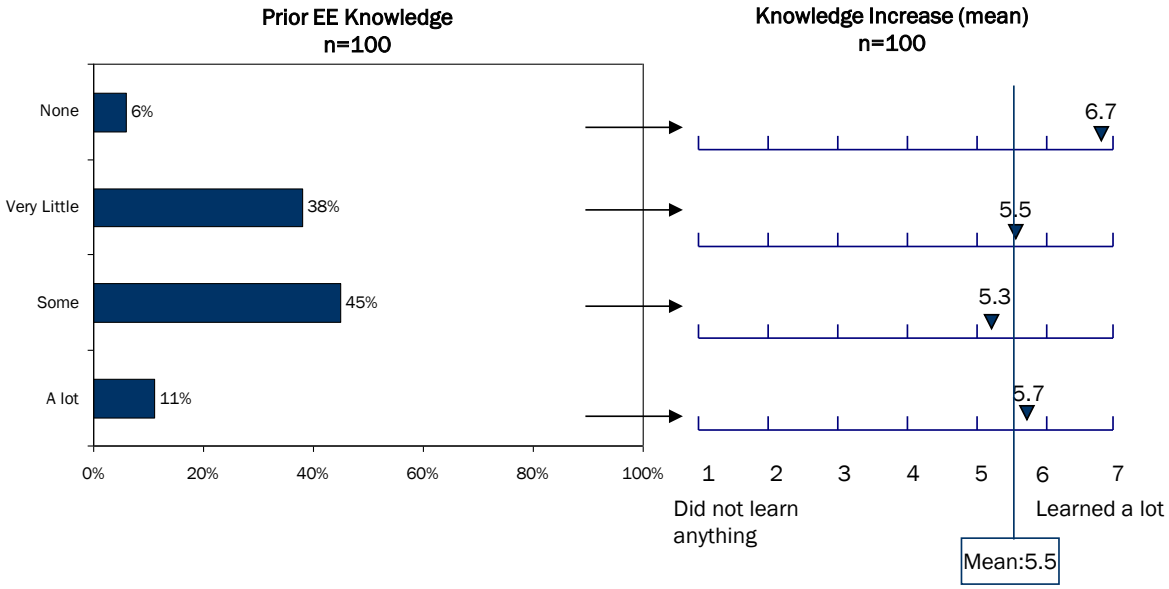
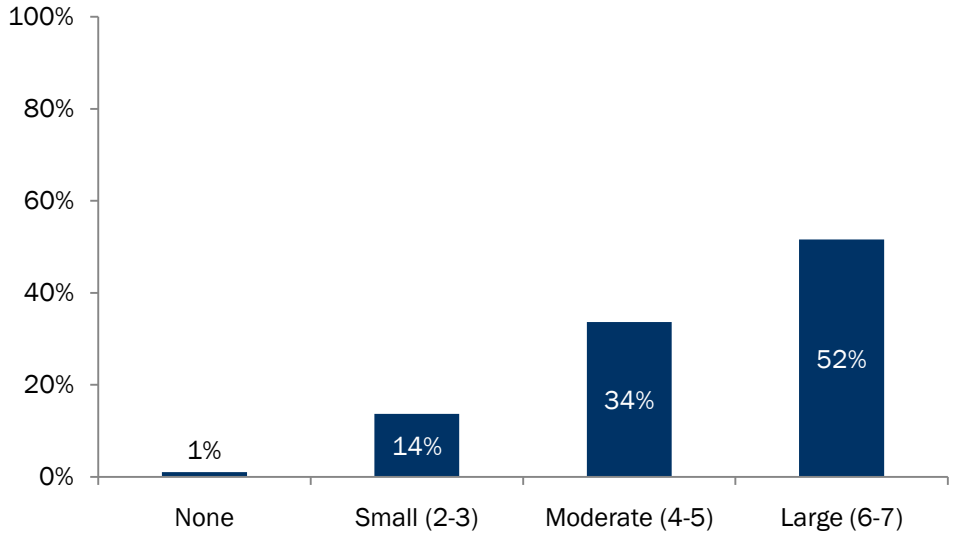
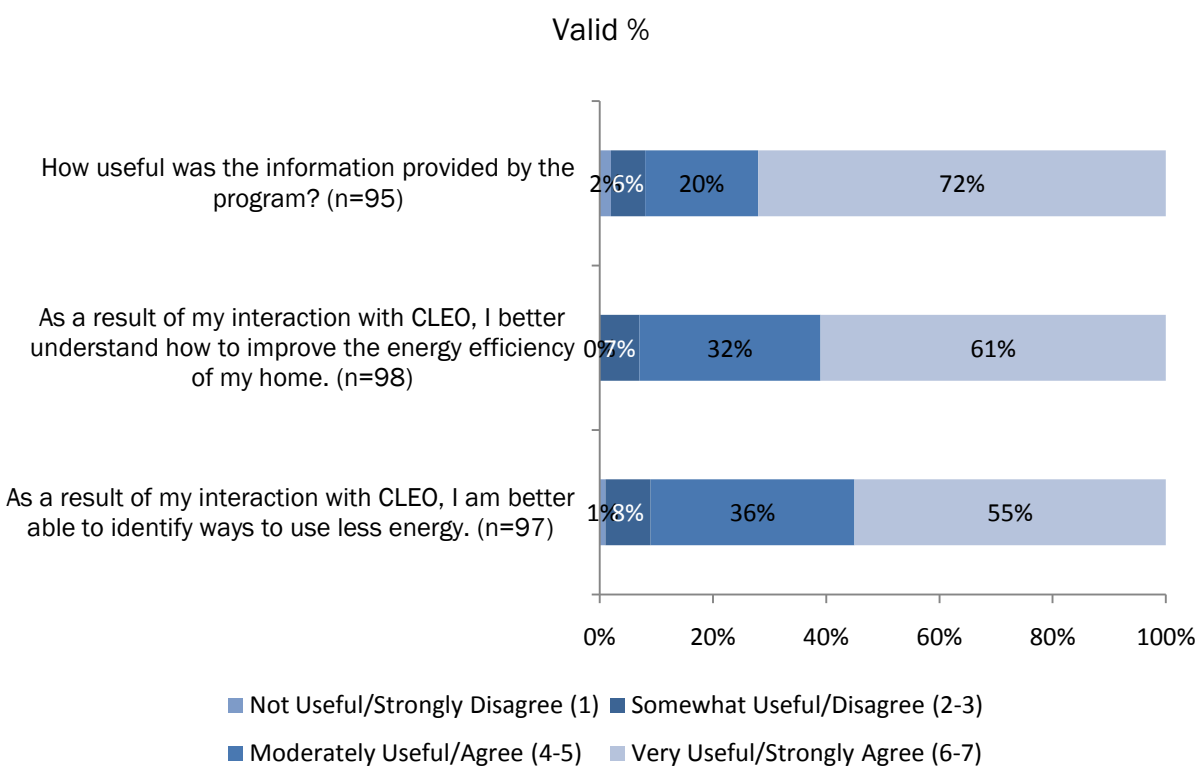


Figure 60. Overall Knowledge Increase (n=95)



The seminars are providing useful information; nearly three in four seminar participants found the seminar information to be very useful. The majority of participants are better able to understand how to improve the energy efficiency of their home and better able to identify ways to use less energy (Figure 61). This indicates that the majority of participants are gaining energy awareness and knowledge from the content in the seminars.

Figure 61. Knowledge and Awareness Gains

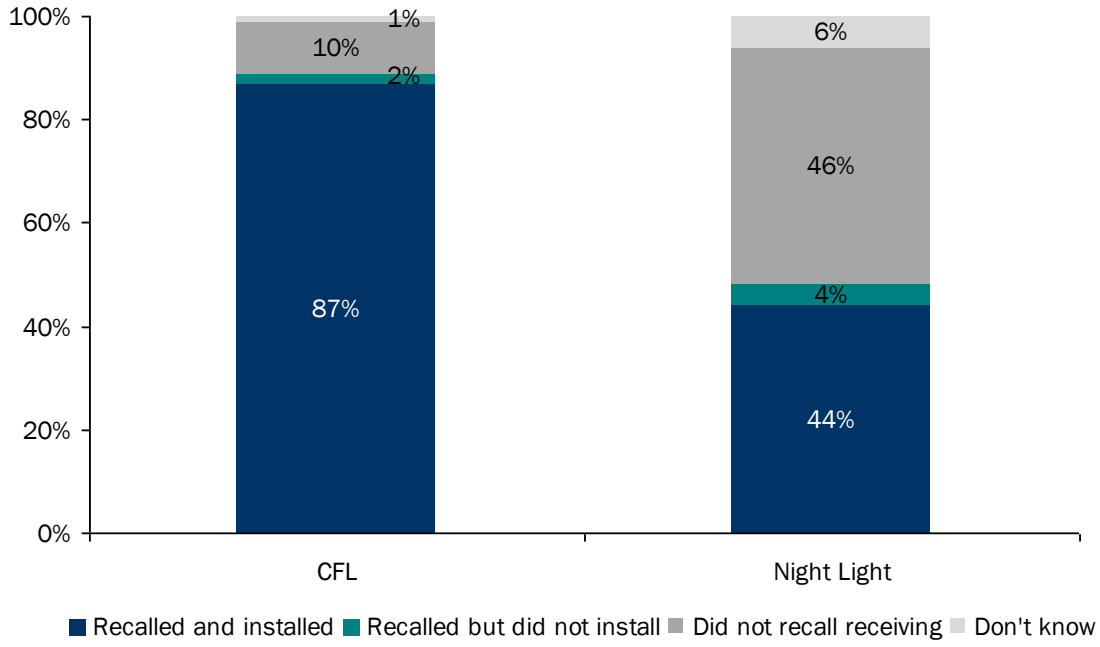


6.4.5 What behavior change occurred as a result of the program?

CLEO intends - not only to increase energy efficiency awareness but to turn that awareness into action. CLEO encourages many energy saving measures and actions through their seminars and outreach. Nine in ten seminar participants reported changing their behavior, which we described in the survey as "turn off lights more frequently, change use patterns, alter operations and maintenance, etc." We asked survey respondents a variety of questions to find out what specific actions they took as a result of the program. Participants overwhelmingly reported a variety of direct energy saving behaviors, including installing free measures provided by the program, but also independent measures such as CFLs, refrigerators and other major household appliances.

CLEO gives its participants free CFLs and LED night lights in return for their participation in seminars. Figure 62 shows the percent of seminar participants who remembered receiving these measures and installed them. Almost everyone that recalled receiving a free item, installed that item at home – resulting in energy savings directly attributable to the program. Although few participants (48%) recalled receiving an LED nightlight, it is possible that CLEO did not give away these items at every seminar.

Figure 62. Received and Installed Free Devices (n=100)

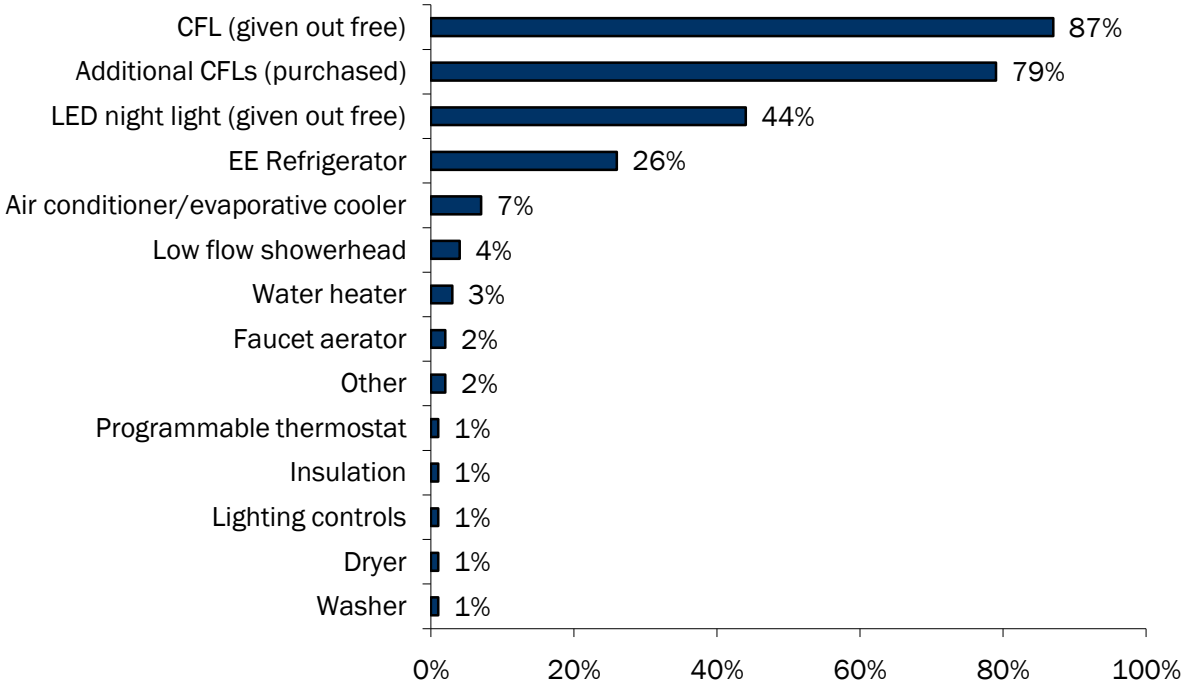


We also asked respondents what specific items they have installed since the seminar they attended (Figure 63). While 87% installed the free CFL they received, 79% reported installing CFLs in addition to the one they received free. On average, participants installed 9 CFLs in their homes.

Furthermore, over one-quarter (26%) of participants reported installing an energy efficient refrigerator. This is a significantly large percentage given that only 6% of the general population installed an energy efficient refrigerator in the state of California[65]. This large percentage of installs may be in part due to survey design and in part due to the programs promoted at the events. Per survey design, participants were asked about CFLs and refrigerators in an aided fashion, while the other items were mentioned unaided. CFLs and refrigerators were intentionally asked in an aided fashion given that participants stated that is what they were most likely to do after attending a seminar in the PY2006-2008 process evaluation. However, the aided question strategy may have resulted in a false response bias. More importantly, CLEO actively promoted rebate programs for ENERGY STAR refrigerators, the LIEE program and the RETIRE program, a refrigerator and freezer recycling program. Of the 26 survey participants that installed an energy efficient refrigerator, four said they participated in a rebate program or the LIEE program, although it is uncertain whether they participated in these programs for refrigerators or other measures. The program's education regarding the value of an energy efficient refrigerator upgrade also likely instigated this action.

[65] Data collected in the General Population tracking study for the Flex Your Power campaign between July 2008 and February 2009.

Figure 63. Items installed since CLEO seminar (n=100)



Furthermore, nearly one-third (31%) of respondents indicated they had future plans to improve the energy efficiency of their home.

6.4.6 What are the net energy savings as a result of the program?

We have seen throughout this report that participants reported an increase in knowledge and awareness as well as many direct energy saving behaviors following participation in CLEO. We used several of the questions in the survey to calculate a cognitive change index (CCI), or a value between 0 and 1 that estimates how much of the changes reported by respondents can be attributed to the program. The CCI for those respondents who reported taking action was 0.85, indicating a strong influence of the program.

We used the CCI along with several of the questions about behavior changes to calculate the net energy savings. By combining this information, we developed a preliminary estimate of energy savings for the 100 survey respondents: 16 to 47 MWh, with a medium estimate of 32 MWh and 55 to 184 therms, with a medium estimate of 120 therms (Table 55)[66].

We surveyed 100 seminar participants out of 2,660 Chinese and Vietnamese seminar participants (a 1:27 survey/participant ratio) reached by CLEO over the three years of the program; therefore we can estimate that energy savings for seminar participants actually amount to approximately 27 times the calculated numbers – or 532 to 1,330 MWh with a

[66] These numbers provide a range of energy savings for those actions that were taken to account for different underlying baselines among respondents; the range is not intended to imply that every respondent took an action.

medium estimate of 798 MWh, and 1,330 to 4,788 therms with a medium estimate of 3,192 therms. In addition, CLEO reached over 3,200 participants at booths. It is likely that booth participants will not undertake the same level of energy saving behaviors as seminar participants because the length of contact is so much shorter, and thus our energy savings estimates should not be extrapolated to the entire population reached by CLEO. We present these numbers simply to demonstrate the order of magnitude of energy savings that may be created by CLEO. It should be noted that the CLEO program does not have any direct energy savings goals associated with it.

We note that the savings estimates for this program is annual, not lifecycle. There are likely ongoing savings as long as the measures are still in function.

Table 55. Net Energy Savings (n=100)

		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Additional CFL/Lighting	743[1]	12.56	25.11	37.67			
EE Refrigerator	22	1.10	2.20	3.30			
Aerator	2				5.79	11.58	17.37
Showerhead	4				11.58	23.15	34.73
EE AC	5	2.19	4.38	6.57			
EE clothes washer	1	0.01	0.03	0.04	4.40	8.80	13.20
EE water heater	2				9.87	19.74	29.60
Lighting controls	1	0.47	0.55	0.63			
Insulation	1				32.98	65.96	98.94
Programmable thermostat	1				(0.08)	11.52	23.13
Gross Total		**16**	**32**	**48**	**65**	**141**	**217**
CCI=0.85							
Net Total		**14**	**27**	**41**	**55**	**120**	**184**
CFL Giveaway	87	1.47	2.94	4.41			
LED night light Giveaway	44	0.63	1.25	1.88			
Overall Total		**16**	**32**	**47**	**55**	**120**	**184**

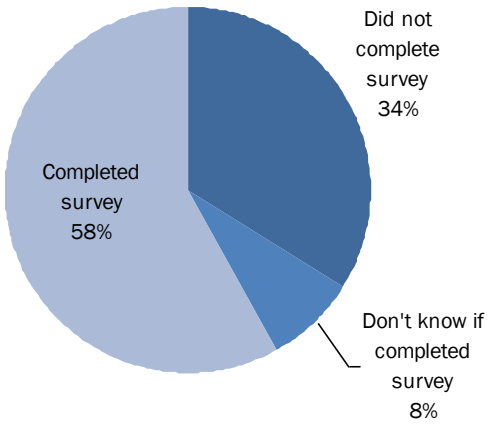
[1] 79 respondents multiplied by average number of bulbs installed (9.4). Savings were calculated per bulb.
Notes: These numbers assume an 85% gas heating fuel share, a 6% electric heating fuel share, an 85% gas water heating fuel share, a 5% electric water heating fuel share, and a 48% central air saturation based on RASS for SCG and SCE.
Estimates of savings are based on DEER data or on industry standards.
Four of the 26 respondents that replaced their refrigerator were removed from the energy savings, as these respondents likely acquired their refrigerator through a rebate program or the LIEE program. We also removed 2 of 7 AC respondents and 1 of 3 water heater respondents for the same reasons.

6.4.7 What percentage of participants were fed into resource programs, and which programs were promoted?

In addition to encouraging energy saving behaviors, much of CLEO's efforts are geared toward increasing this population's awareness of energy efficiency programs. In seminars multiple programs are promoted such as rebate and recycling program for refrigerators, rebate programs for air conditioners, whole house fans and lighting, summer discount plans and low-income programs. Notably, the HEES program is the only non-resource program promoted during the seminars. During seminars and events, many people complete a five-minute HEES. After CLEO sends the completed surveys to the utilities, the utilities mail or email reports to the participants that discuss energy saving tips and rebate programs. These activities serve to further channel participants into resource acquisition programs.[67]

Despite the fact that CLEO seems to put a heavy emphasis on HEES during their outreach events, our survey of seminar participants shows that only 58% of respondents recall completing the HEES (Figure 64). While the HEES was distributed at all of the seminars, not all of the participants are required to complete it.

Figure 64. HEES Survey Completion (n=100)

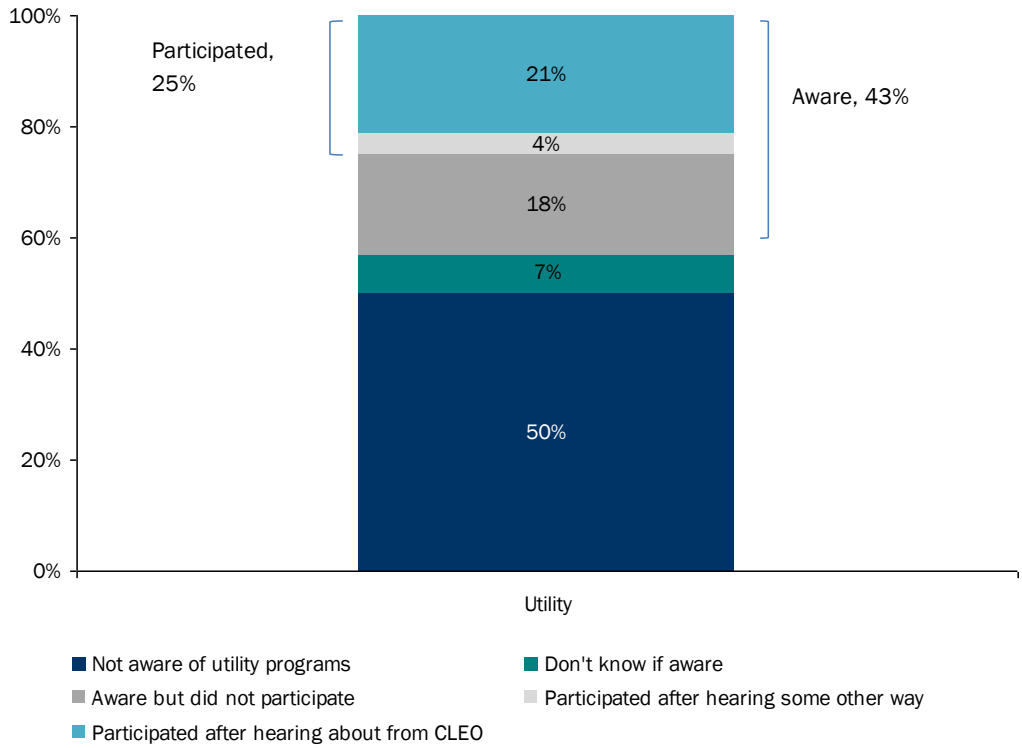


We also asked survey respondents questions about their awareness of utility programs in general. Only 43% of respondents reported being aware of a program (Figure 65), which is low given that providing utility program information is a main portion of the seminar. While awareness is low, participation is high. One-quarter of respondents said they have participated in a utility program since attending the seminar, slightly fewer (21%) participated after hearing about it from CLEO. Therefore, half of the participants who recall hearing about utility programs end up taking part in one. This channeling rate is high,

[67] Note that our evaluation shows the percentage of Chinese and Vietnamese participants that are channeled into resource acquisition programs after participating in a seminar. This information may not be representative of booth participants or other ethnicities targeted by CLEO.

indicating that CLEO is successfully channeling a significant proportion of seminar participants into utility programs.

Figure 65. Awareness of and Participation in Utility Programs (n=100)



CLEO is channeling participants into low income energy efficiency programs and rebate programs. Out of the 25% of respondents that participated in a utility program, the most common was the Low Income Energy Efficiency program (56%), followed by a rebate program (28%).

6.4.8 What is the value of the program versus the cost of the program?

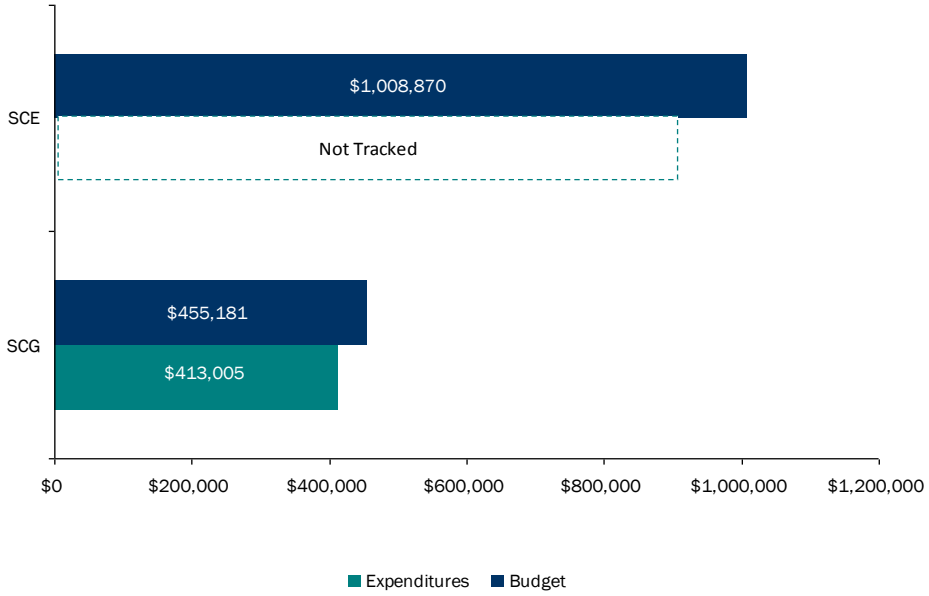
Although this evaluation was able to estimate energy savings, we do not consider this factor alone to judge the value of a non-resource program. Knowing the energy saving potential of this program is beneficial, but it is only one factor among many that should be considered. Given this, we examine multiple factors beyond energy savings in this evaluation to assess the value of the program versus the cost.

The total three-year budget provided by SCG and SCE for the program was $1,464,051[68]. SCG tracks and reports their portion of the budget and expenditures: the three-year (2006 to 2008) projected budget for SCG was $455,181, and the expenditures were $413,005. SCE did not track their portion of the budget and expenditures for this specific education and

[68] Total program budget provided by program implementer.

training program. Instead, SCE rolls the budget and expenditures for this program into their overall $23 million+ Educational and Training Program budget. Therefore, we estimated their total budget contribution by deducting SCG's portion (Figure 66) but cannot estimate expenditures.

Figure 66. Program Budget and Expenditures by Utility



The CLEO program has reached over 6,500 participants during the three-year period of this study. As mentioned previously, the program theory indicated that this population would likely not have received information on energy efficiency had it not been provided to them in-language by CLEO. This hypothesis was found to be somewhat supported by the fact that about 40% had little to no knowledge prior to the seminars (Figure 59). In addition, many of these participants have shared their new-found knowledge with a friend or family member, increasing the reach of this program.

This evaluation attempted to verify program achievements based on program information provided through data requests. This verification process revealed that CLEO successfully reached most of its program goals (Table 56). While quarterly reports show that the program exceeded all of its goals, we were able to verify that the program only exceeded its goals for the number booth events and media spots. However, the program fell short of its seminar and HEES survey goals: the program intended to execute 75 in-language seminars but program records show that 43 seminars occurred. Further, the program intended to get 2,000 HEES survey completes but program records show that 1,788 HEES survey were completed. The previous process evaluation indicated that program rollout was slow because of difficulties with material translation and recommended that in the future utilities complete this development to allow the contractor to focus on their grassroots strengths. That process evaluation also showed that as of the third quarter 2007, none of the budget had been spent on direct implementation, but rather all on administrative and marketing costs. Given these difficulties, the program has done well to exceed most of its goals given these upfront problems.

Table 56. CLEO Goals and Achievement Verification

Goal	Achievements (Q4 2008 Report from Implementer)	Achievement Verification
75 in-language seminars	77	43
15 booths	18	33
620 media spots	686	674
2,000 HEES	2,378	1,788

Note: Achievement numbers were culled from the program's quarterly reports. Information provided to the team was obtained through data requests.

In addition to reaching its target population, CLEO seems to be successfully imparting energy efficiency information. In our participant survey with 100 respondents, we found that over 90% changed their behavior related to energy use, and nearly 80% installed energy efficient lighting beyond what was provided to them free by the program. In addition, 58% took the HEES and 21% participated in a resource acquisition program as a result of their participation in CLEO. Altogether, the energy savings for the 2,660 Chinese and Vietnamese seminar participants are estimated to range from 532 to 1,330 MWh and 1,330 to 4,788 therms.

Overall, it appears that CLEO fills an important role in its marketplace, directly touching thousands of participants who may not be reached otherwise. We know of two other SCE programs that target these hard-to-reach ethnic groups regarding energy efficiency programs: PACE and Flex Your Power-Ethnic. However, CLEO is the only program providing in-depth education through in-language seminars where participants directly learn about ways to save energy and the utility programs available.

6.5 Differences in Vietnamese and Chinese Populations

Although our evaluation did not intend to explore or understand differences between ethnic minorities, we noticed that the survey data showed differences between Vietnamese and Chinese populations in multiple areas. This may reflect cultural differences or instead some difference in delivery of seminar content (that is in theory the same across translations).[69] When compared to the Chinese survey respondents, we found that the Vietnamese respondents were more likely to:

- Have an increase in awareness and knowledge of energy saving opportunities;
- Share information with others;
- Change behavior (but not installations and purchases); and

[69] Research from multiple sources suggests possible cross-cultural influence on extreme response or acquiescence response bias. However, we did not find any research suggesting that Vietnamese- and Chinese-Americans exhibit any single response bias or different response biases that would prevent comparison between groups.

- Complete the HEES.

In addition, Vietnamese respondents answered questions in a fashion that ascribes a higher level of influence (LOI) to the program. Means for seven-point scales (which are used for knowledge increase and many LOI questions) routinely were up to one point higher for Vietnamese over Chinese.

This information seems to demonstrate that CLEO has more of an effect on the Vietnamese population. While this may be explained by an inherent response bias or cultural bias, CLEO may want to verify that seminar content is as uniform as possible across languages while accounting for cultural norms. By evaluating in-language content, they may be able to identify possible improvements to the Chinese seminar that would make it as effective as the Vietnamese seminar.

6.6 Evaluability Assessment

We performed an abbreviated retrospective evaluability assessment of CLEO to determine the information available to help with future evaluation efforts. The participant contact information and program materials to which we had access are noted in Table 57 and Table 58 below. Overall, we generally had the information we needed to evaluate some parts of the program, including finding an event to observe and obtaining a sample of seminar participants to interview.

The program databases and information we received from the implementer through data requests did not always add up to the overall numbers reported by CLEO in quarterly reports – as in the case of the number of seminars and booths, number of booth participants, media spots, HEES participants, and more. Furthermore, we received partial participant information relative to the total number of events that occurred: we had participant information for 52% of the booth events and 84% of the seminar events. This information was sufficient to estimate program reach but required us to use an average number of participants per event in our calculation instead of the actual number per event.

Table 57. Program Information Available: Program Tracking Information

Contact Information	Dates Covered	Electronic or Hard Copy
Seminar Participants (name, date, training location, address, phone, SCE and SCG acct number)	2006-2008	Electronic
5-minute HEES Survey Participants (name, address, date and phone numbers for some)	2006-2008	Electronic
Seminars and Booths (name, activity, ethnic group, date, location)	2007-2008	Electronic
Media Outreach (language, media, name, date, number of spots, circulation)	2006-2008	Electronic

Table 58. Program Information Available: Program Materials

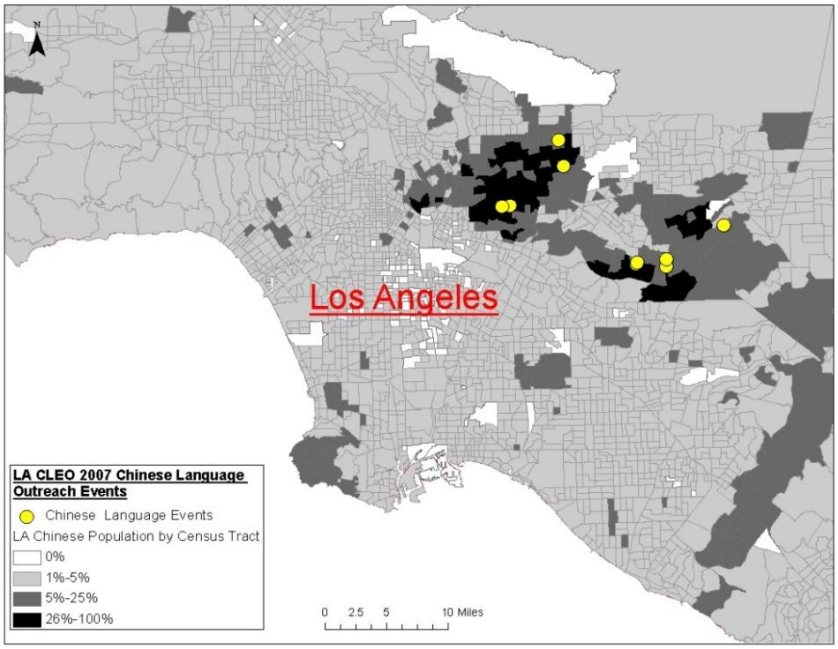
Program Materials	Dates Covered	Electronic or Hard Copy
Program Implementation Plan	2006	Electronic
Quarterly Reports	2Q 2006 – 4Q 2008	Electronic
Newspaper, TV, and Radio scripts (English)	2006-2008	Electronic
Seminar Presentation (English)	2006-2008	Electronic
5 Minute HEES Survey (English)	2006-2008	Electronic
Booth Quiz (English)	2006-2008	Electronic
Workshop Survey (English)	2006-2008	Electronic
GES Brochure (Third Party Implementer) (English)	2006-2008	Electronic

For future evaluation efforts, we recommend that the program:

- Improve event and participant contact information to ensure that all program information aligns with what is reported in quarterly reports. Participant information should include: participant name, phone, address, and email; Participant ethnic group/language spoken; and finally the manner of contact with the participant (where/when/how the contact occurred and also what information and energy efficiency items were provided)
- The program might consider tracking telephone hotline calls (contact information, reason for call, information provided, date of call, programs recommended) so that future evaluations can assess the impact of telephone consultations. Notably, this evaluation did not attempt to evaluate this program component and it is possible that the program already tracks these calls.
- The program may also consider tracking website statistics as this might be another way to calculate program reach in future evaluations. It is also recommended that the program track the total number of participants or attendees at each booth event in addition to the number of participants that took a HEES survey. This information would allow evaluators to analyze program's penetration rate by looking at the number of booth event participants that took a HEES survey. By analyzing these data, an evaluator can assess the multiple levels of participation based on the depth of information received by each participant.

6.7 Appendix A.

Figure 67. 2007 and 2008 Chinese Language Outreach Events and Seminars



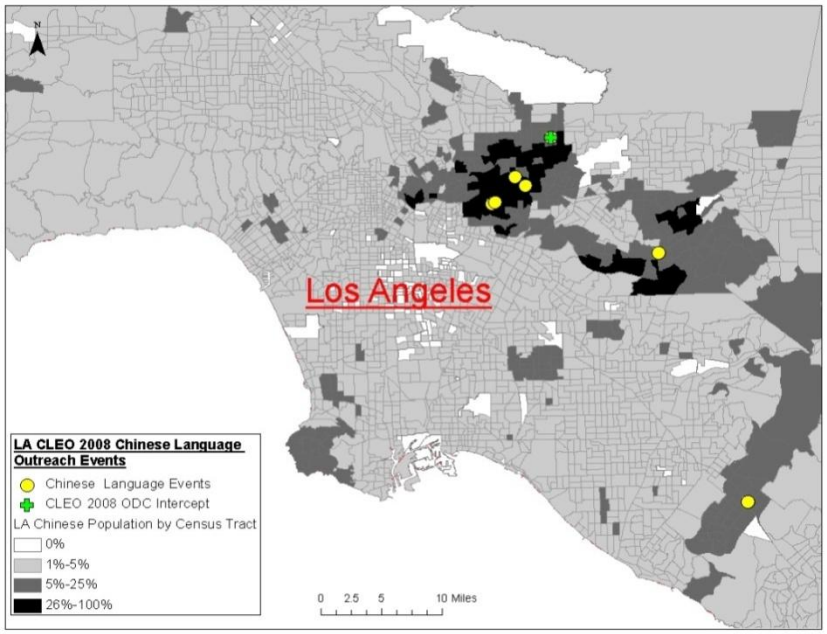


Figure 68. 2007 and 2008 Vietnamese Language Outreach Events and Seminars

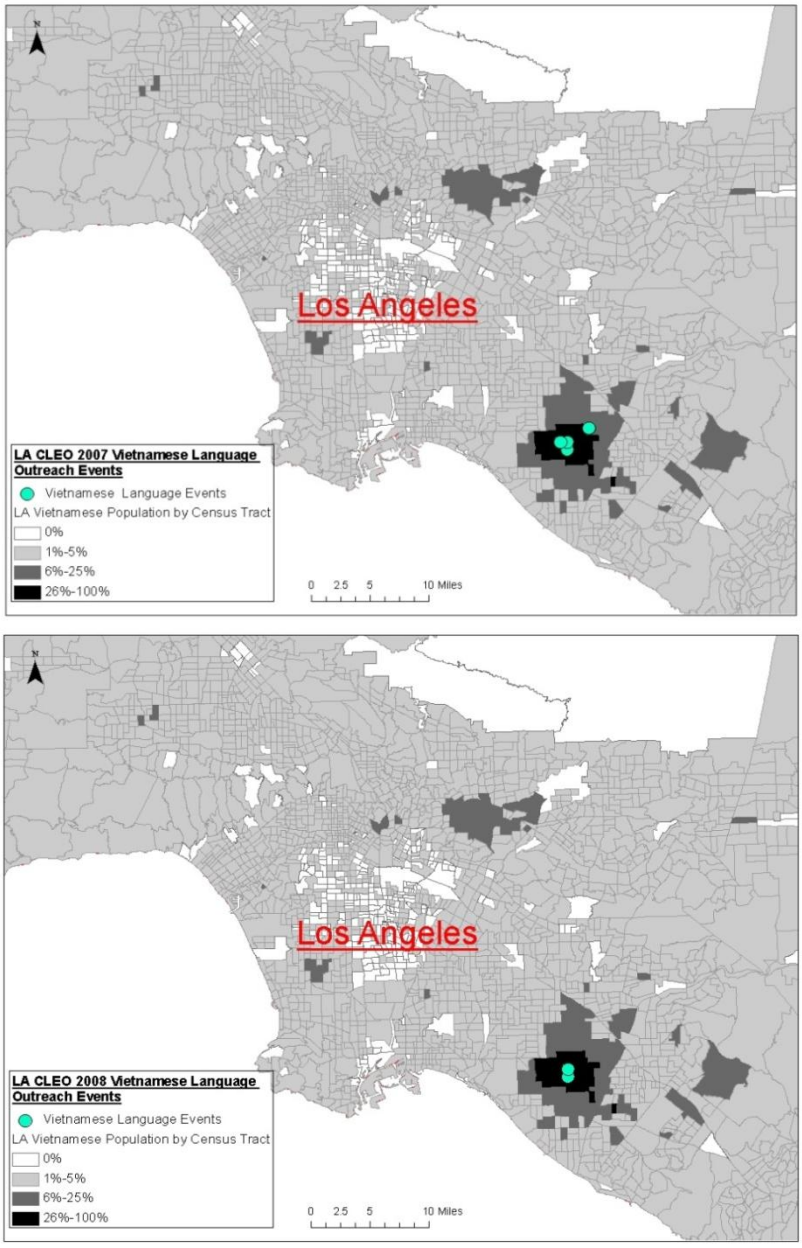
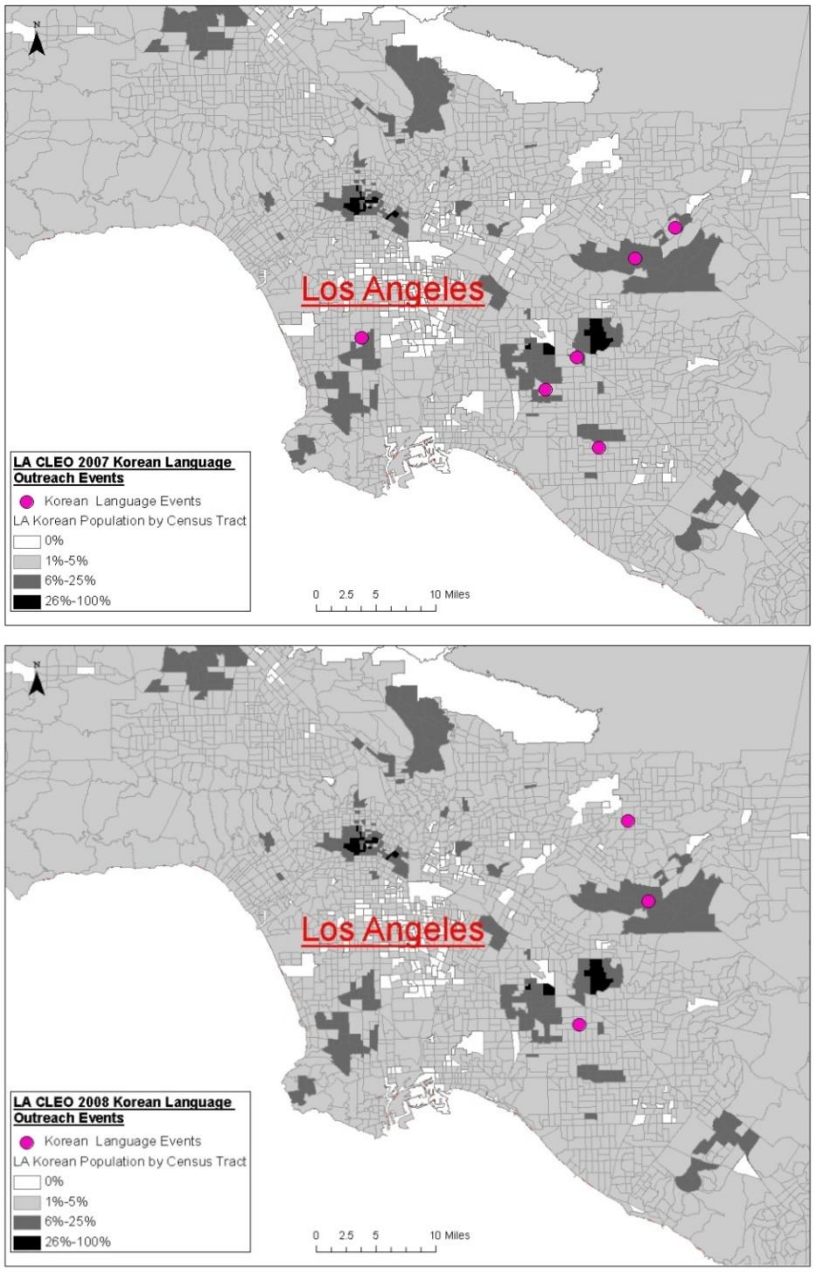


Figure 69. 2007 and 2008 Korean Language Outreach Events and Seminars



7. SDGE 3032: K-12 ENERGY EFFICIENCY EDUCATION PROGRAM

7.1 Introduction

San Diego Gas & Electric (SDG&E) was awarded funding from the California Public Utilities Commission (CPUC) to implement the K-12 Energy Efficiency Education (E3) Program during program years 2006 to 2008. Opinion Dynamics conducted an indirect impact evaluation of the E3 PY2006-2008 program. E3 is a curriculum-based program that provides energy education and energy conservation information to schools in the SDG&E service territory in the form of curriculum, materials, and equipment, which enable teachers to supplement their normal science curriculum with energy education. The program aims to provide students and their families with the benefits of conserving energy, and how their actions can "Save Energy, Save Money, and Save the Planet."[70]

This report provides results from an impact evaluation that was undertaken between February 2008 and April 2009.[71] This evaluation pulls from several data collection methods and sources to provide a holistic presentation of the program. This approach allowed us to draw inferences from observations, teacher interviews and student surveys to assess the potential impacts (both energy and non-energy) of the program. While the program focuses on four primary grade levels – 1st grade, 4th grade, 6th grade and 8-10th grade - we purposely chose to delve deeper into the 4th grade curriculum implementation, as this curriculum was the most advanced during our evaluation period. While we acknowledge that the students' social and cognitive development in the 4th grade is different from other grades, we have no reason to believe there would be any systematic differences between how the curriculum is designed and delivered to the grade levels and therefore consider our 4th grade focus as a typical case for the program's implementation and the setting in which it occurs.

Traditionally, evaluations of curriculum-based programs focus on the level of participation stipulated in the Program Implementation Plans (PIP) and participant satisfaction and knowledge gained. This evaluation of the E3 program expands upon these traditional methods. As such, this evaluation sought to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavioral change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What percentage of those targeted and exposed to the program reported behavior change as a result of the program?; (6) What indirect and direct energy saving behaviors were taken by those who received education or treatment through the program?;

[70] Adapted from the 2006-8 Energy Efficiency Portfolio Quarterly Report Narrative, K-12 Energy Efficiency Education Program, SDGE 3032, Second Quarter 2008.

[71] The indirect impact evaluation was intended for the 2006-2008 program cycle. However, the program did not officially start activities until 2008. The period of study slightly spilled over into 2009 as many of the teachers were trained in 2008 but did not have the opportunity to teach the curriculum until early 2009.

(7) What are the net energy saving behaviors taken by those who receive education through the program?; (8) What are the net energy savings as a result of the program?; and (9) What is the value of the program versus the cost of the program? In addition to these research questions, we also comment on the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on this area in a section called Evaluability Assessment toward the end of this report.

Notably, this evaluation initially intended to answer the research question: What percentage of participants was fed into resource programs, and which programs were promoted? However, our study revealed that this program does not explicitly mention resource programs or channel participants into resource programs and determined that this question was not relevant to this particular program.

7.2 Summary of Key Findings

The E3 program is primarily an education program first and an energy saving program second. The success of a K-12 program evaluation requires full collaboration with the program implementers in order to access the participants. We faced many challenges conducting this impact evaluation as the program implementers took issue with our efforts to assess this program based on "action metrics" versus "educational metrics". Program implementers often challenged the questions we wanted to ask of program participants, both students and teachers. Further, given that this program was still in its early implementation stages during the time of this evaluation, the evaluation was able to primarily focus on the content of the curriculum, how it might encourage behavior change and what behavior changes were likely to occur after students received the curriculum. Additionally, this evaluation explored how the program is implemented, specifically how teachers were trained to implement the curriculum and how well they were trained. Finally, this evaluation explored how the curriculum is implemented in the classroom and how well students respond to the curriculum. The ability to explore all research questions, especially the energy savings piece, was challenging in this evaluation given both the early implementation stage of the program and the implementer's refusal to provide the evaluators with direct access to teacher contact information. The evaluation team made every attempt to overcome these hurdles throughout the evaluation and adjusted the research questions and data collection methods accordingly.

Below is bulleted summary of the key findings from this evaluation:

- This program designed energy efficiency curriculum and supporting educational materials for K-12 students compliant with the California Science Standards. It trains teachers to implement the curriculum as part of their science lessons throughout the school-year. The teachers and curriculum itself encourage students to make energy changes at home and in school. The 4th grade curriculum, for example, encourages replacing incandescent bulbs with CFLs, turning off appliances and electronics when not in use, and adjusting heating and cooling temperatures.
- Though the final design of the program is likely to positively influence students' energy behaviors, by the end of 2008 the program was not used in enough schools to test its long-term impact. The intended reach of the program was 400,000 of the

approximately 408,000 students in the San Diego school district over the period of PY2006-2008. Due to its long development process, the program only reached about 12,000 across all grades by the end of PY2008.

- A pre and post survey of students is the best method to assess knowledge increase from these types of programs. While the evaluator's tried to work with the implementers on such a survey, this survey was not fielded during the time of our evaluation. We strongly encourage this program, and any other K-12 program, to include a pre and post student survey as part of program implementation in the future.
    - Without the ability to assess pre and post knowledge, we focused our efforts on assessing the curriculum for its likelihood to impart energy efficiency knowledge. We found that the program is likely to increase knowledge and awareness for several reasons. First, it uses many hands-on activities that are more likely to stand out in students' minds than textbook-only lessons. Second, it explains new concepts, especially energy efficiency and conservation, likely not specifically taught in other classes in San Diego. Especially important to its effectiveness is the teacher's implementation, both how they implement the curriculum and how well they do it. Finally, it has curriculum that is appropriate for each grade level, training that sufficiently prepares teachers, and students that appear engaged in the material.
    - 90 percent of teachers surveyed rating the curriculum "very appropriate" for their students' grade level.
    - 95 percent of teachers rated the training highly (a 4 or 5 on a 5-point scale) on effectively preparing them for the lessons, meeting their expectations, increasing their knowledge of energy efficiency education, providing supportive materials for the lessons, and providing helpful information about the materials.
- During the evaluation period, we were able to analyze data from 61 post curriculum student take-home surveys. Almost nine in ten, 87%, of these students reported direct behavior change as a result of the program. The most common change was turning off the lights when they leave a room. In addition, many households (70 percent) claimed that they have replaced incandescent light bulbs with CFLs as a result of the program. Seventy-five percent reported reducing the use of their appliances (air conditioners, refrigerators, dryers, water heaters). The change in behavior was not limited to energy issues, but also spilled over into a general increased cognizance of environmental issues. Some of the students and their parents noted they were also recycling more, using reusable bags at the grocery store, and walking more to save gas. [Note that this data is based on a small convenience sample, n=61]
- Students also reported taking some indirect behaviors. Our research found that 93 percent of the parents said the children discussed the program with them at home. Many of the students also shared specific energy information they had learned as a result of the program, as 80 percent of the parents said they reviewed the energy

saving ideas from the program. [Note that this data is based on a small convenience sample, n=61]

- This evaluation identified the following net energy saving behaviors: (1) Replacing a standard incandescent bulb with the CFL (70%); (2) Turning off lights when leaving a room (87%); (3) Reducing appliance use (75%); (4) Turning off/unplugging appliances when not in use (7%); (5) Conserving water (3%); (6) Purchasing an Energy Star washing machine (2%); and (7) Installing low flow show heads (2%).
- This evaluation calculated energy savings for a small convenience sample of households, which provide a sense of the savings that could be accruing due to the program. The net energy savings for the program from this analysis is 53 MWh and 17 therms. Notably, the gross and net savings are identical for this program as we were unable to ask the questions that would enable us to calculate net savings. Furthermore, given that this data was collected via a convenience sample, we are not extrapolating these values beyond our sample, but do acknowledge that the actual number of households taking actions similar to these is likely to be much higher than shown.

7.3 Methodology

Opinion Dynamics utilized multiple sources of data, secondary and primary, to build a chain of evidence for the program's energy and non-energy impacts. Secondary data collection included a review of program documents and curricula. For primary data collection, we collected our own data in conjunction with data collected by the program implementer. The program implementer fielded a number of surveys in consultation with the Opinion Dynamics team[72]. Throughout our evaluation, we had no reason to believe that the survey data collected by the program implementer are intentionally biased given that the program implementer did their best to field the surveys to every teacher and student possible and to share all of that data with us in a timely fashion. The program implementer also provided ODC with an opportunity to review the data collection instruments and provide input. Quantitative surveys included a hard copy teacher training survey at the end of each training session, an electronic teacher curriculum survey after the teachers implemented the E3 curriculum in their classrooms and a mail-in survey of students and their families after students completed the program. Per our own data collection efforts, we attended one of the 4th grade curriculum teacher trainings, observed a classroom receiving one of the lessons, and conducted a in-depth interview with the teacher immediately following our classroom observation. The following table shows the primary data collection efforts upon which this evaluation was built.

[72] Program implementers had a teacher curriculum evaluation survey in place before this evaluation began. Notably, Opinion Dynamics collaborated with the program implementers to create a new teacher curriculum evaluation survey to more effectively assess the potential energy and non-energy benefits of the program. This survey was not fielded in time to collect enough data (only two respondents) for analysis in this evaluation time period.

Table 59. Primary Data Collection Efforts

Opinion Dynamics Collected			Implementer Collected with Evaluation Team's input		
Teacher depth interview	Training Observation	Classroom Observation	Professional Development Training Survey	Teacher Curriculum Survey	Post-Program Student Household Survey
1 teacher provided in-depth feedback on the 4th grade curriculum	Observed the 4th grade teacher training in Nov 2008 (14 teachers in attendance)	Observed a 4th grade classroom receiving curriculum in Dec 2008 (23 students in attendance)	243 teachers completed surveys after each training in 2008 (100% completion rate)	62 teachers completed a survey after teaching the E3 curriculum in schools (31% completion rate[73])	61 students mailed a survey after participating in the program (unknown completion rate[74])

For the purpose of this report the unit of analysis is the people directly touched by the program (i.e., the teachers, students and households).

7.4 Detailed Findings

7.4.1 What education or information is provided and what behaviors are encouraged?

San Diego Gas & Electric (SDG&E) was awarded funding from the California Public Utilities Commission (CPUC) to implement the K-12 Energy Efficiency Education (E3) Program during program years 2006 to 2008. E3 is a curriculum-based program that provides energy education and energy conservation information to schools in the SDG&E service territory in the form of - curriculum, materials, and equipment, which enables teachers to supplement their normal science curriculum with energy education. The program aims to provide students and their families with the benefits of conserving energy, and how their actions can

[73] The program database shows that 200 teachers participated in the program between 2006 and 2008. We based the teacher curriculum survey completion rate on 200 teachers. However, 243 teachers submitted surveys after each training session. Teachers could have participated in multiple trainings and are double-counted in the professional development training survey data. Another explanation is that the program database may not include all of the program participants. Suggested additions to the program tracking database to decipher this discrepancy can be found in the "Evaluability Assessment" section of this report.

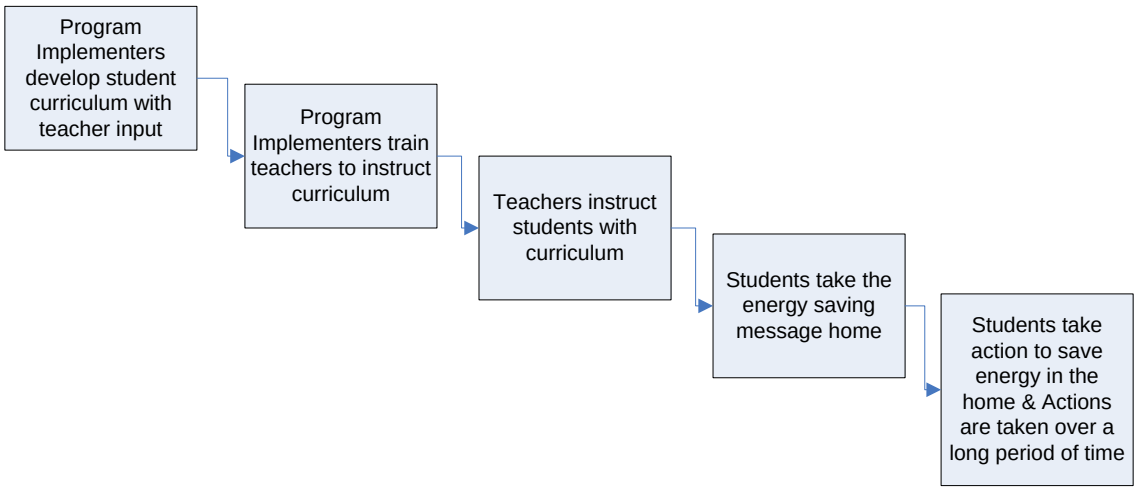
[74] Program databases suggest that roughly 12,000 students received the curriculum through the program cycle however the program did not track the number of students that received surveys. It is estimated that likely about 200-300 students received take-home surveys at this time, resulting in 61 completed returns. Suggested additions to the program tracking database to compute this completion rate can be found in the "Evaluability Assessment" section of this report.

"Save Energy, Save Money, and Save the Planet."[75] The three-year budget for this program was $1,936,583.

The program's premise is that "most people lack a good understanding of the potential for energy and cost savings by their actions. The energy market lacks price signals that are clear enough to influence behavior"[76]. The E3 program attempts to increase the public's understanding of the potential for energy and cost savings through incorporating energy education into the K-12 curriculum. The program has the potential to influence both the students and the adults at home.

The San Diego Unified School District and the San Diego Office of Education work together to implement this program. This program is "Built by Teachers, Managed by Teachers, for Teachers" [77]. As such, the program utilizes a trickle-down approach for program implementation where the program develops teacher-consulted curriculum, instructs teachers on how to teach the curriculum and then relies upon the teachers to implement the program curriculum as part of their standard science curriculum each year. Furthermore, students are expected to take the energy saving messages home and take action, likely together with their families, to save energy in the home. Energy savings from this program can be realized immediately and sustained over a long period of time; therefore the energy savings beyond the cost of the program are sustained over a period of time long enough for the program to be cost effective. The figure below presents the program's trickle-down implementation strategy.

Figure 70. Trickle-Down and Sustained Effects Implementation Strategy



Information for this program is distributed to teachers through professional development trainings, both in-person and online. The in-person trainings lasted about 2 hours, where the instructor walked the teachers through each lesson; the teachers conducted each lesson's experiment themselves followed by a Q&A session before moving onto the next lesson. In

[75] Adapted from the 2006-8 Energy Efficiency Portfolio Quarterly Report Narrative, K-12 Energy Efficiency Education Program, SDGE 3032, Second Quarter 2008.

[76] 2006-2008 SDGE-3032 K-12 Energy Efficiency Education Program Implementation Plan.

[77] Ibid.

addition to the curriculum, the program supplies the teachers with materials for the classroom. Some information is also disseminated to the public through a program website (www.k12e3.org) where parents, teachers and students can learn more about the program and energy conservation. Notably, the program also planned for a Mobile Energy Efficiency Education Unit (ME3U), a mobile unit that would travel to schools and educate students with interactive kiosks. The ME3U was ultimately cut from the PY2006-2008 activities due to budget constraints.

The education provided to students is in the form of a lesson plan, or curriculum, for each grade level. The curriculum developed for this program was fully coordinated with the California Science Standards, meaning that the program curriculum is now a part of the Science curriculum taught in California schools. This also means that the curriculum meets both the program objectives and CA science curriculum standards. This is especially important so that schools accept this curriculum as a standard. As part of this evaluation, we reviewed and analyzed the program curricula developed to date (1st, 4th and 6th grades) to understand both the general content and the energy saving actions encouraged. The curricula for each grade are similar in that each one teaches about types of energy, energy resources and a discussion of ways to save energy at home. As expected, the energy concepts are taught with different levels of abstraction due to age appropriateness. For example, a first grader learns that the sun is a large source of energy but a fourth grader learns that the sun can directly heat water, it is a concept called "solar energy" and the student engages in an activity to heat water with solar energy. Based on our review, students in the 4th grade and higher will likely take more energy saving actions at home due to the curriculum's content and the students' advanced social and cognitive development. However, it can be argued that the concepts learned in the first grade are necessary, regardless of the potential energy and non-energy benefits, because the curriculum provides the building blocks for future energy education. The table below summarizes the general content and energy saving actions that are encouraged through the curriculum for 1st, 4th and 6th grades.

Table 60. Program Curriculum Content Summary

	General Content	Energy Saving Actions Encouraged
1st Grade	Weather and clothing; Shading and cooling; Colors and temperature; Types of energy and energy resources; Ways to save energy	Use less energy at home by turning off lights when you leave a room, unplug appliances when not in use, use less water when possible
4th Grade	Energy efficient technologies; Electricity sources; Renewable and Non-Renewable energy sources, Solar power, Ways to save energy	Install CFLs; turn off lights/TV/computer when not in use; Close doors when HVAC system is on; close/open window curtains/blinds used to keep heat out/in; conserve water when brushing teeth, keep refrigerator door closed; fix air leaks around windows or doors
6th Grade	Forms of energy and transfer of energy, Greenhouse effect, Ways to reduce the greenhouse effect, Non-electric heat sources; Carbon footprint	Construct energy efficient homes (i.e. direction of windows, insulation, roofing color, home color) in the future; Install CFLs; turn off lights/TV/computer when not in use; Close doors when HVAC system is on; close/open window curtains/blinds used to keep heat out/in

As part of our evaluation we delved deeper into the 4th grade curriculum to better understand the information provided and the learning methods used to teach the curriculum[78]. The 4th grade curriculum encompasses a 5-lesson plan where students:

- Learn that some technology uses energy more efficiently than others;
- Learn that electricity comes from renewable and nonrenewable sources; and
- Learn that behavior changes and alternate technologies can conserve energy.

The first four lessons in the curriculum provide the background knowledge of energy necessary for students to understand the concept of energy efficiency and why it is important. Although one can hypothesize that students might encourage their households to install CFLs or solar water heating as a result of conducting the experiments in lessons 2 and 3, one lesson, the fifth lesson, has a direct call to action. During the fifth lesson the students really learn how to "take it home" by assessing their home energy usage in the form of a home audit. The table below provides a summary of the five lessons in the curriculum and the hands-on experiments that students accomplish as part of each lesson. All of the lessons build up to lesson 5, where students are encouraged to change behaviors at school and at home.

Table 61. 4th Grade E3 Curriculum Summary

E3 Lesson	Objective	Topic	Experiment	Materials & Handouts
1	Learn that some technology uses more energy than others	CFLs v. Incandescent Light Bulbs	Compare and contrast bulbs by heat, analyze data and draw conclusions about energy.	Bulbs, sockets, power strips, thermometers
2	Learn the source of electricity	Path of Electricity	Arrange picture cards to draw the path from the power plant to the electric outlet. Compare hand crank generators to large generators at power plants.	Picture cards, hand crank generator
3	Learn that some electricity comes from renewable and nonrenewable sources	Renewable and nonrenewable energy sources	Students sort pictures of energy sources into renewable and nonrenewable categories.	Picture cards of energy sources
4	Learn how a renewable source can be turned into energy for the home	Solar power	Student heat water with the sun in tin pans outside.	Tin trays
5	Learn that behavior changes and alternate technologies can conserve energy	Energy audits	Students complete energy audit in classroom and at home.	Home energy audit, school energy audit

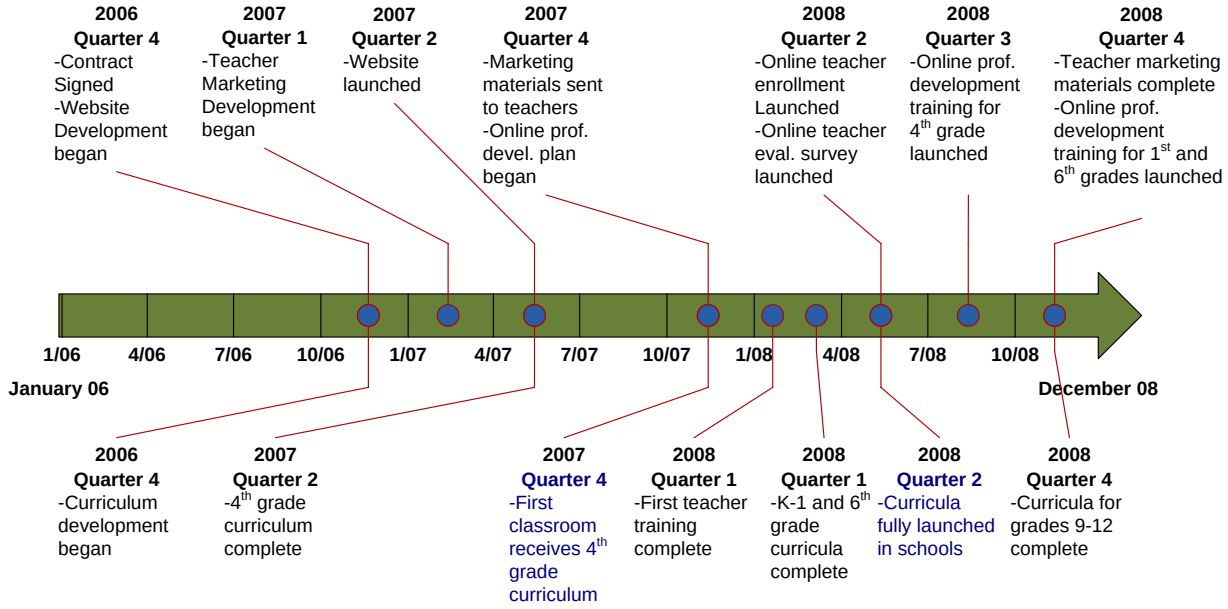
[78] Summary tables for the 1st and 6th grade curricula are provided in the Appendix to this report.

Based on the review of the 4th grade curriculum and our classroom observations, the behaviors most encouraged through the program are: replacing incandescent light bulbs with CFLs, turning off lights, appliances and electronics when not in use, and adjusting heating and cooling temperatures.

7.4.2 What is the reach of the program?

One of the major findings from our evaluation is that while the training, curriculum and implementation are good and will likely result in positive impacts, the program was slow to start and has a long way to go before it can be measure for energy savings. This program aimed to expose over 400,000 students to the curriculum by the end of the 2006-2008 program cycle. However, the program's launch was delayed due to slow decision-making regarding program management and the time to sign a contract. In addition, developing the curriculum took longer than expected, mostly because they developed brand new curriculum and took the time to ensure that it met California Science Standards. The program got fully underway during the Fall of 2007 when the E3 Professional Development Program (i.e., teacher trainings) for the 07/08[79] year commenced. The figure below plots the program's significant milestones from 2006 to 2008.

Figure 71. Program Milestone Timeline



While the program initially planned to reach 400,000 K-12 students, it has fallen short of this goal given that program records state that 12,116 students (or 3%) received the curriculum by the end of 2008. However, the program reached a higher percentage of 4th graders (10%) and 6th graders (8%). Teachers begin instructing the program curriculum in the 4th Quarter of 2007, a little more than halfway through the 2006-2008 program cycle. Furthermore, the program had to develop curriculum in waves by grade level. The fourth

[79] Many schools in San Diego are year-round and therefore the trainings were likely conducted in time to teach the lesson plan in the 07/08 school year.

grade curriculum began first (Q4, 2007), then the K-1 and 6th grade levels (Q1, 2008) and then the 9-12 grade levels (Q4, 2008). Given that the 4th grade curriculum had a significant head start, it is expected that the program would reach more 4th graders than the other grades. The table below shows the number of months that each curriculum was implemented in PY2006-2008 and the number of students that received the curriculum by grade level.

Figure 72. Program Reach

	Number of months curriculum was implemented in PY2006-2008	San Diego County population[80]	Number reached between 2006-2008	% Reached
4th Graders	15	38,480	4,023	10%
K-1st Graders	9	75,236	1,895	3%
6th Graders	9	38,799	3,248	8%
9-12th Graders	3	153,330	1,677	1%
Other Grades[81]		102,518	1,273	1%
All K-12 Students		408,363	12,116	3%

Program implementers recognize that they have fallen short of program expectations and are executing strategies to expedite the reach of the program. Now that the curricula, instruction materials, website and training materials are complete, the program can focus its efforts on fully implementing the E3 curriculum into the standard science curriculum instructed in San Diego schools. In the fall of 2008, the program launched an online version of the E3 Professional Development Program to expedite school penetration. The expectation is that incorporating 21st Century learning tools[82] for the teacher trainings will allow the program to develop a more cost-effective method for training teachers, whereby more teachers can participate in the program at a faster rate.

Our training observation coincided with the first roll-out of the online training. The program was testing the newly developed online learning tool in a supportive in-person environment where the trainer instructed the teachers on the curriculum in-person and showed the teachers how to use the online training resource. The room was well-equipped with computers and IT staff support. In addition, the staff documented any “bugs” or challenges experienced by the teachers as they tried the new tool. When the instructor asked for feedback on the online training, all of the teachers responded that the online training was easy to use and that they felt prepared to do the lesson in the classroom. The online tool appears to be a functional and cost-effective way to expedite the reach of the program.

[80] Data taken from the 2006-2008 Program Implementation Plan and the Program Database.

[81] The program database shows the number of students that participating by the number of teachers that received the training. Many teachers stated that they teach multiple grade levels (e.g. 200 students between 2nd and 5th grade) and we were unable to decipher whether the teacher instructed all grade levels or just the grades for which curriculum was developed. The program database also does not show the curriculum grade for which the teacher received training. Therefore, we made an assumption about the percentage of these students that were in one of the four grade levels and placed the remaining students in an “other” bucket.

[82] The online learning tool can be found at www.k12e3.org

7.4.3 How likely is the program to induce behavioral change?

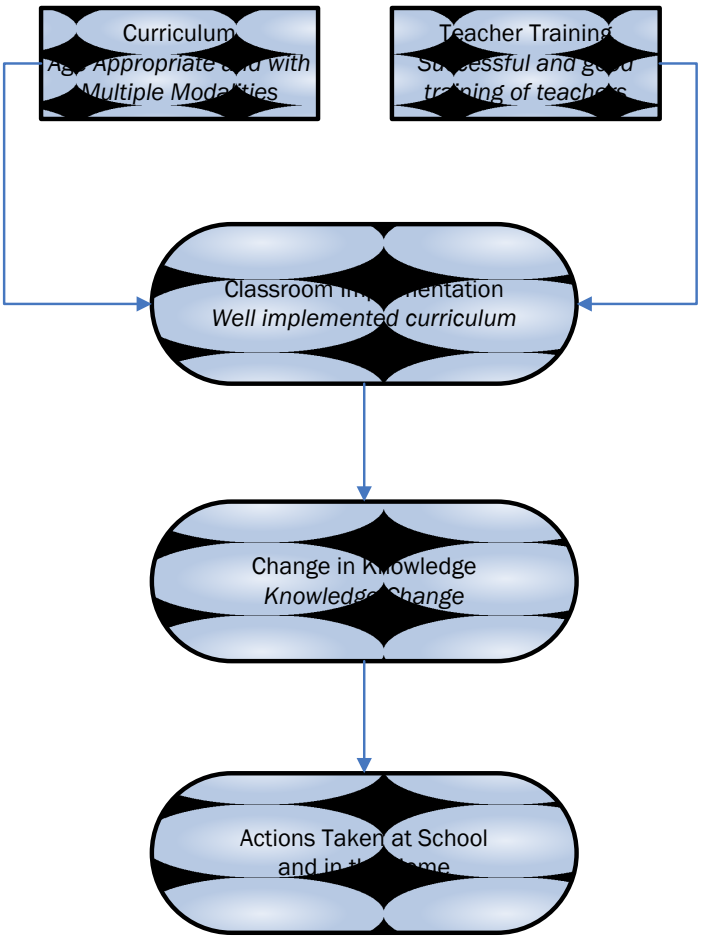
Part of our evaluation focused on the program's potential to induce behavior change. Examining the data collected from the program and from our own primary research efforts, allows us to describe what is occurring and how the program may cause behavior change. This program relies upon the premise that if students gain the awareness and knowledge of ways to save energy then they will likely make changes in their homes to save energy. The program has the ability to heighten awareness of energy efficiency if the program has: (1) A curriculum that increases knowledge and awareness; (2) A curriculum that is appropriate for the grade level; (3) Training that sufficiently prepares teachers to instruct the curriculum; and (4) Students that are engaged in the material.

Notably, even if the program information is age appropriate, it stands to reason that *when* the curriculum is used in the school-year in relation to other curriculum, affects the students' ability to comprehend the concepts. The knowledge required to move students to action will likely come from the E3 curriculum but also builds upon other physical science 4th grade curriculum. Thus, if students receive the E3 curriculum after other relevant physical science content, then students will be more likely to comprehend the concepts.

A curriculum that is especially geared toward behavior changes that students and families can easily make in their homes in the short and long term will likely induce behavior change. While our evaluation found that the curricula provide content that encourages behavior change in the school and the home, much of the program's ability to induce behavior change is dependent upon the teacher's implementation of the curriculum and how much they encourage students to take the message home, either in the form of homework assignments or classroom discussion and exercises. As such, the training is a key component of the program's ability to induce behavior change.

The figure below shows how the program can cause behavior change in the home.

Figure 73. Program Causality Potential

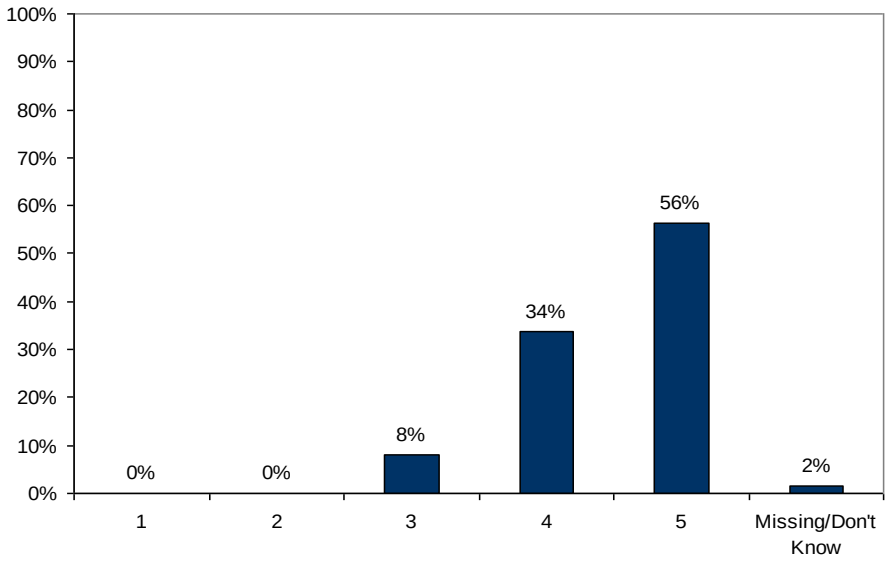


While all of these indicators suggest that the program has the potential to induce behavioral change, one must consider socio-economic, and other influences that may hinder the program's ability to induce behavioral change in the home. During our interview with a 4th grade teacher, we mentioned that one of the goals of this program is to get energy savings at the home. We asked the teacher to rate the curriculum's ability to change energy behavior at home on a scale of 1 to 7, where "1" means "not at all" and "7" means "very much". The teacher gave the curriculum a 5 in this scale noting "that's hard because where I'm teaching here is low socio-economic situations, low income, Title 1 school, and I always feel like the kids don't have a lot of interaction with their parents. As far as the kids having an influence in the family for those types of things is hard." This teacher did not have a sense that any of the students were changing behavior in the home and thought the curriculum could have better activities/instructions in place to encourage behavior change in the home, such as a letter to the parents stating what the kids were learning and that they might come home to discuss it.

7.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

Age appropriate curriculum is a key indicator of the program's ability to increase energy efficiency awareness and knowledge. If the curriculum is age appropriate then the students will gain awareness and knowledge of the given subject. Participating teachers rated the content of the curriculum on its appropriateness for the students. Almost all of the teachers, 90% (rating a 4 or 5 on a 5 point scale), indicated that the content of the curriculum was appropriate for their students' cognitive level.

Figure 74. Teachers' Rating of the Curriculum's Appropriateness for the Students (n=62)[a]



[a] (1 = low rating, 5 = highest rating)

The curriculum is age appropriate for the average student in each grade level given that it is challenging enough to keep the students' interest but not so challenging that it is beyond their comprehension level. One of the 4th grade teachers we interviewed expressed her impressions of the E3 program and its fit for the grade level. The 4th grade teacher stated that the curriculum is:

> *"Simple enough for them to get but hard enough to be a bit of a challenge, in other words, the difficulty was just about right. The students did not get bored because they knew it all. But when the program talks about geo-thermal, they did not know it well but they knew other words and could figure it out. The lessons really got their interest, especially talking about volcanoes. [It] kept their interest well, just enough to make the point but not overkill."*

While the curriculum is appropriate for the average student in each grade level, some students may have more of a challenge than others such as special education students and students that speak English as a second language. This is particularly relevant in San Diego

schools as 22% of students in public schools are "English learners"[83]. During our teacher training observation, only one of the fourteen teachers in attendance was concerned that the curriculum was too advanced for the classroom; however this teacher instructs special education 4th grade students and felt the 1st grade curriculum was more aligned with the students' comprehension level. In addition, the 4th grade teacher we interviewed teaches 23 children, 16 of which speak English as a second language. However, despite this challenge, the teacher still felt that the material was appropriate for the age level and that these children could comprehend it.

Sufficient teacher training is another key indicator of the program's ability to increase energy efficiency awareness and knowledge. Based on our research, the Professional Development Training is successfully equipping the teachers with the knowledge and support necessary to implement the curriculum in their classrooms. During our training observation for 4th grade teachers, the instructor specifically stated that the objective of this curriculum was to help children learn about energy and energy efficiency, but also to encourage children to take that energy knowledge home to their families. In addition, we observed that:

- The instructor actively engaged teachers in hands-on exercises, question and answer sessions in between each lesson, and expressed enthusiastic encouragement for energy education; and
- The instructor was knowledgeable of energy efficiency and the curriculum as she was capable of answering all energy-related questions.

The training provided multiple education methods and resources to accommodate many different learning styles including the online learning tool, hard-copy curriculum, hands-on exercises, question and answer sessions and other internet resources.

The program collects feedback on the professional development trainings in the form of a self-administered survey at the end of each session. As shown by the overwhelming positive feedback from the teacher trainings in the table below, teachers feel that the E3 program is effectively preparing them for the lessons, increasing their of energy efficiency education, providing supportive materials for the lessons and helpful information about the materials. Our depth interview with the 4th grade teacher further supported that the training is sufficient stating that the training and lessons were very clear and well-written.

Table 62. Professional Development Training Feedback (n=243 teachers)

Training Performance Indicators Rated on a 5-point scale	Low (1-2)	Mid (3)	High (4-5)	Missing/ Don't Know
I feel prepared to teach the E3 lessons	1%	3%	95%	1%
The training met my expectations	0%	1%	96%	2%
I now have a better understanding of energy efficiency education	2%	1%	96%	1%
The materials will help support my students' understanding	1%	1%	96%	2%
The presenters provided helpful information about the materials	0%	2%	96%	1%

[83] Source: California Department of Education, CBEDS data for 2003-04 for IOU-specific information.

Our observation of the in-person training revealed that the program is doing a good job of verbally communicating that the program's goals are to encourage students to "take energy information home" or "conserve energy at school or in the home". However these goals were not necessarily stressed in the online learning tool and might be overlooked if teachers only take the professional training development online in its current format. While our evaluation period restricts our ability to assess the effectiveness of the online learning tool versus the in-person teacher training, it is noteworthy that as the online learning tool gains momentum it should be carefully evaluated for its ability to communicate to teachers the importance of encouraging behavior change in the home and classroom.

Students that are engaged in the material is another key indicator of the program's ability to increase energy efficiency awareness and knowledge. To assess students' reaction to the information as an indicator of the program's likelihood to induce behavior change, we observed the instruction of lesson 5 in the 4th grade curriculum when students conduct an energy audit in their classroom. This classroom exercise prepares the students for a homework assignment where they are asked to conduct an energy audit at home. Overall, our observation revealed that the students are acquiring and retaining energy conservation knowledge, are actively engaged in the material and that the teacher is encouraging behavior change in the home and at school. We provide our key findings from the classroom observation below.

It was evident that the students gained and retained knowledge of energy conservation and efficiency from the previous E3 lessons. The teacher began lesson 5 by asking, "What are some ways that we can save energy in the school?" Almost every student raised a hand to offer a response that they had knowledge to relay and wanted to communicate that knowledge. The teacher wrote their responses on the board and the students copied the responses in their own science notebooks. Student responses showed that they gained knowledge of the following behaviors:

- Turn off computers when they are not in use (instead of sleep mode)
- Do not overcharge computers
- Turn off lights when they are not in use
- Use sunlight instead of electrical lighting when possible
- Use CFL bulbs
- Turn off the projector when not in use
- Do not leave the refrigerator open
- Do not leave water running
- Use fans instead of air conditioning

Before the E3 lesson began, all students were reading text books and taking notes for another subject. At this time, many students were easily distracted, disobedient, would not sit still, and appeared bored. Once the E3 lesson started, all of the students were obedient and listening closely to the information. The students were smiling and showed excitement. All of the students participated in the lesson. When the teacher introduced the school energy audit and told the students that they should look around the room in their groups

and fill out the audit, the students were excited for this activity and reacted with the word, "awesome!" The students raced around the room and identified all of the energy consuming equipment for the audit. After the classroom audit activity, the teacher asked the students to talk about how they could save energy in the classroom. Again, the students raised their hands and suggested ways to reduce energy, such as turning off the lights, the projector, the computers, the printer, the fan and opening the window shades.

After the classroom energy audit, the teacher asked the students for ways that they could tell others students in the school about saving energy. The students suggested posters, classroom presentations, and a letter to the principal requesting a school assembly. The teacher gave the students art supplies and allocated time for each student to produce a poster or letter to the principal. After the art activity, the teacher asked the students for where they could save energy outside the classroom. Almost every student responded in unison, "at home." The teacher gave the students the home energy audit for homework and suggested that each student talk to their parents about what they learned in class. The teachers asked the students, "What could you talk to your parents about?" The students replied with: CFL light bulbs; saving energy ideas in general; and "the science behind electricity".

To support the findings from the classroom observation, the teachers provided feedback on the curriculum and the students' reaction. The program encourages teachers to complete an online survey soliciting feedback on the curriculum after students completed the lesson plan. Almost all of the teachers (n=62) rated each indicator a "4" or "5" on a 5-point scale: 93% said the materials/equipment helped support the student's understanding; and 97% said the students were engaged in the lessons. The teachers' positive feedback supported our observational findings that the lessons were easy to follow, content was appropriate for the students, materials and equipment helped support the students' understanding and students were engaged in the lessons.

7.4.5 What percentage of those targeted and exposed to the program reported behavior change as a result?

To determine the effects of the program on household behavior, a take home survey was provided to students starting in early 2009. Students were encouraged to complete the survey together with their parents. Sixty-one students[84] submitted a survey from several grades including 1st, 4th, 6th and 8th. Although the program implementers could not provide us with an exact number that were sent, we estimate that 200-300 students received the surveys. Specifically this survey was designed to gather data regarding the program's impact on the household's energy use. While the limited sample and self-selection bias prevent any statistically significant analysis, the information serves as another string of data in this evaluation that offers significant insight into how the program

[84] The total number of post card surveys that were distributed in early 2009 to the teachers is unknown. The total number of survey that the teachers gave to students to complete is also unknown. It is our understanding that these numbers are not currently tracked by the program.

information is disseminated outside of the classroom. The findings from this survey are highlighted below:

- Based on this sample of students, 87% reported some behavior change as a result of the program.
- Many households noted specific behavior changes they have taken in the home as a result of the program. The primary change at home appears to be "turning off the lights when leaving a room". 87% of students said they are turning off the lights when they leave a room at home. In addition, many households (70%) claimed that they have replaced incandescent light bulbs with CFLs. The number of bulbs replaced in the home with CFLs ranged from 1 to 47. Several of the households that did not replace bulbs with CFLs explained that they already were already using CFLs.
- 75% are reducing the use of their appliances (air conditioners, refrigerators, dryers, water heaters).
- About half of households noted that they have taken other steps to reduce energy. Other energy actions include watching less television, sharing information with other family and friends, water conservation behaviors, turning off electronics and using flashlights.
- Many households also commented on their intent to take action. Among the households that have not taken steps to replace their incandescent bulbs with CFLs, 33% said they plan to take this action.
- The change in behavior was not limited to energy issues, but also spilled over into a general increased cognizance of environmental issues. Some of the students and their parents noted they are also recycling more, using reusable bags at the grocery store, and walking more to save gas.
- Per indirect behaviors, almost all of the families indicated that the children brought some information about the program home and shared it with their household. Specifically 93% of households said the children discussed the program in the home. Many of the students also shared specific energy information they had learned as a result of the program as 80% of the parents said they reviewed the energy saving ideas from the program.

7.4.6 What are the net energy savings as a result of the program?

In an attempt to calculate energy savings for this program, the net energy savings below are based on a convenience sample of program participants (n=61) that completed a take-home survey. This section shows preliminary results for the net energy saving behaviors taken by those who receive education through the program and a range of the estimated net energy savings as a result of the program.[85] This data comes from a survey that is administered by the program implementers as a part of the program. The survey questions fit on a postcard so that it is easy to complete and return to the program. Notably, the gross

[85] We provide a range as the secondary sources used to calculate the possible energy savings vary by many factors. It is not possible to provide a point estimate similar to the impacts calculated by the resource acquisition program evaluations.

and net savings are identical for this program as we were unable to ask the questions that would enable us to calculate net savings. Furthermore, given that this data was collected via a convenience sample, we are not extrapolating these values beyond our sample, but do acknowledge that the actual number of households taking actions similar to these is likely to be much higher than shown. However, the values provide a sense of the savings that could be accruing due to the program from this small sample.

Table 63. Net Energy Savings (n=61 students that returned surveys)

			MWh			Therms		
Measure	**Unit**	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Replace bulb with CFL	Measure	312	5.27	10.55	15.82			
Turn off lights when out of room	HHDs[b]	53	13.01	26.02	39.04			
Reduce appliance use	HHDs	48	3.77	16.04	28.30			
Turn off/unplug small appliances	HHDs	4	0.05	0.09	0.12			
Purchased an ENERGY STAR washer [a]	Measure	1	0.01	0.03	0.04	4.40	8.80	13.20
Installed low flow showerheads	Measure	1				3.86	7.72	11.58
Gross Total			22	53	83	8	17	25
Per Participant Savings			0.4	0.9	1.4	0.1	0.3	0.4

a. Assumed that ENERGY STAR washer used gas water heating; saves both therms and kWh.
b. Abbreviation for Households.

7.4.7 What is the value of the program versus the cost of the program?

The three-year adopted budget for this program was $1,936,583. As shown by the table below, the program's expenditures were slightly greater than the initial budget.

Table 64. 2006-2008 Budget and Spending[86]

Adopted Program Budget (3 - Yr) [1]	Program Operating Budget (3 - Yr) [1]	Program Expenditures (Inception-To-Date)
$ 1,936,583.00	$ 1,967,625.38	$ 1,992,400.62

One of the goals of the program was to provide K-12 students with energy efficiency knowledge and awareness that they will take home to their parents, and that will influence their behavior both now and in the future. This goal has been met through the development of grade-specific curriculum. As the time of our evaluation, curriculum had just been developed for K-1, 4th, 6th and 8-10th grade levels and was just beginning roll-out in classrooms. The program also had a goal intended to reach approximately 400,000 students by the end of the '06'08 program cycle. The program has fallen short of this goal given that program records state 12,116 students received the curriculum by the end of 2008. This shortfall is primarily due to a delay in program initiation and the longer than expected time to develop curriculum for each grade level.

[86] Taken directly from SDG&E's 2006-2008 Monthly Energy Efficiency Program Data Report, December 2008. Publicly available at: http://eega2006.cpuc.ca.gov/DisplayMonthlyReport.aspx?ID=9

Despite the shortfall, our evaluation showed that this program has educational value given its successful creation of energy curriculum for multiple grade levels that can be implemented in schools for many years to come with limited future program costs given that teachers only need to be trained once and can refresh lesson planning as necessary through online resources. The program has the ability to impact multiple people (teachers, students and families) and energy use at multiple structures (households and school buildings). Further, most students will be exposed to elements of the program during multiple years, with rigor of the curriculum increasing in higher grade levels, this will further ensure that energy saving awareness and knowledge increases over time.

Examining the program's role in the marketplace helps to further illuminate the program's value. Per our teacher interview, this material, or energy concepts in general, had never been taught in that particular school before the program, with the exception of the physical science curriculum that has some explanation of electricity and circuits. Other energy curriculum-based programs are offered in the State of California, such as the Alliance to Save Energy's Green School Program and the Energy Coalition's PEAK program[87]. However these programs do not specifically target schools in SDG&E's territory. Therefore, for most schools in San Diego, energy efficiency and conservation are new concepts in the curriculum and help to provide the initial awareness and knowledge necessary to influence short and long term behavior changes. The E3 curriculum is filling a gap in many San Diego schools whereby students are learning about energy for the first time, how it is generated and its environmental impact. Therefore, this program is providing the building blocks for producing a generation of energy conscious individuals.

7.5 Evaluability Assessment

The program information available often determines the potential level of rigor for an evaluation. This is often called the "evaluability" of a program. It answers the question: is all of the information available to rigorously answer the researchable issues dictated in the evaluation plan? This section comments on the evaluability of the program based on our evaluation efforts.

The program's intended outcomes are to "significantly heighten awareness about the impact of energy efficiency, the costs of wasting energy, and the specific actions that can be taken to reduce energy use at home"[88]. To effectively measure program impacts such as heightened awareness, many school-based energy education programs leverage a pre and post survey of the students that we recommend for the K-12 program. These surveys are typically part of the program implementation itself. Students received a pre-survey which reads much like a multiple-choice test of their knowledge of different energy concepts about which they will learn in the upcoming program. After students complete the full curriculum, they complete a post-survey which typically includes the same questions in the pre-survey to allow for a measurement of knowledge change due to the program. In addition, the post-survey often has additional questions regarding the students' actions taken in the home as

[87] California Schools Market Characterization; submitted to PG&E by Ridge & Associates, Equipoise Consulting, Inc. and Robin Jane Walther, Ph.D. September 20, 2005.

[88] 2006-2008 SDGE-3032 K-12 Energy Efficiency Education Program Implementation Plan.

a result of the program to allow for a measurement of potential energy savings due to the program.

Embedding data collection into program implementation efforts is particularly useful with K-12 school-based programs given the difficulty of doing research with populations younger than 18 years of age. During our evaluation of the E3 program, pre and post surveys were not in place but were planned for the upcoming years. We recommend that the E3 program follow through with its plan for the pre and post survey and also work together with an evaluation consultant to ensure that the survey instruments collect the right information. The information should allow for an objective and thorough assessment of the program's impacts.

Furthermore, we found difficulty accessing the teachers involved in the program during our evaluation time period. Direct access to the teachers for data collection would have allowed for objectivity and minimized the potential biases often associated with program implementers collecting evaluation data. The primary cause of this difficulty was a lack of documents that permitted the E3 program implementers to share teacher contact information with a third party for evaluation purposes. Given this, we suggest that the program implementers mandate that teachers read and sign a document allowing them to opt-out of being contacted for evaluation purposes as part of their requirements for completing the Professional Development Training.

Table 65 below shows the fields tracked in the program database and additional fields that we recommend the program begin to track to allow for a more rigorous assessment in the future. Table 66 shows the program information that the program implementers were able to provide for this evaluation as well as some unavailable information that would have enabled an even more rigorous program evaluation.

Table 65. Program Database Assessment

Program Database Fields	Current Program Database Status
Teacher first and last name	Included
# of students taught by teacher	Included
Grade levels taught by teacher	Included
School by teacher	Included
District by teacher	Included
Number of post card surveys distributed by teacher	Needed
Number of post card surveys distributed to students by teacher	Needed
Number of surveys completed linked to teacher	Needed
Number of training evaluation surveys completed by teacher	Needed
Number of curriculum evaluation surveys completed by teacher	Needed
Curriculum level trainings completed linked to teacher	Needed

Table 66. Program Information Assessment

Program Information	Program Information Status
Grade level curriculum (1st, 4th and 6th grades)	Available
Teacher training materials (online, 4th grade)	Available
All quarterly reports (2006-2008)	Available
Teacher training evaluation surveys (# completed in evaluation time period)	Available
Teacher curriculum evaluation surveys (# completed in evaluation time period)	Available
Student post-surveys (# received by program in evaluation time period)	Available
Monthly reports (all months in 2008)	Available
Home Energy Audit (4th grade assignment)	Available
Schoolroom Energy Audit (4th grade assignment)	Available
Teacher contact information (home phone and/or email address)	Needed
Pre and post student surveys	Needed

For future evaluation efforts, we recommend that the program:

- Follow through with its plan for the pre and post survey and also work together with an evaluation consultant to ensure that the survey instruments collect the right information.
- Mandate that teachers read and sign a document allowing them to opt-out of being contacted for evaluation purposes as part of their requirements for completing the Professional Development Training.
- Begin to track the following data to allow for a more rigorous assessment in the future:
    - The number of post card surveys distributed to each teacher;
    - The number of post cards distributed to students by each teacher;
    - The number of survey completed, linked to each teacher;
    - The number of training evaluation surveys completed by each teacher;
    - The number of curriculum evaluation surveys completed by each teacher; and
    - The curriculum level trainings completed by each teacher.

7.6 Appendix A. 1st grade curriculum summary

Table 67. 1st Grade E3 Curriculum Summary

E3 Curriculum	Objective	Topic	Experiment	Materials & Handouts
Lesson 1	Learn how weather affects how students feel and dress	Reacting to climate and temperature	Students measure temperature and monitor weather for one week, notice factors that affect comfort, such as wind and how dressed	Digital thermometer, chart tracking weather, temperature, and level of comfort
Lesson 2	Learn that trees and shade make areas cooler	How the environment affects temperature	Students measure temperature and note comfort in sunny and shady areas	Digital thermometer, chart comparing temperatures in the sun and shade
Lesson 3	Learn how colors and clothes can affect the temperature students feel	Absorbing and reflecting heat	Students measure temperature inside black and white paper envelopes	Digital thermometer, black and white construction paper envelopes, worksheet comparing temperatures
Lesson 4	Learn about energy, electricity, electricity production and consumption, and that the sun is the primary energy source	Types of energy and energy resources	None – teacher demonstrates objects that use energy (wind-up toys, fans, etc.)	Worksheet on energy resources and energy consumers
Lesson 5	Learn about energy efficiency and ways to save energy	Energy conservation	Energy Ticket Game - students have limited resources to make trips, so they must try to do more per trip	Energy Tickets, energy saving contract

7.7 Appendix B. 6th grade curriculum summary

Table 68. 6th Grade E3 Curriculum Summary

E3 Curriculum	Objective	Topic	Experiment	Materials & Handouts
Lesson 1	Review earlier concepts; learn about movement of heat through convection, conduction, and radiation	Forms of energy and transfer of energy	Teacher demonstration of heat transfer from candle light; group activity on how light from flashlights causes motion in radiometers	Radiometer, flashlight, worksheet on heat transfer and concept map on energy sources
Lesson 2	Learn how heat transfer affects temperature in the home and on earth; discuss solar heating and global warming	The Greenhouse Effect	Students construct paper model houses and measure temperatures differences between the houses with covered and uncovered windows	Cut-out, plastic windows, and tape for constructing model houses, thermometers, and worksheet handout
Lesson 3	Learn how the time of day, the direction of the window, and ground insulation affect indoor temperature	Reacting to the Greenhouse Effect	Students use model homes and test temperatures based on direction of windows	Model houses, cardboard ground insulation, thermometers, data worksheet and home data worksheet
Lesson 4	Learn that dark colors absorb more heat in homes than light colors	Heating homes without electricity	Students color some model houses dark colors and some light colors and measure temperature differences when windows point away from sun	Model houses, colored markers, thermometer, data worksheet
Lesson 5	Learn about “hidden” uses of energy, such as manufacturing and transport of goods, and the extent of energy and water consumption in California	Carbon footprint	None – students watch movie and discuss or research conservation ideas	Discussion worksheet

8. SDGE 3036: TIME OF SALE ENERGY CHECK UP

8.1 Introduction

The Time of Sale Energy Efficiency Check Up Program, also known as the EnergyWi$e program, educates the residential market on energy efficiency through realtors and home inspectors. The program encourages the residential market to adopt energy efficient measures either to help sell a home or to improve a newly purchased home. The program educates this market through a Home Energy Audit, known as the Home Energy Check-Up, which is integrated into a standard home inspection. The home audit, often coupled with free direct install measures, is expected to educate homeowners on energy saving opportunities within the home and also motivate homeowners to adopt energy efficient measures. The three-year adopted budget for this program was approximately $1.1 million. The program was implemented by a third party, GeoPraxis. We note that this program was discontinued at the end of 2008 but is still included in the PY2006-2008 Education and Information Indirect Impact Evaluation as it may be informative for other future program efforts.

This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavior change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants were fed into resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program?

In addition to these research questions, we also comment on the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We comment on this area in a section called Evaluability Assessment toward the end of this report.

8.2 Summary of Key Findings

The EnergyWi$e program was implemented as an education and information program and consequently did not have explicit energy savings goals. The program provided both free direct install measures and introduced energy efficient options at a time when homeowners were likely to invest in home improvements, i.e. when prepping a home for sale or just after purchasing a new home. Below is a bulleted summary of the key findings from this evaluation:

- Over the three-year period, the Time of Sale program recruited 406 realtors and 112 home inspectors to attend an introductory training session in an attempt to explain the program participation parameters and invite them to fully participate in the program. Ultimately, 103 realtors (25%) and 38 inspectors (34%) became full program partners.

These realtors and inspectors were able to recruit 3,238 homeowners for program participation, i.e. these homeowners received home energy audits as part of a home inspection and some received free direct install measures.

- One of the most valuable aspects of this program is that it channels people into other utility programs. Realtors were encouraged to recommend other residential SDG&E programs to homeowners, and the homeowners' energy reports included both financing and rebate information. Out of all participants, about one in five (18%) said they received a rebate for the measure(s) they installed.
- The program is increasing energy efficiency knowledge and inducing behavior change for realtors and homeowners.
    - Realtors
        - Most realtors had at least some knowledge of energy efficiency prior to participation. Realtors reported gaining energy knowledge after participating in an introductory training session, reporting a mean knowledge increase rating of 5.2 on a scale of one to seven.
        - The majority of realtors who became full program partners reported making changes in the way they use energy themselves. Of the realtors who became program partners, more than eight in ten recalled receiving free CFLs to install in their homes. Almost every realtor who recalled receiving a free item reported installing that item in their home.
        - The training session and partner requirements were extremely effective in getting realtors to introduce energy efficiency to their clients. Almost all recommended CFLs to clients (97%) and discussed energy efficiency upgrades with clients (95%).
    - Homeowners
        - Most homeowners had at least some knowledge of energy efficiency. Only two in ten homeowners (21%) reported having little or no knowledge of energy efficiency before being touched by the program. However, homeowners reported moderate knowledge gains. Homeowners gave a mean score of 4.9 for their knowledge gained from the audit. Both the content of the audit and how it was presented to the homeowners had vast opportunity for improvement in order for the audit information to fully resonate with homeowners, which could account for the self-reported moderate knowledge gains.
        - Homeowners who received free items through the program were more likely to save energy than those who did not. Almost all of the homeowners installed the free items that they recalled receiving. Furthermore, homeowners who received free items were more likely to change behavior (81%) than those who did not (55%).
        - Homeowners also widely reported making changes in their energy use beyond installing free measures. More than nine in ten of all homeowners surveyed reported making some kind of change in their energy use; 67% homeowners

reported changing their behavior with regard to how they use energy in the home and 70% reported making an energy efficient purchase or upgrade to their home. Most homeowners bought low-cost measures such as CFLs (58% of all surveyed) but many also purchased high-cost measures such as refrigerators (38%) and clothes washers (28%).

- The program expected to influence the behavior of inspectors, homeowners and realtors with energy efficiency information and gifted measures. This evaluation calculated energy savings based on a sample of homeowners and realtors and extrapolated them to the 3,238 participating homeowners and 103 realtors, providing a sense of the savings that could be accruing due to the program. The combined total net energy savings for both participant groups amounts to 3,614 MWh and 94,391 therms.

8.3 Methodology

The Opinion Dynamics evaluation team utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program documents and databases. For primary data collection, we observed a realtor training session and fielded two internet surveys, one aimed at realtors and the other aimed at homeowners who participated in the program by receiving a Home Energy Check Up report.

A process evaluation for this program was conducted by ECONorthwest for the same program cycle. This evaluation was published in February 2008 as part of the report titled "Process Evaluation of the SDG&E 2006-08 Residential Customer Programs." We reviewed this process evaluation as part of our background research for this impact evaluation and coordinated with the process evaluation's data collection efforts to ensure that our data collection efforts did not overlap.

We observed one realtor training session (of the 16 held) that was held on July 21, 2008, at the Prudential California Realty-Training Center in San Diego. The information was presented by a realtor, with 58[89] realtors attending. The observation allowed us to further understand the program's content and how it intended to change the behavior of both realtors and homeowners.

We fielded an internet survey in March and April 2009 to realtors who completed a training session. The sample was drawn from a database of all 406 attendees of the training sessions in SDG&E territory; the database included both EnergyWi$e Partners and non-partners[90]. This survey allowed us to identify realtors' level of knowledge gained, and, amongst those that became full partners after the training, how they changed behavior both in their own homes and in their interactions with homeowners.

[89] A total of 406 realtors were trained by the program throughout 2006-2008.

[90] EnergyWi$e partner realtors decided to fully participate in the program after attending an introductory training session. These partners pledged to incorporate energy efficiency into their interactions with clients, recommended home inspectors to perform energy audits for clients and gave free direct install measures to clients. Non-partners attended the introductory training session but decided not to become EnergyWi$e partners afterward.

We also fielded an internet survey in September 2009 that targeted home buyers and sellers who received Home Energy Check Up reports between 2006 and 2008. The sample was drawn from the database of 3,238 unique participants. The available sample was decreased to 1,578 unique participants for this study after removing participants that were either part of survey efforts for the process evaluation or other SDG&E survey efforts. Our internet survey allowed us to understand what changes homeowners made after the inspection, what actions homeowners took, and how much the program influenced them to take those actions.

Table 69 below shows the number of sample points and completes for both the realtor and homeowner surveys.

Table 69. Internet Survey Response Rate

	Realtors	Homeowners
Total Available Sample	406	1,578
Total Eligible Sample [a]	338	1,292
Completed Surveys	70	60

[a] "Eligible sample" refers to participants who had valid email addresses.

We note that our primary research efforts did not include home inspectors as the Process Evaluation collected data from inspectors leaving very few available to interview for this Impact Evaluation. Furthermore, inspectors were not expected to produce energy savings from this program on the same level as realtors and homeowners. Inspectors did not receive education on the benefits of energy efficiency like the realtors did. Some home inspectors received gifted measures through the program, but they were not required to install them as part of their participation in the program. Because of the difficulty in finding inspectors who qualified for our study, and the small amount of energy savings they were likely to produce, we did not include them in our research efforts, but note that they likely produced some additional energy savings through this program. Instead, we focused our evaluation efforts on the homeowners and realtors who could directly report savings from their homes. Throughout the findings below we refer to the results from the process evaluation's depth interviews of inspectors when relevant to this evaluation.

8.4 Detailed Findings

8.4.1 What education or information is provided and what behaviors are encouraged?

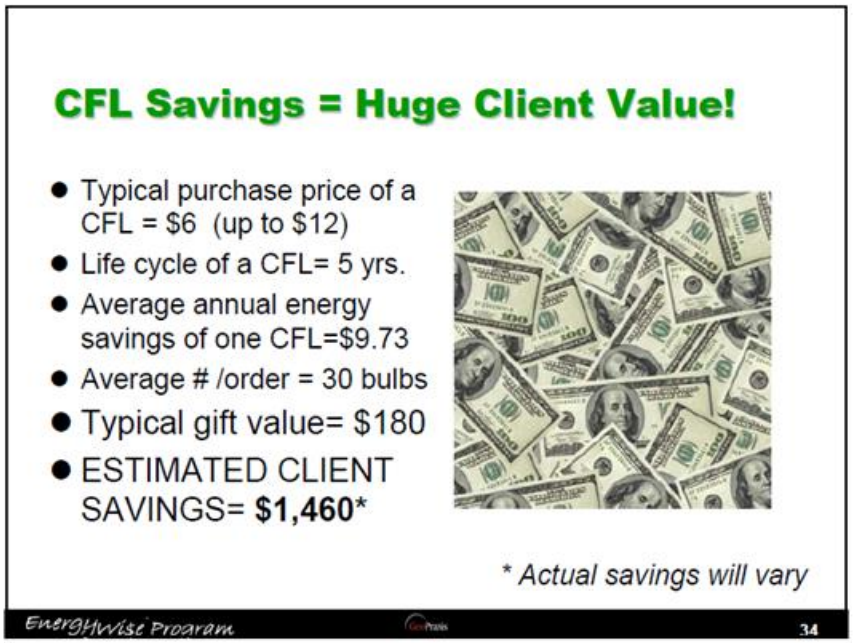
The EnergyWi$e program provided energy efficiency information to homeowners with the goal of encouraging them to make energy saving improvements to a home right before it is sold or right after it is purchased. The program depended on two educational methods to relay this information to homeowners; (1) One-on-one conversation between realtors and home buyers and sellers; and (2) An online Home Energy Check-Up report outlining the results of a home energy audit; which is produced by home inspectors after the inspectors conduct an on-site energy audit of a home in addition to a standard home inspection. To

achieve this end, the program first created a network of realtors and home inspectors to help implement this program. This network was trained on both the basics of energy efficiency and the program participation requirements.

Realtor Education and Behaviors Encouraged

To create a network of realtors, the program conducted introductory training sessions. These sessions were conducted in lecture-style seminars which varied in size from 6 to 58 participants. The sessions were led by a presenter using a standard PowerPoint presentation, and lasted approximately ninety minutes. At the sessions, realtors learned basic facts about energy efficiency in the home so they could converse with clients about their options. Realtors learned about some monetary and environmental benefits of energy efficient measures, how to properly dispose of broken CFLs, some types of energy saving light bulbs and water saving measures on the market, and how much money clients could save by installing certain types of measures such as CFLs and low-flow showerheads. Figure 75 shows some of the information that realtors were given on CFLs during the training session.

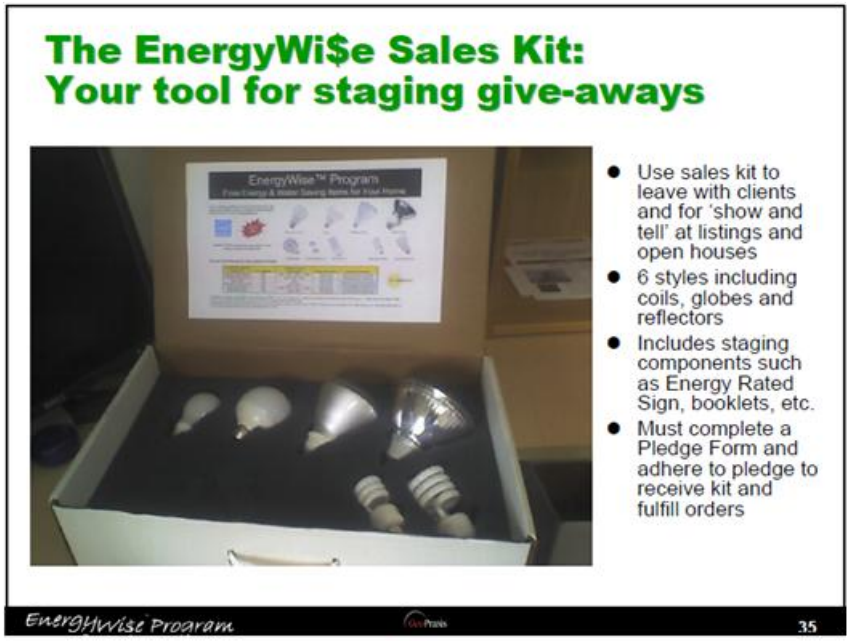
Figure 75. Example of Some CFL Education Provided to Realtors



After learning about energy efficiency, realtors learned about what it would entail to become full program partners, or "EnergyWi$e partners." As such, realtors would be able to brand themselves as "EnergyWi$e," and their home listings as "Energy Rated," to help with advertising and marketing. EnergyWi$e partners were given free measures, mostly CFLs but also LED night lights and water saving measures (low-flow showerheads and faucet aerators), for themselves, friends, colleagues and clients.

EnergyWi$e partners were also given "sales kits" which included several types of CFL bulbs and water saving measures (low-flow showerheads and faucet aerators). These kits were expected to be on display to demonstrate easy-to-install energy saving measures for the realtors' clients. Figure 76 shows the sales kit that was given to EnergyWi$e partners.

Figure 76. EnergyWi$e Realtor Sales Kit Example



By the end of the training session, realtors were expected to have basic knowledge of the energy saving products in the sales kit. Further, realtors were encouraged to become "EnergyWi$e partners." EnergyWi$e partners were required to talk with clients about energy efficiency opportunities and benefits and meet a monthly quota for distributing energy-saving items to clients' homes. They were also strongly encouraged, but not required, to recommend a home inspector from a specific list to provide an energy audit.

Homeowner Education and Behaviors Encouraged

The main education and information that was given to homeowners was the online Home Energy Check Up report (energy report) by home inspectors. A printable PDF version of the report was also available for on the site. This report was typically 27 to 30 pages in length, depending on the number of improvement recommendations. The inspector could then choose to – but was not required to – print out this report and present it to the homeowner either as part of the overall home sale inspection or as its own separate document. Both the online report and the printable PDF version were available in English and Spanish. In addition to getting the energy report, many homeowners also received free direct install measures from their realtor and were encouraged to install them. Figure 77 shows an example of the online energy report given to homeowners.

Figure 77. Home Energy Check-Up Report Example

		AS AUDITED		IF ALL RECOMMENDATIONS COMPLETED	
ESTIMATED ANNUAL ENERGY COSTS		$3546		$2657	
ESTIMATED COST OF ALL RECOMMENDED IMPROVEMENTS & UPGRADES		-		$1344	
ESTIMATED ANNUAL ENERGY SAVINGS		-		$889	
HOME ENERGY RATING		86 out of 100	★★★★★	90 out of 100	★★★★★+

		BENEFITS				ESTIMATED COSTS & SAVINGS				
BEST VALUE	EnergyCheckup™	SAVE MONEY	LESS POLLUTION	HEALTH/ SAFETY	MORE COMFORT	ANNUAL SAVINGS	COST	COST IF FINANCED	PAYBACK (YEARS)	REBATES
	RECOMMENDED IMPROVEMENTS	Costs include full purchase cost and installation.								
1	Replace Incandescent Light Bulbs With Screw-in Compact Fluorescent Lights	✓	✓			$65	$35	$3	0.5	
2	Reduce Air Infiltration and Drafts	✓	✓	✓	✓	$210	$125	$11	0.6	
3	Install Low-Flow Showerheads	✓	✓			$15	$15	$1	1.0	
4	Get an Advanced HVAC (Heating, Ventilation and Air Conditioning) Diagnosis & Tune-Up	✓	✓	✓	✓	$636	$780	$67	1.2	
5	Install a Programmable Thermostat			✓	✓	$123	$162	$14	1.3	
6	Install Kitchen Fluorescent Light Fixtures	✓	✓			$38	$92	$8	2.4	
7	Install Compact Fluorescent Light Fixtures	✓	✓			$28	$135	$12	4.8	

The energy report gave homeowners a straightforward summary of their current home energy use (estimated annual energy costs and HERS rating[91]) and recommendations to save energy (including the potential costs and benefits associated with implementing each recommendation). Furthermore, the report provided homeowners with information on other SDG&E residential resource acquisition programs that could help offset the cost of implementing certain energy efficient measures.

The report included both behavior recommendations and measure recommendations. Behavior recommendations were the same for all homeowners, and were presented in a bulleted list as "FREE Ways to Save Energy and Money." Behavior recommendations included setting thermostats to 78 degrees in summer and 68 degrees in winter, using fans instead of air conditioning, washing clothes in warm or cold water, using only full dryer and dishwasher loads, turning off lights, and unplugging electronic devices.

The energy report tailored recommendations from a set of 27 improvements to a given home's characteristics. Some examples of recommended measures in the reports are:

- Replacing incandescent light bulbs with CFLs;
- Installing low-flow shower heads;
- Insulating water heater pipes;
- Installing a programmable thermostat;
- Getting an advanced HVAC diagnosis and tune-up;

[91] CALIFORNIA'S HERS II regulations were not yet available during this program cycle. Therefore, all HERS ratings were generated in compliance with the RESNET - 2003 Standard (BESTest 1995) based on the proprietary Energy Check-Up server software (DOE2.2).

- Installing kitchen fluorescent light fixtures
- Reducing air infiltration;
- Installing or upgrading insulation;
- Installing energy efficient windows; and
- Upgrading home appliances such as dishwashers, refrigerators, clothes washers, and furnaces to ENERGY STAR or energy efficient models.

The report indicated which recommended measures qualified for utility rebates and the potential cost of the measure. It also included links to information on rebate programs in its navigation bar. Homeowners also received links to other pages explaining the recommendations in detail, offering information on potential rebates and financing options.

Inspector Education and Behaviors Encouraged

Home energy audits were conducted on-site and collected the information needed to create the energy reports for homeowners. To create a network of inspectors who could perform these energy audits, the program recruited inspectors to participate in eight SDG&E training sessions. Inspectors learned about the technical requirements of conducting the home energy audit and were instructed on how to use the program's energy audit software (www.energycheckup.com). Inspectors were also encouraged to recruit realtors into the program. After completing the training, inspectors were eligible to conduct home energy audits for the program. Inspectors received $50 for each home energy audit they completed for the program. Inspectors who became program participants received telephone and email technical support when they encountered technical issues in the field that were not covered in the classroom training.

8.4.2 What is the reach of the program?

The program recruited a total of 406 realtors and 112 inspectors to attend the introductory training sessions. Not all training attendees participated fully in the program. After analyzing the list of trained inspectors against the inspectors that actually performed home energy audits for the program, we found that 38 (34%) inspectors continued to participate in the program by performing energy audits.

Our analysis of the database of all 406 realtors that attended an introductory training session, found that 103 (25%) took the steps required to become an EnergyWi$e partner[92]. realtors had to complete two steps to become an EnergyWi$e partner.

1. Attend a realtor training session;
2. Complete and mail a pledge form stating willingness to be a partner which included:
    a. Encouraging clients to get a home energy audit from a qualified inspector;
    b. Completing and faxing gift order forms for clients;
    c. Completing and faxing CFL order form for self;
    d. Verifying installation of gifted items; and

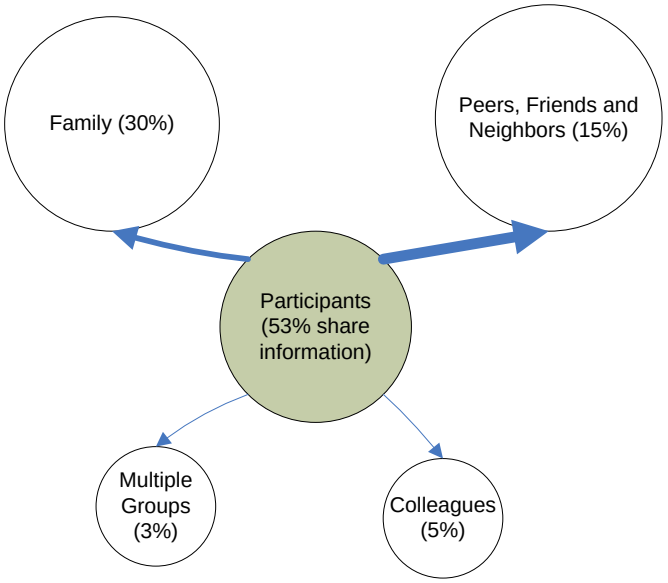
[92] These realtors were listed in the program database as "Qualified-Active".

e. Returning uninstalled gifted items to the program.

This program reached a total of 3,238 unique homeowners[93] throughout the 3-year program cycle. The program generated more energy reports (3,443) but there were several homeowners who received more than one energy report, for example one home buyer received energy reports for several different homes. The reach of this program's information likely goes beyond the direct homeowner participants. Over half (53%) of homeowners surveyed said they talked with someone else, such as friends or family, about the information they received from their energy report. Figure 78 shows the groups with whom homeowners shared information from the program.

Figure 78. Homeowner Information Sharing by Group

(n=60 Homeowner Participants)

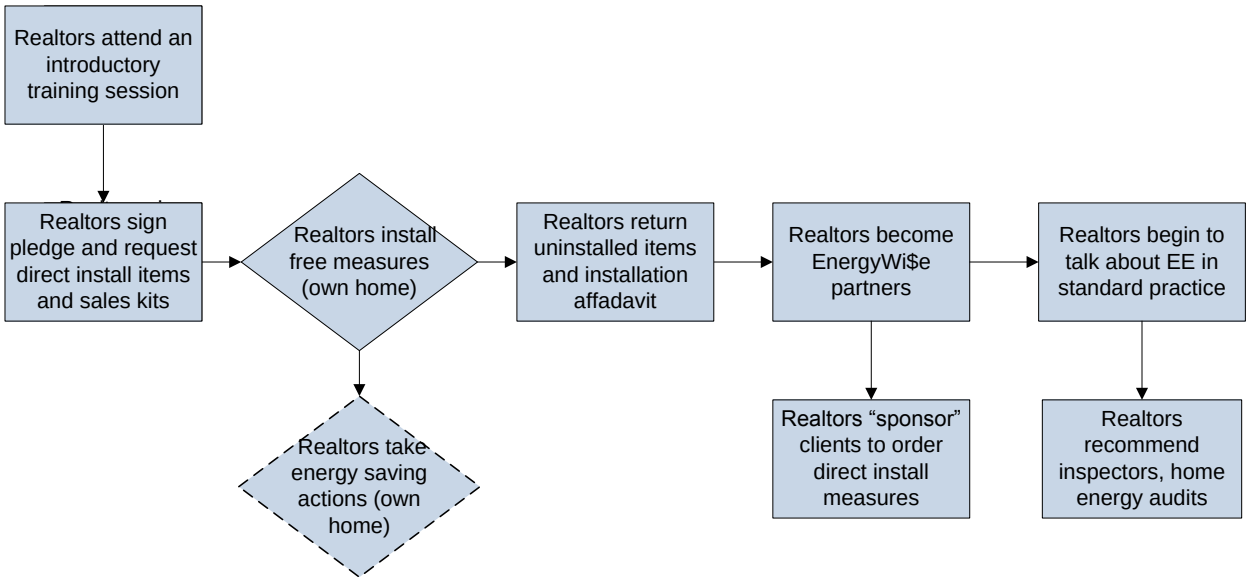


8.4.3 How likely is the program to induce behavioral change?

The program was likely to influence the behavior of both realtors and homeowners in multiple ways. Realtors were expected to change both the way they interact with their clients and their own personal energy consuming behavior. Realtors were encouraged to discuss energy efficiency with their clients and recommend that the clients get an energy audit as part of a home inspection. Furthermore, realtors received free direct install items for their own homes and were expected to install these items. The figure below shows the potential path to behavior change for realtors.

[93] Calculated through program database records.

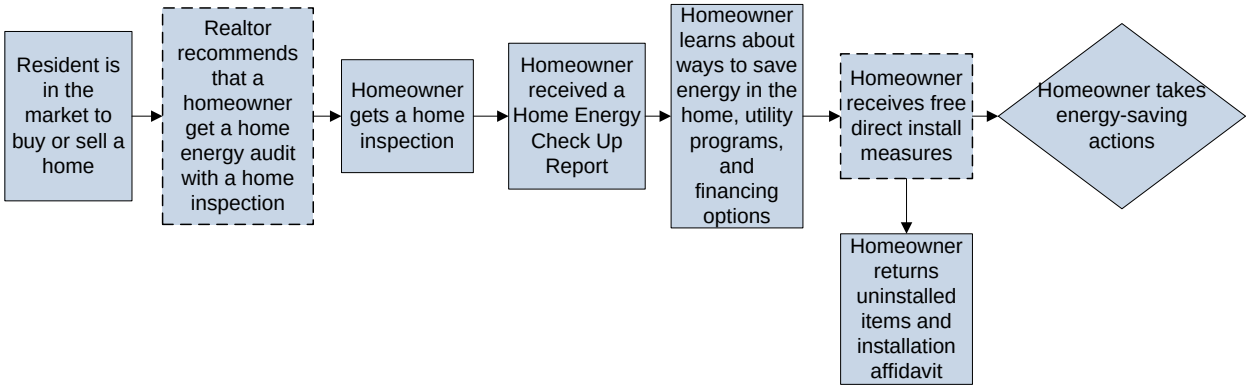
Figure 79. Realtor Path to Behavior Change



Note: Dotted lines indicate that a step does not always take place.

This program was also likely to induce behavioral change in homeowners given that it provided both free direct install measures and introduced energy efficient options at a time when homeowners were likely to invest in home improvements. According to the program theory, many new homeowners make major changes to their homes within the first year of purchase, including home upgrades and major appliance purchases. At the time of this program, home improvement investments averaged $9000 in the first year of home ownership.[94] Thus, two of the major barriers to energy efficiency upgrades (cost and lack of need) were expected to be less prevalent among this program's target population. Figure 80 shows the potential paths to changing homeowners' behavior through the program.

Figure 80. Homeowner's Path to Behavior Change



Note: Dotted lines indicate that a step does not always take place.

Based on our analysis of survey results, behavior change was more likely when homeowners received free items coupled with the information in the energy report. Although the free

[94] SDGE3036 Time of Sale Program Implementation Plan.

items were not given to all program participants, it does appear that the free items increased the likelihood of other behavior change. From our homeowner survey, homeowners who received free items were more likely to change behavior (81%) than those who did not (55%).

Another crucial component to this program's likelihood to change behavior was its ability to provide the energy report in a manner that was easy to recognize, read and understand. In the process evaluation, ECONorthwest noted that some homeowners may only find out about the audit results when they received them by email, or as an appendix to their home inspection.[95] There is a possibility that homeowners could get the energy report and be completely unaware of it as a distinct report. This is especially true given that homeowners are given this information at the time of a home sale when such an email or printed report can easily get lost amongst the copious amount of paperwork involved in selling or purchasing a home. In the homeowner survey we fielded, 21% of the people who attempted to take the survey were terminated because they said they did not receive a Home Energy Check Up report even though program records indicate that a report was sent to them. It is also possible that many homeowners never actually received the report in their email inbox. One potential reason may be that homeowners who were not alerted that they would receive this email may have ignored or deleted it. Another possible reason, notably, is that program records were populated by inspectors who said they conducted energy audits for homeowners and many inspectors provided their own email address in place of a homeowner's in the database.

This program's likelihood to induce behavior change is also closely linked to the housing market. The program was implemented at an unfortunate time for the economy and the housing market. Program reports from as early as mid-2006 noted that home sales in San Diego were decreasing and that as a result fewer people received energy reports than expected.[96] Further, the decline in the housing market was cited as one of the major reasons for why the program reduced its energy audit goal from 7500 to 3000 two years into the program cycle.[97] As our research shows later in this report, however, those touched by the program were still likely to make changes as a result.

We note that the path to behavior change may not be the same for all program participants. While the program intended to reach home buyers and sellers at the time of sale, our survey results show that some homeowners participated in this program at another time. In fact 19% of the participants that attempted to take our survey said they were not in the housing market when they received their home inspection and energy report. Instead these homeowners received inspections and reports either out of general interest in their home's status or as part of a home remodel.

[95] ECONorthwest. *Process Evaluation of the SDG&E 2006-08 Residential Customer Programs*. Portland, OR, 2008. 242.

[96] 3Q2006 report.

[97] GeoPraxis. "2006-2008 "EnergyWise" Time-of-Sale Energy Checkup (TOSEC) Program (#3036) Fund_Shift1_Memo(12-10-2007)." 10 Dec 2007.

8.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

Realtors

The awareness questions from our realtor survey focused on what participants learned from the introductory training sessions. Overall, realtors gave the training high ratings, mean rating 5.2 on a 7-point scale, for the knowledge imparted to them. As expected, realtors who said they had "very little" knowledge of energy efficiency before the class reported the most knowledge gain (Figure 81). The one respondent that had no prior knowledge of energy efficiency gave a low rating; however, this is likely just one disgruntled participant. These knowledge increases are quite good given that much of the training was dedicated to explaining the steps needed to become a program partner. The training provided realtors with very basic energy efficiency information. The training intended to give the realtors just enough information to start a conversation with customers about energy efficiency and lead them to other resources for further information; it did not intend to make realtors "experts" in energy efficiency.

Figure 81. Mean Knowledge Increase by Prior Energy Efficiency Knowledge (Realtors)

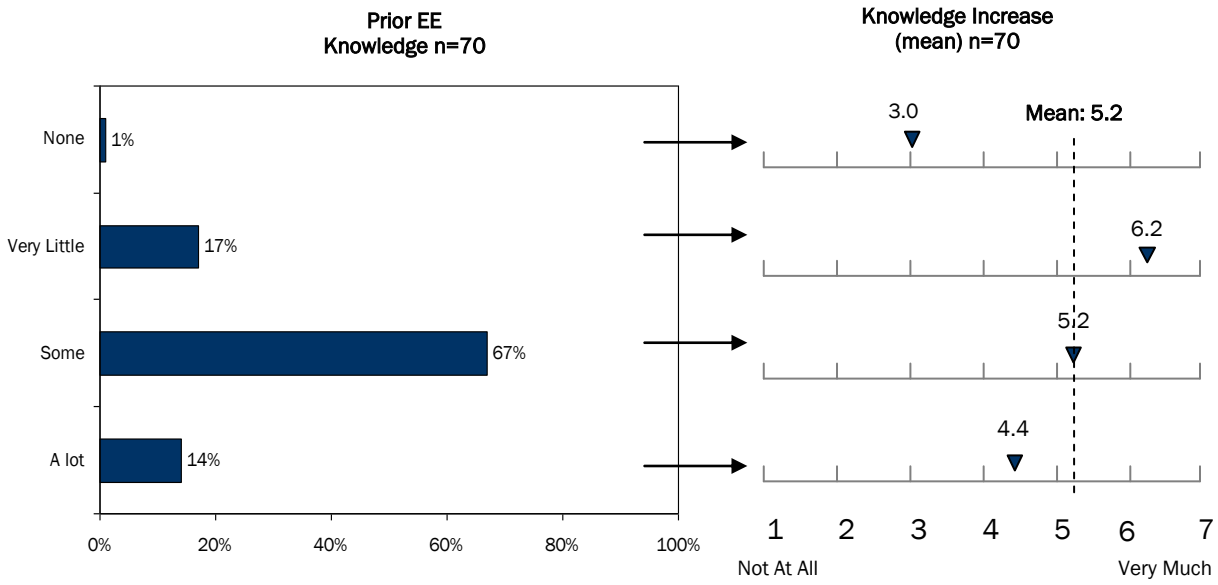
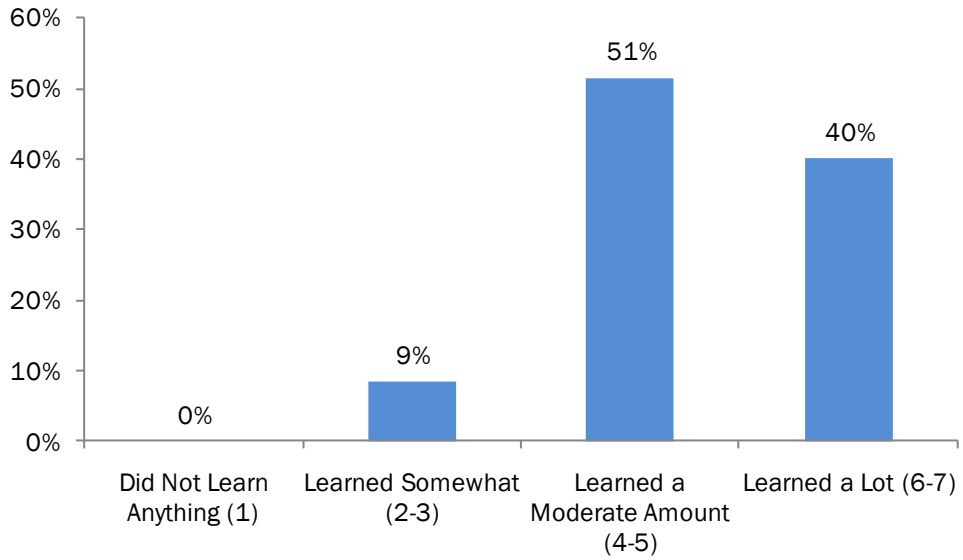


Figure 82. Overall Reported Increase in Knowledge After Training Session (Realtors)

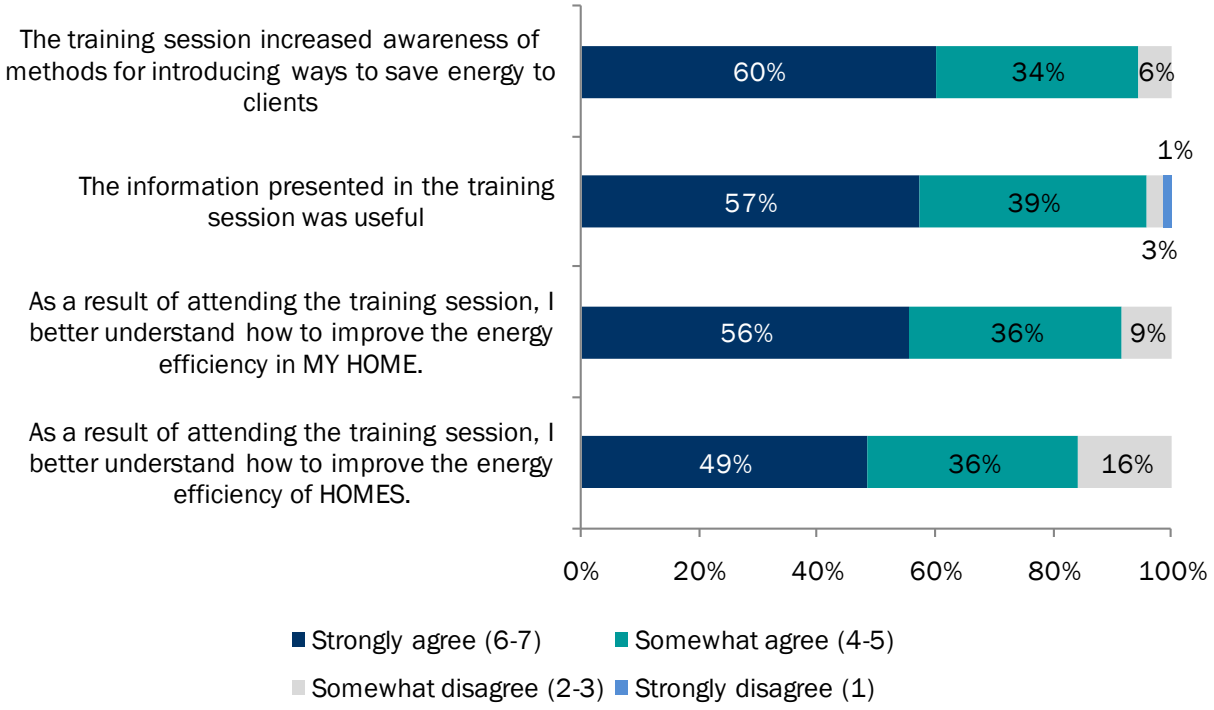
Box Scores, Valid % (n=70)



Most realtors strongly agreed that the training increased their awareness of ways to introduce energy saving to clients (60%), was useful (57%), and increased their awareness of how to save energy in their own homes (56%).

Figure 83. Realtor Knowledge Gains

Box Scores, n=70, Valid %



Homeowners

In the homeowner survey, participants were also asked to rate their knowledge gains based on the information they received from the energy report. Figure 84 shows the level of knowledge gained based on self-reported prior energy efficiency knowledge. The overall mean (on a scale of 1 to 7) was 4.9, indicating that homeowners learned something from the report but likely could have learned much more. Respondents who said they had no knowledge or very little knowledge of energy efficiency before the audit learned the most. As shown in the graph below, the more knowledgeable the participants are about energy efficiency the less knowledge they gained from the energy reports. Almost 80% of the participants had "some" or "a lot" of prior energy knowledge indicating that participants would likely learn more if the reports included more advanced information or if the information were delivered in an alternate fashion that resonated better with this target market.

Figure 84. Mean Knowledge Increase by Prior Energy Efficiency Knowledge (Homeowners)

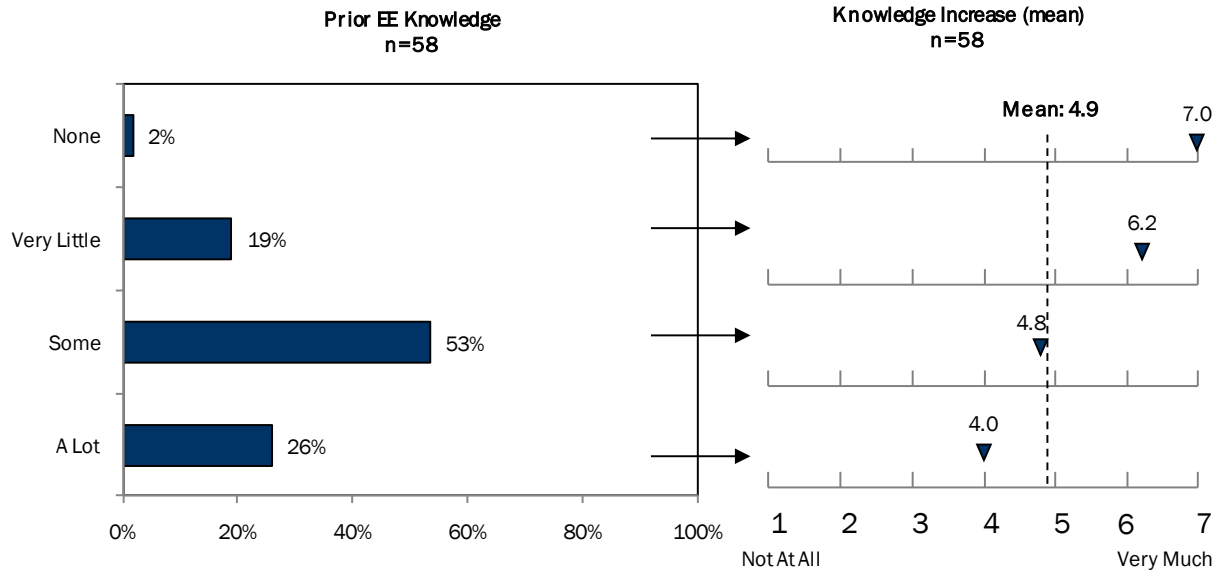
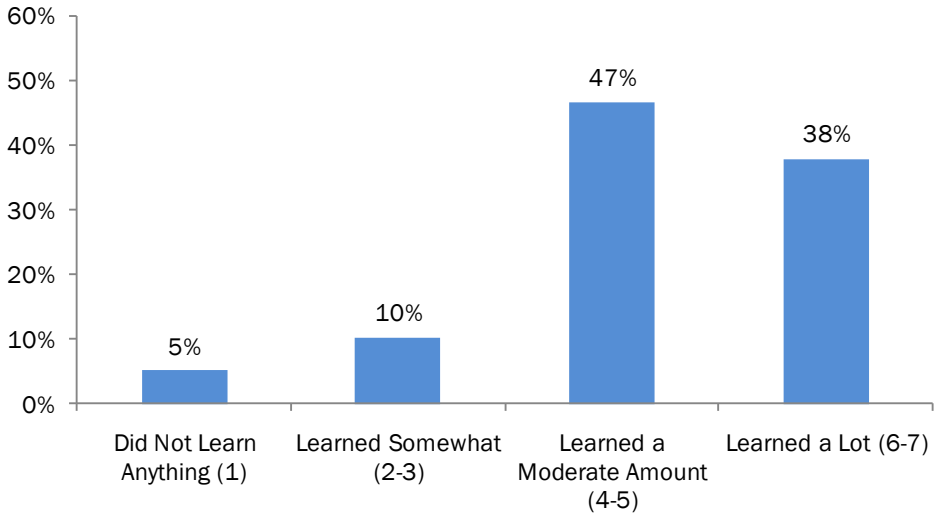


Figure 85. Overall Reported Increase in Knowledge After Energy Reports (Homeowners)

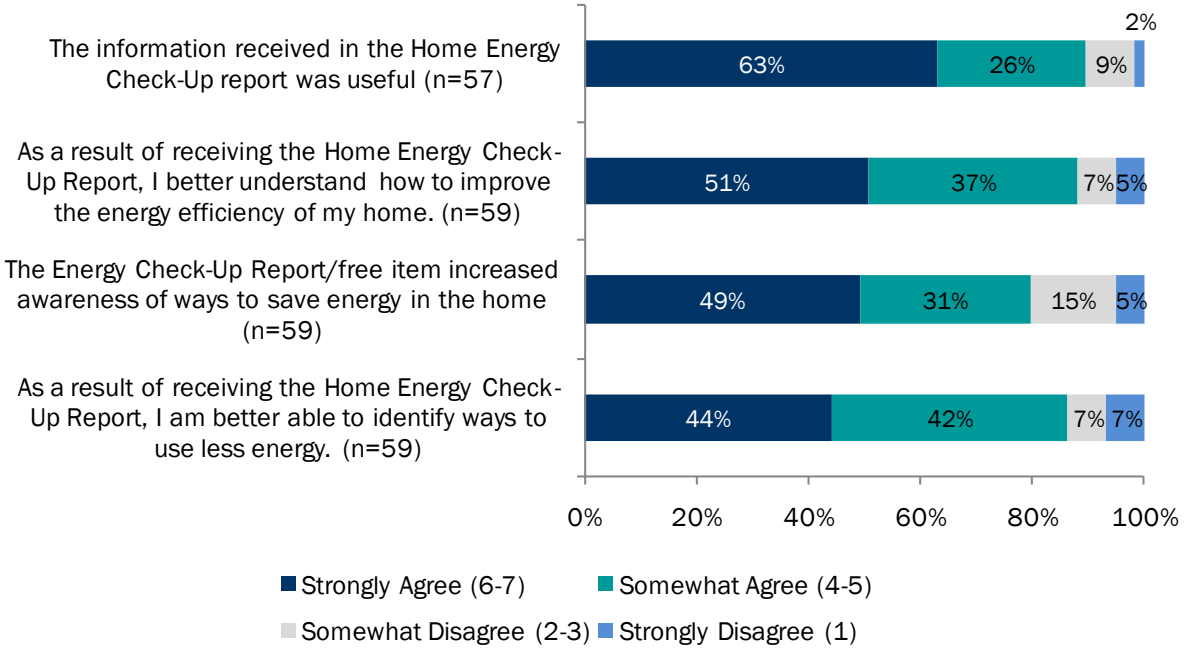
Box Scores, Valid % (n=58)



More than six in ten respondents (63%) rated the information from the energy report as very useful (Figure 86). Just over half strongly agreed that the report increased their awareness of energy efficiency around their homes. Just under half strongly agreed that the report increased their understanding of how to improve the energy efficiency of their home, and ability to identify ways to use less energy. Again, one factor may be that respondents were given information that they already knew and another may be that the methods of delivering the information (an emailed link to an online report) may not be sufficiently effective with this target market.

Figure 86. Homeowner Knowledge Gains

Box Scores, Valid %



8.4.5 What behavior changes occurred as a result of the program?

Indirect Actions Taken

Realtors

Realtors that became EnergyWi$e partners were expected to take actions such as discussing energy savings with clients and recommending home energy audits and energy efficient measures such as CFLs. Of the realtors surveyed, more than half (53%, or 37 realtors) reported that they became EnergyWi$e partners after the training session. Among the EnergyWi$e realtors, all applied concepts from the training session to the service they provided clients. The training session and partner requirements were extremely effective in getting realtors to introduce energy efficiency to their clients. Almost all recommended CFLs to clients (97%) and discussed energy efficiency upgrades (95%). Table 70 illustrates the indirect actions that the EnergyWi$e realtors and non-EnergyWi$e realtors took.

Table 70. Realtors' Indirect Actions Taken

	EnergyWi$e Realtors (n=37)	Non-EnergyWi$e Realtors (n=33)	Total Realtors that Attended Training (n=70)
Applied concepts from class to services with clients	100%	12%	56%
Recommended CFLs to clients	97%	24%	63%
Discussed energy efficiency upgrades with clients	95%	30%	64%
Recommended home energy audits to clients	84%	24%	56%
Used techniques from training to discuss energy efficiency with clients	84%	21%	54%

EnergyWi$e realtors also had the opportunity to request "Energy Rated" signs to advertise homes on the market that had received home energy audits. Few realtors took this action, however. Less than one-fourth of EnergyWi$e realtors (24%) said that they requested and received at least one "Energy Rated" sign, and even fewer (14%) remembered posting one or more of these signs at clients' homes. One likely reason for the low use of these signs is that the vast majority of homeowners who got the audit got it for their own use, not to advertise to others: Only two of the 60 homeowners surveyed (3%) said that they were the seller of the home that received the audit (i.e. the ones who would be interested in posting an "Energy Rated" sign). Another possible reason is that, according to the program implementer, most Realtors in this market do not place their own signs, relying instead on a 3rd party sign management company. This finding suggests in the logic of using Realtors to place "Energy Rated" signs may need to be reviewed.

Homeowners

Although the main purpose of the Home Energy Check Up reports was to encourage direct actions, many homeowners also took indirect actions. Just over half (53%) of homeowners said that they talked to other people about the energy report (as shown in Figure 78). Furthermore, more than half (57%) of homeowners said they searched for additional ways to save energy.

Direct Actions Taken

Realtors

EnergyWi$e realtors received free items (primarily CFLs) to install in their own homes. These installations lead to some energy savings for the program. Of EnergyWi$e realtors, more than eight in ten (84%) reported that they received free CFLs for their home. All of them installed these CFLs in their home, but only 68% recalled the specific number of bulbs they installed. The mean number of bulbs they reported receiving was 35 (ranging from 3 to 90), and the mean number they reported installing was 30.

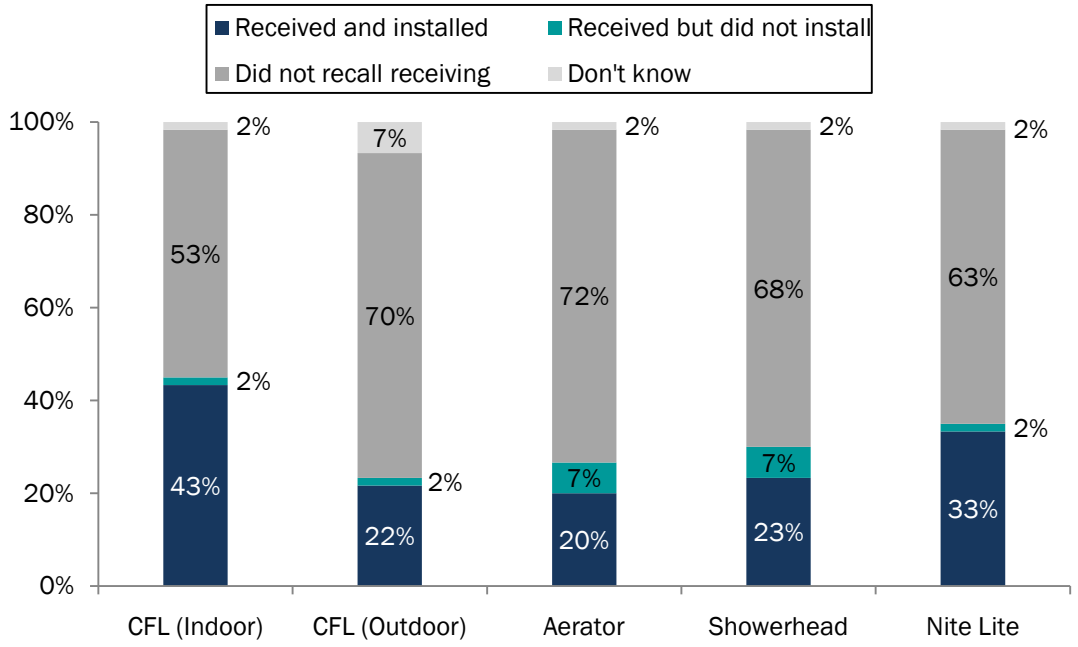
Realtors were also asked, open-ended, if they installed any other energy efficiency measures in their homes as a result of the program. Few realtors reporting making changes beyond

the free items they received; 22% reported installing more CFLs, and 5% reported taking other measures (insulating the attic and wrapping the water heater). Eight percent reported making behavior changes with measurable energy savings: turning off the lights, unplugging electronics, and using fans instead of air conditioning.

Homeowners

Less than half of homeowners surveyed (45%) recalled receiving a free measure from the program. This number is lower than expected but logical given that not all participants received a free items. However, if they remembered receiving an item, almost all participants installed the measures they received for free (Figure 87), indicating significant savings directly attributable to the program.

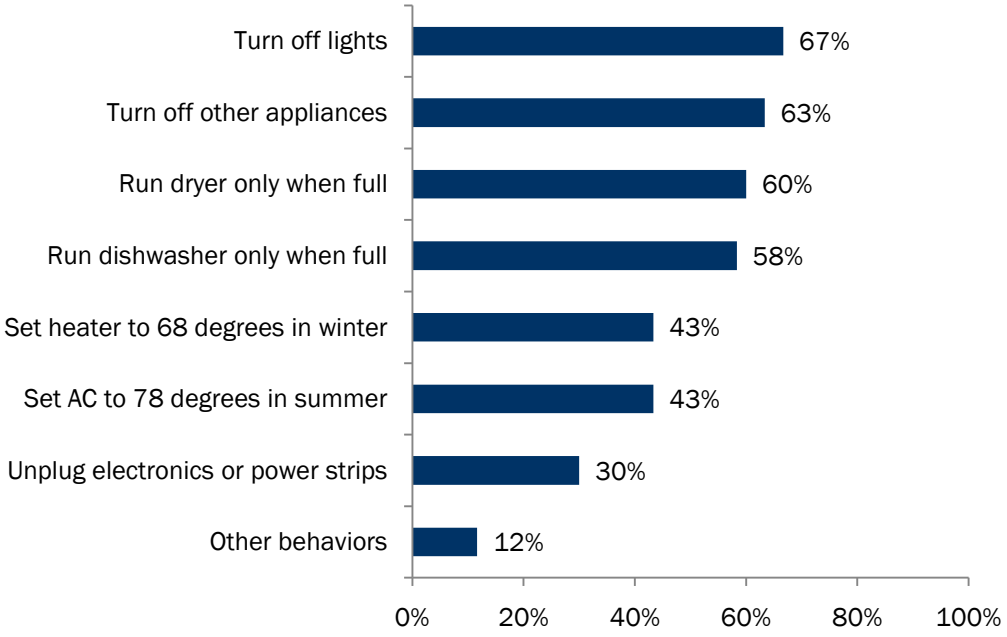
Figure 87. Homeowner Received and Installed Free Items (n=60)



Beyond installing free measures, 90% of homeowners either changed their energy behavior in the home or installed an energy efficient measure. Furthermore, nearly one-third (32%) of respondents said that they planned to make changes to improve their home's energy efficiency in the next 12 months, whether or not they had already made a change.

Two-thirds (67%) of respondents reported changing their behavior in cost-free ways and most of them reported changing multiple behaviors. Among the behavior changes, two-thirds (67%) of all homeowners said they started turning off the lights when leaving the room, and nearly as many reported turning off other appliances when not in use (63%), running only full loads in the dryer (60%) and the dishwasher (58%). Figure 88 shows all behaviors respondents remember taking after receiving an energy report.

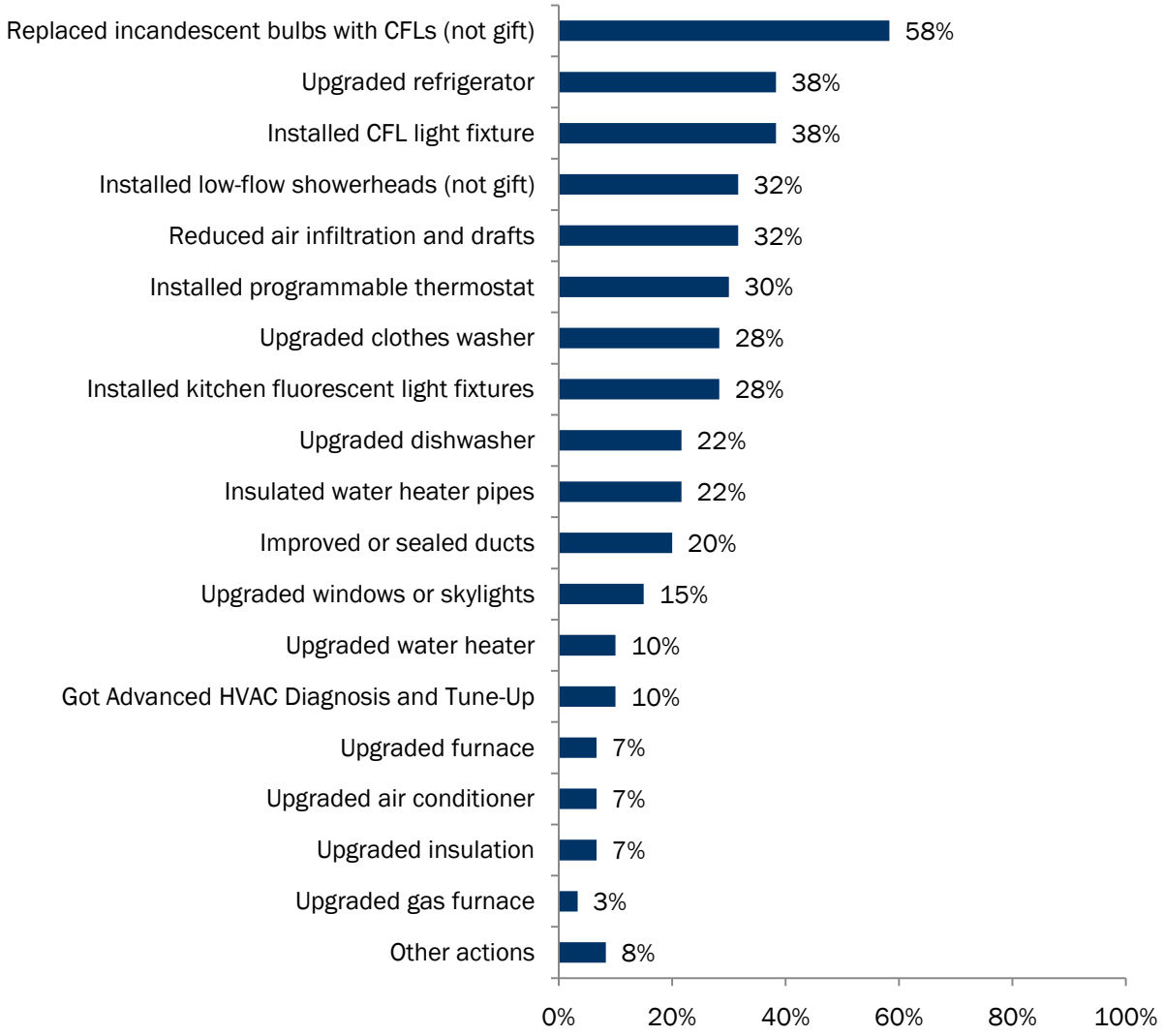
Figure 88. Homeowner Behaviors Changed Since Home Energy Audit (n=60)



"Other" behaviors mentioned include water-saving actions, unplugging extra refrigerators, installing motion-sensing lights, hanging clothes out to dry, powering down computer networks when not in use, using solar-powered landscape lights, and forgoing air conditioning altogether.

Seven in ten homeowners (70%) purchased and installed energy efficient measures for their home. Most homeowners bought low-cost measures such as CFLs (58%) but many also purchased high-cost measures such as refrigerators (38%) and clothes washers (28%). Building envelope and HVAC measures were reported least often. Figure 89 illustrates all of the energy efficient measures that homeowners said they purchased for their home after receiving an energy report.

Figure 89. Homeowner Measures Installed (n=60)

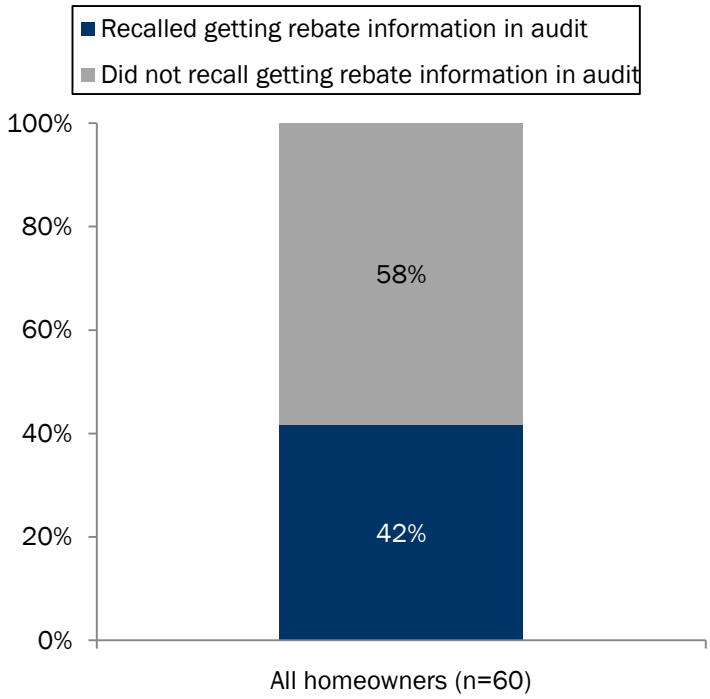


"Other" actions mentioned include installing ceiling fans instead of air conditioning, repairing the fireplace damper, buying other energy efficient appliances, and installing a low-flow toilet.

8.4.6 What percentage of participants were fed into resource programs and which programs were promoted?

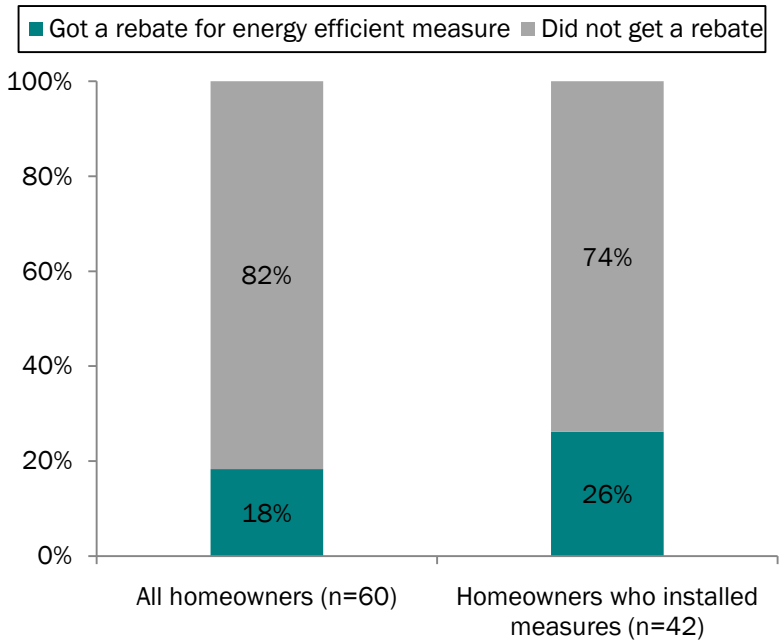
All of SDG&E's residential programs were promoted through the information provided in the Home Energy Check Up reports while 42% of homeowners recalled getting rebate information in their energy report. Figure 90 shows homeowners' recall of rebate program information in their energy reports.

Figure 90. Homeowners' Recall of Rebate Program Information



A significant percentage of homeowners said they also participated in other SDG&E programs for rebates on energy efficiency purchases. Eighteen percent of the total homeowners surveyed said they participated in a rebate program. Among those homeowners that installed an energy efficient measure, 26% said they participated in a rebate program. These rebates included measures such as upgrading insulation, upgrading refrigerators, upgrading dishwashers, upgrading water heaters, upgrading gas furnaces, and upgrading clothes washers. Figure 91 shows the number of homeowners who got rebates, measured out of both the total number of homeowners and the number of homeowners who installed energy efficient measures after their audits.

Figure 91. % of Participants Channeled into Resource Programs



8.4.7 What are the net energy savings as a result of the program?

We have seen throughout this report that both realtors and homeowners reported an increase in knowledge and many took direct energy saving behaviors following participation in the program. We used several of the questions in the survey to calculate a Cognitive Change Index (CCI), or a value between 0 and 1 that estimates how much of the changes reported by respondents can be attributed to the program. The CCI for homeowners who made a change following the program was 0.71 and for realtors, 0.83.

We used the CCI along with questions about behavior changes to calculate energy savings. By combining this information, we developed an estimate of the average energy savings per participant. For appropriate measures, we removed respondents who said they received an SDG&E rebate. In addition to the measures listed in the savings, homeowner participants reported some additional measures. These were not counted for the following reasons:

- Advanced HVAC Diagnosis and Tune-up: This is a free SDG&E program, so savings are assumed to be attributed elsewhere.
- Installing kitchen fluorescent light fixtures: Not enough information was available on the measure to estimate savings.
- Running full loads in the dryer and dishwasher: Difficult to estimate savings because it requires changing assumptions about number of cycles.
- Unplug devices and power strips: All these participants reported turning off electronics and appliances when not in use, so we only attributed savings to one measure rather than both.

- Upgrade furnace (not gas): Cannot estimate savings with unknown fuel type.

The total energy savings generated by this program is based on a sample of homeowners and realtors and extrapolated to the 3,238 participating homeowners and 103 realtors. The combined total net energy savings for both participant groups amounts to 3,614 MWh and 94,391 therms. We present these numbers simply to demonstrate the order of magnitude of energy savings that may be created by the program.[98]

We note that the savings estimates for this program is annual, not lifecycle. There are likely ongoing savings as long as the measures are still in function.

Table 71. Net Homeowner Energy Savings (n=60 homeowner participant homes)

		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Replace incandescent with CFLs (not free)	35	2.96	5.92	8.87			
Install a programmable thermostat	18	-0.14	2.08	4.31	-3	369	740
Install low-flow showerheads (not free)	19	0.05	0.09	0.14	54	108	162
Reduce air infiltration drafts	15	0.11	0.22	0.32	36	72	109
Upgrade refrigerator	15	0.75	1.50	2.25			
Insulate water heater pipes	13	0.08	0.16	0.24	42	83	125
Improve or seal ducts	9	0.43	0.86	1.29	67	134	201
Upgrade clothes washer	9	0.09	0.18	0.27	31	62	92
Upgrade windows	8	0.04	0.13	0.21	19	57	94
Upgrade dishwasher	8	0.10	0.20	0.30	6	12	18
Upgrade water heater	4	-	-	-	15	30	44
Upgrade air conditioner	4	1.48	2.95	4.43			
Upgrade insulation	2	-	-	-	59	118	177
Install CFL fixtures	1	0.08	0.17	0.25			
Install occupancy sensors	1	0.47	0.55	0.63			
Behaviors							
Turn off lights when leaving the room	50	9.82	19.64	29.46			
Turn off electronics/appliances not in use	38	0.50	0.81	1.12			
Set AC to 78 in summer	26	14.59	20.23	25.87			
Set heat to 68 in winter	26				671	1189	1706
Use ceiling fans instead of air conditioner	2	1.49	3.23	4.98			
Take shorter showers	1	-	-	-	9	18	27
Repaired leaking fire place damper	1	-	-	-	1	2	3
Gross Total		**31**	**55**	**79**	**997**	**2233**	**3469**
CCI=0.71							
Net Total		**22**	**39**	**56**	**708**	**1585**	**2463**
Free Measures							
Indoor CFL[a]	577	10	20	29			
Outdoor CFL[a]	42	3	6	8			

[98] Complete tables showing the calculations used to derive these estimates are included in Appendix D of Volume I.

		MWh			Therms		
Faucet Aerator	12	0.04	0.07	0.11	26	52	78
Low-flow Showerhead[a]	18	0.05	0.09	0.14	54	108	162
LED Nite Lite[a]	36	1	1	2			
Gross/Net for Giveaways		**13**	**26**	**39**	**80**	**160**	**240**
Overall Net Total		**35**	**65**	**96**	**788**	**1745**	**2703**
Average Savings Per Homeowner		**0.6**	**1.1**	**1.6**	**13.1**	**29.1**	**45.1**

[a]These measures show (and are calculated using) the total number of units installed rather than the number of participants who installed them.
Notes: These numbers assume 74% gas heating fuel share, 13% electric heating fuel share, 76% gas water heating fuel share, 5% electric water heating fuel share, and 35% central air based on RASS for SDG&E.
Estimates of savings are based on measures evaluated by Summit Blue based on industry standards.
All measures reported were assumed to be energy efficient.

Table 72. Net Realtor Energy Savings (n=37 Realtor participant homes)

		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Change CFLs in home (not free)	8	0.68	1.35	2.03			
Insulate attic	1				59	118	177
Use fans instead of air conditioning	1	0.74	1.62	2.49			
Turn off lights	1	0.25	0.49	0.74			
Unplug electronics	1	0.01	0.02	0.03			
Wrap hot water heater	1				10	21	31
Gross Total		**2**	**3**	**5**	**69**	**139**	**208**
CCI=0.83							
Net Total		**1**	**3**	**4**	**57**	**115**	**172**
Free Measures							
CFL[a]	934	16	32	47			
Overall Net Total		**17**	**34**	**52**	**57**	**115**	**172**
Average Savings Per Realtor		**0.2**	**0.5**	**0.7**	**0.8**	**1.6**	**2.5**

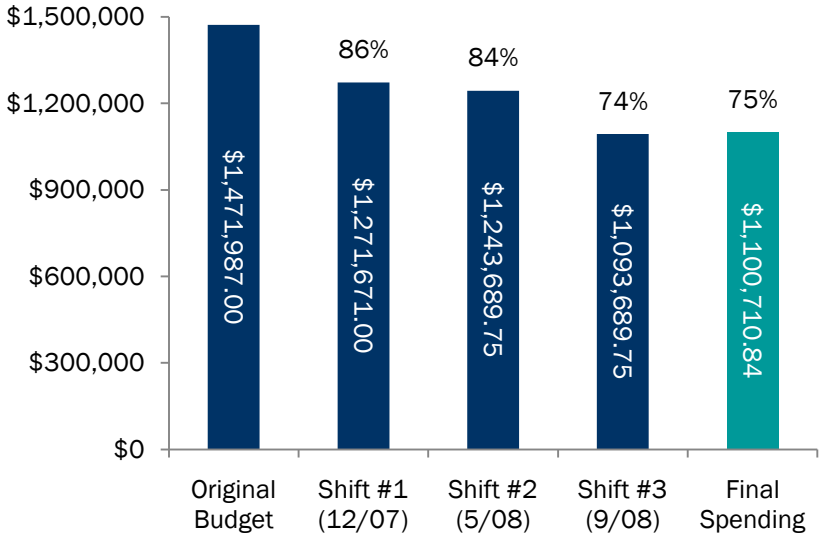
[a]This measure shows (and is calculated using) the total number of units installed rather than the number of participants who installed them.
Notes: These numbers assume 74% gas heating fuel share, 13% electric heating fuel share, 76% gas water heating fuel share, 5% electric water heating fuel share, and 35% central air based on RASS for SDG&E.
Estimates of savings are based on measures evaluated by Summit Blue based on industry standards.
All measures reported were assumed to be energy efficient.

8.4.8 What is the value of the program versus the cost of the program?

The original budget for the program outlined in the PIP was $1,471,987. The budget was shifted three times and ultimately reduced to $1,093,689.75. The total expenditure reported for the program at the end of December 2008 was $1,100,710.84, exceeding its final budget by about one percent. Though the overall energy report goal was cut in half (from 7,500 to 3,000 energy reports) in December 2007, the spending per participant

increased somewhat, as the program raised the incentive for inspectors from $35 to $50 per inspection. The total energy savings generated by this program is estimated to be 3,614 MWh and 94,391 therms. Figure 92 illustrates the changes in budget and overall final expenditures.

Figure 92. Projected Budgets and Final Spending, PY2006-2008



Note: Percentages indicate percent of original budget.

We note that this program struggled to meet its goals for Home Energy Check Up Reports. The program started with a goal of conducting 7,500 energy reports in SDG&E territory. By the end of 2007, the goal was reduced to 3,000, when only 758 reports had been generated. Quarterly reports marked the program as "falling short of expectations" until the second half of 2008. The goals changed over the course of the program, and Table 73 shows its initial goals, final goals and progress against those final goals.[99] At the end of 2008, its goals were to train 500 realtors and 85 home inspectors, complete 3,000 energy reports, and install 27,316 free items in the SDG&E territory.

The program exceeded three of its four goals and did not meet one goal (the number of realtors trained). This is likely not an issue since the realtor training was only crucial to meeting the energy report goal. Had the program succeeded in training 500 realtors, it likely would have surpassed the audit goal by a much higher margin. We were able to verify all of the program achievements through program databases and documentation with the exception of the free items installed. This goal was reported achieved in the quarterly report documentation however the program did not have a database of the number and type of items that were sent to each realtor or homeowner.

[99] The shift in goals was in parallel with funding reallocations at the end of 2007.

Table 73. Program Goals and Achievements

Goals	Achievements	% of Goal	Verified
Train 500 realtors	406 realtors trained	81%	Yes
Train 85[100] inspectors	112 inspectors trained[101]	132%	Yes
3,000 Home Energy Check Up Reports (4Q08)	3,443 Home Energy Check Up Reports	115%	Yes
Install 27,316 free items	29,541 free items installed	108%	No

8.4.9 Evaluability Assessment

The program information available often determines the potential level of rigor for an evaluation. This is often called the "evaluability" of a program. It answers the question: is all of the information available to rigorously answer the researchable issues dictated in the evaluation plan? This section comments on the evaluability of the program based on our evaluation efforts.

The participant contact information and program materials to which we had access are noted in Table 74 below. Overall, we had most of the information we needed to evaluate this program, including contact information for training participants and homeowners who received energy reports through the program. The homeowner information was also comprehensive and provided valuable demographic information on all homeowners who received reports, not just those who responded to the survey.

One problem with the information provided, however, was that the homeowner participant database was missing a significant amount of contact information, especially phone numbers and email addresses. Some of the contact information was also incomplete or inaccurate. For example, several inspectors inputted their own email addresses in place of the homeowner email address for many or all homes they inspected. Furthermore, some of the columns labeled in the sample spreadsheet, specifically "With_Home_Inspection," were unclear in what they were measuring.

Another important piece of information that was missing was the number of free items given away through the program. The final quarterly report said that the program gave away 29,541 free items. We requested a detailed database of these giveaways through SDG&E for more accurate energy savings calculations, but we did not receive it from the implementer during the course of our evaluation. However, after the implementer reviewed our final evaluation, they informed us that they did have this database but did not know that

[100] This goal was reported to have changed in the 4Q07 report.

[101] The number of inspectors trained is corrected from the 4Q08 report, which stated that 156 inspectors were trained in SDG&E territory. This original number counted the total number of attendees at each training session, without removing inspectors who attended more than one. The corrected number comes from listing of all attendees provided by SDG&E.

we requested it. This issue is also addressed in Volume I of this report, in Section 12.1.2: Recommendations for Future Evaluations.

Some realtor information was also difficult to verify. Though the database of realtor information we received listed which realtors participated in the program, it was unclear whether the information was up to date at the time we received it. The homeowner database, which listed the name of the inspector who performed the audit, did not list the name of the realtor who recommended it. This information would be valuable in learning which realtors actually made homeowner recommendations, and it also would show exactly how many homeowners got an audit with and without a realtor recommendation. This was especially important due to the 21% of homeowners who said they were not in the housing market when the audit was conducted.

The tables below outline the information we received and desired for an Evaluation.

Table 74. Program Information Received and Desired for Evaluation

Program Information	Receipt Status
List of inspectors trained through 9/18/07 (with Names, email addresses, and date of training attended)	Received
Inspectors' telephone numbers and program participation status	Desired
List of realtors attending training sessions through end of 2008 (with names, email addresses, phone numbers, company names, partner status, and training event ID)	Received
List of all homeowners who received audits through the program (with names, addresses, phone numbers, email addresses, home square footage, home build date, name of inspector, inspector email address, and link to online audit). Homeowners contacted in previous related studies (including the process evaluation) were color-coded.	Received
Homeowner audit database with additional information on recommending realtors and legend clarifying any abbreviated column names	Desired
Program materials, quarterly reports	Received
Database of free items given away through the program (including recipient names, addresses, phone numbers, email addresses, type of items, and number of items)	Desired

Given that this program has discontinued, we do not provide recommendations for future evaluation efforts.

9. SDGE 3040: BUSINESS ENERGY ASSESSMENT

The purpose of this chapter is to provide findings from our evaluation of the Business Energy Assessment (BEA) Program. The program provides businesses in San Diego Gas & Electric (SDG&E) service territory with an energy assessment that identifies energy efficient opportunities, recommends energy efficient actions and increases awareness of resource acquisition programs. This program is one of several programs that are currently being evaluated by the Opinion Dynamics evaluation team as part of the Education and Information Indirect Impact Evaluation for the CPUC. This program is implemented by a third-party, EnVinta, under a contract with SDG&E (SDGE 3040).

9.1 Introduction

The California Public Utilities Commission (CPUC) awarded San Diego Gas & Electric (SDG&E) with funding to implement the Business Energy Assessment (BEA) Program during program years 2006 to 2008. The program provides small and medium-sized businesses with an energy assessment known as the "Energy Challenger". The program ultimately aims to increase awareness of the potential energy saving opportunities available to businesses, as well as the resources and programs offered by SDG&E that would help achieve these savings. The three-year program implementation budget for this program was $599,347[102].

Opinion Dynamics conducted an indirect impact evaluation of the program. This evaluation seeks to answer the following research questions: (1) What education or information is provided and what behaviors are encouraged?; (2) What is the reach of the program?; (3) How likely is the program to induce behavior change?; (4) What are the changes in awareness of energy saving opportunities as a result of the program?; (5) What behavior change occurred as a result of the program?; (6) What are the net energy savings as a result of the program?; (7) What percentage of participants were fed into resource programs, and which programs were promoted?; and (8) What is the value of the program versus the cost of the program?

In addition to these research questions, we discuss the breadth and quality of data and other materials that were made available by the program implementers for this evaluation. We also comment on the available data in a section called Evaluability Assessment toward the end of this report.

9.2 Summary of Key Findings

While our evaluation sought to determine the extent of the energy savings provided by BEA in PY2006-2008, BEA was considered an education and information program and did not have explicit energy savings goals. The program asks participants to complete an energy assessment for their business and then provides participants with a tailored action plan that

[102] Budget information taken from December 2008 Program Expenditure report: http://eega2006.cpuc.ca.gov/ReportsDisplay.aspx.

identifies energy efficiency opportunities, recommends energy efficiency actions and promotes SDG&E resource acquisition and demand response programs for financial assistance. Our evaluation found that the program's main value can be found in its ability to serve as a marketing tool for other SDG&E programs. SDG&E offers many programs for small and medium-size businesses including demand-response and rebate programs and the BEA program helps channel customers into these programs. The action plans also help facilitate a discussion around energy efficiency in businesses by providing energy efficiency information in a format that is easy to read and share. Furthermore, it helps employees who want to champion energy efficiency within their company by helping them quickly and easily determine energy efficient opportunities, cost saving estimates and financial assistance tailored to the business's usage and needs.

Below is a summary of the key findings from this evaluation:

- The program launch and marketing of the assessment tool occurred approximately one year into the PY2006-2008 cycle. Within two years, 2,562 businesses completed the program's energy assessment, comprising an estimated 2% of the total number of small and medium-sized businesses in SDG&E territory. The program's reach likely extends far individuals that completed the energy assessment as three-quarters of participants (75%) said they shared program information with others, most commonly (69%) with peers/colleagues. This data shows that the program is effectively initiating energy efficiency dialogue within businesses.
- According to the program theory, by increasing participants' awareness of the potential energy savings available to their company, as well as the resources offered by SDG&E, businesses will likely take action to reduce energy consumption. Additionally, participants in this program are most likely already planning to take energy saving actions and are looking to the BEA program to provide them with specific recommendations for where to start. This hypothesized theory was found to be accurate as, according to our survey, 53% of respondents said they were planning to take energy saving actions prior to the assessment[103].
- One key factor in the program's ability to induce behavior change is whether the program reaches the actual decision-maker in a business or someone with the ability to influence energy decisions. The program recognizes this fact and attempts to target actual decision makers - managers and business owners (rather than technical staff) – so that there is a higher probability that the business takes action. Although this reach is crucial to the program's ability to impact change, it likely remains a challenge. From our survey of participants, we found that 40% of respondents said it is difficult for them to change the amount of energy used in their organization.
- The program's information is increasing energy efficiency knowledge. Almost half of the respondents (45%) said they learned new information from the program. However, participants appear to already be quite knowledgeable of energy efficiency; 91% say they possessed "some" or "a lot" of energy efficiency knowledge prior to completing the

[103] These include respondents that rated their intent to take action prior to the assessment either a 6 or 7 on a 7-point scale.

assessment and claimed that the assessment only moderately increased their knowledge; the self-reported knowledge increase averaged a 4.3 on 7-point scale.

- Almost all (95%) of BEA participants reported taking some action after completing the assessment either by installing energy saving measures or changing their energy behavior. Specifically, 63% of participants reported installing energy saving measures. The most common installation was lighting (performed by 58% of total participants), with the second most common being HVAC (performed by 29% of participants). Nearly 9 in 10 (88%) participants indicated changing behavior or practices with regard to how energy is used.
- Although many participants reported installing measures, our analysis calculated how much of the changes are attributable to the program and found the program had a moderate influence. The cognitive change index, used in this evaluation to determine how much of the energy actions were likely instigated by this program, came to 0.65, a moderate score especially when compared to other programs in this evaluation with scores as high as 0.81. Therefore, fewer energy savings were attributable to the BEA program than other programs in this evaluation. This evaluation found that the program's primary value is its ability to induce businesses to take energy efficient actions either on their own or with the assistance of other utility programs. The program proactively recommends SDG&E programs to participants by providing them with web links to specific programs in their action plans. Survey results show that BEA channeled almost one-quarter (22%) of its participants to other programs.
- The annual savings induced by this program are 8,198 MWh and 38,942 therms for the 2006-2008 program cycle. This means that each participant, on average saved 3.2 MWh and 15.2 therms per year.

9.3 Methodology

Opinion Dynamics utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program documents, program databases, and past evaluations[104]. Primary data collection included an internet survey of participants.

Opinion Dynamics fielded an internet survey of businesses that completed the assessment between May 2007 and December 2008. The list of all assessment participants was provided by the program implementer. Individuals who participated in the assessment prior to May 2007 were not contacted since they may have participated in prior evaluation efforts. Therefore, the total number of participants that received an invitation to complete the internet survey (after removing individuals with invalid email addresses) was 857. Out of this sample pool, 93 BEA participants completed the internet survey between March and April 2009. Notably, while there are three ways that a business could participate, i.e. by email, telephone or mail, the program database did not provide that information and we were unable to sample by assessment type.

[104] We reviewed the process evaluation for BEA which was undertaken by KEMA as part of the Process Evaluation of SDG&E's 2006-2008 Non-Residential Energy Efficiency Programs, published March 15, 2008.

The participant survey included a range of questions on awareness and knowledge of energy efficiency, and elicited information about behavior changes stemming from the program, including channeling into other programs. From these responses we calculated energy savings from BEA.

9.4 Detailed Findings

9.4.1 What education or information is provided and what behaviors are encouraged?

BEA provides businesses with an assessment tool that identifies energy efficiency opportunities, offers recommendations and promotes other SDG&E programs. Businesses can either complete the assessment on their own by going to the SDG&E website (www.sdge.com/audit), over the phone with a program representative or via direct mail. While participants have multiple ways to complete the assessment, the majority of participants (84%) opt to complete the assessment online.

The assessment was designed to be as non-technical as possible to gain the highest response rate. This approach is especially important for a business assessment program as it enables people to complete the assessment regardless of their role within the organization. Throughout the assessment, participants answer a series of statements regarding their businesses' energy management practices and equipment, by choosing yes, no or not applicable. For example, one of the survey statements asks the participant whether: "We have upgraded our incandescent lighting to energy efficient compact fluorescent (CFL) lamps". The assessment automatically determines the series of questions for the participant based upon business sector and size.[105] In total, there are fourteen possible sets of questions across the following measures:

- Lighting (e.g. compact fluorescent lighting, lighting controls);
- HVAC (e.g. air tightness, heating/cooling controls);
- Refrigeration;
- Energy-Efficient equipment (e.g. upgraded gas equipment, Energy Star status of office equipment);
- Demand response practices;
- Operating and Maintenance Practices (e.g. HVAC maintenance, equipment procedures); and
- Management Practices (e.g. have a plan to reduce energy costs for the next year).

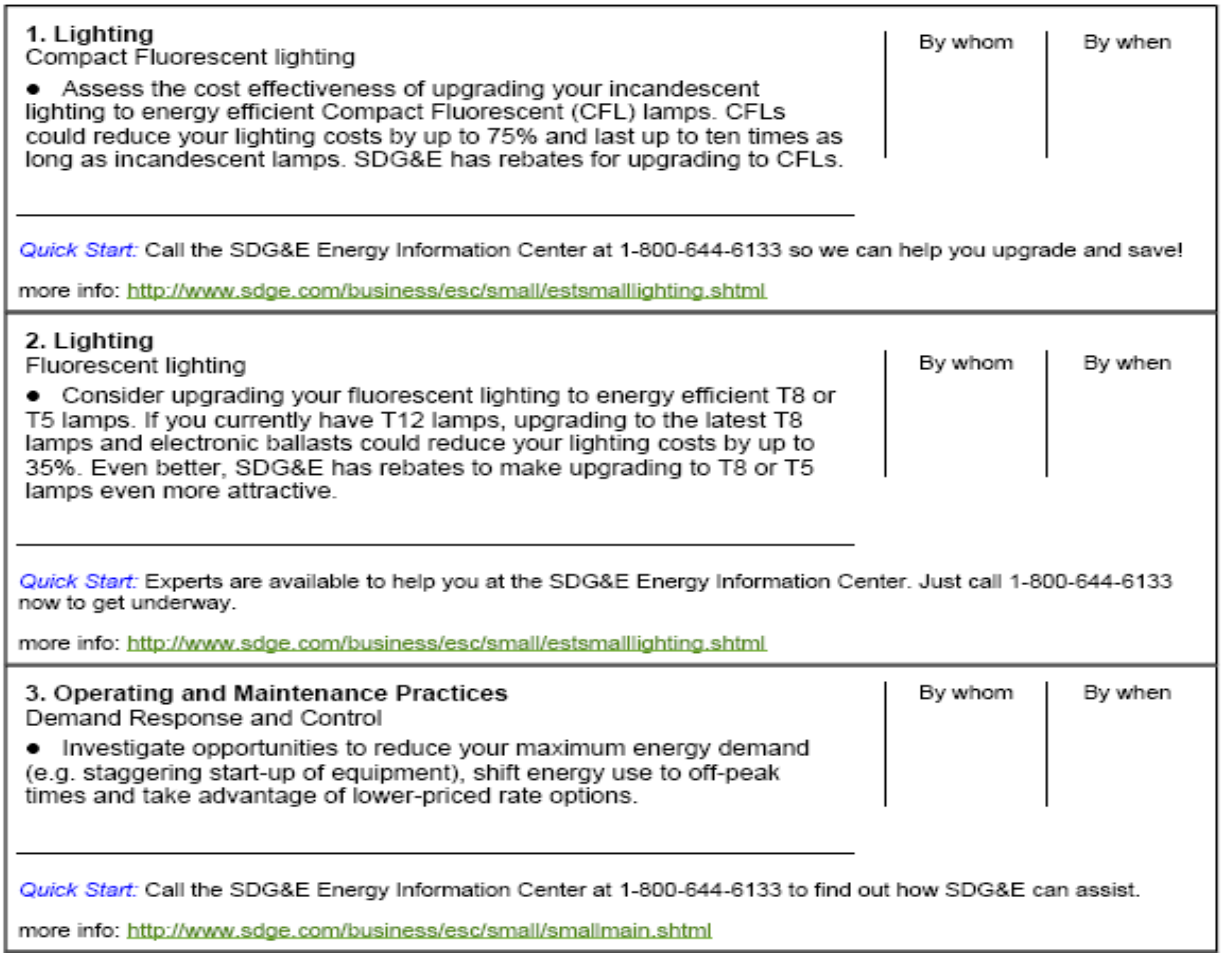
[105] Business size is determined at the beginning of an assessment by asking the business for its annual electricity and natural gas costs. A business is considered "small" if the sum of its energy costs are less than $100,000 and the business is considered "medium" if the sum is greater than $100,000.

Businesses that complete the assessment online are immediately presented with a detailed action plan that is formatted for printing out and tracking actions by the customer.[106] The action plan contains up to seven recommended actions. In addition, the action plan also provides the following:

- Potential cost savings associated with specific energy saving measures;
- A benchmarking report comparing the participant to other assessment participants;
- A carbon footprint calculator; and
- Online links to SDG&E services for each recommendation and the number to the SDG&E Energy Information Center.

Figure 93 shows a snapshot of an example action plan.

Figure 93. Assessment Action Plan Example



1. Lighting
Compact Fluorescent lighting

By whom | By when

- Assess the cost effectiveness of upgrading your incandescent lighting to energy efficient Compact Fluorescent (CFL) lamps. CFLs could reduce your lighting costs by up to 75% and last up to ten times as long as incandescent lamps. SDG&E has rebates for upgrading to CFLs.

Quick Start: Call the SDG&E Energy Information Center at 1-800-644-6133 so we can help you upgrade and save!

more info: http://www.sdge.com/business/esc/small/estsmalllighting.shtml

2. Lighting
Fluorescent lighting

By whom | By when

- Consider upgrading your fluorescent lighting to energy efficient T8 or T5 lamps. If you currently have T12 lamps, upgrading to the latest T8 lamps and electronic ballasts could reduce your lighting costs by up to 35%. Even better, SDG&E has rebates to make upgrading to T8 or T5 lamps even more attractive.

Quick Start: Experts are available to help you at the SDG&E Energy Information Center. Just call 1-800-644-6133 now to get underway.

more info: http://www.sdge.com/business/esc/small/estsmalllighting.shtml

3. Operating and Maintenance Practices
Demand Response and Control

By whom | By when

- Investigate opportunities to reduce your maximum energy demand (e.g. staggering start-up of equipment), shift energy use to off-peak times and take advantage of lower-priced rate options.

Quick Start: Call the SDG&E Energy Information Center at 1-800-644-6133 to find out how SDG&E can assist.

more info: http://www.sdge.com/business/esc/small/smallmain.shtml

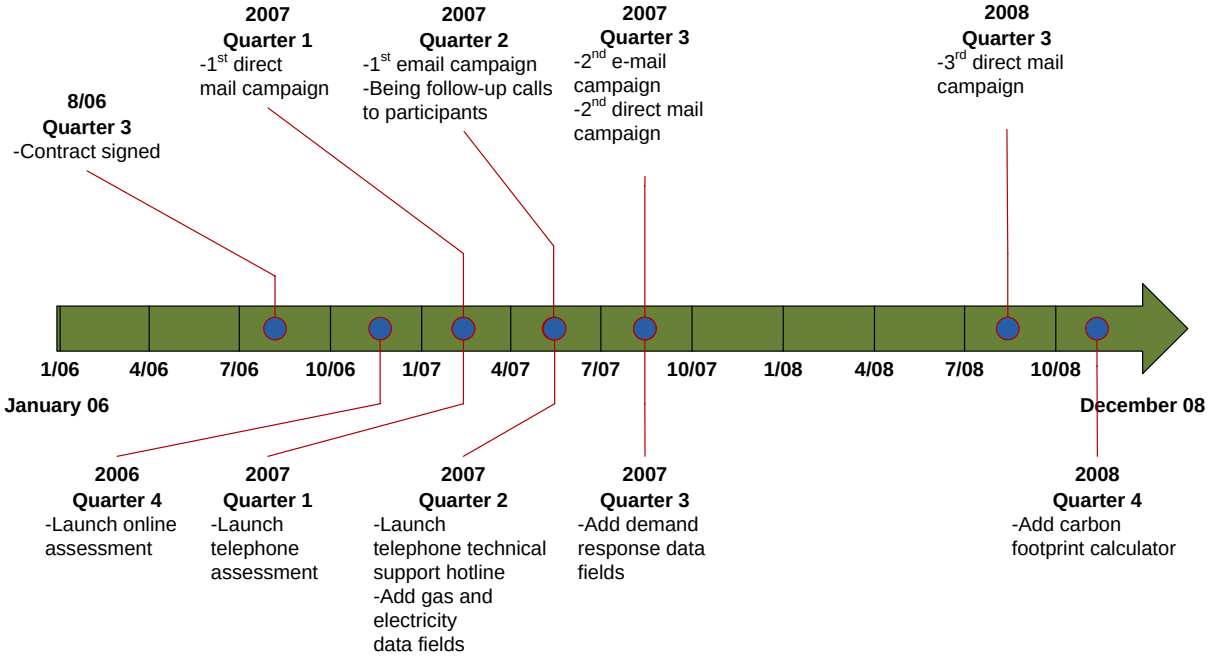
According to documents provided by the program implementer, the assessment tool takes 10 to 15 minutes to complete. The respondents to our participant survey confirmed that most respondents complete the assessment in 15 minutes or less.

[106] For assessments completed over the phone, the business is sent the action plan by email.

9.4.2 What is the reach of the program?

The program targeted small and medium-sized businesses in the SDG&E territory. As of 2001, there were 115,827 small and medium-sized SDG&E business customers[107]. Throughout the program cycle, the program was able to recruit 2,562 businesses to complete assessments, thereby reaching 2% of its target market. While this penetration rate may appear low, the program did exceed its goal of completing more than 2,000 assessments in its first 3-year program cycle. As a new program, it took some time to sign a contract, develop the energy assessment tool and marketing plan. As shown in the timeline below, the online energy assessment launched in late 2006 and was not marketed until early 2007. Given that the program was able to recruit over 2,000 businesses in two-thirds of the program cycle, it is expected that the program will continue to penetrate even more of its target market in the next program cycle.

Figure 94. Assessment Tool Development and Marketing Timeline



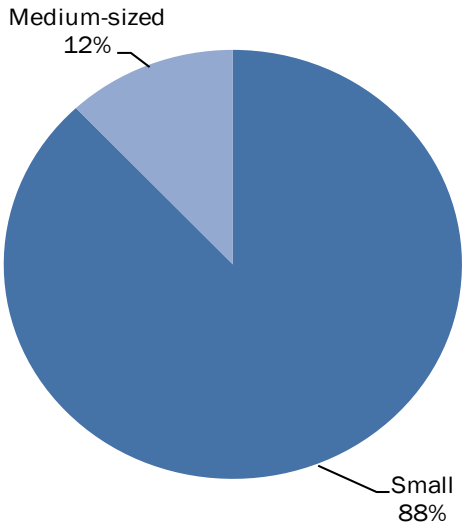
Although the program targeted both small and medium-sized businesses, participant databases show that the program is primarily reaching small businesses, or businesses with annual energy costs below $100,000[108]. The majority (88%) of participants are small businesses with the remaining (12%) participants comprising medium-sized businesses. BEA marketing campaigns involve direct mail, over-the-phone marketing and email to attract

[107] Study undertaken by Quantum and Xenergy, *Statewide Small/Medium Nonresidential Customer Needs and Wants Study,* published December 2001.

[108] Business size is based upon 1,051 participants or 39% of the total PY2006-2008 participants. This is the number of participants for which the program database had cost data. Annual energy cost data was added to the assessment in May 2007. It is impossible to know whether the business size of post-May 2007 participants is similar to the pre-May 2007 participants.

participants. It is currently unknown as to whether the program targeted more small businesses with its marketing strategy or whether the total business population distribution is similar to these data.

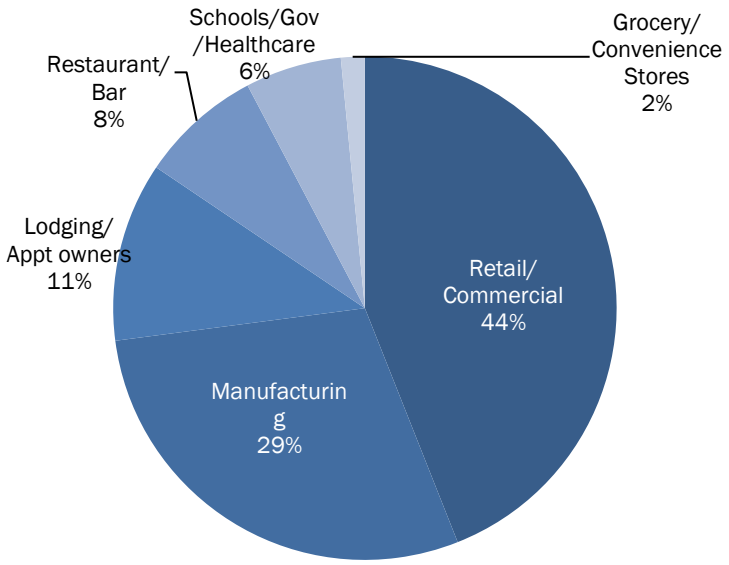
Figure 95. Participant Business Size (n=1,051)



The program was able to reach a mix of business sectors. Most businesses that participated were from the retail or commercial sectors (44%) or manufacturing (29%). The program also reached businesses in lodging, property management, food service, education, health, government, and grocery sectors (Figure 96).[109]

[109] Please see Appendix A for a review of firm demographics.

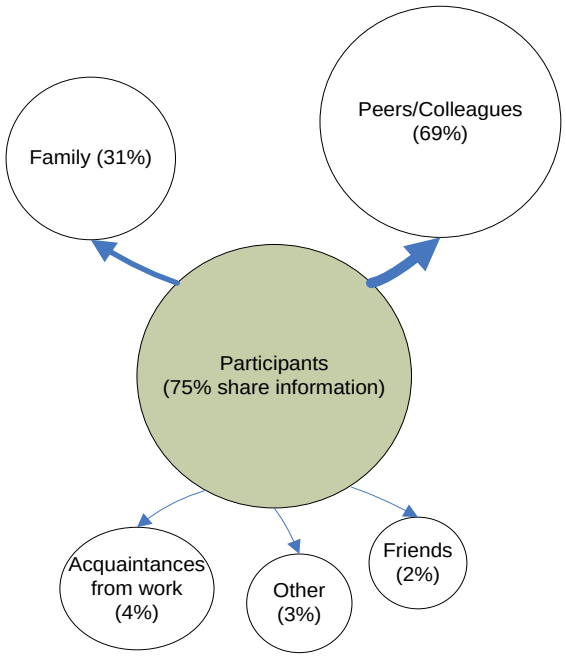
Figure 96. Participants' Business Sector[110] (n=2,562)



BEA's reach also extends beyond the individuals that directly completed the energy assessment. Three-quarters of our survey respondents (75%) shared information with others, most commonly (69%) with peers/colleagues (see Figure 97).

Figure 97. Program Information Sharing (n=93)

(Multiple Response)



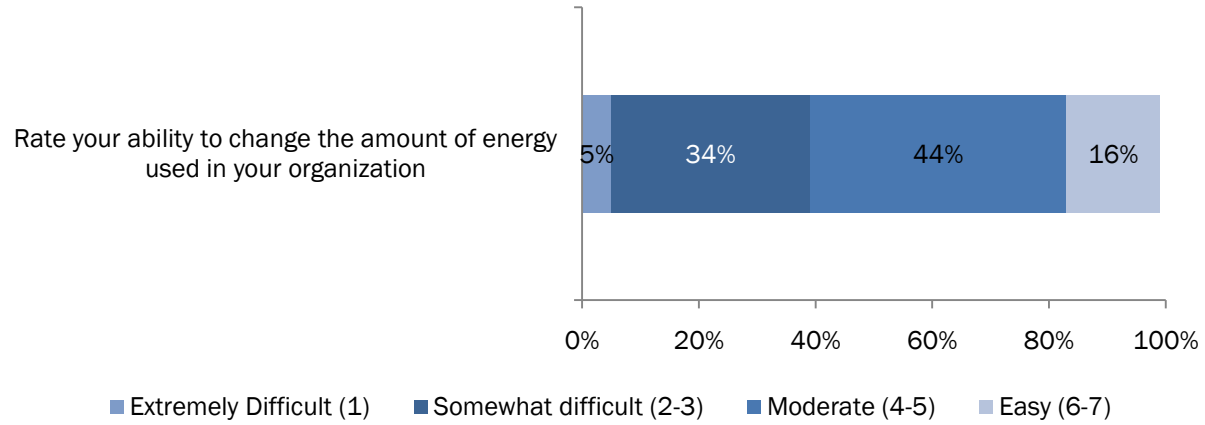
[110] These categories are based on the groupings provided by the program implementer.

9.4.3 How likely is the program to induce behavior change?

According to the program implementation plan and previous process evaluations for similar programs, standard audits tend to fail as they typically require technical knowledge and take too long to complete, resulting in early terminates. BEA attempts to address this design flaw by providing businesses with an online assessment tool that is intended to be user-friendly, quick, does not require technical knowledge, and provides practical recommendations. By increasing participants' awareness of the potential energy savings available to their company as well as the resources offered by SDG&E, it is believed that businesses will likely take action to reduce energy consumption. According to the program theory, participants in this program are likely to already want to take energy saving actions and are looking to the BEA program to provide them with recommendations for where to start. This was evident in our survey as 53% of respondents said they were planning to take energy saving actions prior to the assessment[111].

The BEA program is likely to induce behavior change through specific points in several paths (see Figure 99). One factor that determines the program's ability to induce behavior change is whether the program reaches the actual decision-maker in a business or someone with the ability to influence energy decisions. The program recognizes this fact and attempts to target actual decision makers - managers and business owners (rather than technical staff) – so that there is a higher probability of the business taking action. The program targeted decision-makers by designing a non-technical assessment; one that does not require an engineer or someone with vast energy knowledge to complete. Although reaching the decision makers is crucial to the program's ability to impact change, it remains a challenge; 40% of survey respondents said it is difficult for them to change the amount of energy used in their organization[112].

Figure 98. Participant's Ability to Change Energy in Organization

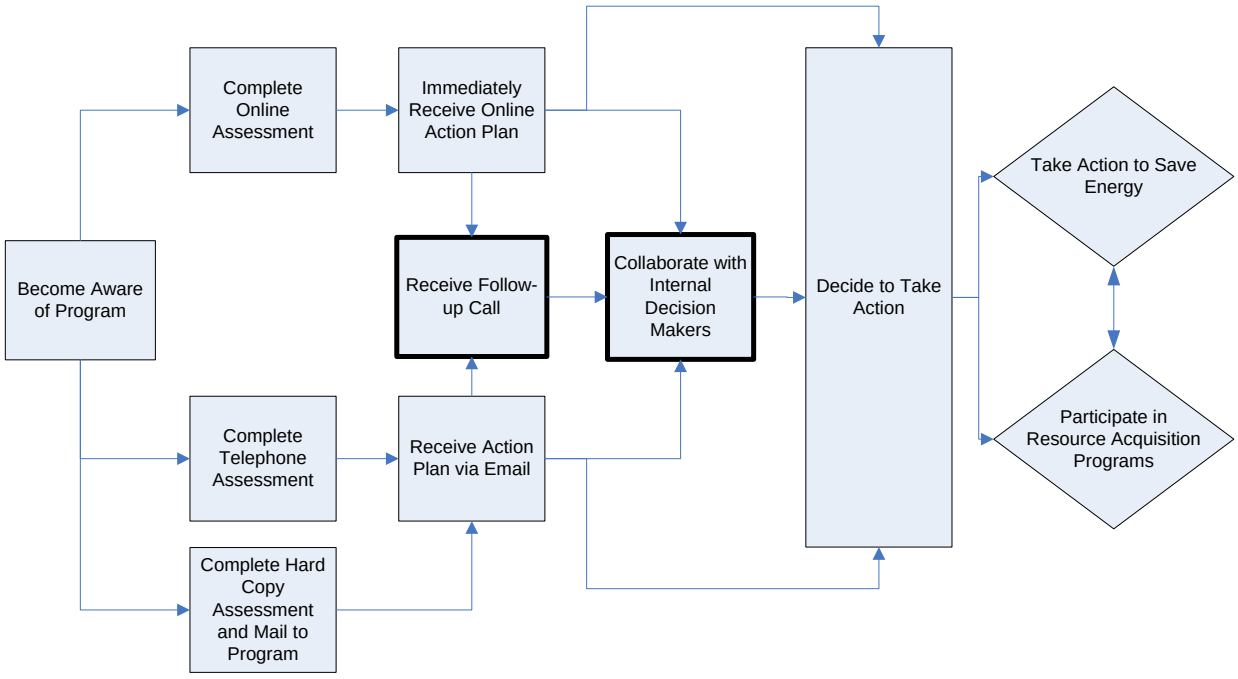


[111] These include respondents that rated their intent to take action prior to the assessment a 6 or 7 on a 7-point scale.

[112] These respondents that rated their ability to change the amount of energy used in their organization a 1, 2 or 3 on a 7-point scale.

Participants may complete the assessment and review the recommendations, but their ability to make changes in the organization determines whether the program can induce change. The participant may be the decision-maker in many cases, however if he/she is not the decision-maker then that person must collaborate with internal decision-makers to gain approval for action. Given that 40% of respondents in our survey indicated that they lacked the ability to make energy changes in their organization, the diagram below highlights the crucial step of "collaboration with internal decision makers" in the potential path to behavior change.

Figure 99. Potential Paths to Behavior Change



Another crucial component in the path toward behavior change is the "follow-up" call. BEA contacts participants after they have received an action plan. The program contacts participants by phone to go over the assessment results and discuss next steps. An early interview with the program implementer found that following up with participants via telephone has been a challenge given that many participants do not respond to the program's attempts to reach them. Notably, program databases do not indicate which participants received follow-up calls. To further evaluate the impact of the follow-up call on behavior change, we asked respondents in our survey whether they received a follow-up call. Survey results show that 23% of participants recall receiving a follow-up phone call to review the results. Table 75 shows the differences in our survey data between respondents that received a follow-up call and those that did not. Specifically, the program was able to impart more knowledge to follow-up call recipients and these recipients were more likely to install an energy saving measure.

Table 75. Follow-up Call Impact on Likelihood to Induce Behavior Change

Metric	Follow-Up Call (n=21)	No Follow-Up Call (n=29)
Knowledge and Awareness Gains (% that gave 6 & 7 Ratings on 7-point scales)		
Usefulness of Information Received from Audit	52%*	24%
How Much Audit Caused Participants to Want to Make EE Changes	71%*	34%
How Much Audit Increased Awareness of EE Opportunities	62%*	17%
How Much Audit Changed knowledge of EE Opportunities	43%*	7%
Behavior Change (% said Yes)		
Installed any Energy Saving Measures	76%*	38%

* Statistically significant at 90% confidence level.

It is uncertain whether the follow-up call is the only factor increasing the program's likelihood to induce behavior change or whether these participants actually share a set of unique characteristics that are driving the increase. For example, follow-up call recipients may be more accessible, more interested in saving energy, more motivated to save energy, have more energy saving opportunities or are in a better position to take action within their business. Given the small sample size of follow-up call recipients in our survey and that the program does not track the follow-up call status of its participants; we were limited in our ability to explore whether follow-up call recipients share a set of other common characteristics.

9.4.4 What are the changes in awareness of energy saving opportunities as a result of the program?

In this section, we explore the program's impact on awareness by examining whether the respondents report that the information is new or useful, as well as their self-reported increases in knowledge.

Almost half of the respondents (45%) said they learned new information from the program. This data is not surprising given that many respondents were already thinking of taking energy saving actions and were turning to the assessment to identify specific areas of improvement and resources to help offset the upfront costs of these energy savings actions. Participants also appear to be knowledgeable of energy efficiency; nine in ten participants say they possessed "some" or "a lot" of energy efficiency knowledge prior to completing the assessment (9 in 10 or 91%). The overall extent of knowledge increase was moderate, averaging a 4.3 on a 1-7 scale (see Figure 100 and Figure 101). The percentage of respondents who had a "large" knowledge increase was 24%. Given the non-technical nature of the assessment coupled with participants' large share of previous energy knowledge, it is expected that the program would have a moderate impact on participants' knowledge of energy efficiency opportunities at their organization. If the majority of participants lacked previous energy knowledge, the level of knowledge gained from participation in this program would likely be greater. Further, if the assessment included

more specific recommendations or a detailed cost-benefit analysis of proposed energy efficient upgrades, we would likely see a larger knowledge gain.

Figure 100. Energy Efficiency Knowledge Increase

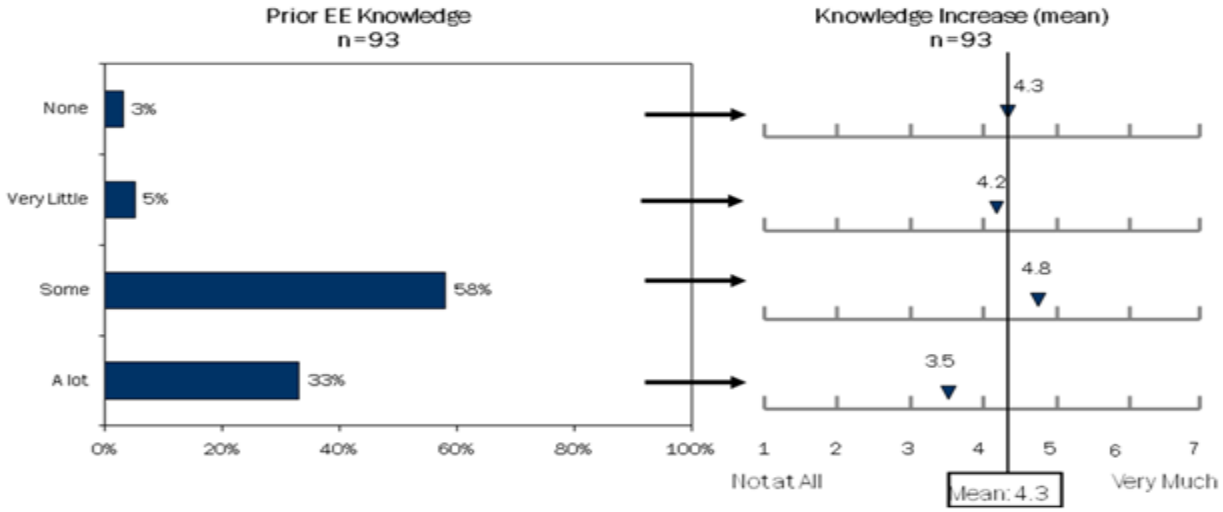
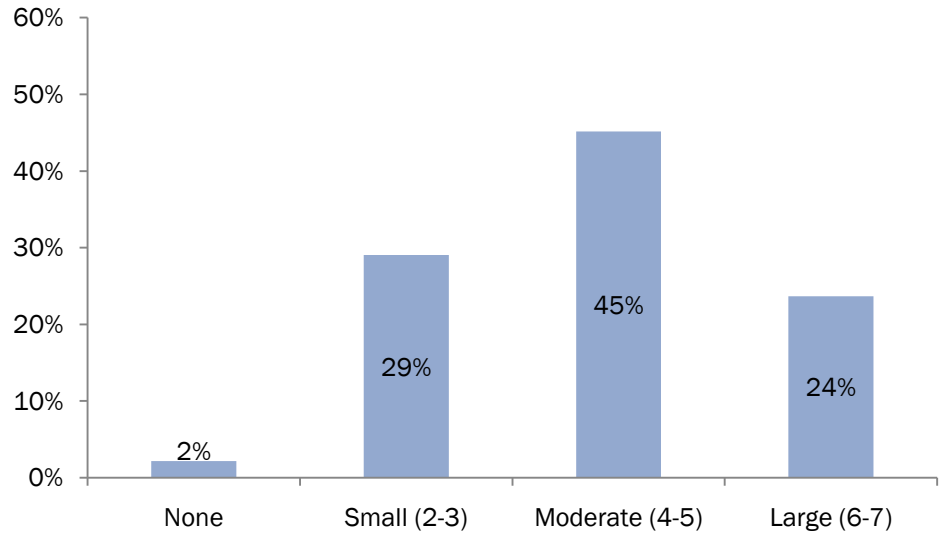
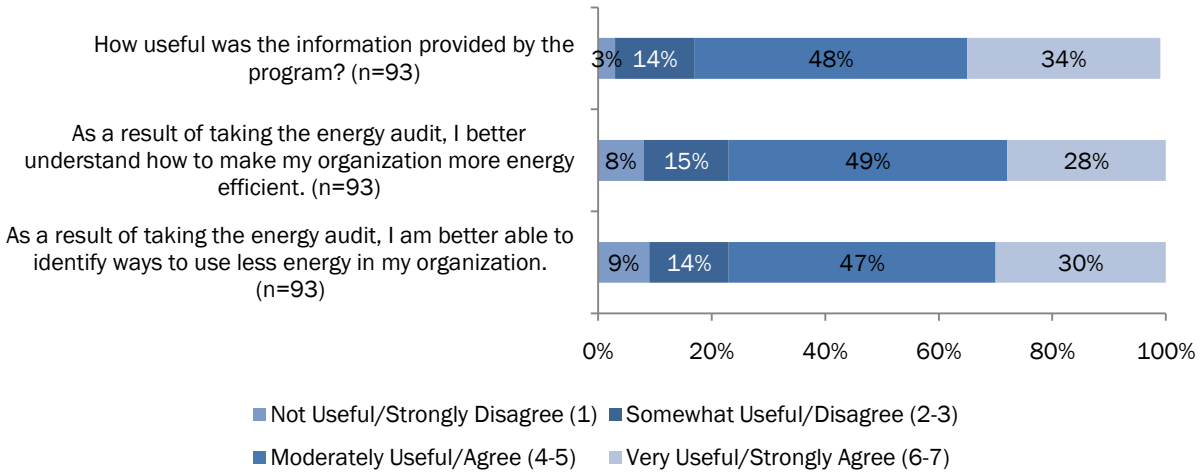


Figure 101. Overall Knowledge Increase (n=93)



The survey also asked respondents whether the program information was useful, if the assessment better helped them to identify ways to use less energy in their organizations and whether it increased their understanding of how to make their organization more energy efficient. In total, 34% of respondents rated the information useful (6 or 7 ratings on a 7-point scale). Fewer participants (30%) said they are better able to identify ways to use less energy. While (28%) of participants stated that they better understand how to make their organization more energy efficient (see Figure 102).

Figure 102. Knowledge Gains (n=93)[113]



9.4.5 What behavior change occurred that indirectly influenced energy savings?

Following the assessment, a large percentage of participants communicated with others about ways to save energy. Although the program may not have imparted a large amount of knowledge to program participants, the program likely imparted knowledge to other employees in a given organization. Early we noted that 40% of participants indicated that it was difficult for them to make energy changes within their organizations and therefore collaboration with internal decision-makers was a necessary step to taking action. As shown in the table below, 78% of participants said they recommended ways to save energy to upper management, indicating that the information is being communicated to those who have decision making authority. More than half of respondents also said they shared information with others, searched for additional information and recommended energy saving ideas more often. The program specifically encourages participants to visit the SDG&E website and/or call the SDG&E Energy Center in the action plans; 24% of participants said they visited the website and 15% said they called SDG&E for more information. This data seems somewhat low given that the action plans heavily emphasize the SDG&E Energy Information Center telephone number.

Table 76. Indirect Actions Taken (n=93)

Since the time you took the audit, have you…	% Yes
Recommended ways to save energy to your management	78%
Shared the information you learned with others	75%
Searched for additional information on ways to save energy in your organization	71%
Made energy saving recommendations more often	68%
Visited the SDG&E website to learn more about energy efficiency opportunities	24%

[113] Questions in this graph were asked on two different scales. The useful question was asked on a 7-point scale where "1" meant "not useful at all" and "7" meant "very useful". The statement questions were asked on a 7-point scale where "1" meant "strongly disagree" and "7" meant "strongly agree".

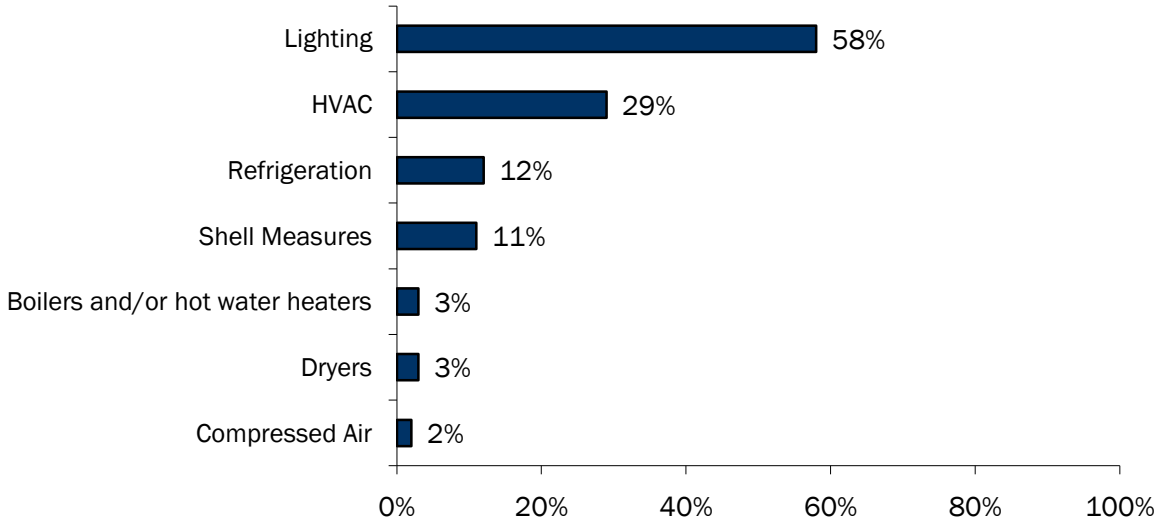
Since the time you took the audit, have you…	% Yes
Asked a contactor about other energy efficiency programs	20%
Called the SDG&E Energy Information Center	15%

9.4.6 What behavior change occurred that directly influenced energy savings?

Overall, nearly all respondents (95%) said that they took a direct energy-related action since the start of the assessment. This was defined as those who either installed energy saving measures and/or changed behavior[114]. Specifically, 63% of participants say they installed equipment and 88% of participants say they changed their behavior or practices with regard to how energy is used in their business after completing the assessment, e.g. turned off lights more often or changed maintenance practices.

The 63% of participants that installed energy efficient equipment since completing the assessment were asked for the specific measures they installed (Figure 103). The program appears to make the most impact in lighting equipment, following by HVAC and refrigeration equipment. Over half (58%) of participants reported installing energy efficient lighting and 29% installed HVAC equipment. Businesses that did not take any action were asked why their organization had not changed its energy use. The small number of respondents (n=4) cited reasons of cost, inability to understand recommendations, and difficulty in getting others on board.

Figure 103. Energy Saving Equipment Installed (n=93)



Furthermore, almost one third of respondents (32%) have plans to take action in the next 12 months to improve energy efficiency using concepts learned from the assessment. The most cited action was “change or replace lights.”

[114] Participants were asked whether they changed behavior or practices with regard to how energy is used (e.g., turned off lights more frequently, changed use patterns, altered operations and maintenance, etc.) since completing the assessment.

9.4.7 What are the net energy savings as a result of the program?

Despite the large number of participants who took some energy saving actions after the assessment, not all participants said the actions were taken because of the program. We calculated a cognitive change index (CCI), which provides a value between 0 and 1, from several of the survey questions to estimate how much of the changes reported by respondents can be attributed to the program. The value for BEA was 0.65, which indicates a moderate influence from the program. This value was calculated for those respondents who reported taking any energy-related action (direct or indirect) since the start of the assessment (95% of respondents).

Summit Blue calculated energy savings for BEA based on specific details reported by participants in extended modules. Because not all respondents had the technical knowledge to answer the questions, the "n" in the table below represents only those respondents who provided enough information for a specific measure that resulted in energy savings. These "n's" are lower than the number of respondents who actually reported taking action (shown in the previous section), and as a result, the savings may be underestimates. The table below shows that the net energy savings for the survey respondents are 298.11 MWh and 1416.35 therms. Extrapolated to the 2,562 participants reached, this results in an estimated savings of 8,198 MWh and 38,942 therms due to the program. We note that the savings estimates for this program is annual, not lifecycle. There are likely ongoing savings as long as the measures are still in function.

Table 77. Net Energy Savings (n=93)

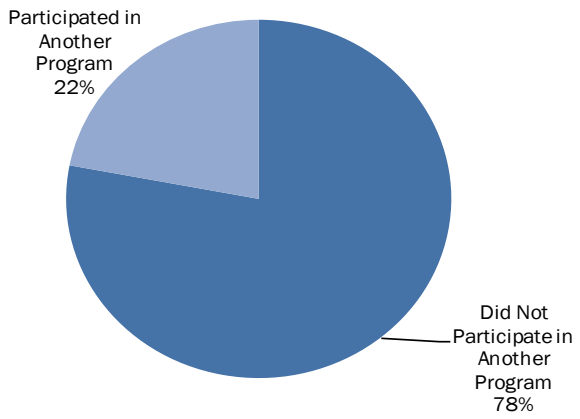
		MWh			Therms		
Measure	**n**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Lighting	11		163.0			-401.0	
HVAC	7		259.0			2,584.0	
Refrigeration	1		0			--	
Boilers and/or Hot Water Heaters	1		3.1			--	
Compressed Air	1		34			-66	
Dryers	2		--			62	
Gross Total			**459**			**2,179**	
CCI=0.65							
Net Total			**298.11**			**1,416.35**	
Average Savings Per Participant			**3.2**			**15.2**	

Notes: The more detailed method of calculating BEA energy savings (as compared to the other programs) results in a single number rather than a range. For this reason, we provide only medium values.

9.4.8 What percentage of participants were fed into resource programs and which programs were promoted?

The BEA program is closely integrated into SDG&E's portfolio of energy efficiency programs for small and medium sized business customers including: Customer Energy Savings Bid, Standard Performance Contact, Express Efficiency, Small Business Super Saver, Savings By Design, and the On Bill Financing Programs. For each recommendation in the action plan, the program provides links to websites for relevant SDG&E programs. Our survey results suggest that the program is successfully channeling participants into other programs; almost one-quarter (22%) of respondents participated in another program after completing an assessment (see Figure 104). To provide some context regarding the channeling effect of audit programs, Itron's 2004-2005 Evaluation of the Non-Residential Audit and PG&E Local Program calculated that 6% of audit participants also participated in the Express Efficiency program. Even though that evaluation was not entirely based on self-reported data and the audits were conducted on-site, by telephone, by mail, online or through a CD-ROM; this data still provides a reference point for the channeling potential of these types of programs. Although the self-reported data shown below might be high, overall the channeling rate of the BEA program looks quite good compared to what we've seen from other similar programs.

Figure 104. Participation in Other Programs (n=93)



Of the BEA program participants that were channeled into another SDG&E program, the Peak Day Credit Program was the most popular (35% of these participants), followed by the Standard Performance Contract (20%), Express Efficiency (20%) and Savings by Design (20%) programs.

Table 78. BEA Channeling to Other Programs (n=20)

(multiple response)

SDG&E Program	Participated
Peak Day Credit Program	35%
Standard Performance Contract	20%
Express Efficiency	20%
Savings by Design	20%
Summer Saver Program	15%
Accept Higher Rate During 'Critical Alert' Periods	10%
Small Business Super Saver	10%
Smart Controls for Pools and Spas	5%
Lodging Energy Efficiency Program	5%

9.4.9 What is the value of the program versus the cost of the program?

The program operated under a budget of $599,347 over the three-year period, of which $634,864 (106%)[115] was spent at the close of 2008. With these funds, the BEA program created an assessment tool for businesses, marketed the program and reached 2,562 businesses during the three-year period. Although survey results show a moderate amount of energy efficiency knowledge imparted by the program, the program has been most successful in getting businesses to take action to reduce their usage.

The overall goals of this program were to: achieve 2,000 completed assessments, increase the uptake of rebates, influence behavior, and stimulate discussion of energy efficiency within organizations. The program achievements for these goals are shown in Table 79.

Table 79. BEA Goals and Achievement Verification

Goal	Achievements
2,000 completed assessments	2,754 total completed assessments by 2,562 unique companies or individuals
Increase uptake of rebates	22% of survey respondents said they participated in another SDG&E program
Influence behavior	95% of survey respondents said they took some energy saving action since completing the assessment: either installed an energy saving measure or changed behavior in the organization
Stimulate discussion of energy efficiency within organizations	75% of survey respondents said they shared information with others and recommended ways to save energy to upper management

Given the large number of participants that took specific energy actions, it can be surmised that the program is directly reaching decision-makers and/or giving organizations the

[115] This information was taken from: http://eega2006.cpuc.ca.gov/ReportsDisplay.aspx.

information they need to gain approval from internal decision-makers. Despite the large number of participants who took some energy saving actions after the assessment, not all participants say the actions were taken because of the program.

The program's main value can be found in its ability to serve as a marketing tool for other SDG&E programs. SDG&E offers many programs for small and medium-size businesses including demand-response and rebate programs and the BEA program helps channel customers into these programs. The action plans also help facilitate a discussion around energy efficiency in businesses by providing energy efficiency information in a format that is easy to read and share. Furthermore, it helps employees who want to champion energy efficiency by helping them justify their request with energy efficient opportunities, cost saving estimates and financial assistance tailored to the business's usage and needs.

9.5 Evaluability Assessment

We performed an abbreviated retrospective evaluability assessment of BEA to determine whether information was available to rigorously answer the researchable issues dictated in the evaluation plan. This section comments on the evaluability of the program based on our evaluation efforts.

Notably, the program does not identify the type of assessment method per participant, nor does it identify which participants received a follow-up call. These data would be useful in further evaluations so that we can control for these variables in the sampling methodology to ensure that our survey data accurately represents population characteristics. Furthermore, the program does not track the exact recommendations given to each participant. This information would have been useful to assess the usefulness, practicality and actionability of each recommendation. Table 80 shows the program data collected for each participant as well as the data that we recommend the program implementers to begin to collect. Table 81 shows the program information we had access to, which was all of the information that we requested.

Table 80. Program Database Assessment

Program Database Fields	Current Program Database Status
List of participants 12/5/2006 – 5/31/2007 (with company name, session date/time, email address, contact name, business sector). This was the information provided to KEMA for their prior evaluation.	Available
List of participants 5/31/2007 – 10/31/2008 (with business name, session date/time, account number, zip code, email address, contact name, business type, electricity cost and natural gas cost .	Available
List of participants 10/31/2008 – 12/17/2008 (with business name, user name, session date/time, industry sector, contact email address, zip code, account number, estimated operating hours, renewable energy sources –yes/no, electricity annual consumption & UOM, annual electricity cost, natural gas consumption & UOM, natural gas cost).	Available
Per participant, the type of assessment (online, mail or phone).	Needed

Program Database Fields	Current Program Database Status
Per participant, status of follow-up call (received or not).	Needed
Per participant, the recommendations received.	Needed

Table 81. Program Information Assessment

Program Information	Program Information Status
All quarterly reports	Available
Program implementation plan	Available
Ten example reports from a cross section of sectors and customer sizes	Available
A map of industry sectors to question sets	Available
A list of the questions included in each of the 14 question sets – separated for small and medium sized businesses	Available
A list of the management questions that were incorporated in the original version	Available
Information about the changes that were made to the assessment since it first went online in the 2006-2008 program cycle	Available

For future evaluation efforts, we recommend that the program:

- Begin reporting expenditures in its quarterly reports;
- Keep a record of the recommendations given to each participant;
- Keep a record of the assessment type each participant completes (online, mail or telephone); and
- Keep a record of the follow-up call status for each participant (no attempt made, scheduled an appointment, contacted, left voice mail, etc).

9.6 Appendix A.

Table 82. Firmographic Data (n=93)

Number of employees at organization	
1 to 5	25%
6 to 10	18%
11 to 20	19%
21 to 50	12%
51 to 100	12%
Over 100	12%
Refused	2%
Approximate Square Footage of Facility	
0-2,000	26%
2,001-10,000	26%
10,001-100,000	20%
100,001 or more	2%
Don't know	25%
Refused	1%
Percentage of Facility that is Heated	
0	12%
1-24	10%
25-49	4%
50-74	5%
75-99	11%
100	38%
Don’t know	18%
Refused	2%
Percentage of Facility that is Air Conditioned	
0	8%
1-24	13%
25-49	6%
50-74	8%
75-99	9%
100	41%
Don’t know	15%
Refused	1%
Average Hours a Day Facility is in Use	
Less than 8 hours	1%
8 to 11 hours	57%
12 to 15 hours	15%
16 to 23 hours	10%
24 hours	15%
Refused	2%

SECTION II: VERIFICATION ASSESSMENT

In this section the ODC evaluation team presents summaries of each of the 10 programs included in this evaluation effort that were discontinued during or after the 2006-2008 program cycle.

Table 83. Discontinued Education and Information Programs Verification Summary

	Budget (2006-2008)	Program Expenditures (2006-2008)	Percent of Budget Spent	Discontinued Date
CHEERS New Construction (SDGE3041)	$179,000	$356	<1%	Dec 2008 [a]
Sweetwater Schools Demonstration (SDGE3037)	$249,800	$270,614	108%	Dec 2008
Advanced Home Renovation Program (SDGE3031)	$456,805	$461,678	101%	Dec 2008
One-2-Five Energy Program (SCE2540)	$500,000	$167,069	33%	Dec 2007
Affordable Housing EE Alliance (SCE2542)	$522,362	$591,467	113%	July 2008
Email Based Energy Efficiency Program (SCE2545)	$600,000	$593,264	99%	Dec 2007
Industrial Energy Efficiency Acceleration (SDGE3033)	$724,986	$241,572	33%	Dec 2008
Energy Efficiency Kiosk Pilot Program (SCG3529)	$900,000	$681,360	76%	Dec 2008
Aggregation of Housing Agencies (SCE2547)	$1,363,569	$948,575	70%	Dec 2008
Energy Efficiency Delivery Channel Innovation Program (SCG3504)	$3,000,000	$2,687,973	90%	Dec 2008

[a] This program was not formally discontinued, but was never implemented beyond the initial planning period.

Below we provide a more detailed summary of verification findings for each of these 10 discontinued education and information programs. These program summaries capture our review of the program implementation plans, quarterly reports, past evaluation efforts, data received from data requests, and initial interviews with program staff. Each summary includes bulleted at-a-glance descriptions, detailed logic models, and a synopsis of the goals, achievements and reach (both planned and achieved-to-date) for each program.

10. SCE 2540: ONE-2-FIVE PROGRAM - SUSTAINABLE ENERGY EFFICIENCY DEVELOPMENT (SEED)

This program planned to improve the energy efficiency of food processing customers. It was discontinued by Southern California Edison in December of 2007.

- **Third-Party Implementer:** EnVinta
- **Program Cycle Budget:** $500,000
- **Program Cycle Spending:** $167,069
- **Target Market Sector:** Non-residential
- **Target Participants:** Large (>0.5MW load) food processing businesses
- **New/Established Program:** New
- **Program Description:** Sustainable Energy Efficiency Development (SEED) was an energy management program for the food processing industry. It was a specialized program developed by EnVinta that applied to energy management the same approaches found in management standards such as ISO 9000+ and Six Sigma. Using both One-2-Five software (which assesses and benchmarks energy management practices) and on-site audits, the program engaged the top management of food processing companies. It would have derived savings through improved energy management business practices and the application of energy efficiency and load response technologies.
- **Desired Market Effect:** The program aimed to increase the participation of food processing customers in the Demand Side Management programs offered in SCE service territory
- **Program Goals:** SEED aimed to: 1) improve energy management policies, procedures and practices, and 2) identify energy efficient technology upgrade opportunities. The program planned to engage 30 participants in Stage One and five participants in Stage Two (see next bullet for an explanation of Stages One and Two).
- **Educational Tactics:** SEED utilized one-day workshops, site audits, customized action plans, and one-on-one consultations.
- **Length of Participant Interaction with Program:** Most participants completed Stage One of the program, which is a one-day session. Only a few companies proceeded to Stage Two; the exact length of Stage Two is unclear, but is thought to be a long and intense commitment.
- **Format of Program Activity/Activities:** Stage One of the program was a one-day session. The day started with a two-hour workshop involving use of the One-2-Five Energy tool, which assesses and benchmarks energy practices. This was followed by a site audit to validate the findings from the tool, observe business practices, and identify potential improvements. Participants took away a customized 180-day action plan (a list of actions to improve business practices for energy management), and a benchmarking

report compared their practices with others in their sector. Stage Two provided up to five participants with consultative support to implement the action plan developed in Stage One. At the end of Stage Two, customers would have a second One-2-Five Energy session to identify new actions that could be taken.

- **Energy Saving Actions Targeted by Program:** SEED program participants saved energy by installing more efficient food service equipment components and by making operational improvements.
- **Channeling to Utility Energy Efficiency Rebate Programs:** The SEED program included the identification of other potential SCE Demand Side Management programs that addressed participants' needs. Stage Two of SEED provided assistance in applying to these programs.

10.1 Program Goals and Achievements

This program began on July 24, 2006. In the Fourth Quarter Report for 2007, the implementers categorize this program as "falling short of expectations."

Table 84. SCE2540 Sustainable Energy Efficiency Development Program Goals and Achievements

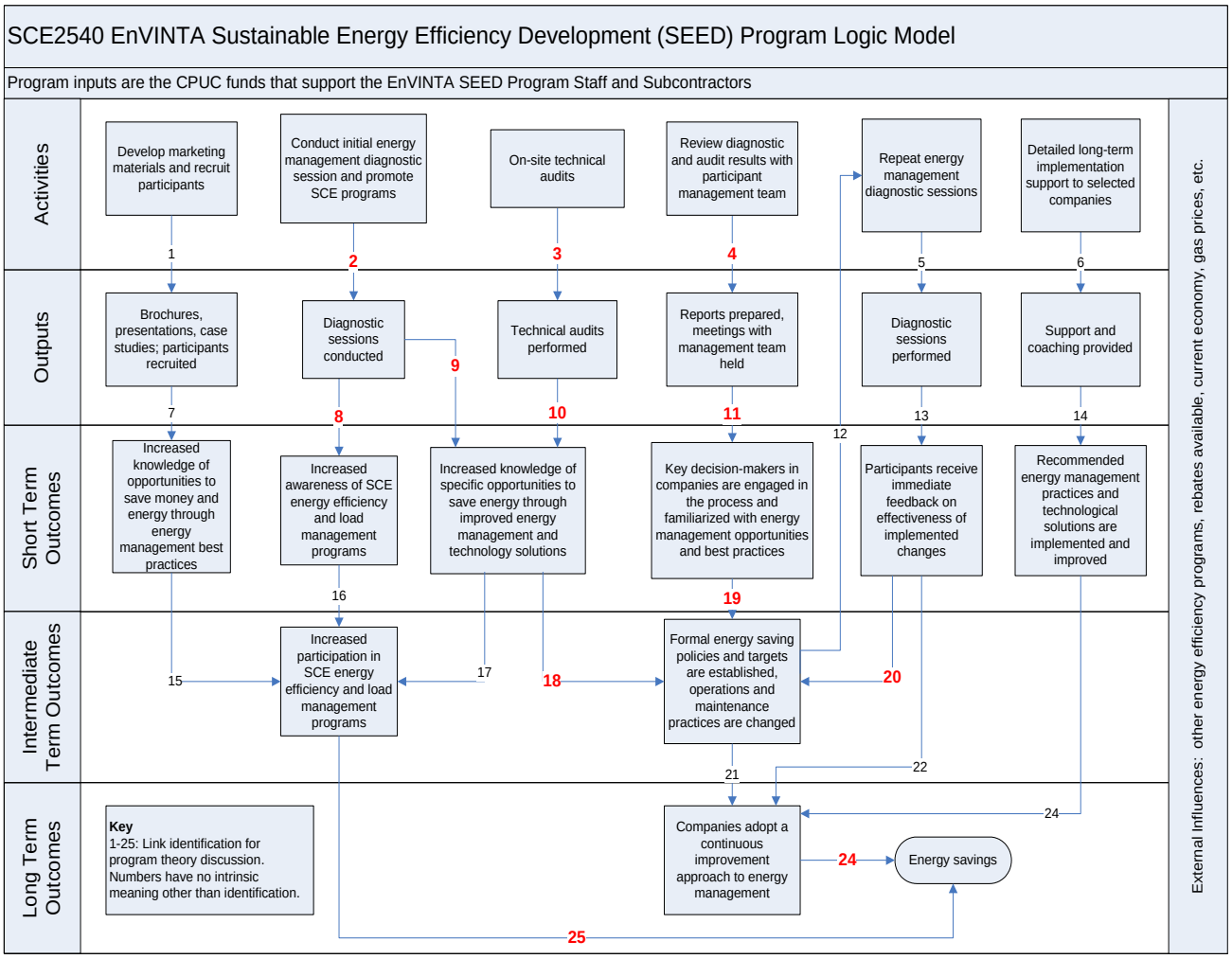
Goals	Achievements	Accomplishment Status
30 Stage One participants	9 Stage One Participants	Fell Short
5 Stage Two participants	1 Stage Two Participant	Fell Short
Market to a targeted group of 60 companies	Marketed to 13	Fell Short

10.2 Program Logic Model

The SEED program improved energy management policies, procedures and practices in the food processing industry by working directly with decision-makers. The program provided support to customers to implement an improvement methodology to drive energy saving and created a continuous management commitment to reduce the barriers to implementing energy efficiency improvements. The program had two stages. Stage One was a one-day diagnostic session and on-site audit, and Stage Two provided coaching and training support to implement the action plans developed in Stage One.

Figure 105 provides the logic model of the program based on our findings.

Figure 105. SCE2540 Sustainable Energy Efficiency Development Program Logic Model



11. SCE 2542: AFFORDABLE HOUSING ENERGY EFFICIENCY ALLIANCE

The Affordable Housing Energy Efficiency Alliance served as an information clearinghouse of energy efficiency issues for the affordable housing community. Prior to the 2006-2008 funding cycle it was known as the Design for Comfort program. Over the course of the program, the language shifts from focusing on public housing authorities[116] to being directed to the broader affordable housing[117] market. It was discontinued in July 2008.

- **Implementer:** Heschong Mahone Group
- **Program Cycle Budget:** $522,362
- **Program Cycle Spending:** $591,467
- **Geographic Area:** SCE territory
- **Target Market Sector:** Residential: new and existing affordable housing
- **Target Participants:** Building industry professionals, including affordable housing owners and developers, financers and lenders of new construction and rehabilitation of apartment buildings.
- **New/Established:** Established. The current program built from previous programs (e.g. Design for Comfort).
- **Program Description:** The Affordable Housing Energy Efficiency Alliance (AHEEA) worked with owners, developers, financers, and architects of both new and existing multifamily buildings to incorporate energy efficiency measures into their current and future projects.
- **Desired Market Effect:** The program aimed to increase the market share of energy efficient new and rehabilitated affordable housing units.
- **Program Goals:** This program had a two-fold strategy: 1) directly affect current construction projects in the affordable housing sector by incorporating energy efficiency measures into projects that are in the design and construction phases; and 2) educate and train those involved in these projects to influence future decision-making.
- **Educational Tactics:** This program used enrollment meetings, small workshops, booths at conferences, training events, one-on-one consultations, newsletters and energy efficiency design charrettes (final design efforts before deadline).
- **Length of Participant Interaction with Program:** Varied. Enrollment meetings were approximately one hour. Consultations could be brief encounters or lengthy sessions;

[116] Public housing is typically government-owned housing units made available to individuals and families at no cost or nominal rental rates.

[117] Affordable housing is any type of multifamily or single family housing that costs no more than 30% of a household's monthly income. Public housing can be a type of affordable housing, but affordable housing is a much broader term, and is not limited to public or government-assisted housing.

and workshops, training sessions and energy efficiency design charrettes could last for a half day to a full day.

- **Format of Program Activity/Activities:** One-on-one consultations for outreach, energy efficiency design charrettes usually included a small group, and workshops involved fewer than twenty participants.
- **Energy Saving Actions Targeted by Program:** The program covered all aspects of new construction and rehabilitation of existing affordable housing projects. Sub-topics of efficient building practices include building envelope materials, windows, lighting, HVAC, insulation, electrical, and weatherization techniques.
- **Channeling to Utility Energy Efficiency Rebate Programs:** This program discusses benefits offered by utility resource acquisition programs and provides instructions for participation in specific programs.

11.1 Program Goals and Achievements

This program was a continuing program from previous funding cycles. In the Third Quarter Report for 2008 (the final quarter of implementation), the implementers categorize this program as "on target."

Table 85. SCE2542 Affordable Housing Energy Efficiency Alliance Program Goals and Achievements

Goals	Achievements	Accomplishment Status
15 workshops/trainings/presentations	18 workshops/trainings/ presentations	Exceeded
32 conference calls or in-person meetings to provide information and/or schedule services	68 meetings	Exceeded
20 design assistance/energy efficiency design charrettes	20 charrettes	Accomplished
300 EnergySmart Paks distributed	479 Paks distributed	Exceeded
500 manual distributed	417 manuals distributed [a]	Fell Short
Create bi-monthly electronic newsletter	Exact total not mentioned in final quarterly report, only mentions that newsletter has been implemented	Accomplished

a The program database records people who received manuals under the two names: "AHEEA Manual" and "Workshops Training Manual." The PIP does not clearly define which manual the goal applies to, so the two have been combined in this count.

Table 86. SCE2542 Affordable Energy Efficiency Housing Alliance Program Reach

Goals and achievements that touched people	Who was touched?	Projected number of people touched (based on goals)	Actual number of people touched by December 2007	
			Of actual, number that were <5 minutes	Of actual, number that were >5 minutes
Workshops/trainings/ presentations to various audiences	Market actors	300 (assumes 15 at each one)	0	195
Conference calls or in-person meetings to provide information and/or schedule services	Market actors	64 (assumes 2 at each one)	0	501
Design assistance/ energy efficiency design charrettes	Market actors	60 (assumes 3 at each)	0	37
Distribute EnergySmart Paks	Market actors	300	315 [a]	0
Create and distribute manual	Market actors	500	0	369 [a]
Create bi-monthly electronic newsletter	Market actors	No data	No data	0

[a] Removes duplicates (people who received more than one)

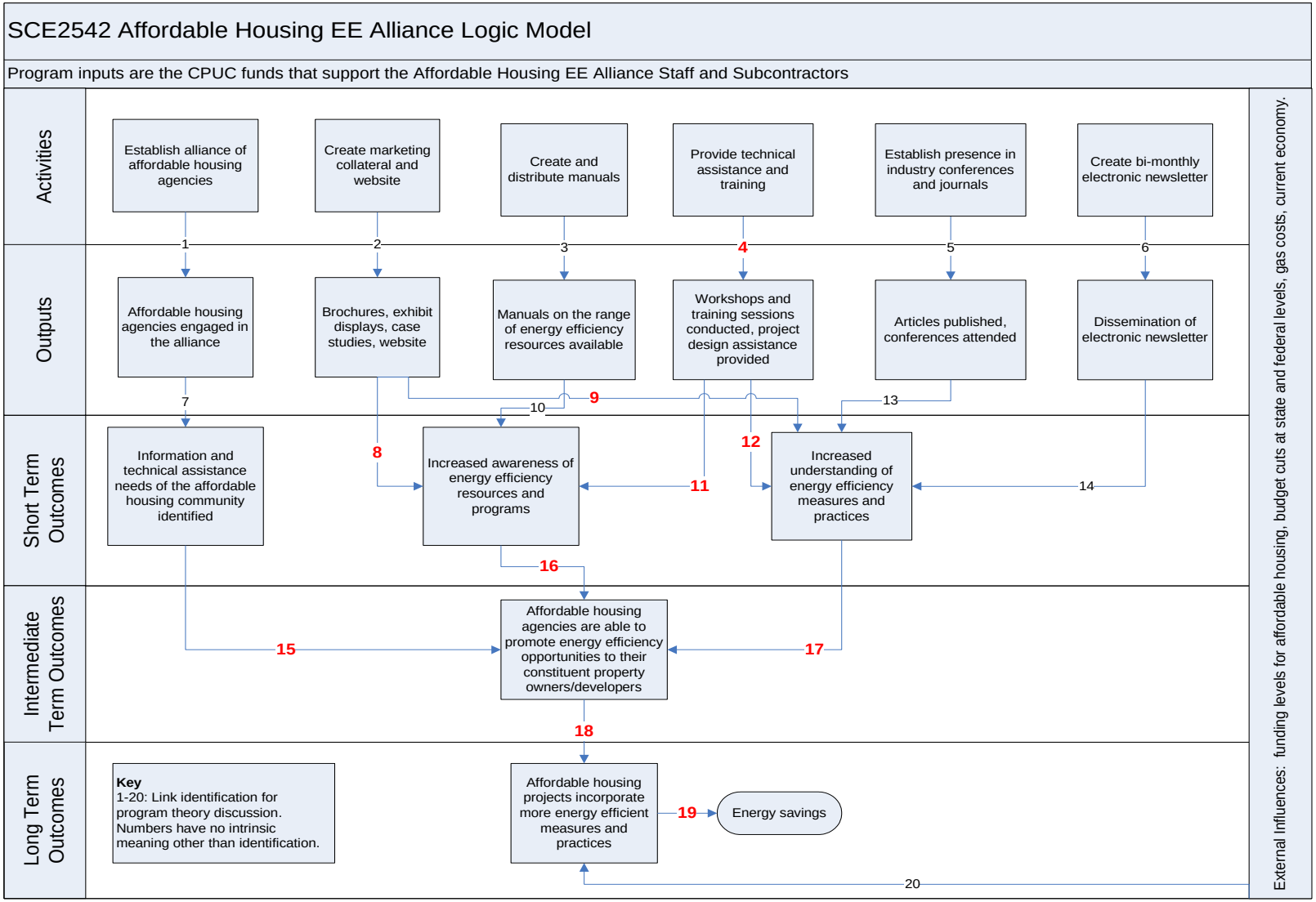
11.2 Program Logic Model

The Affordable Housing Energy Efficiency Alliance Program worked with owners, developers, financers, and architects of both new construction and rehabilitation of existing multifamily units. The program provided training and design assistance to project teams and acted as a clearinghouse of information for other energy efficiency programs. As a result, this program included a two-fold strategy: 1) directly affect current construction projects in the affordable housing sector by incorporating energy efficiency measures into rehabilitation of existing buildings and new construction projects and, 2) educate and train those involved in these projects to influence future decision-making. Program staff use a multi-faceted outreach and education approach including individual phone calls, individual and group trainings, individual project technical support, information booths at conferences and alignment with other programs with similar goals to engage program target markets.

The program was originally developed in prior program cycles to attempt to leverage investments in energy efficiency in public housing through providing technical and financial resources to project teams and financiers. The program logic was based on the concept that the affordable housing market is a relatively tight-knit market and that information can be transferred quickly through the affordable housing community.

Figure 106 provides the logic model of the program based on our findings.

Figure 106. SCE2542 Affordable Energy Efficiency Housing Alliance Program Logic Model



12. SCE 2545: EMAIL-BASED ENERGY EFFICIENCY (ENERGY GRAM)

Through the Energy Gram program, SCE sought to generate a web community that would provide an email and web-based interface for residential customers with personalized energy saving tips throughout the year. The program was discontinued in December 2007.

- **Implementer:** Nexus
- **Program Cycle Budget:** $600,000
- **Program Cycle Spending:** $593,264
- **Geographic Area:** SCE residential service area
- **Target Market Sector:** Statewide residential
- **Target Participants:** Residential customers
- **New/Established:** New
- **Program Description:** The Email-Based Energy Efficiency program was designed to offer personalized emails to a large segment of residential customers. The messages provided energy use feedback and links to programs and resources.
- **Desired Market Effect:** Implementers hoped that Energy Gram would establish a "Web Community" that counted at least 30% of SCE's residential customers as subscribers. They estimated that participants would experience energy and demand savings of 2-5%, when compared with a matched set of non-subscribers.
- **Program Goals:** The program aimed to subscribe over 250,000 of SCE's 3.6 million residential customers over two years to a monthly personalized email newsletter with customer-specific content and calculations. The emails were intended to increase participation in SCE's energy efficiency and demand response programs and produce significant and measurable energy and demand savings.
- **Educational Tactics:** The Energy Gram program delivered monthly, ongoing emails to encourage customer interaction and program participation, and improve customers' energy management practices. The program aimed to proactively bring information and analytics to SCE's residential customers to empower them to make informed choices regarding how they used energy.
- **Length of Participant Interaction with Program:** Brief – 15 minutes or less.
- **Format of Program Activity/Activities:** Online content.
- **Energy Saving Actions Targeted by Program:** Energy and demand savings of 2-5% for subscribed households through personalized energy and demand resources.
- **Channeling to Utility Energy Efficiency Rebate Programs:** The EnergyGram channeled participants to resource acquisition programs by directly linking them to the SCE's and/or the program website.

12.1 Program Goals and Achievements

This program began in July 2006. In the Fourth Quarter Report for 2007, the implementers categorize this program as "falling short of expectations."

Table 87. SCE2545 Email-Based Energy Efficiency Program Goals and Achievements

Goals	Achievements	Accomplishment Status
250,000+ subscriptions	7,949 unique, opened emails	Fell Short
3% or higher energy savings	Energy savings could not be measured	Not applicable

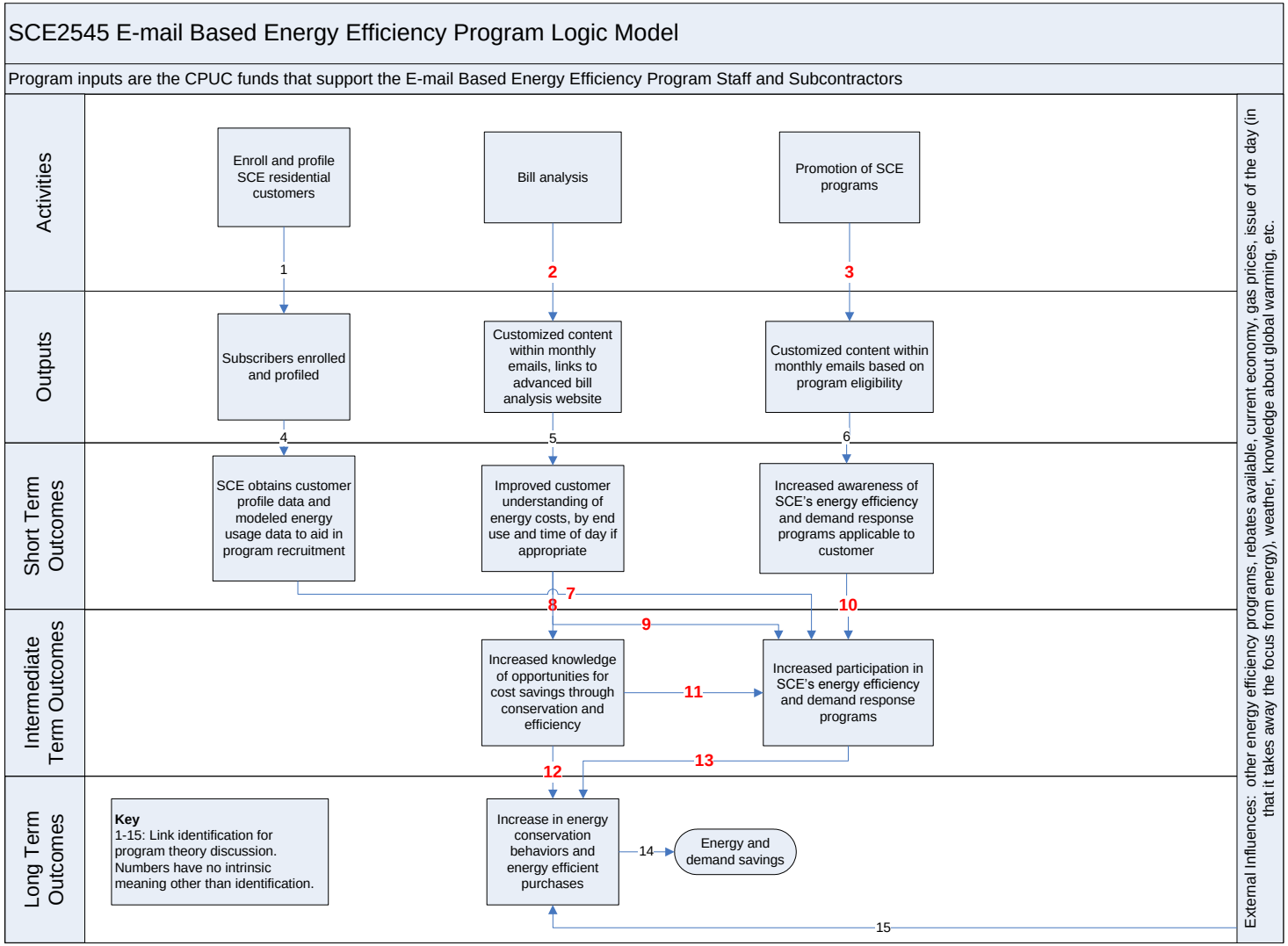
12.2 Program Logic Model

The SCE Email-based Energy Efficiency program wanted to establish a "Web Community" by enrolling over 250,000 residential customers to an email subscription from the utility. Email messaging was intended to include personalized links to efficiency and rebate programs, provide bill analysis to help residential customers develop a customized plan to save energy and money, and cut demand.

Due to infrastructure problems in the program set up, customers could opt-out of or inaccurately record their account numbers when subscribing to the program. Because of this oversight in planning, SCE did not have enough accurate billing data to effectively launch the billing analysis. In the end, the final product provided a general, e-newsletter (Energy Gram) to subscribers that contained helpful hints and links back to programs targeting seasonally appropriate efficiency measures. While the logic model (on the following page) is an accurate reflection of program goals, it does not represent the program's actual activities, outputs, and short-term outcomes.

Figure 107 provides the logic model of the program based on our findings. When it was canceled at the close of 2007, the program had sent out seven Energy Gram emails to approximately 7,949 unique SCE customers. Based on the logic model, these customers had the potential to progress through links 3, 6, 9, 10, 13, and 14. Due to program's failure to solicit account numbers, links 1, 2, 4, 5, 8, and 12 did not occur.

Figure 107. SCE2545 Email-Based Energy Efficiency Program Logic Model



13. SCE 2547: Aggregation of Housing Agencies for Energy Retrofit and Management Program

This program provided tools and services that promote energy efficiency to small- and mid-sized public housing agencies. The Aggregation of Housing Agencies addressed the complex barriers to energy efficiency faced by housing agencies by grouping the agencies together and addressing common problems *en masse.* It was discontinued at the end of December 2008.

- **Implementer:** Strategic Energy Innovations
- **Program Cycle Budget:** $1,363,569
- **Program Cycle Spending:** $948,575
- **Geographic Area:** SCE territory
- **Target Market Sector:** Residential: public and assisted housing
- **Target Participants:** Market actors that serve the "public and assisted housing" sector, including housing agencies, property management companies, social service agencies and private landlords.
- **New/Established:** New
- **Program Description:** The program reached out to small- and mid-sized public housing agencies to encourage them to participate in large scale energy efficiency upgrades by providing communications, financial and technical services to target participants. The program helped aggregations (large pools of residential units) capture lost opportunities and implement more efficient technologies using energy financing from performance contracting, operating cash flow and capital reserves, bulk procurement techniques, aggregated energy commodity purchases, sales of greenhouse gas emissions reduction credits, and other energy management strategies.
- **Desired Market Effect:** This program aimed to establish aggregations of public and assisted housing agencies to create economies of scale in the purchase of energy efficiency equipment and/or to enter into energy performance contracts.
- **Program Goals:** The program staff sought to create four aggregations and work with 75 housing agencies to initiate projects that impact 15,000 apartments and 45 small offices.
- **Educational Tactics:** This program used many types of educational tactics, though the primary method is one-on-one consultations and small group presentations. The program created informational materials (including brochures/newsletters) and engaged in participant recruitment through phone calls and emails.
- **Length of Participant Interaction with Program:** The length of a participant interaction with the program varied based on the size and scope of the work for their project, ranging from weeks to years.

- **Format of Program Activity/Activities:** Conference meetings and one-on-one consultations for outreach and implementation
- **Energy Saving Actions Targeted by Program:** The program worked with small- and mid-size public housing agencies to form aggregations (large pools of units) that require energy efficiency upgrades. In creating economies of scale, the program sought to attract performance contractors, obtain low-cost financing, and/or purchase energy efficiency equipment at volume discounts. Energy savings measures varied from project to project but included energy efficient lighting upgrades (interior and exterior), refrigerators and electric domestic hot water, DX air conditioning systems, and heat pump systems. Envelope upgrades (such as insulation, windows and air sealing) were also completed as appropriate. Water conservation measures were also installed.
- **Channeling to Utility Energy Efficiency Rebate Programs:** This program discussed benefits of utility resource acquisition programs and provides instructions for how to participate in other energy efficiency programs.

13.1 Program Goals and Achievements

This program began on August 8, 2006. In the Fourth Quarter Report for 2008, the implementers categorize this program as "on target."

Table 88. SCE2547 Aggregation of Housing Agencies Program Goals and Achievements

Goals	Achievements	Accomplishment Status
7.05 million kWh energy savings	Not measured	Not applicable
1529 net kW demand savings	Not measured	Not applicable
Educate up to 500 housing agencies	51 agencies contacted [a]	Fell short
Work with 75 housing agencies to initiate retrofit projects	20 agencies wrote letters of intent [a]	Fell short
4 aggregations	5 aggregations, 3 completed by the end of 2008	Exceeded

[a] The quarterly reports in 2008 did not provide these numbers. The numbers for these achievements come from the program database provided in September 2008, before the end of the program. Thus they may not be the final numbers, but serve as our best approximation.

Table 89. SCE2547 Aggregation of Housing Agencies Program Reach

Goals and achievements that touched people	Who was touched?	Projected number of people touched	Actual number of people touched	
			Of actual, number that were <5 minutes	Of actual, number that were >5 minutes
Educate up to 500 housing agencies	Market actors	1,000 (assume 2 people per agency)	0	102 (assume 2 per agency) [a]
Work with 75 housing agencies to initiate retrofit projects	Market actors	150 (assume 2 people per agency)	0	40 (assume 2 per agency) [a]

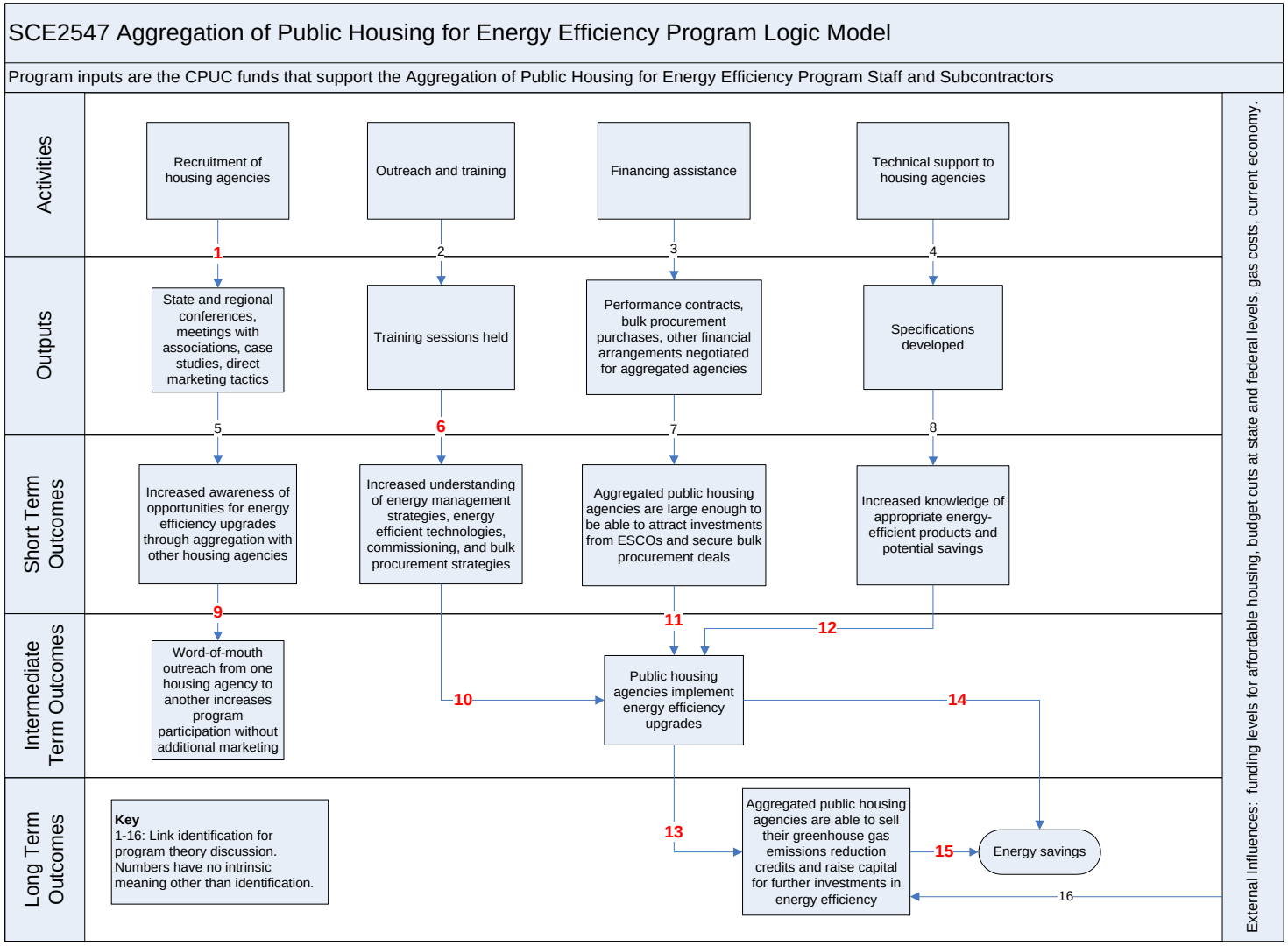
[a] Not all agencies included in the program database included individual contact names, so our total is based on the same assumption as the initial estimate.

13.2 Program Logic Model

The program is designed to break the aggregation process down into five steps: 1) a letter of intent to participate in the program is signed by public housing agencies; 2) a formal agreement is signed between the program and the housing agencies; 3) the program works with the agencies to release a Request for Proposal (RFP) for energy efficiency upgrades at the public housing agencies; 4) a proposal is selected by the agencies and the agencies enter into a formal contract with the energy services provider; and 5) the energy efficiency measures are installed. Along the way, the program provides communication and financial and technical services to the wide range of market actors within the "public and assisted housing" sector who are involved in the aggregation process.

Figure 108 provides the logic model of the program based on our findings.

Figure 108. SCE 2547 Aggregation of Housing Agencies for Energy Retrofit and Management Program Logic Model



14. SCG 3504: ENERGY EFFICIENCY DELIVERY CHANNEL INNOVATION (DCI)

This program was not a traditional education and outreach program in that it acts as a strategic marketing advisor to all energy efficiency programs within SoCal Gas's portfolio. The program completed a variety of activities, but most are short, brief interactions in all forms (in person, email, mail and online) with all types of customers: residential, commercial and industrial. The program was discontinued at the end of December 2008.

- **Implementer:** Southern California Gas Company
- **Program Cycle Budget:** $3,000,000
- **Program Cycle Spending:** $2,687,973
- **Geographic Area:** SCG territory
- **Target Market Sector:** Residential, commercial and industrial
- **Target Participants:** All SoCal Gas customers
- **New/Established:** Both established and new. Prior to 2006, SCG completed tasks that were similar to the work that is currently incorporated into the Delivery Channel Innovation (DCI) program; however, this work was not known as DCI at the time. The program began in the first quarter of 2006.
- **Program Description:** The Energy Efficiency Delivery Channel Innovation Program (DCI) was a marketing program within SoCal Gas created to increase customer understanding of the utility's energy efficiency portfolio. DCI worked closely with program managers to determine their marketing needs and acts as a strategic marketing advisor to all energy efficiency programs in SoCal Gas's portfolio. DCI provided targeted emails promoting SoCal Gas programs, hosting and attending more than 200 outreach events throughout the territory, and managing on-going energy efficiency PR efforts in local and national publications. In addition to this, DCI assisted programs in the development and distribution of program collateral and materials. The rationale for the program was that by combining all SoCal Gas energy efficiency programs into an integrated package, customers would recognize and value the SoCal Gas portfolio more, and thus participation in the programs would increase. Programs assisted by DCI span included commercial efforts such as the vendor participation program through negotiating the strategic placement of collateral at manufacturer sites, industrial efforts such as the greenhouse energy efficiency program through targeted outreach to greenhouses, and residential efforts such as promoting SoCal Gas's energy efficiency kits at local events.
- **Desired Market Effect:** The program attempted to increase SoCal Gas customer participation in a variety of energy efficiency programs. Together, these programs covered all market sectors and aimed to increase the energy savings associated with all of SoCal Gas's demand side management programs.

- **Program Goals:** While DCI did not have specific numeric goals of customers it hoped to reach, the program had goals for each of channel of communication.[118] Efforts aimed to: 1) increase awareness, 2) increase understanding and interest in SoCal Gas's energy efficiency portfolio, 3) attain high customer satisfaction with the portfolio, and, 4) assist in meeting or exceeding portfolio energy savings goals.
- **Educational Tactics:** DCI maintained a number of channels to reach out to its customers, including E-newsletters, energy efficiency information on the SoCalGas website, mass media advertising in the winter months, collateral for the business and residential sectors, and outreach events and expos for the residential and business sectors.
- **Length of Participant Interaction with Program:** Most interactions were brief, ranging from a few seconds (for example, a customer reads an email or bill insert) to a few minutes (for example, a customer talking with a representative at a community event at a booth).
- **Format of Program Activity/Activities:** The bulk of DCI efforts were centered on generating collateral for hand holding outreach for events year-round. The format of these events depended on the target audience, scale, and scope of DCI's participation in the event. They ranged from detailed, education-driven breakout sessions with commercial and industrial customers to brief exchanges with residential customers at local outreach events. The program also disseminated targeted bi-monthly eNewsletters. DCI also conducted a limited amount of mass media outreach through radio and print primarily targeting SoCal's hard-to-reach segments.
- **Energy Saving Actions Targeted by Program:** The DCI program covered all sectors, and tried to increase everything from small-scale behavioral change in the residential sector to large-scale capital improvements in industrial facilities.
- **Channeling to Utility Energy Efficiency Rebate Programs:** DCI program materials discussed the benefits of utility resource acquisition programs and provided customers instructions on how to participate in specific programs based on their needs.

14.1 Program Goals and Achievements

This program began in the first quarter of 2006. In the Fourth Quarter Report for 2008, the implementers categorize this program as "exceeding expectations."

Table 90. SCG3504 Energy Efficiency Delivery Channel Innovation Goals and Achievements

Goals	Achievements [a]	Accomplishment Status
32,000 visits to SoCal EE Website	152,381 visits (through Dec 07)	Exceeded
400 visits to SoCalGas FYP Website	4,173 (through Dec 07, one of SCG's "top 20" sites in 2008)	Exceeded
340 media placements	647	Exceeded
Advertising overall	Not measured	Not applicable

[118] Program goals by channel are outlined in the *Monthly Tracking Report.* These goals vary based on the effort and are iterated in greater detail in the "Program Goals and Achievement" portion of this outline.

Goals	Achievements [a]	Accomplishment Status
80 business outreach events	207 events	Exceeded
20 email blasts to on-line business outreach	29 email blasts (through Dec 07)	Exceeded
120,000 pieces of collateral to businesses	347,420 pieces	Exceeded
400 business opt-ins	2,797 opt-ins	Exceeded
100 food service opt-ins	292 opt-ins (through Dec 07)	Exceeded
3,600 C&I welcome kits	6,339 kits (through Dec 07)	Exceeded
120 residential outreach events	324 events	Exceeded
24 residential e-mail blasts	29 email blasts (through Dec 07)	Exceeded
150,000 residential EE collateral pieces	440,996 pieces	Exceeded
20,000 non-DSM residential safety collateral	26,470 pieces (through Dec 07)	Exceeded
80,000 non-DSM residential collateral	103,949 pieces	Exceeded
800 household residential opt-ins	11,915 opt-ins	Exceeded
ERC collateral [b]	77,653 pieces (through Dec 07)	Accomplished
FSEC collateral [b]	3,950 pieces (through Dec 07)	Accomplished
SDERC collateral [b]	24,275 pieces (through Dec 07)	Accomplished
ERC E-mail communication [b]	67,811 emails (through Dec 07)	Accomplished
FSEC email communication [b]	27,356 emails (through Dec 07)	Accomplished
SDERC email communication [b]	37,546 emails (through Dec 07)	Accomplished

[a] Programs where the number was not recorded in the 2008 reports are noted as being the total as of December 2007.

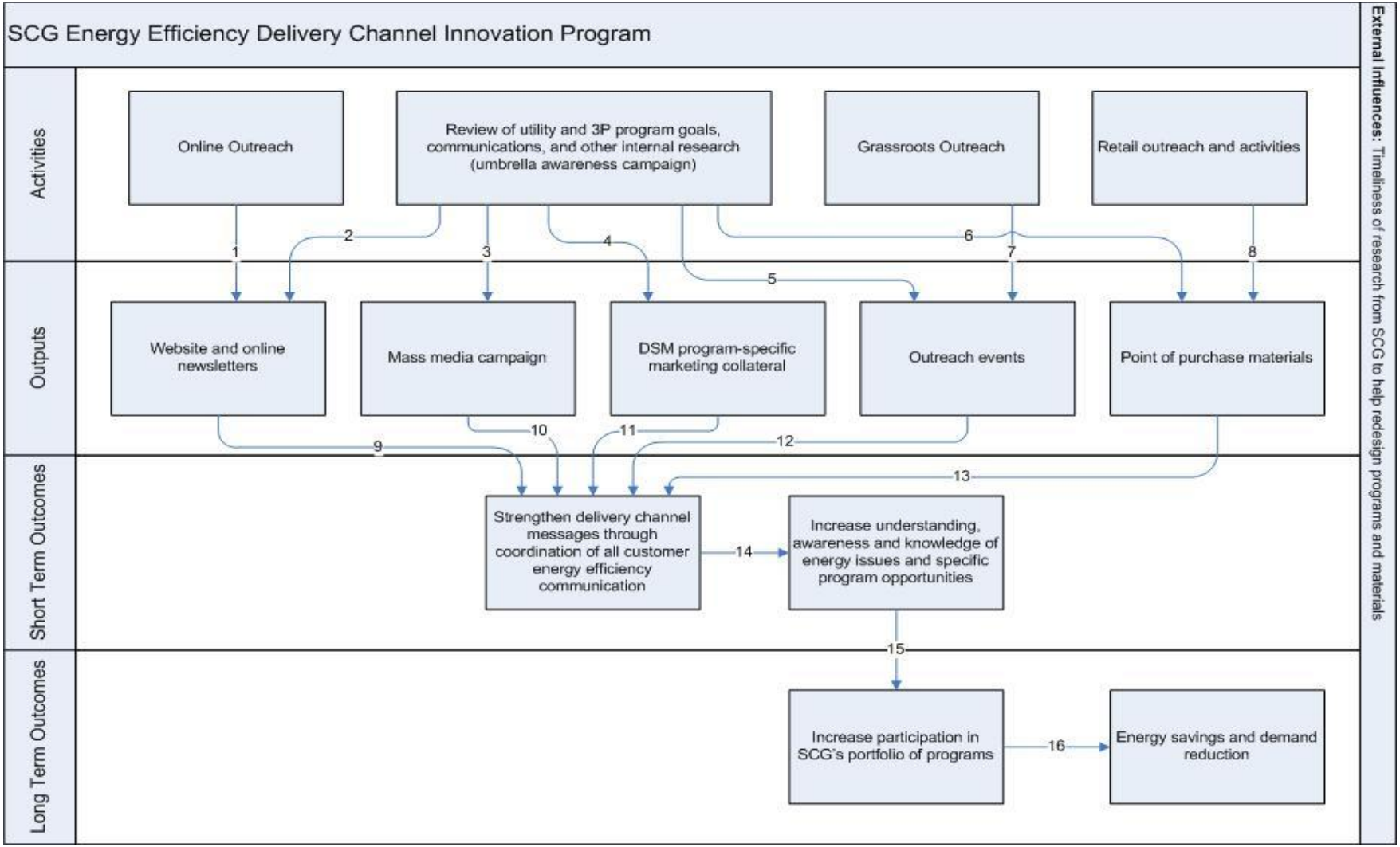
[b] These measures did not have explicit numeric goals.

14.2 Program Logic Model

The Energy Efficiency Delivery Channel Innovation Program (DCI) aimed to increase awareness, understanding, and interest in SoCalGas' energy efficiency programs among the utility's customer base. The program provides targeted marketing materials on the utility's portfolio to residential, commercial, and industrial customers through online and in-person intercepts. The goal of the program was to move all markets in SoCalGas's territory towards greater overall energy efficiency. Barriers to participation, such as lack of information or lack of understanding about energy efficiency rebates, were lowered through the strategic bundling and targeting of program efforts by market.

Figure 109 provides the logic model of the program based on our findings.

Figure 109. SCG3504 Energy Efficiency Delivery Channel Innovation Program Logic Model



15. SCG 3529: ENERGY EFFICIENCY KIOSK PILOT

This program develops and places interactive kiosks in 20 banks to educate, inspire and inform homeowners who are seeking financing for home improvement projects about energy efficiency.[119] The program was discontinued at the end of December 2008.

- **Implementer:** Intergy
- **Program Cycle Budget:** $900,000
- **Program Cycle Spending:** $681,360
- **Geographic Area:** SCG territory within the San Gabriel Valley
- **Target Market Sector:** Residential: existing homes
- **Target Participants:** The program primarily targeted English-, Spanish-, and Mandarin-speaking homeowners. Secondary target participants were loan officers, community-based organizations, home remodeling and HVAC contractors, and home repair retailers.
- **New/Established:** New
- **Program Description:** The Energy Efficient Kiosk Pilot program promoted energy efficient upgrades to homeowners through the development of interactive kiosks placed at lending institutions. This program developed and produced all kiosk content, identified banks to host the kiosks, coordinated with community organizations, developed marketing material, and tested the effectiveness of different incentive levels for kiosk users. Intergy had the goal of recruiting a minimum of 500 customers with documented energy efficient activities as a result of using the interactive kiosks.
- **Desired Market Effect:** The program aimed to help homeowners understand energy efficiency and how to implement retrofits and upgrades. Intergy designed the kiosks to inform homeowners of the most effective energy efficiency applications for their planned home improvement projects, connect homeowners to rebates and incentives available from SCE and SoCalGas, and assist homeowners to finance any energy efficiency upgrades.
- **Program Goals:** The program's primary goals were to create the kiosks and content, test the effectiveness of the energy efficiency kiosk concept, measure the level of influence of the four financial incentives offered to kiosk users, and recommend a long-term strategy to SoCalGas. The program secondarily connected users to energy efficiency rebates and incentives.
- **Educational Tactics:** Participants watched an interactive video that explained the benefits of energy efficient upgrades and retrofits, provided testimonials of the retrofits' effectiveness, and connected users to the various incentive and rebate programs.

[t]This program may be affected by the slowing housing market and the tightening of borrower eligibility requirements in light of the global credit crunch.

- **Length of Participant Interaction with Program:** The video portion of the kiosk content was less than ten minutes in duration. Customers may spend more or less total time at the kiosk.
- **Format of Program Activity/Activities:** Participants interacted with one of twenty kiosks and were then encouraged to incorporate energy efficiency into their home improvement projects. The kiosks also provided resources and information.
- **Energy Saving Actions Targeted by Program:** This program promoted energy efficient improvements to homeowners who are seeking financing for a retrofit/remodeling project.
- **Channeling to Utility Energy Efficiency Rebate Programs:** The Energy Efficiency Kiosk Pilot program was designed to channel participants to rebate and incentive programs available to residential customers.

15.1 Program Goals and Achievements

This program began on September 22, 2006. In the Fourth Quarter Report for 2008, the implementers categorize this program as "on target."

Table 91. SCG3529 Energy Efficient Kiosk Pilot Goals and Achievements

Goals	Achievements	Accomplishment Status
Create a high impact energy efficiency video/interactive material in English and Spanish	All program materials completed by 2008	Accomplished
Install kiosks in 20 locations	20 installed	Accomplished
Recruit 500 customers for the loan incentive program	At least 399 recruited [a]	Unknown

[a] Program quarterly reports mention that 399 customers took intercept surveys for the program. It is unclear if all customers took this survey.

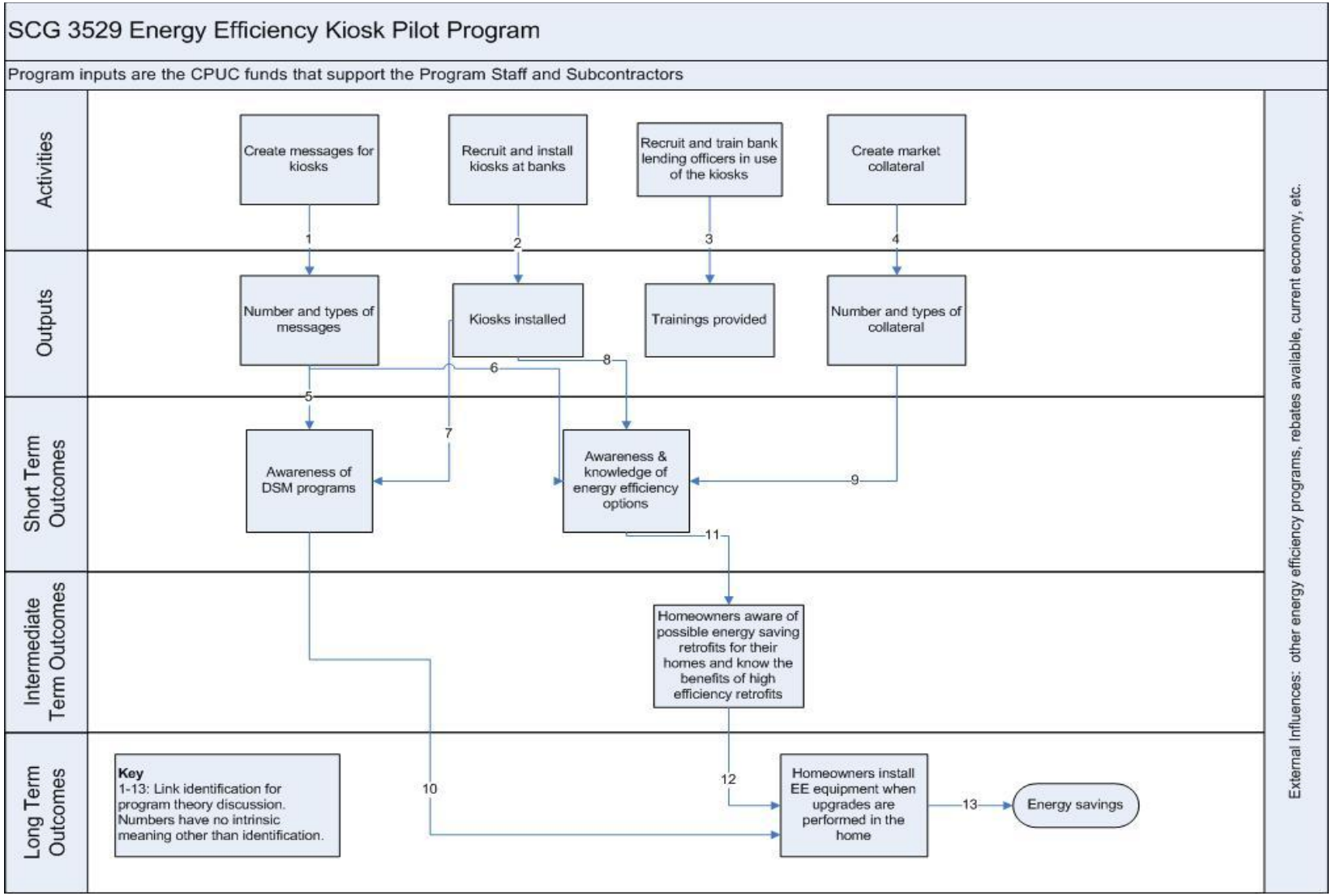
15.2 Program Logic Model

The Energy Efficiency Kiosk Pilot increased awareness of, and interest in, energy efficient home renovation opportunities in residential customers in SCG territory. The program developed 20 interactive kiosks that were placed in lending institutions in SCG territory. The kiosks had streaming video, and were meant to be appealing and intriguing centers that draw bank customers in to learn more. The logic of the program was that when a homeowner is seeking a loan to undertake a home improvement project, it is a perfect opportunity to take advantage of the finance seeker's already firm intentions and expose him/her to a different type of renovation: energy efficient renovations.

The program partnered with lending institutions, and part of the success of the program is contingent upon bankers drawing their customers' attention to the kiosks, and helping them turn the kiosks' suggestions into reality.

Figure 110 provides the logic model of the program based on our findings.

Figure 110. Energy Efficiency Kiosk Pilot Program Logic Model



16. SDGE 3031: ADVANCED HOME RENOVATION

This demonstration program renovated a house that was built prior to 1978 with energy efficient technologies and techniques, and then held several open houses. The program was discontinued at the end of December 2008.

- **Implementer:** RHA
- **Program Cycle Budget:** $456,805
- **Program Cycle Spending:** $461,678
- **Geographic Area:** SDG&E territory
- **Target Market Sector:** Residential construction: retrofit of existing homes
- **Target Participants:** Homeowners of pre-1978 homes, contractors, builders, and other building industry professionals
- **New/Established:** New
- **Program Description:** Advanced Home Renovation was a demonstration program that renovated a pre-Title 24 home (built before 1978) to the current California energy code. Program funds were combined with donations and write-downs from industry partners to pay for upgrades to make the home significantly more energy efficient. Once the improvements were in place, RHA held four open house events to educate homeowners and building industry professionals about the work that was completed and to describe the quality-of-life benefits that are experienced from living in a renovated home. RHA also created informational material that describes the work that was completed on the home and to refer the open house attendees to SDG&E's residential rebate programs.
- **Desired Market Effect:** The program attempted to increase the number of energy efficient renovations undertaken to pre-1978 constructed homes in the SDG&E territory. When the program started, there were over 230,000 pre-1978 single family homes in SDG&E territory.
- **Program Goals:** Advanced Home Renovation aimed to renovate one home and hold several open house events that will expose homeowners, contractors, and other building industry professionals to appliances, technologies, and techniques that promote energy savings.
- **Educational Tactics:** The program used a demonstration approach to educate homeowners, contractors, and other building professionals about energy efficiency.
- **Length of Participant Interaction with Program:** Open houses commenced in April 2008. We assume that visitors stayed for one hour or less. The demonstration home and key partners were also featured in a television interview that was viewed by 100,000 people.
- **Format of Program Activity/Activities:** One home renovation, four open houses, some publicity events, and some collateral material.

- **Energy Saving Actions Targeted by Program:** The Advanced Home Renovation project covered all aspects of residential energy efficiency retrofits. Specifically the program encouraged the use of efficient lighting, windows, HVAC, insulation, electrical, and weatherization techniques.
- **Channeling to Utility Energy Efficiency Rebate Programs:** The program directed participants to the SDG&E website and SDG&E rebate hotline for more information regarding utility resource acquisition programs.

16.1 Program Goals and Achievements

This program began on June 5, 2006. In the Fourth Quarter Report for 2008 the implementers categorize this program as "on target."

Table 92. SDGE3031 Advanced Home Renovation Program Goals and Achievements

Goals	Achievements	Accomplishment Status
Identify cost-effective energy savings measures beneficial to pre-1978 single family residences and install these measures into one demonstration home	Measures have been identified and most were installed in one demonstration home	Accomplished
Disseminate information to retrofitters and homeowners through a series of media events and development of a website	A four page brochure, press release, and "backgrounder" were developed; the website was launched	Accomplished
4 open house events	4 events in 2008	Accomplished
TV interviews and media events	Several TV and radio interviews, broadcast of one open house and local newspaper article	Accomplished
Calculate before/after energy use	Energy use was calculated before renovations took place, but not after	Fell Short

Table 93. SDGE3031 Advanced Home Renovation Program Reach

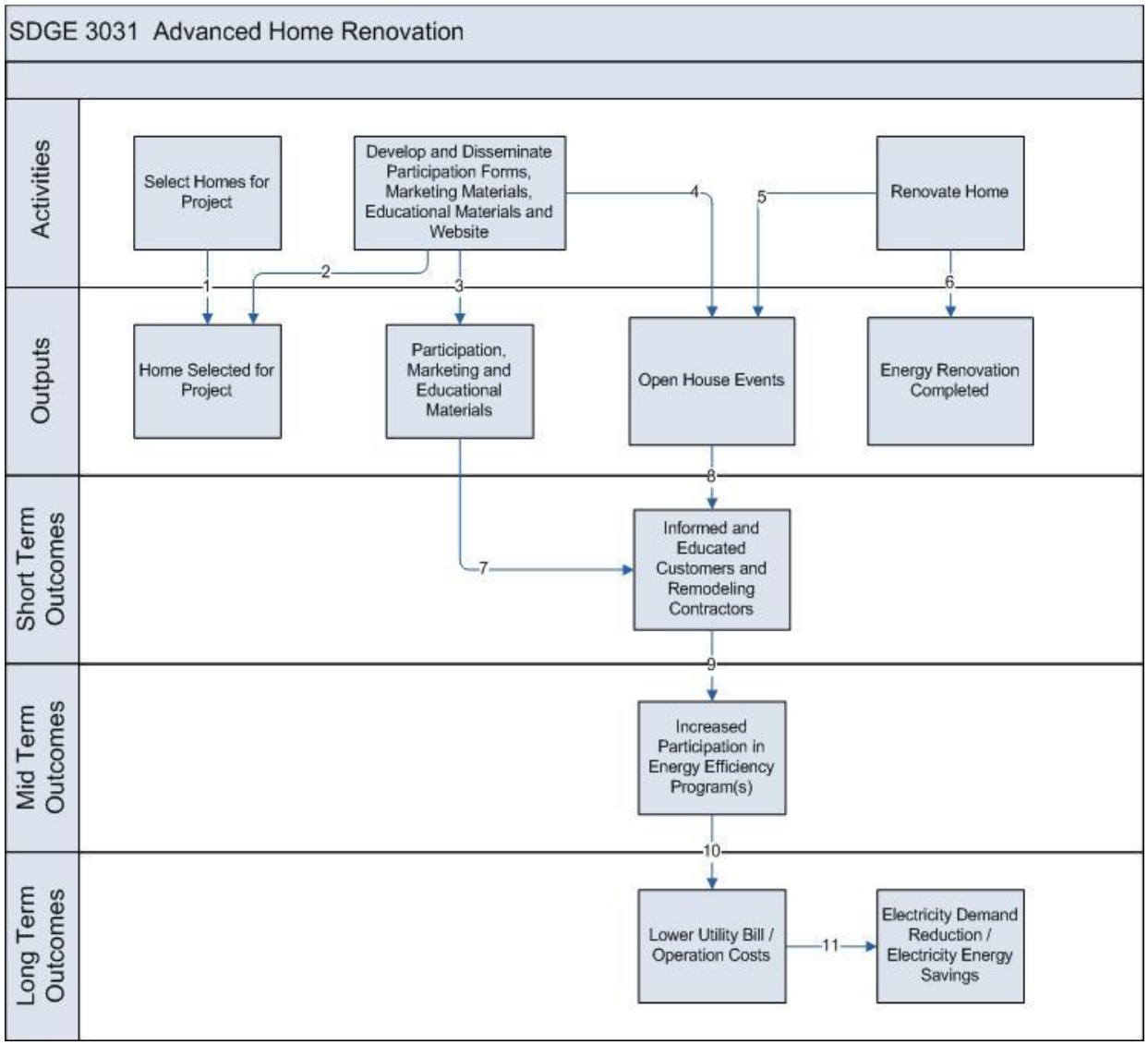
Goals and achievements that touched people	Who was touched?	Projected number of people touched	Actual number of people touched	
			Of actual, number that were <5 minutes	Of actual, number that were >5 minutes
Disseminated information to retrofitters and homeowners through a series of media events and development of a website	Market actors and households	Not estimated by program	Not known	Not known
4 open house events (interview with program implementer)	Market actors and households	At least 700 (only three open houses included an estimated number of attendees)	0	>700
TV interview (interview with program implementer)	All	0 – the program goals did not include television interviews.	At least 100,000 (estimate)	0

16.2 Program Logic Model

The Advanced Home Renovation project was designed to increase the number of energy efficient home renovations undertaken in pre-1978 single-family residential structures in the SDG&E territory. The program was developed as a showcase to homeowners, contractors, and others in the rehab industry to demonstrate the availability and ease of energy efficiency products and building practices. The demonstration home, renovated with program funds and donations/write-downs from industry partners, functioned as a model that homeowners and contractors could emulate when they renovate their homes. This project demonstrated, in a very concrete way, that renovating pre-Title 24 homes was cost-effective and could yield financial and environmental benefits to homeowners. The end goal of the program was to help SDG&E capture the significant energy savings potential that exists in the single-family pre-1978 residential housing stock (230,000 homes). The program also hopes to channel SDG&E customers into the utility's rebate programs.

Figure 111 provides a logic model of the program based on our findings.

Figure 111. SDGE3031 Advanced Home Renovation Program Logic Model



17. SDGE 3033: INDUSTRIAL ENERGY EFFICIENCY ACCELERATION PROGRAM

This program provides advice and support to reduce the energy use of large industrial and manufacturing customers. The program contract expired at the end of December 2008.

- **Implementer:** EnVinta
- **Program Cycle Budget:** $724,986
- **Program Cycle Spending:** $241,572
- **Geographic Area:** All SDG&E service territory
- **Target Market Sector:** Industrial
- **Target Participants:** Large industrial customers with an energy spend of over $400,000 per year
- **New/Established:** New
- **Program Description:** IEEA was a specialized program developed by EnVinta that targeted large energy users in the manufacturing and industrial sectors. The program provided energy management advice and support for customers to implement a strategy to increase energy savings rates. It applied to energy management the same approaches found in management standards such as ISO 9000+ and Six Sigma.
- **Desired Market Effect:** The program aimed to increase the participation of large commercial and industrial customers in the energy efficiency programs offered in the SDG&E service territory.
- **Program Goals:** IEEA would improve energy management policies, procedures and practices; and identifies energy efficient technology upgrade opportunities. The program planned to engage 40 participants in Stage One and 10 participants in Stage Two.
- **Educational Tactics:** IEEA utilized one-day workshops, site audits, customized action plans, and one-on-one consultations.
- **Length of Participant Interaction with Program:** Most participants completed Stage One of the program, which is a one-day session. Only a few companies proceeded to Stage Two; the exact length of Stage Two is unclear, but is thought to be a long and intense commitment.
- **Format of Program Activity/Activities:** Stage One of the program was a one-day session. The day starts with a two-hour workshop involving a management diagnostic session and continues with a technical site audit (a walk-through of the facility to confirm the operations). After completion of the workshop and technical walkthrough, the site management team met at the end of the day to create an implementation timeline and to assign responsibilities for tasks and deliverables. Participants took away customized results of their diagnostic session and audit. In Stage Two, EnVinta provided support and coaching for some participants to implement the action plan developed in Stage One.

- **Energy Saving Actions Targeted by Program:** The IEEA program would improve existing practices and established cost-effective energy efficiency improvements.
- **Channeling to Utility Energy Efficiency Rebate Programs:** The IEEA program included the identification of other potential SDG&E Demand Side Management programs that may be applicable.

17.1 Program Goals and Achievements

This program began on August 17, 2006. In the First Quarter Report for 2008, the implementers categorize this program as "on target." Later quarterly reports did not provide information on this question.

Table 94. SDGE3033 Industrial Energy Efficiency Acceleration Program Goals and Achievements

Goals	Achievements	Accomplishment Status
40 participants in Stage One	11 completed	Fell Short
10 participants in Stage Two	2 completed	Fell Short
80 contacts at target companies	105 contacts	Exceeded

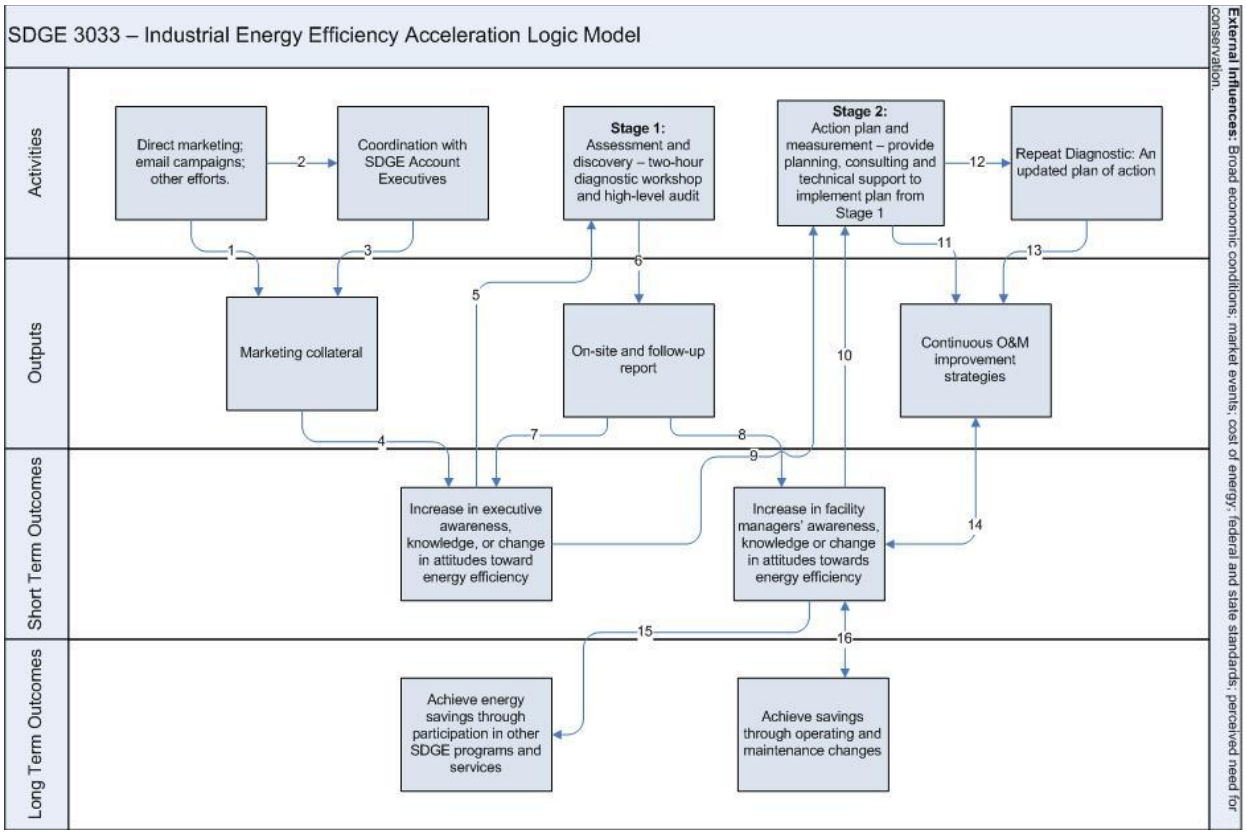
17.2 Explanation of Program Logic Model

The IEEA program targeted the decision-makers at large industrial customers that had great potential for improvements in their energy management, but were not easily served by existing utility rebate programs. Considerable savings can be obtained by making "systems" more efficient, often through the use of improved operation and maintenance practices, efficient system design and installation of control measures. In many cases, industrial customers are not aware of the types of measures that can be instituted to achieve energy savings, or the magnitude of savings possible.

The program consisted of two stages. Stage One was a one-day session involving a management diagnostic session and a technical site audit. Stage Two provided to up to ten customers coaching and training services to implement the action plan developed in Stage One.

Figure 112 provides the logic model of the program based on our findings.

Figure 112. SDGE3033 Industrial Energy Efficiency Acceleration Program Logic Model



18. SDGE 3037: SWEETWATER SCHOOL DISTRICT DEMONSTRATION

This is a demonstration program of two technologies – a cooling system and a dimmable lighting system – located in portable classrooms. The program was ended at the end of 2008.

- **Implementer:** Intergy Corporation and Sweetwater Union High School District (SUHSD)
- **Program Cycle Budget:** $249,800
- **Program Cycle Spending:** $270,614
- **Geographic Area:** Southern boundary of San Diego to USA / Mexico border including the cities of San Diego, Chula Vista, National City, Imperial City and San Ysidro. The OASys cooling system's application is limited to dry climate zones.
- **Target Market Sector:** Cooling retrofits and lighting retrofits within secondary educational facilities.[120]
- **Target Participants:** Portable classrooms at two schools within the Sweetwater School District are the target participants for equipment installation. Representatives from SDG&E and school facility decision-makers throughout SDG&E service territory are targets for distribution of case studies and attendance at open houses that will be conducted to demonstrate the technology and document its performance.
- **New/Established:** New
- **Program Description:** The primary objectives of the Sweetwater School District Demonstration Program were to demonstrate, document and measure energy and demand savings associated with two innovative energy efficiency/demand response technologies as a means of: 1) validating the technologies' performance to warrant inclusion in SDG&E's energy efficiency portfolio; and 2) promoting broad scale implementation of the technologies across the school district and among other SDG&E customers. The two technologies included an HVAC indirect/direct evaporative cooling system, OASys, and a dimmable and demand response capable T5 lighting system.
- **Desired Market Effect:** By demonstrating their performance and benefits, the program was attempting to increase awareness, and thus market penetration of the OASys and Retrolux technologies. Increased awareness would enable the technologies to achieve full market potential and would avoid lost opportunities at facilities that are replacing compressor-based AC equipment and T12 lighting.
- **Program Goals:** The program sought to demonstrate an integrated application of innovative energy efficiency and demand response technologies as a means of increasing awareness and helping these technologies achieve full market potential. Specifically, the program intended to: 1) install, monitor and document the performance of 15 OASys cooling systems and 250 2-lamp Retrolux T5 systems at two demonstration

[120] Though not a specific target audience for the program, the technologies could also be targeted to small and medium commercial businesses.

sites within the Sweetwater School District; 2) publish case studies, specification sheets and marketing brochures (2,500 case studies printed for each technology, 2,500 specification sheets printed for each technology, and 2,500 marketing brochures for each technology); 3) establish a program web site that will track equipment performance and provide general program information; and 4) conduct 12 "open house" events to demonstrate the technologies. Program implementers anticipated 93,520 kW of energy savings and 62 kW of demand savings from the demonstration equipment.

- **Educational Tactics**: Open house sessions consisted of a lecture / presentation (including PowerPoint presentation) and a demonstration (tour) of equipment. In addition to conducting twelve open house events, individual demonstration appointments were coordinated for customers who could not attend an open house event. Program implementers also planned to develop and distribute case studies, product specification sheets and marketing brochures to school districts and energy industry professionals throughout the SDG&E service territory, and to develop a website to communicate product information and to track performance.
- **Length of Participant Interaction with Program:** Open house events lasted approximately one hour.
- **Format of Program Activity/Activities:** Small open houses (approximately 20 attendees). Organizers also provided one-on-one demonstration tours to interested parties unable to participate in open house events.
- **Energy Saving Actions Targeted by Program:** Installation of OASys and Retrolux technologies were the focus of the program. However, presentations at open house events also highlighted general benefits of HVAC and lighting efficiency improvements, particularly the use of dimmable lighting.
- **Channeling to Utility Energy Efficiency Rebate Programs:** The program did not provide information regarding utility resource acquisition programs. One of the goals of the demonstration program was to validate the technologies so they would ultimately be eligible for incentives through SDG&E's portfolio of energy efficiency programs.

18.1 Program Goals and Achievements

This program began on June 2, 2006. In the Fourth Quarter Report for 2008, the implementers categorize this demonstration program as "on target."

Table 95. SDGE3037 Sweetwater School District Demonstration Program Goals and Achievements

Goal	Achievements	Accomplishment Status
Install 226 2-lamp Retrolux T5 systems and 9 OASys cooling systems	226 Retrolux fixtures and 8 OASys units installed	Fell short
Monitor performance of installed units and prepare case study presenting results	1 prepared, not clear if presented	Fell short
8 community events	2 open houses, 6 conference exhibits	Accomplished

Gross savings of 93,520kWh and 62kW (PIP)	Not calculated	Not Applicable
Develop program website	Unknown	Unknown

Table 96. SDGE3037 Sweetwater School District Demonstration Program Reach

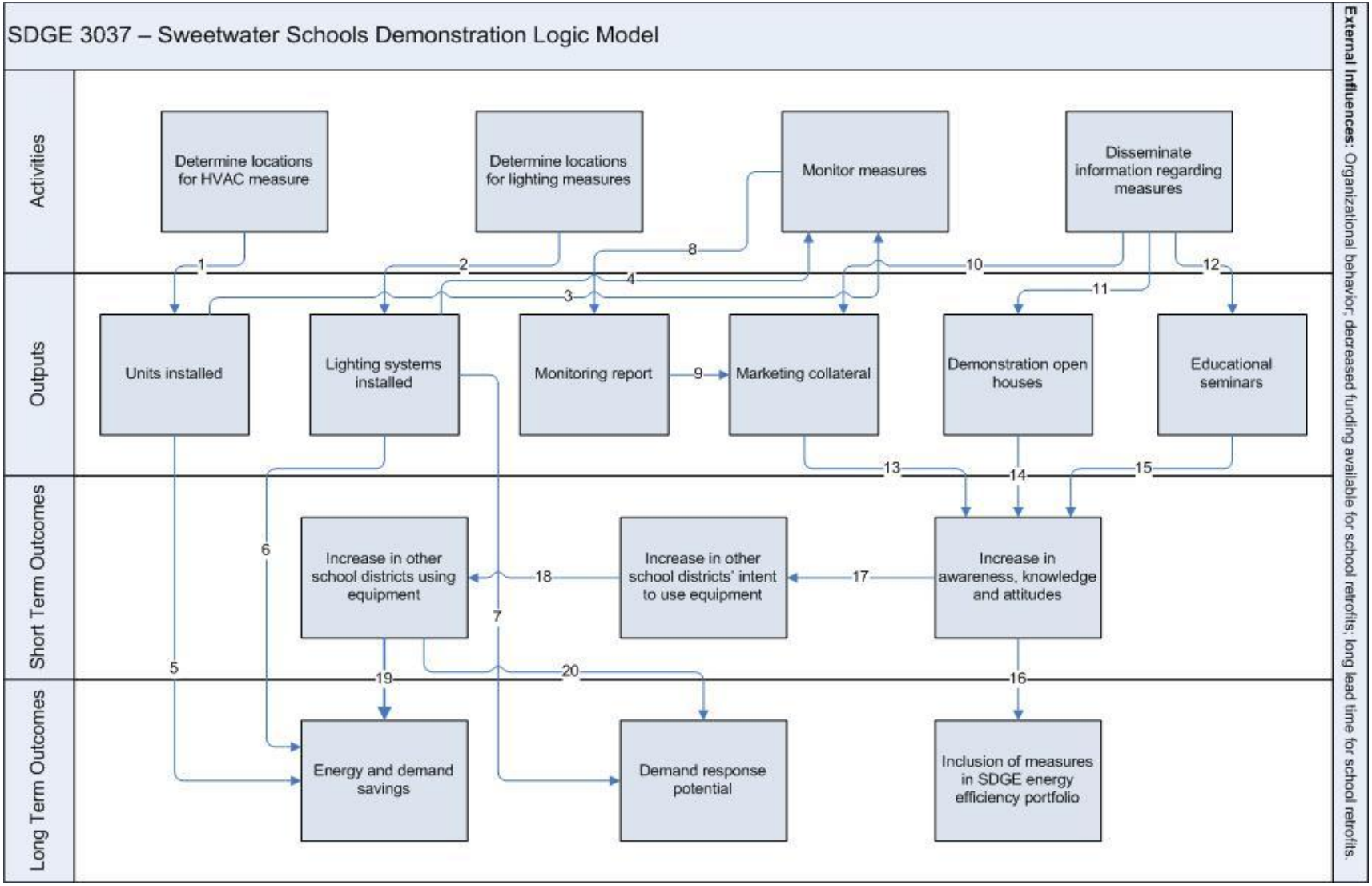
Goals and achievements that touched people	Who was touched? (Market actors, commercial/industrial, small businesses, or households)	Projected number of people touched (based on goals)	Actual number of people touched by December 2007	
			Of actual, number that were____<5 minutes	Of actual, number that were____>5 minutes
Open house events to demonstrate technology	Market actors	240 (assume 20 for each)	0	40 (estimated)
Exhibit at conferences	Need data	NA – no goal specified in the PIP	800 (estimated)	0

18.2 Explanation of Program Logic Model

The Sweetwater Schools Demonstration Program aimed to weigh the merits of two innovative technologies: the OASys evaporative cooling system and the Retrolux automated dimmable lighting system. This demonstration program would address the current lack of awareness and understanding of these two technologies by installing demonstration equipment at two sites within the Sweetwater School District, measuring and documenting equipment performance, and communicating the benefits of the technologies through open house events and printed materials. The program's ultimate goal was for these technologies to be included in SDG&E's portfolio of funded measures. The program also sought to take advantage of opportunities for energy savings that occur when building managers replace failed compressor based AC equipment and T12 lighting.

Figure 113 provides the logic model of the program based on our findings.

Figure 113. SDGE3037 Sweetwater School District Demonstration Program Logic Model



19. SDGE 3041: CHEERS NEW CONSTRUCTION

This program, which adds functionality to a software package used by energy raters, made very little progress during the 2006-2008 cycle. Though the program was never officially discontinued, only $356 of the budget (less than 1%) was spent, and the quarterly reports mentioned almost activity beyond initial planning.

- **Implementer:** CHEERS
- **Program Cycle Budget:** $179,000
- **Program Cycle Spending:** $356
- **Geographic Area:** SDG&E territory
- **Target Market Sector:** Residential new construction
- **Target Participants:** The target participants of this effort were SDG&E New Homes program managers, staff from plan-check agencies, and some contractors. The program was developing software applications that ultimately be used by builders, though they would not be aware of the development process.
- **New/Established:** This is a new component of an established CHEERS program. CHEERS (California Home Energy Efficiency Rating Services) is a well-established non-profit organization dedicated to promoting energy efficiency.
- **Program Description:** CHEERS was using this funding to develop additional functionality in a software package that would allow home energy raters to input specific energy savings information into the EnergyPro compliance software. This functionality would give SDG&E a more accurate understanding of the incremental energy savings that occur whenever homebuilders built homes that are more energy efficient than what was currently required by code.
- **Desired Market Effect:** The goal of adding this increased functionality was to provide a system of recognition and documentation for builders who build beyond code. The theory was that this might remove a barrier that prevents some builders from building above code.
- **Program Goals:** The goal of the program was to develop the software feature and then instruct key stakeholders on how to use the new functionality.
- **Educational Tactics:** None. Builders would be unaware that these changes are taking place. Once the software program was updated, CHEERS would coordinate with SDG&E staff, plan check agencies, and contractors via email, conference calls, and web casts.
- **Length of Participant Interaction with Program:** NA. Builders would not interact with the program.
- **Format of Program Activity/Activities:** NA. No activities were planned.

- **Energy Saving Actions Targeted by Program:** This program aimed to collect and count "missed" energy savings that were previously unrecorded, but did not directly encourage new energy savings efforts.
- **Channeling to Utility Energy Efficiency Rebate Programs:** None. The program did not provide information regarding utility resource acquisition programs.

19.1 Program Goals and Achievements

This program began on September 11, 2006. In the Fourth Quarter Report for 2008, the implementers categorize this program as "falling short of expectations."

Table 97. SDGE3041 CHEERS New Construction Program Goals and Achievements

Goals	Achievements	Accomplishment Status
Make software changes to EnergyPro and CHEERS registry	Little if any implementation of program beyond initial planning period	Fell Short

19.2 Program Logic Model

The CHEERS (California Home Energy Efficiency Rating Services) program is a well-established non-profit organization dedicated to promoting energy efficiency. Founded in 1990, CHEERS was approved in 1999 by the California Energy Commission as the first home energy rating provider under home energy rating system regulations. CHEERS is an accredited HERS software provider, and with this new funding the program planned to expand the software's capabilities. The logic behind this expansion was that the increased functionality would provide a system of recognition and documentation for builders who build beyond code. The theory is that this may incentivize more and more builders in California to adopt building practices that take their buildings beyond Title 24 energy code requirements.

Figure 114 provides the logic model of the program based on our findings.

Figure 114. SDGE4041 CHEERS New Construction Advanced Rating Program Logic Model