Government Partnerships Programs

Effectiveness and Impacts for Non-Resource Elements of the 2006-2008 Government Partnerships Programs

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E. EXECUTIVE SUMMARY

The Local Government Partnership (LGP) program impact evaluation examined the 56 programs implemented throughout California during the 2006-2008 program cycle. These programs were offered through investor owned utilities (IOUs) in California and their state, local government, or community organization partners. The objectives of these LGP programs are to:

- Take advantage of the unique relationship that these agencies have with the residential and commercial utility customers which are their constituents;
- Take advantage of both the implicit knowledge these local government agencies have of their communities and the access they have to local events and media for communicating about the energy efficiency opportunities available to them; and
- Deliver some of these energy efficiency services and measures, especially, but not limited to, the government sector and underserved constituencies.

In many ways the LGP programs offered during the 2006-2008 cycle were a grand experiment because this was the first time LGPs were recruited to develop and deliver programs on this scale. The overall success of programs in meeting these objectives is undoubtedly mixed, with varying levels of success at the program level and at the program element level. Undoubtedly, many lessons were learned by all involved.

This report focuses on the evaluation of indirect impacts resulting from these programs, targeting the specific program elements which encouraged participants to adopt energy efficient practices, such as turning off lights, or to purchase energy efficient equipment without the assistance of a resource program. These elements were identified as non-resource elements. The energy savings resulting from behavioral changes can be difficult to measure, as information about changes caused by the program elements need to be documented through the use of self-report surveys or on-site visits. Primarily, issues arise when there are few program records in the program tracking databases identifying changes that have occurred as a result of the non-resource program efforts.

This report represents the culmination of evaluation efforts for several of the non-resource elements (i.e., activities) offered through the LGP programs. Many of the recommendations are regarding changes to the programs that can be expected to improve the delivery of these non-resource elements or induce changes that will increase the "evaluability" of those elements. This is, in part, due to the fact that these programs are in the process of climbing-up a fairly steep learning curve, launching programs that are often significantly different and require different skills, expertise, and management and operational frameworks than the standard types of services provided by LGPs. This level of focus on non-resource elements for LGP programs is still relatively new. These findings are not meant to indicate that these programs are unsuccessful, but rather point out that providing new and different types of services and establishing market-based programs and operational processes are opportunities that can be captured in future years. . The evaluation team believes that the original expectations of the value of these programs are valid and that the programs will continue to evolve and improve and develop substantial expertise. However, at this time, several of the LGP programs need guidance on how to improve the management and operations of their programs and improve their management infrastructure. This should be done in a coordinated effort that avoids 56 programs all trying to re-invent the management and operational wheels.

A number of recommendations have been made that will improve the effectiveness of government partnership non-resource activities. We wish to emphasize the need for the establishment of a LGP support structure that provides market understanding, management and operational recommendations, and tracking system guidelines. The commission will need a central agent that all of the government

partnerships are willing to work with. The commission is in the unique position of being able to make that happen.

In this report we present detailed findings and recommendations drawn from the non-resource indirect impacts evaluation for non-resource program elements in the following categories:

- Energy Audits
- Energy Efficiency Training
- Referrals to Resource Acquisition Programs

Table E-1 provides a high-level summary of this evaluation effort, including element type (i.e., audit, training, or referral), associated program name and ID, as well as a brief description of the programs' offered non-resource elements.

Table E-1. Non-Resource Evaluation Summary

Element Type	Program IDs	Program Name	Element Description
Audit	PGE2015	ABAG	Energy Audit, Energy Assessment, and Action Plan
	PGE2016	AMBAG	Free Home Energy Audit
	PGE2020	East Bay	CYES Single- and Multi-Family Direct Install Audits
	PGE2025	Marin County	
	SCE2523	CEP	Small Business Tune-ups
	SCE2523	CEP	Residential Tune-ups
Training	SCE2519, SCG3521	Ventura County	Title 24 Codes and Standards Workshop
	SCE2525	San Gabriel Valley	
	SCE2567	LGEAR/Mammoth Lakes	
	SCE2568	LGEAR/Ridgecrest	
	PGE2016	AMBAG	Advanced Framing for Resource and Energy Efficiency Workshop
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	HVAC Workshop
	PGE2028	Redwood	Motor Efficiency Workshop
	SCE2525	San Gabriel Valley	Advanced Energy Efficiency Workshop
	PGE2016	AMBAG	Commercial and Business Refrigeration Workshop
	SCE2530, SDGE3026, PGE2036, SCG3520	UC/CSU	EE Procurement Workshop
			MBCx Workshop
			Commissioning Workshop
Referral	PGE2021	Fresno	Third Party Program Referrals
	PGE2016	AMBAG	
	PGE2020	East Bay Energy Watch	
	PGE 2025	Marin County Energy Watch	
	PGE2026	Merced/Atwater	
	PGE2030	South San Joaquin	
	PGE2033	Stockton	
	SCE2520	South Bay	
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	
	SCE2567	LGEAR/Mammoth Lakes	
	SCE2568	LGEAR/Ridgecrest	
	PGE2028	Redwood Coast	

E.1 Overarching Conclusions and Analysis

As stated above, the overarching goal of a LGP non-resource element is to cause energy savings through the installation of efficient measures or by influencing program participants' behavior(s). Table E-2 provides a detailed summary of the per person average annual and lifecycle indirect energy impacts of the non-resource elements for which energy savings calculations were possible.

Table E-2. Average per Household/Business Indirect Energy Impacts for Applicable Evaluated Programs (ESF1)[1]

			Percent of Participants Who Took Action	Type of Savings	kWh savings			kW savings			therm savings		
					Gross	Net	Net-to-Gross Ratio[2]	Gross	Net	Net-to-Gross Ratio[2]	Gross	Net	Net-to-Gross Ratio[2]
Audits	Residential	CYES (n=73)	32%	Annual Savings	129	100	77%	0.02	0.01	77%	9.7	6.7	69%
				Lifecycle Savings	527	407	77%	NA	NA	NA	45	31	68%
		CEP Res (n=150)	31%	Annual Savings	139	89	64%	0.05	0.03	60%	3.7	2.2	61%
				Lifecycle Savings	570	382	67%	0.22	0.15	67%	22.2	14.3	64%
		AMBAG (n=176)	27%	Annual Savings	124	100	81%	0.02	0.01	67%	1.84	0.19	10%
				Lifecycle Savings	562	445	79%	0.12	0.07	61%	19.5	2.3	12%
	Small Business	CEP SB (n=177)	50%	Annual Savings	226	157	70%	0.07	0.05	70%	NA	NA	NA
				Lifecycle Savings	1,047	724	69%	0.33	0.23	70%	NA	NA	NA
Training	Non-Residential	EUCC (n=22)	91%	Annual Savings	77,227.3	23,152.6	30%	22.76	6.67	29%	167.30	120.88	72%
				Lifecycle Savings	755,583.6	206,944.5	27%	NA	NA	NA	444.74	513.73	116%

[1] This report references all key findings and recommendations, which are tracked in Appendix K. All key findings and recommendations are given a corresponding tracking number, which is also found in Appendix K.

[2] Simple (non-enhanced) self-response was used to set NTG values.

In addition to identifying key indirect energy impacts, the evaluation team identified several cross-cutting non-energy key findings.

- Although program leads were helpful in the evaluation process by providing what information they could about the programs and related elements, determining energy savings from the 2006-2008 program cycle's non-resource elements was difficult. Much of this difficulty results from a distinct lack of adequate program tracking systems and processes, particularly in the referral and audit elements. Examples of missing data include name, contact information, measure or action recommended, etc. This single condition prohibited the evaluation of over 80% of indirect energy impact evaluation efforts originally planned for this evaluation[3]. Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations. (ESF2)

- The estimate of energy savings is more accurate for the few programs that planned and maintained effective tracking systems. For example, when participant and service information was maintained detailing participant audit recommendations and referrals, the evaluation contactors were able to use this information to prompt participants, establishing higher recall rates and more accurate recollections of the effects of the program-element on their energy use behavior change. The study was able to use this information to more accurately estimates energy impacts. (ESF3).

- The level of engagement of program staff is important in determining the effectiveness of a non-resource element. Personal interaction and program follow-up are important in ensuring that the element both made the participant aware of the process and that it met the participant's needs. (ESF4)

- The program staff are dedicated to the success of the LGP programs. In instances where there was direct participant participation, such as in trainings, participants gave positive feedback regarding the program. (ESF5)

E.2 Element-Specific Key Findings

E.2.1 Audits

The evaluation team initially identified ten programs to include in the indirect impacts evaluation of non-resource audit activities. Based on follow-up "evaluability" discussions with program managers and reviews of program tracking systems, the number of programs targeted for the indirect impact evaluation was reduced from ten to four. The programs included and reviewed as part of this indirect impacts research are:

- Association for Monterey Bay Area Governments (AMBAG)
- Community Energy Partnerships / Energy Coalition (CEP): residential customers
- Community Energy Partnerships / Energy Coalition (CEP): small business customers

[3] The California Energy Efficiency Evaluation Protocols of April 2006 published by the CPUC detail the data needed by the evaluation community to support the evaluation efforts of non-resource programs, see page 205.

- California Youth Energy Services (CYES), also referred to as Marin and East Bay

In addition to identifying the indirect impacts related to the aforementioned programs, the evaluation team also researched the effectiveness of the audit process provided through the Association for Bay Area Government (ABAG) partnership program. This was an exploratory research effort that provided rich insight into municipal respondents' perceptions of the audit process as well as the influence it had in moving them to install the energy efficient equipment promoted through the program.

Table E-2, as presented in the above subsection, summarizes the annual and lifecycle indirect savings estimates for each audit program. While the evaluated residential programs varied in their audit delivery and reporting mechanisms, the annual gross energy savings estimated per household did not differ significantly by program.

However, the net-to-gross ratio and resulting net (or program attributable) energy savings vary somewhat by program. All programs provided walk-through audits and some form of written report to customers documenting recommendations. One explanation for the difference may be the ability for customers to recall program influence; CYES, which resulted in higher net savings than CEP, also had the survey completed most closely to the service provided (within 6 months). This emphasizes the importance of evaluating these types of non-resource programs in a close enough timeframe to the intervention to allow for activities to take place while minimizing any loss of data due to recall issues. Another explanation for the difference is the type of information provided to customers through the reports. AMBAG, for example, illustrated monetary savings associated with changes. This distinction could also have had more of an effect on customers' changes and/or reported level of influence.

The limited indirect energy savings resulting from the LGP walk-through audits suggests the audit process needs to be more effective. One opportunity is to provide participants with a richer experience than that provided through a traditional walk-through audit (ESF6). Qualitative evidence gathered through interviews with municipal ABAG participants suggests that a more in-depth audit experience (i.e., providing leave behind materials, cost-benefit analyses, and investment-grade audit experiences, depending on customer type) more effectively encourages customers to change behaviors or install high-efficiency equipment; however, more research is necessary to determine if this applies to other customer segments. ABAG participants said that while they appreciated the information provided through the initial walk-through audit; they attributed their motivation to move forward with energy efficiency projects to the in-depth audit and its subsequent report.

Recommendations

As a result of these findings, the evaluation team made the following audit-related recommendations:

- Establish a system to effectively track customers, services, and information disseminated to program participants. Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations. (ESR1)
- Provide leave-behind materials and/or reports of recommendations made for program participants. (ESR2)
- Encourage a program design that includes a more in-depth audit experience for participants. (ESR3)
- Follow up with customers after the audit, reinforcing the messages provided through the audit and providing an opportunity for the program to address any questions. (ESR4)

- Ensure that auditors have proper training to provide audits effectively. (ESR5)

E.2.2 Training

The non-resource assessment completed by PA originally identified 16 LGP programs that had training activities that warranted evaluation. However, due to participant sample availability, the scope was reduced to focus the evaluation of 12 workshops instead of 16 programs. These workshops represented both residential and non-residential applications (discussed in more detail in Section 3.1.3). The team categorized these 12 workshops into three different types of training types:

- **Codes and Standards:** This type of training focuses on providing information to participants to update them on the latest Title 24 codes and standards and enable them to correctly implement and enforce them (as applicable).

- **Equipment:** These trainings provided detailed information on specific types of energy efficient equipment such as refrigeration and motors.

- **Process:** This category represents trainings that cover energy efficient practices that attendees would need to implement to realize energy savings, such as commissioning and advanced framing techniques in construction.

All respondents were asked to categorize the situation that best described where they intended to apply the information they learned as a result of participation. Based on their responses, these respondents were categorized into three primary respondent type groups, as seen below.

- **End-Use Commercial Customers (EUCC):** This group consisted of commercial customers who intended to apply the information gained in the workshop at facilities that their business either occupied or managed.

- **Market Actors (MA):** This group said that the target for the knowledge they had learned through the workshop was primarily in facilities occupied or managed by customers to whom they provided services. Examples of MA include architects, engineering firms, and contractors.

- **End-Use Residential Customers (EUCR):** These respondents indicated that the primary application for information learned through their participation in the training was targeted specifically to their homes.

Across the three respondent types, PA completed a total of 185 surveys. The majority of respondents were MAs (89 participants, representing 48% of the total), followed closely by EUCC respondents who represented approximately 44% of respondents (82 participants). The smallest group consisted of EUCR respondents, with only 14 participants (eight percent).

Due to the small number of EUCR participants (14), this report does not include detailed findings that are specific to that group. For the MA participants, qualitative findings are included, though the team was unable to estimate indirect impacts due to the nature of the respondent's role in delivering energy efficiency.

Analysis indicates that the equipment-specific trainings indirectly provide energy savings for EUCC participants, as well as directly impact their savings through efficient technologies installed (ESF7). Employing the methodology reviewed and approved by the California Public Utilities Commission

(CPUC), the evaluation team calculated the indirect energy savings resulting from information provided by four training workshops that specifically emphasized equipment. The four trainings were 1) Advanced Energy Efficiency (Advanced EE); 2) Motor Efficiency; 3) Heating, Ventilation and Air Conditioning (HVAC); and 4) Commercial Refrigeration workshops.

Table E-3. Average Indirect Impacts per Small Business from Training (n=22 EUCC survey respondents)

Savings	kWh savings			kW savings			therm savings		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	77,227.3	23,152.6	30%	22.76	6.67	29%	167.30	120.88	72%
Lifecycle Savings	755,583.6	206,944.5	27%	NA	NA	NA	444.74	513.73	116%

Training workshops are reaching correct stakeholders (ESF8). Title 24 workshops were targeted at the correct audience and attendees represented an appropriate range of professional positions including architects, engineers, business owners or directors, draftspersons, planners, public officials, general contractors, building inspectors, and building department staff. Equipment-specific training workshops were attended by commercial customers and market actors who found the information useful and applicable. In fact, many contractors attended multiple HVAC workshops in the series. The Commissioning and Advanced Framing workshops also had appropriate attendance by those groups who would gain the most from attending.

The trainings have increased participant knowledge and understanding of covered energy efficiency concepts (ESF9). Overall, almost all respondents reported that the workshops provided them with new information (95% of all 185 surveyed training participants). In addition, responses indicated the trainings positively impacted respondents' ability to understand and identify energy efficiency opportunities. This was true for all types of respondents: residential customers, non-residential customers, and market actors.

EUCC respondents who attended training workshops are better educated about energy efficient opportunities they have at their businesses and are taking action based on that knowledge (ESF10). The training workshops have raised awareness of opportunities to be energy efficient, increased their confidence in implementing energy efficient actions, and influenced their decisions to implement those actions. Three-quarters of EUCC respondents made an effort to save energy since training and of those, 64% rated the influence of the training as strong (a six or seven on a seven point scale). Not only are the trainings having an impact on those who attend, they are reaching an even wider audience. Most of the EUCC respondents (93%) have shared the training information with others.

MA respondents who attended training workshops have altered their practices (ESF11). Seventy-nine percent of MA respondents agree they are more familiar with tools and techniques to save energy after attending training workshops. Three quarters (78%) of market actors agreed with the statement, "I am more likely to recommend energy efficient equipment, designs or practices to my clients." A very large portion of MA respondents attribute changes in behavior to attending the training workshops. Eighty-two percent realized an increased desire to introduce energy efficiency in client work after attending a training workshop, 80% better understand methods to introduce energy efficiency in client work, and 71% acknowledge the ability to think differently regarding energy efficiency.

End-use customers (both EUCC and EUCR) have a greater understanding of energy efficiency opportunities at their facilities (ESF12). End-use customers' answers across three statements indicated the workshops positively impact their ability to identify and implement energy efficiency opportunities at their facilities.

Increased understanding increases efforts to save energy (ESF13). Participant responses emphasize the correlation between a participant's understanding and/or awareness of energy efficiency opportunities and the likelihood that the participant has made any effort to save energy at their facility. Participants who report a high increase in understanding are also likely to have an increased awareness of available energy efficiency opportunities. Furthermore, these participants also demonstrate an increased tendency to make efforts to save energy at their facilities and they attribute the workshop(s) they attended with influencing their decision to make these efforts.

Recommendations

As a result of these findings, the evaluation team presents the following training-related recommendations:

- Trainings should continue to accompany changes in codes and standards to make sure the codes and standards changes are properly understood, implemented and enforced in order to realize the expected energy savings. The Title 24 survey results demonstrate the importance of training on codes and standards. (ESR6)

- In general, the team recommends that training workshops continue to be part of program and portfolio offerings in California as they are resulting in energy savings even though they can be difficult to quantify. The trainings are having a definite impact on program savings, both in terms of directing customers to the program and making customers and market actors aware of the availability of energy efficiency opportunities. (ESR7)

- Develop a more rigorous methodology for measuring savings. Based on the high proportion of attendees who made some effort to save energy as a result of the training, the evaluation team feels the savings that were able to be measured are likely understated. In order to better quantify the savings resulting from the training efforts, the team recommends that a more rigorous methodology be employed. This would include conducting a pre-training survey with all participants and then a post-training survey approximately six months following the training. Because of the timing of this evaluation, the team was not able to employ this methodology. This methodology could be further enhanced by on-site inspections and monitoring of specific participant facilities or analysis of energy bills for participants' facilities. (ESR8)

- Standardize tracking of program participation across local government partnerships. Standardization of a tracking system to record attendees as well as methods of marketing, exit survey results, and training materials used would assist in a more robust evaluation. Consistent capture of information such as contact information, company name, title, and role would greatly improve sampling and analysis opportunities that could in turn help quantify more savings benefits from training workshop efforts. (ESR9)

E.2.3 Referrals

The evaluation team initially identified 22 programs to include in the evaluation of non-resource program referrals. Based on follow-up discussions with program managers and a review of tracking systems, the

number of programs included in the indirect impact evaluation was reduced from 18 to 12. The programs included and reviewed as part of this research are:

- Association for Monterey Bay Area Governments (AMBAG)
- East Bay Energy Watch
- Fresno Energy Watch
- Marin County Energy Watch
- Merced/Atwater Energy Watch
- Redwood Coast
- South San Joaquin
- Stockton Energy Watch
- South Bay Partnership
- Bakersfield-Kern
- LGEAR/Mammoth Lakes
- LGEAR/Ridgecrest

Due to issues in obtaining sufficient referrals-tracking data sample, the findings resulting from the data collection task did not fully address the key researchable questions (see Section 4.1). Furthermore, only half of the evaluated partnerships (two residential and four non-residential) provided tracking data that contained sufficient information to support a database analysis (i.e., the sample had enough customers with complete contact information). As the survey findings and database reviews yielded limited results, the evaluation team is unable to assess the energy impacts resulting from non-resource program referrals. Below, we provide qualitative key findings which lend insight into the shortcomings of the referrals process.

The referrals process is currently not successful in getting customers what they need to participate in appropriate resource programs (ESF17). There is little or no follow-up effort made by the partnerships and many of them did not participate although nonparticipants expressed interest in the resource programs to which they were referred.

Very few LGPs were able to provide tracking data on their referrals to program participants and even fewer had any results from those referrals (ESF18). Many of the partnerships indicated that there were not tracking or managing a referral system or had a formalized approach for dealing with referrals. Recommended database inputs are presented, in detail, in Appendix M,.

It is not possible to draw conclusions on the effectiveness of the referrals process in customers' decisions to participate in the program (ESF19). The number of programs that had data and could be included in the analysis was quite small. Customers were often not aware that they hade been referred by the LGP, as there were no follow-up activities. It was not possible to discern whether they knew about the program before the referral or planned to participate. Referrals from the few tracking systems that were provided could not be matched with participation data from the resource programs due to inconsistencies in formats and differences in customer names and addresses.

This review of program referral processes indicates that LGPs have a variety of definitions of and methods used for referrals (ESF14). These range from referrals made to specific programs based on an audit or discussion, to general advertising or references made to visit a web site.

Participants are typically aware of the programs to which they were referred (ESF15). Many of them attribute that awareness to sources that could be the result of activities by LGPs if not from direct referrals.

Program participation is influenced more by personal contact by program staff, program information from the utilities, and participation in previous programs (ESF16). Personal recommendations have a significant influence on the respondent's decision to participate in the programs.

Recommendations

As a result of these findings, the evaluation team presents the following referral-related recommendations:

- Develop a standard definition of what constitutes a "referral" and make it significant enough that there is strong potential for that referral to lead to savings. By encouraging LGPs to adopt a standardized definition, the tracking and implementation of these programs will be simplified greatly. (ESR10)

- Define and establish goals for referrals. If a major objective of the LGPs is to refer customers to appropriate energy efficiency programs, the partnerships should develop quantitative goals for referrals, as well as track their progress in meeting those goals. (ESR11)

- Create detailed plans that are consistent with program theories and describe the referral management, tracking systems, and processes. The program theory should identify a specific path that referred participants will take, including the expected results, so it is clear how referrals are managed, tracked, and how they fit into the program design. (ESR12)

- Ensure that referrals are documented, specific, direct and targeted to the customer. This encourages higher participation rates, as the program is pertinent to the participant's needs. (ESR13)

- Require follow-ups to ensure participants are being appropriately referred and finding the assistance they need. All referrals that are made, including the lists gathered at community events, should include personal follow-up contact with the customer to ensure they have received the appropriate information. (ESR14)

- Evaluate program referrals on an ongoing basis to ensure high participant recollection and to confirm that programs are reaching the appropriate audience. The transparency of these data will serve to place more emphasis on referrals, promote ongoing evaluate efforts, as well as improve the process overall. (ESR15)

E.3 Metrics and Indicators for Success

The evaluation of the LGP non-resource program elements has shown that, while the LGP programs use a viable approach for increasing energy efficiency within communities, there are roadblocks to both the success of these programs and the *evaluation* of that success. Major problems, such as the lack of adequate and consistent tracking systems, made many of our planned evaluations impossible. However, since these non-resource LGP elements are in their infancy, the evaluation team expects that the changes and improvements suggested in this report, if well implemented will aid the LGPs in improving the delivery of their programs as well as support the success of future evaluation efforts. In the end, the CPUC will be able to document higher levels of energy impacts from their LGP programs.

A number of recommendations have been made that will improve the effectiveness of government partnership non-resource activities. These recommendations revolve around four primary areas: 1) establishing a standard language and standard definitions for non-resource activities, 2) establishing systems for tracking non-resource activities, 3) establishing metrics for measuring performance of non-resource activities, and 4) establishing mechanisms for communication among the government partnership programs to encourage the sharing of information on "best practices" so they might learn from one another Action on these recommendations requires facilitation from a central agent that all of

the government partnerships are willing to work with, as well as the allocation of resources to support that agent. The commission is in the unique position of being able to make that happen.

Potential metrics for each element type (i.e., audits, trainings, and referrals) are presented in tables E-4 through E-6. We include in these tables the potential data source(s) for each metric. Furthermore, all metrics have been prioritized with the programs in mind—metrics that are the most cost effective and easy to measure are presented at the top of each table, while those that are less cost effective are presented lower in the table.

The evaluation of these programs raised awareness for the need to further establish metrics upon which we can benchmark the performance of the programs' non-resource elements, specifically audits, education and training, and referrals. While the team recognizes that each program and target market is unique, there are a number of metrics that could be integrated into program design and implementation initiatives to gauge program performance and account for the effectiveness of these non-resource activities.

Table E-4. Recommended Metrics for Audit Program Elements (ESR16)

Metric	Potential Data Source
Recommendations for all participants are captured	Program tracking database
Contact information for all participants are captured	Program tracking database
Program cost data are documented	Program information
Type of audit service(s) received	Program tracking database
% of participants who recall, top of mind, top recommendations	Participant survey and program tracking data
% of participants who recall receiving recommendations	Participant survey
% of participants who change at least one behavior as a result of the audit	Participant survey
% of participants who purchased EE equipment as a result of the audit	Participant survey
% of actions wholly or partially attributable to the program	Participant survey
Average of X kWh and/or X therms saved per household/business	Participant survey
Average of X number of specified behavior changes and/or equipment purchases achieved	Participant survey
Average of X$/kWh saved	Participant survey and program information

Table E-5. Recommended Metrics for Training Program Elements (ESR17)

Metric	Potential Data Source
Contact information for all participants are captured	Program tracking database
Program cost data are documented	Program information
Collateral materials show direct tie-in(s) to related resource program(s)	Collateral review
% of participants who recall attending the workshop	Participant survey
% of participants who report an increase in knowledge/understanding of topics covered in workshop	Participant survey
% of actions wholly or partially attributable to the program	Participant survey
% of participants who purchased EE equipment as a result of the workshop (end-users)	Participant survey
% of participants who recommend EE equipment purchases to others as a result of the program (market actors)	Participant survey
% of participants who recommend energy saving behaviors to others as a result of program participation (end-users and market actors)	Participant survey
Average of X number of specified behavior changes and/or equipment purchases achieved	Participant survey
Average of X kWh and/or X therms saved per household/business	Participant survey
Average of X$/kWh saved	Participant survey

Table E-6. Recommended Metrics for Referral Program Elements (ESR18)

Metric	Potential Data Source
# of customers referred to resource programs outside of the LGP that meet definition of a "referral"	Program tracking database
% of referred customers who participate in resource programs outside of the LGP (success rate)	Program tracking database
% of customers who recall receiving the referral recommendation	Participant survey and resource program application form
# of attempts made to follow-up with referred customers who either participated in the programs to which they were referred or other resource programs as a result of the referral	Program tracking database
Distribution of referrals across programs (comprehensiveness)	Program tracking database
Contact information for all participants are captured in consistent format	Program tracking database
Program cost data are documented by activity	Program information
Total kWh and/or X therms as a result of the referral	Participant survey and program tracking database
Proportion of annual total kWh and/or therms saved in resource program that resulted from LGP referrals	Participant survey and program tracking database

E.4 Design Recommendations to Impact Future Evaluations

Based on the key findings, the evaluation team presents several cross-cutting recommendations meant to encourage the success of future non-resource elements and evaluation activities.

- Develop a standardized tracking system to be used across LGPS to accurately and consistently capture energy savings across element types. Due to the lack of data, programs are not able to estimate the appropriate savings attributable to non-resource elements. By adopting a standardized tracking system, programs will be able to circumvent this problem and document more energy savings. A detailed table with recommended database inputs are presented in Appendix M, Program Database Tracking System Recommendations (ESR19)

- Place importance on increasing the collaboration and cooperation between the CPUC, utility managers, and program managers, especially when it comes to improving data tracking and measurement processes that are needed to document performance and enable evaluation. (ESR20)

- Establish concrete definitions for non-resource elements (e.g., referrals or audits) and develop metrics and methods for their measurement. This will greatly improve the success of evaluation and savings-measurement efforts. (ESR21)

- Establish protocols for future non-resource elements regarding the types of data to be collected and retained (i.e., participant contact information, recommendations, etc.) to improve performance tracking and enable evaluation processes. (ESR22)

- Conduct internal workshops to share information regionally, or state-wide, with LGP and IOU staff. This will be a useful tool in the development of the above metrics, tracking systems, and protocols. (ESR23)

- Develop and inform LGP program designers of "best practices" non-resource element case studies through additional research. These will be useful in establishing the most effective means of delivering these programs to customers. (ESR24)

1 INTRODUCTION

The Local Government Partnerships Program (LGP) impact evaluation examined the 56 programs implemented throughout California in 2006-2008. These programs were offered through investor owned utilities (IOUs) in California and their state, local government, or community organization partners. These programs include *program elements*, or activities, that covered most commercial and residential market sectors. For example, a LGP typically had several program elements, such as direct install, rebate, and training components. While the approaches and services varied in each local partnership, the end goal was the same: the achievement of measurable energy savings and demand reductions.

This report presents the overall evaluation approach and findings for the evaluation of non-resource elements offered through the LGP programs. In this chapter, we focus on the following:

- Defining and Cataloguing Non-Resource Elements
- Non-Resource Element Tracking and Prioritization
- Data Requests for Element-Specific Information
- Evaluation Approach and Methodology
- Key Findings and Recommendations

In the remaining chapters of this report, we present the detailed findings of the non-resource indirect impacts evaluation for the following non-resource element types:

- Energy Audits
- Energy Efficiency Training
- Referrals to Core and Third-Party Resource Acquisition Program

Each section presents overarching findings specific to the non-resource element, any study-specific methodologies, as well as detailed survey results.

1.1 Defining and Cataloguing Non-Resource Elements

Direct impacts are obtained through resource element activities. As the name suggests, savings that are obtained from a resource element can be *directly* linked to a resource or measure. For example, a program which offers rebates for high-efficiency clothes washers can claim savings for the installation of these high-efficiency clothes washers.

Non-resource elements are activities that include education, outreach, and training activities. These elements may lead to behavioral changes or decisions to install equipment not rebated by a program, which, in turn, may result in energy savings (also referred to as indirect energy savings). For example, if a utility customer was told during an in-home energy audit to use power strips to reduce phantom loads and they subsequently began doing so, these *indirect* energy savings should be attributed to the audit program element. However, the energy savings resulting from behavioral changes are not as easily measured, as information about any changes made need to come from self-report surveys or on-site visits, since there are no records in the tracking database of changes that have occurred. Furthermore, the savings resulting from some types of equipment or behavioral changes may be highly variable based on household

conditions (e.g., replacement of a heating system) or may be lacking deemed savings values (e.g., using a ceiling fan instead of central air conditioning in the summer).

This report evaluates, where applicable, the indirect impacts resulting from non-resource elements offered through LGP in California for three unique element types. Each non-resource element (i.e., a particular activity that was hypothesized to generate indirect impacts) was categorized into three primary element types.

- Energy Audit—this category includes elements where participants receive behavioral or equipment recommendations during an energy audit. These audits could come in the form of home-based energy assessments, partnership delivered energy assessments, and third-party delivered audits.

- Training—elements which promote public awareness regarding energy efficiency are assigned to this category. These elements typically promote energy efficiency through small workshops regarding specific aspects, such as energy efficient codes and standards or equipment.

- Outreach—this includes elements, such as community outreach, information booths at local events, and business presentations, where efforts are focused on obtaining information from the event participants (e.g., through a sign-up to receive a free CFL or through submission for a raffle or drawing). Mass marketing through print, radio, and television was not considered as part of this type of element.

- Referral—this element type is composed of elements which refer residential households, government facilities, and small businesses to other appropriate energy-efficiency resource programs. These are frequently the result of an audit, discussions at community events, or an inquiry from a homeowner, business owner, or local government official regarding opportunities for rebates or other incentives to install energy efficient equipment.

- Other—this element type was a catch-all for the program activities that did not fit into the above element types. These included policy assistance activities, CFL and gas kit giveaways, green business activities, and so on.

Program elements tend to vary from one another with regards to theory and implementation. The majority of elements, once categorized, were evaluated separately from one another. In cases where elements offered by different programs were similar, such as the Title 24 workshops, we combined these into one single element.

1.2 Non-Resource Element Tracking and Prioritization

The majority of LGPs include non-resource program activities. In order to assess non-resource program activities with potentially significant indirect impacts, the evaluation team reviewed the entire group of 56 partnership programs, which included 258 program elements. For programs with substantial anticipated indirect impacts, we, in conjunction with the CPUC contract manager and the MECT advisor, examined the specific non-resource activities within each program in order to prioritize the activities to evaluate. The following questions were used to determine the level of a program's potential indirect impacts:

- What is the potential magnitude of the energy savings – High, Medium, or Low?

- What is the "evaluability" of the program element(s)? That is, the extent to which data exists to facilitate evaluation and measurement of the behavioral changes.
- What is the type, frequency, and scope of educational and informational activities that do not result in direct energy savings (i.e., non-resource program elements)? How many of these program elements are deployed and what level of resources are devoted to each?
- What is the likelihood that the program element will result in near-term behavioral changes? (Ratings of High, Medium, or Low were assigned to reflect the probability that the program element would have an effect on behavioral change within the time period of the evaluation.)
- What are the targeted markets – local government facilities, residential or commercial end users within the community, school children, etc.?
- What is the level of participation, as defined by each program element (e.g., number of people in a workshop, number of CFLs distributed, etc.)?
- What is the likelihood that research of this element will provide insights to the CPUC that will help them in shaping future government partnership program initiatives?

Generally, the magnitude of the potential energy savings and the "evaluability" of the program element(s) determined whether a program element was selected to evaluate. Evaluations of non-resource program elements with minimal expected savings are not justified given the costs. All program elements categorized under the outreach and other element types, for example, were removed during the prioritization process, as it was determined that quantifying the indirect impacts for these elements was not cost effective. Furthermore, program activities with insufficient data cannot support evaluation efforts despite the fact that they may have the potential for high levels of energy savings through their non-resource program activities.

Table 1-1 displays the program activities selected for evaluation using the above criteria. Please refer to Appendix F through H for more detail on prioritization slides, summaries, and memos for Southern California Edison (SCE), Sempra Utilities (SCG, SDGE), and Pacific Gas and Electric (PG&E).

Table 1-1. Non-Resource Elements Evaluated

Element Type	Program IDs	Program Name	Element Description
Audit	PGE2015	ABAG	Energy Audit, Energy Assessment, and Action Plan
	PGE2016	AMBAG	Free Home Energy Audit
	PGE2020	East Bay	CYES Single- and Multi-Family Direct Install Audits
	PGE2025	Marin County	
	SCE2523	CEP	Small Business Tune-ups
	SCE2523	CEP	Residential Tune-ups
Training	SCE2519, SCG3521	Ventura County	Title 24 Codes and Standards Workshop
	SCE2525	San Gabriel Valley	
	SCE2567	LGEAR/Mammoth Lakes	
	SCE2568	LGEAR/Ridgecrest	
	PGE2016	AMBAG	Advanced Framing for Resource and Energy Efficiency Workshop
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	HVAC Workshop
	PGE2028	Redwood	Motor Efficiency Workshop
	SCE2525	San Gabriel Valley	Advanced Energy Efficiency Workshop
	PGE2016	AMBAG	Commercial and Business Refrigeration Workshop
	SCE2530, SDGE3026, PGE2036, SCG3520	UC/CSU	EE Procurement Workshop
			MBCx Workshop
			Commissioning Workshop
Referral	PGE2021	Fresno	Third Party Program Referrals
	PGE2016	AMBAG	
	PGE2020	East Bay Energy Watch	
	PGE 2025	Marin County Energy Watch	
	PGE2026	Merced/Atwater	
	PGE2030	South San Joaquin	
	PGE2033	Stockton	
	SCE2520	South Bay	
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	
	SCE2567	LGEAR/Mammoth Lakes	
	SCE2568	LGEAR/Ridgecrest	
	PGE2028	Redwood Coast	

Table 1-2 summarizes the general evaluation approach methodology applied to program activities to determine the significance of a program's indirect impacts.

Table 1-2. Indirect Impact Approach by Program Element

Element Type	Element Description – Core Activity Type(s)	Researchable Issues	Evaluation Approach
Audits	Home-based energy assessments, partnership-delivered energy assessments (residential and small commercial), third-party delivered audits.	Determine the extent to which specific measure recommendations have been implemented, other actions taken beyond those recommended (spillover), extent participants have leveraged or participated in other programs (referrals).	Survey participants; review audit-estimated savings as compared to engineering factors to estimate indirect energy savings.
Trainings	Training of government, staff, facilities managers, trade allies, etc.	Participant awareness of source/sponsor of information or event; skills and information obtained; extent to which these have been applied to specific energy efficiency actions taken, by measure.	Program-specific determination of education and training events; surveys of participants (where participant lists exist); application of engineering factors to estimate savings (where applicable).
Referrals	Customers for whom the program provided specific recommendations based on a customer's needs or opportunities (Active Referrals); may have provided brochures and other marketing materials distributed at centers, events, and trainings; assistance in completion of applications for other programs.	Determine which data are collected that indicate the referring source is a LGP; determine if participants are tracked from LGP programs into other programs, determine if they acted on the referral and measures or actions taken as a result.	Query utilities' databases to determine extent of LGP activities as source of intake; survey participants associated with participation in other programs; develop estimates for energy savings by taking survey results of measures installed and applying engineering factors to estimate savings.

1.2.1 Researchable Issues

The primary directive from the CPUC/MECT regarding the evaluation of non-resource elements for the Government Partnership programs was to try to identify the elements which were most likely to result in near-term energy impacts that could potentially be quantified. The Summit Blue team Measurement approaches were then developed for the highest priority elements so that evaluation resources were cost-effectively expended. The identification of these high priority elements is discussed in Section 1.3.

The Summit Blue team developed an approach to measure indirect impact savings by identifying program elements and initiatives that were most likely to yield meaningful energy savings.

The primary researchable issues for the evaluation of non-resource program elements were as follows:

- What activities are the programs conducting that may be resulting in behavioral changes that lead to energy savings?
- What are the behavioral changes that occur as a result of these activities (e.g., installing a non-rebated measure, turning off lights, etc.)?
- What measures are affected by these behavioral changes?
- What is the magnitude of the potential energy savings being caused by the indirect impact activities?
- What energy savings are resulting from indirect impacts that are NOT linked to participation in an IOU resource program (e.g., conservation, cleaning air filters, buying measures and self-installing without rebate)?
- To what extent are the partnership programs funneling or channeling people into IOU resource programs, and what is the magnitude of the energy savings? In addition, what is the rate of success for these referrals?

Each program was assigned a non-resource principal investigator (NRPI). In order to understand what the programs were doing that may result in near-term energy savings not being claimed by the program, the NRPI researched available documents including program implementation plans (PIP), quarterly narratives, monthly reports (for level of spending), and web sites. The NRPI also spoke with the IOU program manager and/or the partner program manager where needed. Through this process, we discovered that the PIPs do not necessarily indicate which non-resource elements a program does or does not implement. To address this, a secondary objective of the research was developed in order to identify additional non-resource program elements not addressed in the PIPs that were also worth exploring.

1.2.2 Objectives of Evaluation Research for Non-Resource Elements

The measurement approach for energy impacts using the indirect evaluation protocol had three broad objectives:

- To characterize the behavioral changes resulting from non-resource program activities;
- To describe how non-resource program activities resulted in the installation of energy-efficient measures outside of an IOU resource program; and

- To estimate the actual energy savings achieved through these behavioral changes or installation of energy-efficient measures outside of any program.

This measurement approach allowed us to understand what types of impacts should be attributable to the program(s). Using the Evaluators' Protocols for impacts from a behavioral change program, program effects were classified as either:

- Energy savings attributable to a resource program (Path A);
- Energy savings resulting from the installation of an energy efficient measure outside of a resource program that are attributable to an education and information program component of a non-resource program (Path B);
- Energy savings from measurable behavioral changes resulting from the education and information program component of a non-resource program. These behavioral changes may include large-scale activities, such as a business altering their operating or maintenance schedules or making energy-efficiency related policy changes (Path C);
- Non-verifiable behavioral effects resulting from the education and information program component of a non-resource program (e.g., activities that are too small in scope or intermittent to be cost-effectively measured, such as turning off lights when not in use) (Path D).

1.3 Data Requests

The data request process began with a single bulk data request issued by the CPUC (master request) to all programs in September 2007. All data received was catalogued in the Non-Resource Activity Tracking (NRAT) database[4]. Very little of the submitted data was sufficient, as it rarely included the requested primary evaluation-related data—such as participant lists, element descriptions, and collateral—necessary for supporting the non-resource evaluation.

Due to the lack of data provided in response to the primary data request, in March 2008, a second wave of data requests was issued. These requests were specifically submitted to LGPs on an individual basis. As with the master request, these requests sought out all program data. Meetings with utility stakeholders were held to discuss the data requests and answer any questions. The evaluation team painstakingly reviewed all data, which was again catalogued in the NRAT Database. Again, the data were generally incomplete, showing a minimal increase in pertinent data.

Informed by the first and second data responses, paired with the prioritization slides,[5] the third wave of data requests were issued in October, 2008.This final wave specifically requested that programs provide all data regarding targeted non-resource elements that were hypothesized to yield significant energy savings. These requests were submitted via EEGA (see Appendix Y for a sample copy of the request form). Despite these efforts to target the data requests on non-resource elements, the vast majority of programs either failed to provide relevant information or provided insufficient data for evaluation purposes. Due to the program administrators' and managers' inability to compile the requested data necessary for the conduct of planned evaluations, approximately 80% of non-resource elements were removed from the evaluation list (see Appendix F – Non-Resource Activity Tracker Information).

[4] This database was designed by PG&E.

[5] These summarized program information based off of preliminary research, including element descriptions drawn from PIPs and other program documentation. These slides are presented in Appendix G.

1.3.1 Data Availability and Quality

On January 8, 2008, the Summit Blue LGP Evaluation team submitted a memorandum summarizing the data provided in response to the initial CPUC master data request. The evaluation team reviewed all data resulting from the master data request and quantitatively scored the quality of the response, as seen in Appendix H. The second and third waves of data requests were evaluated qualitatively, as discussed above. A data response was considered sufficient if it included fields regarded by the evaluation team as mandatory. The fields considered as mandatory[6] were as follows:

- Element title
- Element description (including objectives and mechanisms used)
- Collateral (supporting documentation, such as brochures, power points, etc.)
- Participant name
- Participant phone number
- Referring program
- Resource program

Data availability issues were a constant problem. Information regarding identified non-resource elements was often absent. Where non-resource element information was provided, it sometimes had limited or no participant information. Furthermore, responses lacked additional background information, such as measures installed and recommended during the audit process (recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations).. These data, though not essential to the evaluation, enabled more accurate estimates of indirect impacts resulting from non-resource activities by linking recommendation data to contact information.

Our experience interacting with all IOU staff and partnership staff was always very positive, professional, and supportive. Staff were willing to provide whatever information they had. Unfortunately, this information was too limited to support the evaluation of the majority of the programmatic efforts that were expected to provide substantial energy savings.

Completeness of the provided data was also a recurring issue. For example, data would sometimes be missing or have limited participant and/or contact information, or missing contact information for a significant proportion of participants. Some participant information is very helpful in understanding who the participants are, e.g., in a training specification of organization and title can provide valuable insight into who actually participated in the training (which can often differ from the specified target audience).

However, despite the significant variation in the availability of the data across utilities and partnerships, the accuracy of provided data was rarely an issue. For example, data provided in PDF format, such as sign-in sheets for training events, were generally understandable, though this format tended to be resource intensive as it needed to be entered in electronic format for sampling and interviewing purposes. Data responses and collateral materials were typically clearly defined and provided useful insight into the non-resource element.

In the few cases where the data were difficult to interpret, this data had been submitted by third party contractors who provided services to multiple partnerships. Oftentimes, the information submitted could not be linked directly to a specific LGP. The data was for multiple program elements across multiple

[6] These fields are the bare minimum requirements needed for an evaluation to take place. Ideally, all fields requested, as seen in Appendix I, would be tracked by programs to support more successful evaluation efforts.

programs that the third party contractor was responsible for implementing. However, these third parties were very cooperative and helpful in responding to any follow-up questions that we had.

1.4 Approach and Methodology for Estimating Gross and Net Energy savings

The following section details the approach and evaluation protocols used to determine the indirect impacts of the LGP agreed to by the evaluators and the CPUC in a series of meetings held in August-September 2008. As part of these meetings, we reviewed the first survey instrument for identifying indirect impacts from the Community Energy Partnerships Home Energy Efficiency Tune-ups.[7] One focus of the meetings was to determine the approach for establishing program attribution for indirect impacts. The first version of the survey applied the CPUC approved net-to-gross battery used by the resource programs; however, this was determined to be too onerous for the indirect impacts.

The approach for establishing attribution by the Marketing and Outreach contractor in their evaluation of Energy Center courses or activities was also considered. After consideration of this approach, however, the evaluation team decided to take a different approach to calculating impacts. Our primary focus was on the identification of near-term energy impacts, and our final survey approach identified specific energy saving actions participants have taken and then asked a single-scale question on the impact their participation in the program element had on their taking that action.

Summit Blue assisted PA Consulting in designing the surveys for this research. To estimate gross impacts, surveys needed to identify:

1) **Actions taken by the respondent** - PA Consulting conducted content reviews of trainings and audit programs and provided Summit Blue with measure lists.

2) **Details of the actions that most impact energy savings** - Summit Blue then recommended follow-up questions for actions identified that captured the following details:

- Equipment type, size, and quantity;
- Equipment usage characteristics (set points, hours of operation);
- Building shell characteristics for HVAC measures and measure with HVAC interaction effects (building size, vintage, climate zone, HVAC equipment types, shell details); and
- Whether equipment replacements were early retirements or replacements of nonfunctioning equipment.

Throughout the survey, Summit Blue suggested wording that would resonate with respondents and coordinated equipment and building options in multiple choice questions to match parameter descriptions in DEER and other data sources used for the analysis.

1.4.1 Gross Impact Analysis

Summit Blue developed the gross energy (kWh and therm) and demand (coincident peak kW) savings for respondents of select LGP non-resource program surveys. This effort began by assisting PA Consulting in

[7] The meetings included Bryan Ward and Pam Rathbun of PA Consulting, Jeff Erickson and Argene McDowell of Summit Blue, and Nick Hall of the Master Evaluation Contract Team.

their survey design to ensure that the most relevant technical information was captured from respondents. Survey responses were then reviewed, interpreted, cleaned, and finally used to determine savings using deemed savings, results from literature review, and engineering algorithms.

The five surveys analyzed were:

- Equipment Training
- California Youth Energy Services (CYES) Residential Audit
- Association of Monterey Bay Area Governments (AMBAG) Residential Audit
- Community Energy Partnerships (CEP) Residential Audit
- Community Energy Partnerships (CEP) Small Business Audit

Measures were categorized as follows:

- Appliances
- Building envelope
- HVAC
- Laundry
- Lighting
- Motors
- Refrigeration
- Water
- Other

This section describes the gross impact analysis process and discusses uncertainty that arises from this type of analysis. Appendix E details the methods used to estimate savings, identifying the data sources, models, algorithms, and assumptions used for each measure.

Energy and demand measures identified by respondents included equipment replacement, maintenance, and behavior change. Savings methods leveraged core California-based secondary resources (e.g., DEER, CEUS, and reports on CALMAC.org) and models (eQUEST), wherever possible. Where data from these sources was not adequate, not reflective of the range of participant conditions, or was internally inconsistent, additional secondary sources and engineering calculations were used. Gross impact analyses were coordinated with those from the *CPUC Marketing and Outreach – Energy Centers* contract, for which Summit Blue also conducted the gross impact analysis.

The measures covered in the surveys and the key data source(s) used to estimate savings for measures identified by respondents are summarized in Appendix A.

1.4.2 Accounting For Sampling Error and Uncertainty

The presented gross and net savings estimates are based on survey results applied to engineering algorithms, as designed and agreed upon by the evaluation team in conjunction with the CPUC contract manager and the MECT advisor. As both gross and net savings estimates are derived from survey results, it is necessary to account for sampling error by estimating error bands. While we recognize there are other potential sources of error that could affect the savings estimates (e.g., assumptions made in the engineering calculations, non-response bias, etc.), we are focusing this discussion on sampling error only. Other potential sources of uncertainty will be discussed below.

There are two major estimates around which we need to develop error bands: the percent of participants that took action and program attribution. The levels of precision are reported within each individual survey section as appropriate.

There is a considerable level of uncertainty in estimating energy and peak-load savings for non-resource measures. Uncertainty was not addressed in the development of savings estimates. The following is a brief discussion of sources of uncertainty and methods for addressing them. Appendix E contains a more thorough version of this discussion.

Four types of uncertainty may affect savings estimation:

- **Value uncertainty (stochastic)** – random variation in a system
- **Value uncertainty (epistemic)** – lack of knowledge of the appropriate value of a parameter
- **Structural uncertainty** – application of inappropriate or insufficient methodologies
- **Unpredictability** – inability to know the future state of a system

These four types of uncertainty are inherent in estimating savings from survey data. Uncertainty stems from each step of the savings estimation process including gathering data, developing estimation methodology, and establishing values of parameters.

- **Survey Data –** Uncertainty caused by survey data is the result of either lack of data or inaccuracy in the data. Lack of data may result from either the appropriate question for the adopted methods not being asked or not being answered. Integration of selected methods into the survey design helps to minimize questions not being asked. Analyzing survey questions for clarity and likelihood of receiving a response will minimize questions not being answered.
- **Methods –** The primary type of uncertainty associated with the estimation methodology is structural uncertainty. This results from the inability of methodologies to accurately evaluate future energy and peak demand savings. Analysis that neglects dynamic states or interaction effects allows estimates to be arrived at quickly with less work, but does not capture some complexities that may impact the estimate. Also, uncertainty from unpredictability can result from applying a retrospective consumption approach to future consumption reductions. Although it is reasonable to assume that future energy consumption will be consistent with past consumption patterns, this nevertheless introduces an aspect of uncertainty.
- **Parameters** – The parameter values used in estimation are probably the best candidate for estimating and reducing uncertainty. Wherever possible, values were used from reliable public sources such as studies or databases. Occasionally, values were selected based on engineering judgment and consensus from internal review. Uncertainty exists for all parameter values. When parameter values are applied from a study or database, the following aspects of the study should be considered:
    - **Validity** – Is the study or database valid?
    - **Applicability** – Is the study appropriate?
    - **Availability** – Is statistical data presented in the study, or only average values?
    - **Fidelity** – Can specific criteria be used to filter data, or is data presented as aggregate?

If the validity, applicability, and fidelity of the study and databases used are low, then judgment may provide a more accurate estimate. Judgment has its own issues with uncertainty and confidence. Particularly, effort should be taken to include high numbers of experts and diversity among experts when soliciting judgment or seeking expert consensus.

Treating uncertainty of energy and peak load savings analysis requires consideration at the early stages of M&V planning activities. Implementation of an uncertainty guidance plan ensures a consistent approach in reducing and evaluating uncertainty. Several methods for treating uncertainty are outlined below.

- **Data collection and analysis –** considering likely distributions (and conducting analysis to develop these distributions) of key variables to estimate uncertainty in savings estimates.
- **Expert judgment or consensus –** increasing confidence in the data, methods, and values of parameters used to arrive at savings estimates.
- **Sensitivity analysis –** increasing confidence in the estimation result, or indicating parameters whose quantification justifies further investigation.
- **Scenarios –** showing a range of outcomes based on feasible or reasonable input conditions when information on likelihood of occurrence is unavailable.

These methods for treating uncertainty require integration throughout the M&V process and are often untenable as afterthoughts.

1.4.3 Net Impact Analysis

The net savings analysis is based on a question that asks the respondent to assess, on a scale of zero to ten, whether the program influenced them to make the behavioral change or purchase the energy-efficient equipment.[8] This question is asked for each behavior or technology the participant said they implemented for which the gross savings were estimated.

> (ASK FOR EACH BEHAVIOR CHANGE)
> On a 0 to 10 scale, with 0 being no influence and 10 being a great deal of influence, how much influence did the [program/auditor] recommendation have on your decision to **[BEHAVIOR CHANGE]**?
>
> (ASK FOR EACH TECHNOLOGY PURCHASE AND INSTALLATION)
> Please rate the influence on a 0 to 10 scale, with 0 being no influence and 10 being a great deal of influence, that the auditor's recommendation had on your decision to purchase and install **[installed equipment]**?

The response to the influence questions is the primary driver to estimating the net energy savings attributable to the program. The answer is converted to a percentage and provides a direct multiplier to the gross savings. Table 1-3 shows how the response to the survey question is applied to the gross savings estimate for that technology or behavior. If the participant responded "don't know" or refused to answer the influence question, that record was dropped from the net impact analysis.

[8] Note that the equipment deemed energy-efficient is via self-report, and not verified in person. There may be some bias introduced due to this self-report, which we assume to be within the required level of precisions.

Table 1-3. Calculation of Net Savings Estimate from Influence Response

Influence Response ***0=No influence*** ***10=A great deal of influence***	**Multiplier to Gross Savings by Behavior/Technology**
10	1
9	0.9
8	0.8
7	0.7
6	0.6
5	0.5
4	0.4
3	0.3
2	0.2
1	0.1
0	0

Each individual surveyed who reported taking some action resulted in a total gross savings estimate and net savings estimate. The calculations are as follows:

> **TotGrossSavings**= sum of all gross savings resulting from behavioral changes and installations
>
> **TotNetSavings**=sum of all net savings, defined as the influence ratio multiplied by gross savings for behavioral changes and installations

If we took an average of these calculations, we would see the average gross and net savings *for participants that took some action*. This estimate would not be applicable to the program population.

To determine the program population average savings, we needed to determine the average savings taking into account all participants surveyed. This includes all individuals who said they did make a change as well as those that did not make a change. As a simple example:

Table 1-4. Example of Calculating Average Savings

Respondent Number	Installed CFL	Influence Ratio	CFL Gross (kWh)	CFL Net (kWh)
1	No	-	-	-
2	Yes	0.5	50	25
3	Yes	1.0	50	50
4	No	-	-	-
5	No	-	-	-
Total		**.75**	**100**	**75**

In the above example, the gross savings for the surveyed population is 100 kWh. When applying the net-to-gross ratio of .75, the total net savings for the surveyed population is 75 kWh.

However, we still need to determine the average savings per participant. To do this, we would determine an average gross and net savings using the population surveyed, where the average CFL gross savings is 20 kWh (100/5) and the average net CFL savings is 15 (75/5). This will then allow an estimate of the net indirect impacts to be extrapolated to the population of all participants for the 2006-2008 program years.

1.5 Coordination with Marketing and Outreach Team

A common objective of the marketing and outreach evaluation, led by Opinion Dynamics Corporation and the Government Partnership non-resource evaluation, was quantification of indirect energy impacts from non-resource program activities. Recognizing this, we made an effort to regularly communicate with the marketing and outreach evaluation team throughout the evaluation process—survey design, developing an approach for estimating gross impacts, and developing an approach for estimating net impacts. This communication was facilitated mainly due to the fact that the prime contractor for the government partnership contract (Summit Blue) was also a subcontractor on the marketing and outreach contract. Summit Blue played an integral role in developing gross savings estimates for both evaluation efforts.

The purpose of this coordination was not to ensure that the approaches were necessarily the same, but to simply share approaches and to understand where there were differences in the approaches. Being aware of these differences was necessary because of differences in the more specific research objectives and differences in the scope of the research. It should be noted here that the specific similarities for evaluation of non-resource efforts was education and training initiatives. Many of the local government partnerships offered trainings to their constituencies, some of which were associated with Energy Centers. The marketing and outreach contractor was specifically tasked with evaluation of these Energy Centers. While almost all of the government partnerships had extensive marketing initiatives, it was determined early on in the evaluation planning process that evaluation of these marketing initiatives would not be within the scope of this non-research evaluation.

The marketing and outreach approach for evaluation of the Energy Centers was to assess the degree to which participation in the course changed how participants think about, take advantage of, and are more aware of energy saving opportunities. We also captured much of this information for this evaluation,

especially for training elements. Our focus, however, was on the identification of near-term energy impacts. A key difference between these efforts was the approach to estimating net impacts. In general terms, the marketing and outreach contactor asked questions related to program attribution questions on a broad level, while we pursued capturing attribution for specific activities. As such, our approach was to identify specific energy saving actions participants have adopted and then ask a single scale question regarding the impact the program had on their taking that action.

1.6 Overarching Findings and Recommendations

The non-resource (NR) elements—training, audits, and referrals—are vastly different activities; however, there are many common threads running through these activities in terms of key findings and areas of improvement to achieve local government partnership (LGP) program objectives. Ultimately, the key measure of success is whether the LGP non-resource elements result in energy savings through changes in behavior, installation of measures, or procurement of efficient equipment. The energy audit activities should identify energy savings opportunities for customers in addition to directly installing some measures. The referral process should link customers with appropriate energy efficiency programs. The trainings sponsored by the LGP should provide the technical knowledge for market actors and customers, in some cases, and encourage contractors and vendors to include energy efficiency into their business products and services.

Energy savings were estimated for some of the training and audit non-resource element activities. These included only the measures taken as a result of the training and audit recommendations that were not rebated and/or captured in the savings reported by a resource program. In addition, for the referrals process, customers were asked about participation in energy efficiency programs and implementation of measures. There was no attempt to estimate these savings because they were already captured in the resource programs if implemented. At the same time, the role of the referrals in increasing participation in these programs is also important.

As stated above, the overarching goal of a LGP non-resource element is to cause energy savings through the installation of efficient measures or by influencing program participants' behavior(s). Table 1-5 provides a detailed summary of the average indirect energy impacts of the non-resource elements for which energy savings calculations were possible.

Table 1-5. Average Indirect Impacts for Applicable Evaluated Programs (OF1)

			Percent of Participants Who Took Action	Type of Savings	kWh savings			kW savings			therm savings		
					Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Audits	Residential	CYES (n=71)	32%	Annual Savings	129	100	77%	0.02	0.01	77%	9.7	6.7	69%
				Lifecycle Savings	527	407	77%	NA	NA	NA	45	31	68%
		CEP Res (n=149)	31%	Annual Savings	139	89	64%	0.05	0.03	60%	3.7	2.2	61%
				Lifecycle Savings	570	382	67%	0.22	0.15	67%	22.2	14.3	64%
		AMBAG (n=171)	27%	Annual Savings	124	100	81%	0.02	0.01	67%	1.84	0.19	10%
				Lifecycle Savings	562	445	79%	0.12	0.07	61%	19.5	2.3	12%
	Small Business	CEP SB (n=171)	50%	Annual Savings	227	157	70%	0.07	0.05	70%	NA	NA	NA
				Lifecycle Savings	1,047	724	69%	0.33	0.23	70%	NA	NA	NA
Training	Non-Residential	EUCC (n=22)	91%	Annual Savings	77,227.3	23,152.6	30%	22.76	6.67	29%	167.30	120.88	72%
				Lifecycle Savings	755,583.6	206,944.5	27%	NA	NA	NA	444.74	513.73	116%

Findings

With these objectives in mind, the evaluation team identified a number of cross-cutting findings.

The energy savings from non-resource elements were difficult to measure in this evaluation (OF2). The energy savings from the evaluated non-resource elements are likely understated due to the lack of useable tracking data, which was an issue for both the referrals and the audit evaluation activities. In addition, customer recollection was a concern in that some of the non-resource evaluation surveys, such as referrals, were conducted over a year after the last LGP contact with the customers. Some of the programs did a particularly good job in detailing specific recommendations that were made during the audit process and the evaluation team was able to use that data with the surveys to estimate energy savings more effectively. The energy savings resulting from the training were much more difficult to estimate, due to variance in both participant types and course objectives. The report discusses opportunities to improve that process with a pre-training and post-training survey methodology. Several of the LGP partnerships, including South Bay Partnership, and the Fresno, Merced/Atwater, and Stockton Energy Watch Partnerships, stand out in tracking referrals and are improving, although not yet considered "best practice" case studies. In addition, there was no consistency in the process of tracking or in key definitions, such as what constitutes a "referral."

The depth and level of engagement provided by LGP staff is key (OF3). It is clear that the depth and level of engagement provided by LGP staff impacts the effectiveness of a non-resource element. The direct personal contact by LGP and other program staff are particularly effective in getting customers to implement energy-efficiency measures above and beyond those that are part of the direct install component of many LGP activities. A key element of that personal contact is to ensure the education, information, or the program referral information matches the individual customer's needs and preferences. Furthermore, follow-up with the customer and with the core or third-party program managers to which the customers are referred is an important component in the quality of the engagement.

Participating businesses and organizations are constrained staffing-wise which limits their ability to effectively pursue energy efficiency opportunities (OF4). Whatever a program can do to help these businesses and organizations, the more effective they are (e.g., energy champion). Program staff need to assist participants throughout the process; this may include ensuring that participants are speaking with appropriate people, recommending the trainings that are most relevant to participants' needs, or referring participants to the correct programs.

The training sessions were quite successful in that end-use commercial customers (EUCC), end-use residential customers (EUCR), or market actors (MA) were able to choose the topics of most interest to them and have direct contact with experts through the training process (OF5). Approximately 76% of EUCC participants reported that the course had a strong influence on their decision to pursue energy saving efforts at their facilities. Likewise, nine of 14 EUCR respondents (64.3%) said that they had pursued energy saving efforts, such as the installment of new equipment, as a result of the training course. Market actors were also positively impacted by the training in that 79% rated the course as having a significant influence on the decision to apply course concepts to their work.

Between 27 percent and 50 percent of audit participants surveyed implemented at least one energy savings recommendation, depending on the program reviewed (OF6). On-site energy audits were completed by trained staff with residential and small business customers for many of the LGP programs. In most cases, these were free audits that included some direct install measures. Beyond those savings, the auditors made specific recommendations while conducting the audit to implement other behavioral changes or measures. All of the programs documented these recommendations for customers.

The referrals process was examined for several LGP programs where the customer was directly referred to an investor-owned utility (IOU) or third-party energy efficiency program by the LGP. One finding was that many people were unaware they had been referred, which negatively affected this indirect impact evaluation (OF7). However, of those who did know they were being referred, particularly for the business customers, one key finding was that personal recommendations by program staff were rated the highest in terms of influencing their decision to participate in the program to which they were referred. This suggests that consistently ensuring a personal interaction when referring a participant to future programs will help that participant understand he or she was being referred and allow for more accurate future evaluations.

Recommendations

Based on the overarching key findings, we present several cross-cutting recommendations for improving the non-resource energy savings measurement and evaluation process.

Continue to work collaboratively to improve the non-resource program data tracking and measurement process (OR1). The CPUC staff and advisors to this project played an important role in providing constructive feedback and involvement in this process. The CPUC staff should continue to work collaboratively with the utility program managers and third-party program managers to ensure the LGP programs are well integrated. In particular, methods and protocols must be in place to allow measurement of all energy savings that occur from these programs

Develop consistent, clear definitions of non-resource elements (OR2). The referrals evaluation indicated that there is a need to establish a clear definition of what constitutes a referral. Likewise, there are a number of different audit activities that collect information on-site and develop estimates of energy savings for various installed or recommended measures. The level of effort varies, as do the types of reports. A clear definition of these various types of non-resource elements and consistent reporting formats would greatly enhance the ability to measure resulting savings. These definitions should also address the requirement to conduct critical follow-up activities, such as benefit-cost analyses, follow-up calls, etc., for each element in order to improve the participation rates in other programs and the installation of measures with resulting energy savings.

Develop metrics and methods for measuring those metrics for non-resource elements (OR3). To avoid future issues associated with non-resource elements and participant tracking, programs that either deem a non-resource element as playing an important role in their program logic model or expend significant resources on the non-resources element should specify metrics for these activities. These metrics need to be included in the program's PIP with clear specifications for what information will be tracked electronically for reporting progress toward goals. In particular, the metrics should be designed to maximize the energy savings that could result from the non-resource element. For example, the training workshops could use clear metrics for participant responses to confirm the effectiveness of the training in achieving increased implementation of energy efficient practices and equipment. The evaluation team encourages the partnerships to work with each other along with the CPUC to continue to define and refine non-resource metrics and data that should be captured to track progress against those metrics.

Establish clear protocols for what data and information is to be collected and retained for the non-resource elements (OR4). In order to evaluate non-resource elements in the future, a clear picture of which activities are being pursued, including planned budget allocation, is needed. Although non-resource element information is available from multiple sources (i.e., program models, PIPs, program managers, etc.), there is typically a significant difference between the initial planned elements and the actual implemented elements. Therefore, comprehensive element information (i.e., participant lists, collateral

materials, recommendations made during the audit process, etc.) is critical for evaluators trying to prioritize and evaluate non-resource elements.

Develop a consistent tracking system for all non-resource elements that ensures the energy savings attributed to LGP programs is captured (OR5). Each of the non-resource element analyses discuss the lack of good data tracking and what should be captured in these systems to facilitate follow-up evaluation activities and measurement of energy savings. There are some examples of LGP efforts that are superior to others but there is a need to develop one system that will be used by all LGPs to meet these needs. Accurate tracking systems will facilitate future evaluations in crediting elements with their energy savings. In addition, the tracking systems should interface with other IOU and third-party systems to improve the referrals process and to show how the various elements ultimately result in resource program participation and installation of energy efficient measures and equipment. Furthermore, adopting a consistent tracking system will simplify the follw-up process as well as facilitate program management duties. In the 2006-2008 evaluation of LGPs, program staff members were concerned about the level of effort required to accommodate data requests, especially when there were no electronic systems in place for tracking the requested data. Implementing a universal data tracking system for all high priority non-resource elements will significantly reduce the strain placed on programs using manual tracking efforts. This will also ensure higher data quality and availability, as well as consistency, of non-resource program data for future evaluation efforts.

Consider periodic workshops and information exchanges (OR6). The LGPs include some local networking; however, there is an advantage in conducting larger regional or statewide workshops to exchange information and to establish protocols and consistency in operations that relate to tracking and measuring energy savings.

Conduct additional research to benchmark and develop "best practices" for non-resource elements (OR7). Given the differences in approaches to the various non-resource elements, this is a good opportunity to conduct additional research to determine which types of referrals, audits, and training have the best outcomes for energy savings. The evaluations for this study were not able to address those issues in any detail. If the goal is to develop consistent, standard "best practices" for each of those elements, it would be useful to examine the processes in more details to determine what has been most effective.

1.7 Metrics and Indicators for Success

The evaluation of the LGP non-resource program elements has shown that, while the LGP programs use a viable approach for increasing energy efficiency within communities, there are roadblocks to both the success of these programs and the *evaluation* of that success. Major problems, such as the lack of adequate and consistent tracking systems, made many of our planned evaluations impossible. However, since these non-resource LGP elements are in their infancy, the evaluation team expects that the changes and improvements suggested in this report, if well implemented will aid the LGPs in improving the delivery of their programs as well as support the success of future evaluation efforts. In the end, the CPUC will be able to document higher levels of energy impacts from their LGP programs.

A number of recommendations have been made that will improve the effectiveness of government partnership non-resource activities. These recommendations revolve around four primary areas: 1) establishing a standard language and standard definitions for non-resource activities, 2) establishing systems for tracking non-resource activities, 3) establishing metrics for measuring performance of non-resource activities, and 4) establishing mechanisms for communication among the government partnership programs to encourage the sharing of information on "best practices" so they might learn from one another Action on these recommendations requires facilitation from a central agent that all of

the government partnerships are willing to work with, as well as the allocation of resources to support that agent. The commission is in the unique position of being able to make that happen.

Potential metrics for each element type (i.e., audits, trainings, and referrals) are presented in Table 1-6 through Table 1-8. We include in these tables the potential data source(s) for each metric. Furthermore, all metrics have been prioritized with the programs in mind—metrics that are the most cost effective and easy to measure are presented at the top of each table, while those that are less cost effective are presented lower in the table.

The evaluation of these programs raised awareness for the need to further establish metrics upon which we can benchmark the performance of the programs' non-resource elements, specifically audits, education and training, and referrals. While the team recognizes that each program and target market is unique, there are a number of metrics that could be integrated into program design and implementation initiatives to gauge program performance and account for the effectiveness of these non-resource activities.

Table 1-6. Recommended Metrics for Audit Program Elements (OR8)

Metric	Potential Data Source
Recommendations for all participants are captured	Program tracking database
Contact information for all participants are captured	Program tracking database
Program cost data are documented	Program information
Type of audit service(s) received	Program tracking database
% of participants who recall, top of mind, top recommendations	Participant survey and program tracking data
% of participants who recall receiving recommendations	Participant survey
% of participants who change at least one behavior as a result of the audit	Participant survey
% of participants who purchased EE equipment as a result of the audit	Participant survey
% of actions wholly or partially attributable to the program	Participant survey
Average of X kWh and/or X therms saved per household/business	Participant survey
Average of X number of specified behavior changes and/or equipment purchases achieved	Participant survey
Average of X$/kWh saved	Participant survey and program information

Table 1-7. Recommended Metrics for Training Program Elements (OR9)

Metric	Potential Data Source
Contact information for all participants are captured	Program tracking database
Program cost data are documented	Program information
Collateral materials show direct tie-in(s) to related resource program(s)	Collateral review
% of participants who recall attending the workshop	Participant survey
% of participants who report an increase in knowledge/understanding of topics covered in workshop	Participant survey
% of actions wholly or partially attributable to the program	Participant survey
% of participants who purchased EE equipment as a result of the workshop (end-users)	Participant survey
% of participants who recommend EE equipment purchases to others as a result of the program (market actors)	Participant survey
% of participants who recommend energy saving behaviors to others as a result of program participation (end-users and market actors)	Participant survey
Average of X number of specified behavior changes and/or equipment purchases achieved	Participant survey
Average of X kWh and/or X therms saved per household/business	Participant survey
Average of X$/kWh saved	Participant survey

Table 1-8. Recommended Metrics for Referral Program Elements (OR10)

Metric	Potential Data Source
# of customers referred to resource programs outside of the LGP that meet definition of a "referral"	Program tracking database
% of referred customers who participate in resource programs outside of the LGP (success rate)	Program tracking database
% of customers who recall receiving the referral recommendation	Participant survey and resource program application form
# of attempts made to follow-up with referred customers who either participated in the programs to which they were referred or other resource programs as a result of the referral	Program tracking database
Distribution of referrals across programs (comprehensiveness)	Program tracking database
Contact information for all participants are captured in consistent format	Program tracking database
Program cost data are documented by activity	Program information
Total kWh and/or X therms as a result of the referral	Participant survey and program tracking database
Proportion of annual total kWh and/or therms saved in resource program that resulted from LGP referrals	Participant survey and program tracking database

2 AUDITS

2.1 Audit Overview

The majority of local government partnership (LGP) programs provide an audit component in their program design. Audits serve a variety of purposes. Primarily, they provide a basis for the program to determine what equipment should be installed to promote energy efficiency in a given building or facility system. The audit may lead to the direct installation of equipment itself, development of a project plan, and/or referral to a core IOU resource program. The audit also provides a means for disseminating information about energy efficiency behaviors and opportunities. While conducting the audit, contractors are encouraged to share information related to the effects of behavioral changes (e.g., turning off lights, reducing the temperature of a heating system) and other technology-based opportunities for savings.

The evaluation team initially identified ten programs to include in the indirect impacts research of non-resource audit activities. Based on follow-up discussions with program managers and a review of tracking systems, the number of programs included in the indirect impact evaluation was reduced to four. The programs included and reviewed as part of this indirect impacts research are:

- Association for Monterey Bay Area Governments (AMBAG)
- Community Energy Partnerships / Energy Coalition (CEP): residential customers
- Community Energy Partnerships / Energy Coalition (CEP): small business customers
- California Youth Energy Services (CYES), also referred to as Marin and East Bay

Programs were removed from the research for a variety of reasons. The most prevalent reason was, as determined by evaluators through follow-up program manager interviews, that recommendations and energy conservation information was not consistently provided to program participants, either verbally or formally. Programs were also removed for lack of tracking information and confirmation that savings were claimed through utility core programs and, therefore, not eligible for this study (so as to avoid double counting of savings).

The four above programs had savings claimed through their resource components. However, in order for this indirect impacts evaluation to claim indirect impacts savings for equipment installations, the core programs could not claim the same savings. In other words, customers would have had to install the equipment outside of the core rebate programs. This primarily came up in non-residential programs where the non-residential customer received an audit. The non-residential customers may have received an audit; however, discussions with program managers for these programs, which were removed, confirmed that the recommendations primarily revolved around equipment changes and retrofits and that customers would not have installed this equipment on their own without a rebate given there was a rebate available through the core program. For all four programs, the evaluation identified and quantified savings for purchases that participants confirmed were not rebated through a core utility program.

In addition to identifying the indirect impacts related to the aforementioned programs, the evaluation team also researched the effectiveness of the audit process provided through the Association for Bay Area Government (ABAG) partnership program. This was an exploratory research effort with a multitude of researchable issues surrounding the effectiveness of the program's multi-tiered audit process. Although this particular research effort was process-driven, it provided rich insight into municipal respondents'

perceptions of the audit process as well as the influence it had in moving them to install the energy efficient equipment promoted through the program.

PA completed telephone surveys with 576 residential and small business customers that received audits through the CEP, CYES, and AMBAG partnership programs. Across all the surveys 14 of these cases were removed from the impact analysis because they could not recall actions taken after the audit or level influence the audit had on actions they did take (2.4 percent of respondents). PA also spoke with 16 municipal staff that participated in the ABAG partnership program, as seen in Table 2-1, below.

Table 2-1. Impact Evaluation of LGP Audits Survey Summary

Program ID	Program Name	Study Objective	Sector	Survey Completes	Surveys Retained for Impact Analysis
PGE2016	Association of Monterey Bay Area Governments (AMBAG)	Estimation of indirect impacts	Residential	176	171
PGE2025 PGE2020	Marin County / East Bay: California Youth Energy Services (CYES)	Estimation of indirect impacts	Residential	73	71
SCG3524 SCE2523	Energy Coalition / Community Energy Partnerships (CEP)	Estimation of indirect impacts	Residential	150	149
SCG3524 SCE2523	Energy Coalition / Community Energy Partnerships (CEP)	Estimation of indirect impacts	Small business	177	171
Total				**576**	**562**
PGE2015	Association for Bay Area Governments (ABAG)	Qualitative assessment of audit methods	Municipal	16	16
Total				**592**	**581**

2.1.1 Key Researchable Issues

PA identified key researchable questions in order to guide our plans for the indirect impact evaluations. These included:

- Do participants recall specific recommendations that were made? (If program data provides recommendation details for each sample point)
- What are participants doing *as a result of the audit recommendation*? It is important that each action be tied back to the audit recommendation itself and the behavior or purchase can be quantified in terms of energy savings.
- What level of influence do programs have in encouraging participants to make behavioral and/or purchasing changes after audits are complete?
- Are some programs more effective at encouraging indirect impacts than others, and why?

- What energy savings can be defensibly estimated for the reported behavioral changes?

The study completed for ABAG included additional researchable questions. The questions, summarized below, are also discussed in detail within the ABAG audit section.

- What level of audit and information did facilities receive?
- How comprehensive were the audits and reports and recommendations made?
- Did the program provide sufficient information to encourage building owners to participate?
- What processes do government decision-makers undertake to gain commitment and/or buy-in for energy efficiency investments?
- What role does the program play in the decision to adopt energy efficiency projects? What element of the program was effective in promoting the adoption of energy efficiency projects?
- What are the primary barriers for municipal facilities' adoption of recommended energy efficiency improvements?

2.1.2 Evaluation Approach

The evaluation applied a standard level of rigor to the evaluation of the audit activities. These activities estimated savings resulting from the audit process through self-reports; field visits were not included in the study to verify the savings. The following activities were included for all programs researched:

- Gathered lists of audit participants from the program implementers, once programs were prioritized for evaluation, through data requests.
- Requested and reviewed program materials for the identified audit programs.
- Identified key objectives for the prioritized audits including hypothesized behavioral changes resulting from the trainings.
- Developed post-audit surveys for participants that included customized modules to assess behavioral changes attributable to the audits.
- Collected participant data via telephone surveys.
- Quantified energy efficiency actions attributable to audits based on the surveys. For the detailed analytical approach used, see Section 2.3.

2.1.3 Key Findings and Recommendations

This section provides overarching key findings and recommendations related to the audits. These key findings and recommendations are a direct result of research conducted through this indirect impacts study. We also developed metrics designed to provide qualitative indicators of program success. These metrics are presented at the beginning of this report in Section 1.7, Metrics and Indicators for Success.

Key Findings

Throughout this section, we reference Table 2-2. This table summarizes the annual and lifecycle indirect savings estimates for each program. Subsequent sections within this chapter discuss how these estimates were derived for each program. This section provides this summary table to illustrate the overarching key findings and recommendations.

Table 2-2. Average Indirect Impacts per Household for Applicable Evaluated Programs (AF1)

		Percent of Participants Who Took Action	Type of Savings	kWh savings			kW savings			therm savings		
				Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Residential	CYES (n=71)	32%	Annual Savings	129	100	77%	0.02	0.01	77%	9.7	6.7	69%
			Lifecycle Savings	527	407	77%	NA	NA	NA	45	31	68%
	CEP Res (n=149)	31%	Annual Savings	139	89	64%	0.05	0.03	60%	3.7	2.2	61%
			Lifecycle Savings	570	382	67%	0.22	0.15	67%	22.2	14.3	64%
	AMBAG (n=171)	27%	Annual Savings	124	100	81%	0.02	0.01	67%	1.84	0.19	10%
			Lifecycle Savings	562	445	79%	0.12	0.07	61%	19.5	2.3	12%
Small Business	CEP SB (n=171)	50%	Annual Savings	226	157	70%	0.07	0.05	70%	NA	NA	NA
			Lifecycle Savings	1,047	724	69%	0.33	0.23	70%	NA	NA	NA

While the evaluated residential programs varied in their audit delivery and reporting mechanisms, the annual gross energy savings estimated per household did not differ significantly by program (AF2). All programs included in the audit study were unique in some aspect. For example, while the residential programs all provided audit services via a walk-through audit, they were unique in the level of information reported to participants. The AMBAG audit followed up with a home energy report mailed to households, detailing the savings they could achieve by following energy efficiency recommendations. CYES and CEP left behind recommendations immediately following the audit, but for CYES the youth provided recommendations via a checklist they completed when conducting the audits, and CEP provided a far more extensive report documenting a variety of housing characteristics. Below, we provide brief descriptions of each audit approach.

- CYES administered audits through trained youth volunteers from the community. These volunteers completed a walk-through audit of the home while directly installing low-cost energy efficiency equipment (e.g., CFLs). The youth were trained to provide verbal and written recommendations to households. These recommendations were recorded in CYES' database, which was provided to evaluators.
- CEP also provided a walk-through audit to residential (and small business) customers while directly installing energy efficiency equipment (e.g., CFLs, lighting, water saving devices). CEP provided highly detailed leave-behind materials documenting home and equipment characteristics, such as number of rooms in the home, age of home, number and type of lighting bulbs in home, HVAC and building envelope age and conditions, as well as faucet and showerhead measurements. Additionally, the form documents the top three recommendations for customers to follow. This information directly translates to the TuneUp database, which captures the customer-specific data.
- AMBAG's audit delivery differed from CYES and CEP. An AMBAG representative completed a PG&E survey[9] with participating homeowners regarding energy using equipment in their home and the participant's energy conservation practices. While doing the walk-through survey, the representative also verbally communicates recommendations for improving the home's energy efficiency. Upon completion of the audit, the program processes the survey results and sends a report to the participant. This report benchmarks the customers' energy use against neighboring residents and assesses the energy costs related to various end-uses. The report recommends energy saving improvements, behaviors, and expected savings from making these changes. The program did not capture recommendation data electronically. Therefore, recommendation data were not used in the survey effort.

These distinctions in program theories provide an interesting opportunity for a comparative analysis of these different audit approaches, particularly for the residential programs where evaluators estimated indirect impacts. Would one audit approach prove to be more effective than others? And how is effective defined – as overall savings resulting from the audits, or relative influence of the program in participants' decisions towards the adoptions of higher efficiency behaviors or equipment (as indicated by the net-to-gross ratio)?

Unfortunately, it is not clear from this evaluation and results whether one format is better than another for documenting findings and recommendations to customers. The estimated per participant annual gross savings for the evaluated residential programs are virtually indistinguishable from one another. As seen in Table 2-2 above, these annual savings can range from 124 kWh to 139 kWh, 0.02 kW to 0.05 kW (peak coincident), and 1.84 to 9.7 therms. This analysis indicates that, when providing a walk-through audit to

[9] This survey was initially designed for a PG&E program, but is administered independently by AMBAG.

residential customers, the delivery and reporting mechanisms do not significantly affect the *gross savings* estimates.

The two non-residential programs included in this study were also unique from each other.

- CEP provided walk-through audits to small business customers. PA estimated non-residential indirect impacts only for this activity.

- ABAG provided participants with a combination of different audit approaches, including both walk-through and investment-grade audits, to recommend energy efficiency improvements to municipal facilities. We evaluated this program's unique multi-tiered audit approach through in-depth interviews with participating local government staff.

The net-to-gross ratio, and resulting net (or program attributable) energy savings, vary by program.. (AF3). There is some variability participants' report of program influence in their decisions to change their behaviors or purchase high-efficiency equipment, as indicated in the net-to-gross ratio. The higher the net-to-gross ratio, the higher the program influence as rated by respondents.

Table 2-2, above, shows the variance in net-to-gross ratios. Compared to the CEP survey, participants that received services through CYES and AMBAG were more likely to report that the program was influential in their changes to higher efficiency electric equipment or behaviors; however, only the differences between CYES and CEP were statistically significant at the 90 percent confidence interval.

One explanation for the difference may be ability for customers to recall program influence; CYES, which along with AMBAG resulted in the highest net savings of all programs, also had the survey completed most closely to the service provided (within 6 months). This emphasizes the importance of evaluating these types of non-resource programs in a close enough timeframe to the intervention to allow for activities to take place while minimizing any loss of data due to recall issues (e.g., within six of intervention).

Another explanation for the difference is the type of information provided to customers through the reports. AMBAG, for example, illustrated monetary savings associated with changes. This distinction could also have had more of an effect on customers' changes and/or reported level of influence.

Please note that this pattern changes when reviewing the indirect impacts resulting from therms measures. The therms net-to-gross ratios should be reviewed in light of the fact that therms penalties are accounted for when electric measures reduce heating load, which affects the therms net-to-gross ratio. This issue is discussed in detail within the program-specific chapters; however, in light of this information, the therms net-to-gross ratios should be reviewed with caution as they are not indicative of low program influence.

Retaining participant-specific recommendations in the program tracking database assists in customers' recollection of information provided through the audit, which encourages higher quality data for evaluation efforts (AF4). Programs' ability to track quality participant data varied significantly. One reason so few programs are included in this evaluation is that not all programs that provided audit services sufficiently tracked their participants. As discussed throughout this chapter, the CEP and CYES programs retained recommendation data for each participant who received an audit, whereas AMBAG did not retain this information. The benefit of having the recommendation data is that it allows interviewers to probe specifically on recommendations made by the program if it is not offered top-of-mind by participants. Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations.

A review of the survey data confirmed that having recommendation data included in the sample allowed respondents to recall additional recommendations not mentioned top-of-mind. Below, Table 2-3 illustrates this point using the CYES program data; a similar pattern was seen with other programs evaluated when specific recommendations were included in the survey, such as the CEP program. The second column shows the number of participants that recalled the recommendation top-of-mind, and the third column shows the number of participants that recalled the recommendation after prompting (if not mentioned top-of mind). For the majority of recommendations, a greater number of participants were able to recall the information when prompted, compared to those unprompted. The greatest exception to this is the recommendation to install CFLs, where a significant number of respondents recalled this recommendation without any prompting (n=16).

Table 2-3. Recollection of Recommendation Unprompted then Prompted for CYES Respondents

Recommendation	Unprompted Number Recall Recommendation	Prompted Number Recall Recommendation[10]
Install pipe wrap and/or water heater insulation	0	3
Install window caulking/weather stripping	1	8
Replace windows	2	1
Install CFLs	16	4
Add or improve insulation	5	5
Install faucet aerators and/or low-flow showerheads	4	5
Install ENERGY STAR appliances	4	2
Use energy saving button on refrigerator	0	4
Turn off lights and electronics when not in use	10	23
Clean refrigerator coils	1	17
Turn off faucets and/or take shorter showers	6	11
Reduce freezer/refrigerator temperature	0	4

As the table shows, customers will be more likely to recall recommendations made by a program, provided the opportunity to prompt. Should programs consider any follow-up to the audits or further evaluation efforts, it is important that the program log the recommendations made for each participant in order to improve both data quality and the ability to follow-up. Furthermore, higher data quality will likely result in higher indirect impacts which the program can claim.

[10] If participant does not recall recommendation unprompted.

Qualitative evidence suggests that a more in-depth audit experience more effectively encourages customers to change behaviors or install high-efficiency equipment; however, more research is necessary to identify if this applies to all customer segments (AF5). All programs for which indirect impacts were assessed provided walk-through audits. The evaluation team did not have the opportunity to identify indirect impacts related to a more in-depth audit process such as an investment-grade audit, despite the fact that investment-grade audits typically lead to larger projects funded by the utility and/or partnership program. However, the qualitative research conducted for ABAG indicates that a more intensive audit process is more likely to result in behavior changes or equipment purchases than a less intense audit experience. The interviewed municipal staff commented that, while they appreciated the information provided through the walk-through audit, the in-depth audit and its subsequent report were what motivated them to move forward with the energy efficiency projects.

It is not feasible for this evaluation to estimate the potential increase in indirect impacts resulting from this more intensive audit experience. Nor do we have sufficient information to differentiate whether this approach is as effective (or necessary) for residential customers as it may be for non-residential customers. That said, the limited indirect energy savings resulting from the walk-through audits (upwards of 139 gross annual kWh for each residential household) suggests the audit process needs to be more effective. Potentially, this can be accomplished by making the audit a more impacting experience by going deeper than the traditional walk-through audit experience.

Recommendations

The following recommendations are based on a comprehensive review of the audit studies included in this indirect impacts evaluation. Additional recommendations were uncovered through the qualitative research of the ABAG program, which are specific to the program. These recommendations are also found in the ABAG section within this chapter.

Establish a system to effectively track customers, services, and information disseminated to program participants (AR1). Evaluators reviewed the tracking systems for all program activities reviewed under the audit component of this study. As illustrated in the key findings above, in order to effectively determine indirect impacts resulting from non-resource activities, it is imperative that programs accurately and completely track this information for each participant that received the service. Not doing so inhibits evaluators' ability to accurately estimate a program's indirect impacts for the customers it serves.

Conduct evaluation closer to the point of intervention to most accurately capture changes resulting from program intervention and program influence on those changes. (AR2). The evaluation included customers that participated within the 2006 – 2008 program cycle. Many of these interviews took place in late 2008 or early 2009. This time lag between intervention and evaluation may have inhibited participants' ability to recall actions taken or level of influence the program had on their change in behaviors. Additionally, at the point that the survey took place the action may have become habit meaning that they do not recall that the change took place at all even though it did. The one program evaluated closer to the point of intervention was CYES where in early 2009 we interviewed participants from the summer of 2008. This program had the highest percentage of participants that said they followed recommendations provided by the program, and also resulted in higher net to gross ratios compared with CEP.

Encourage a program design that includes a more in-depth audit experience for participants (AR3). Particularly for non-residential customers, a more in-depth audit experience will likely have a greater level of impact than the more simplistic walk-through audits. Walk-through audits are instrumental in a program's ability to directly install equipment while taking the opportunity to disseminate energy

conservation tips or recommendations for equipment replacement. However, research shows a more in-depth audit experience will have a greater impact on customers. At minimum, the audit should include an analysis of savings that could be achieved through making a change and perhaps a high-level return on investment analysis, particularly for residential customers.

Follow up with customers after the audit, reinforcing the message provided through the audit and providing an opportunity for the program to address any questions (AR4). With the exception of ABAG, none of the programs included in this evaluation formally followed-up with audit recipients after audit completion. Research suggests that for education efforts to be most effective, customers need the message reinforced. This is particularly true for residential customers, although staff and time constrained non-residential customers would also benefit from follow-up services, as evidenced in the ABAG research. Programs should build into their audit processes (and potentially other non-resource efforts, such as education) time and resources to follow-up with customers on specific recommendations.

Ensure that auditors have proper training to provide audits effectively (AR5). One of the programs included in this evaluation (CYES) changed their program process mid-cycle to formally train the youth providing the audits. Prior to this change, youth received minimal training, although program implementation staff did not feel the information provided to them was sufficient to ensure the services were delivered consistently. Additionally, the youth were not provided with a checklist or form to record information and/or recommendations provided to customers. While seemingly apparent in program design and delivery, providing proper training and materials to deliver audit services is a key component to an effective audit process that was highlighted in the evaluation of the CYES program.

2.1.4 Section Organization

The remainder of this chapter presents detailed information on the results of the audit indirect impact evaluation as follows:

- Description of the audit process (Section 2.2)
- Analytic approach (Section 2.3)
- Association of Monterey Bay Area Governments Survey Results (Section 2.4)
- Community Energy Partnerships / Energy Coalition Residential Survey Results (Section 2.5)
- Community Energy Partnerships / Energy Coalition Small Business Survey Results (Section 2.6)
- California Youth Energy Services Survey Results (Section 2.7)
- Association for Bay Area Governments Results (Section 2.8)

2.2 Summary of Audit Process

Energy audit is a term used generically, despite the fact that there is considerable variability in the available types of audits. The types of audits range from a walk-through of a facility to an extensive economic analysis that selects only the projects that will yield cost-effective results; however, they typically fall within one of three categories:

- **Simple audit.** This audit, also referred to as a walk-through or screening audit, is the most basic of the three. This includes minimal time speaking with facility personnel and a walk-through of the facility to identify energy-saving opportunities. This audit type may also include a review of energy

bills. The simple audit may serve as the basis for a more rigorous, follow-up audit, or it may be the only audit conducted for the building.

- **General audit.** A step-up from the simple audit, a general audit collects more detailed information about a facility's operations and performance. At a minimum, utility bills are acquired and reviewed longitudinally to denote any patterns in energy use (e.g., daily patterns, seasonal patterns). The general audit also strives to understand the systems that are major consumers of energy in the facility, such as motors, HVAC systems, and lighting. This audit also typically provides the financial implications for the organization or building, such as cost of the technology and savings resulting from the investment.
- **Investment-grade audit.** Also referred to as a comprehensive or technical analysis audit, the investment-grade audit is typically employed for larger, system-wide energy efficiency projects. The audit expands on the general audit and models the energy use and savings resulting from the investment to calculate the return on investment (ROI). When competing for non-energy related capital funds, facility managers rely on ROI analyses to obtain buy-in for these energy efficiency projects.

The investment-grade audit may also provide a building simulation that leverages existing utility data and potential data resulting from submetering of energy consuming equipment data. This is used to show the current (baseline) energy use and the energy use after adopting the proposed technologies. This is also common for follow-up engineering analyses to be completed to verify the audit yields the estimated results.

Programs vary from one another in the types of audits they offer. There is also variation *within* programs in the audits performed, depending on the program's targeted market. Additionally, there are also programs that provide a three-pronged, or multi-tiered, audit approach that, in a step-wise fashion, incorporates all three types of audits noted above for each program participant.

Audits primarily drive resource savings. The focus for this evaluation plan is any behaviors or activities resulting based on information provided through the audit that are not being captured in the resource component of the impact evaluation. Examples include behavioral changes where specific savings values can be tied to those changes, and technology changes, where technology is purchased and installed outside of any utility program offering.

Audit evaluations that identified indirect savings estimates determined the extent to which specific recommendations have been implemented by participants and the impact of the program on their decision to take the action (net-to-gross). Energy savings were quantified for actions taken by the participant after participating in the audit as discussed in the next section.

2.3 Analytic Approach

This section outlines the survey and analysis approach for each of the audit surveys, excluding the research for the ABAG study. The survey and analysis approach for that study is detailed within its section.

2.3.1 Program and sample review

The evaluation team identified programs for which audit studies should be completed. As a general rule, a program would receive an audit study if the program manager indicated that participants received energy efficiency recommendations resulting from the audit process that did not immediately and directly result

in resource savings through the program or another utility program. Ideally, these recommendations would be provided to customers through a report or other formal communication.

In addition to the recommendation process, the evaluation team only included programs where it was feasible to obtain contact details. As detailed throughout this report, tracking systems varied considerably in the level of customer information captured (if they captured the information at all). This was also true of audit recipients. Some programs, such as the CEP, developed a tracking system that included recommendations details. This information allowed the evaluation to probe customers on those specific recommendations, thereby improving the data quality. Other programs only captured contact information.

Once the prioritization process was complete, the evaluation team reviewed program documentation. This review identified the types of information and recommendations made to program participants to be incorporated into the audit evaluation. Each survey instrument was then adapted to include these recommendations.

The evaluation team then reviewed the participant data provided by program managers. Evaluators reviewed this participant data to identify the feasibility of evaluating the program and inform survey and study design.

2.3.2 Survey Structure and Net Savings Analysis Methodology

Based on the review of the program documentation and participant data, evaluators modified each survey to assess the level of application of recommendations by program participants, and whether the activity was a result of program audit efforts. The level of details regarding the recommendations will shaped the flow of the survey.

For each of the audit surveys, PA first assessed what information or recommendations participants received through the audit or report (e.g., install an energy efficient refrigerator or turn down water heater temperature). For each item mentioned and/or verified by the respondent, the survey asked if the respondent took action by purchasing the recommended technology or by making behavioral changes on their own without participating in any other energy efficiency program. In the event the program did not provide details on the recommendations resulting from the audit for each participant, the survey first asked if the contractor made specific recommendations informed by the program documentation review task. For each recommendation affirmed, the survey then reviewed if respondent acted on the recommendation as a result of the program audit.

If the program provided details on recommendations made for each sample point, then the survey first asked respondents to top-of-mind tell us what recommendations were made through the program audit. This question was followed by a confirmation of recommendation information relayed in the sample source if not mentioned top-of-mind.

Gross savings estimates were made for each technology installed or behavioral change made by the respondent. PA worked with Summit Blue to develop questions that captured the information necessary for gross savings assessments. This series of questions included equipment and household characteristics, as well as household behaviors. The processes used for estimating gross savings are discussed, in detail, in Appendix E, Gross Analysis Methods.

The net savings analysis is based on a question that asks the respondent to assess, on a 0 to 10 scale, whether the program influenced them to make a behavioral change or purchase the energy-efficient

equipment.[11] This question was asked for each behavior or technology the participant said they implemented, for which the gross savings were estimated (as seen in Section 1.4.3).

The participant's response to the influence questions serve as the primary driver for estimating the net energy savings attributable to the program. The scale rating is converted to a percentage and provides a direct multiplier to the gross savings, as discussed in Section 1.4, Approach and Methodology for Estimating Gross and Net Energy Savings. The resulting savings for each audit survey are presented within this chapter as both annual and across the measure's effective useful life (EUL). Appendix D at the end of this report details the assumptions related to each measure's EUL and source or rationale for that assumption.

2.4 Association of Monterey Bay Area Governments Survey Results

The Association of Monterey Bay Area Governments (AMBAG) provides a multitude of services to all customer sectors within the counties of Santa Cruz, San Benito, and Monterey. AMBAG works with American Synergy and Staples Marketing to deliver program services, which include turnkey direct installation of measures in single family and multifamily buildings, direct installation of select electric measures in small hospitality organizations, and energy efficiency services to municipal facilities.

The program also provides homeowners with a free home energy audit and survey. An AMBAG representative visits the home and completes a PG&E survey[12] with homeowners regarding energy using equipment in the home and the participant's energy conservation practices. While doing the walk-through survey, the representative also verbally communicates recommendations for improving the energy efficiency of the home.

Upon completion of the audit, the program processes the survey results and sends a report to the participant. The analysis compares the customers' energy use to neighboring residents and assesses the energy costs related to various end-uses, including central air conditioning, water heater, refrigerators, and a heating system. The report documents energy saving improvements and actions participants can take to save energy in their home as well as a range of savings associated with those activities.

This section focuses on the free home energy audit implemented by the AMBAG program. The evaluation team selected this program to estimate indirect impacts due to the fact that the program provides customers with a document of recommendations. Additionally, evaluators review program documentation and clearly identify the recommendations made to customers; this information played a key role in the survey design and data collection processes.

2.4.1 Study and Sampling Methodology

While the program materials provided a basis to understand which recommendations might have been made to customers, the program database did not document the actual recommendations made to each customer. Having these recommendations documented would have allowed survey interviewers to verify audit results with survey respondents. Program managers confirmed this information was not captured

[11] Note that the equipment deemed as energy-efficient is retrieved via self-report and is not verified in person. There may be some bias introduced due to this self-reporting aspect, which we assume to be within the required level of precisions.

[12] This survey was initially designed for a PG&E program, but is administered independently by AMBAG.

electronically; however, having the customer-specific recommendations would have allowed evaluators to prompt on specific recommendations and develop better indirect impact estimates. This is particularly true, since there could have been considerable time lapse between the survey and service (e.g., greater than a year).

The residential participant database contained contact information for 1,199 audits. In order to interview enough households to provide statistically robust data, a sample of 600 households was randomly drawn from the participant population. From this sample, we conducted 176 interviews between March 3, 2009 and April 4, 2009. Table 2-4 below provides the overall survey responses rate for the AMBAG survey.

Table 2-4. AMBAG Residential Survey Response Rate

Program population	**1,199**
Starting sample	**600**
No/bad phone number	105
Ineligible[13]	94
Adjusted sample	**401**
Refused	46
Language barrier	59
Over 12 attempts made; no longer active sample	120
Completed interviews	**176**
Response rate	**43.9%**

2.4.2 Gross and Net Savings Results

As part of the AMBAG free home energy audit telephone survey, 176 participants answered questions regarding the recommended equipment purchases and behavior changes they have made since participation. For the first step in estimating the indirect impacts, we assess the annual gross and net savings reported by survey respondents that indicated they followed recommendations made by auditors.

Fifty-seven of 176 participants that responded to the survey (32% of respondents) reported making at least one behavioral change or purchase related to recommendations received from the program. The survey asked if the respondents received a rebate from a utility program for any purchases made. These respondents confirmed that they had not received a utility rebate for the equipment. Five of the 176 participants responded "don't know" when asked about specific recommendations. These five participants were dropped from analysis.

Table 2-5 through Table 2-7 detail the gross and net kWh, kW, and therms savings resulting from installation of individual measures or behavior changes reported by these 57 households. The tables present the information annually and across the effective useful life (EUL) of the measure (See Appendix D for EUL assumptions). Note that the net-to-gross ratios differ for kWh, kW, and therms impacts. This is

[13] "Ineligible" includes those records in which no household member recalled participating in the program or receiving the report.

due to the fact that the results are weighted by respective savings, which differs for each measure and each case.

As seen in Table 2-5, the installation of CFLs realized the greatest annual kWh savings (both net and gross). Significant savings were also achieved through customer reports of behavioral changes, such as turning off lights when not in use or water saving actions (e.g., taking shorter showers and reducing water pressure).

Table 2-5. Detailed Annual and EUL kWh Savings Results from AMBAG Residential Survey *(n=57 Respondents who took Action on One or More Recommendation(s)) (AF6)*

Measure	Count	Annual kWh Savings		Lifecycle kWh Savings	
		Gross savings	Net savings	Gross savings	Net savings
Replace refrigerator	4	444	345	4,495	3,494
Install window caulking	1	1	0	2	1
Install weather-stripping	3	73	73	110	109
Replace windows	1	94	9	1,356	136
Replace clothes washer	4	73	61	578	488
Replace dishwasher	1	25	25	203	203
Install CFLS	17	12,208	9,649	54,962	43,441
Install solar screens	6	344	244	4,977	3,524
Turn down thermostat during heating season	10	711	462	2,589	1,683
Use fans instead of air conditioning	1	7	5	25	20
Turn off lights when not in use	10	3,018	2,605	10,992	9,489
Close shades	1	14	13	51	46
Take shorter showers	1	2,620	2,096	9,544	7,635
Use full load in clothes washer	3	45	39	165	143
Reduce household water pressure	1	925	925	3,369	3,369
Unplug electronics when not in use	4	459	400	1,673	1,459
Full Load Dishwashing	2	95	88	344	321
Other - Clothes Dryer	3	82	66	655	524
Total	**73**	**21,237**	**17,107**	**96,091**	**76,085**
Average per respondent who took action on recommendation (n=57)		**373**	**300**	**1,686**	**1,335**

Table 2-6 provides the kW savings resulting from the AMBAG free home energy audit. These savings are presented both annually and across the EUL of the measure.

Table 2-6. Detailed kW Savings Results from AMBAG Residential Survey *(n=57 Respondents who took Action on One or More Recommendation(s)) (AF7)*

Measure	Count	Annual kW Savings	
		Gross savings	Net savings
Replace refrigerator	4	0.07	0.05
Install weather-stripping	3	0.01	0.01
Replace windows	1	0.22	0.02
Replace clothes washer	4	0.01	0.01
Install CFLS	21	1.31	1.04
Install solar screens	6	0.4	0.28
Use fans instead of air conditioning	1	0.06	0.04
Turn off lights when not in use	10	0.33	0.28
Close shades	1	0.04	0.04
Take shorter showers	1	0.27	0.21
Reduce household water pressure	1	0.09	0.09
Unplug electronics when not in use	4	0.05	0.04
Full Load Dishwashing	2	0.01	0.01
Other - Clothes Dryer	3	0.03	0.03
Total	**58**	**2.9**	**2.2**
Average per respondent who followed recommendation (n=57)		**0.05**	**0.04**

As seen in Table 2-7, lowering the thermostat setting during the heating season comprised the bulk of the gross and net therms savings. Replacing windows also resulted in significant savings.

Table 2-7. Detailed Therms Savings Results from AMBAG Residential Survey *(n=57 Respondents who Followed Recommendation) (AF8)*

Measure	Count	Annual Therms Savings		Lifecycle Therms Savings	
		Gross savings	Net savings	Gross savings	Net savings
Replace refrigerator	4	-0.7	-0.6	-6.7	-5.7
Install water heater blanket	1	15.2	15.2	121.4	121.4
Install window caulking	1	2.3	1.4	8.5	5.1
Install weather-stripping	3	13.0	11.3	19.6	17.0
Replace windows	1	156.1	15.6	2,256.8	225.7
Replace water heater	1	34.6	27.7	275.8	220.7
Replace clothes washer	4	29.0	24.5	230.9	194.8
Replace dishwasher	1	1.2	1.2	9.6	9.6
Replace heating system	1	41.9	0.0	606.3	0.0
Install CFLS	17	-242.6	-183.0	-1,092.4	-823.9
Install low-flow showerheads and aerators	1	14.3	14.3	103.4	103.4
Install solar screens	6	-11.9	-5.5	-171.9	-79.2
Turn down thermostat during heating season	10	277.6	123.4	1,011.1	449.4
Lower hot water temperature	3	4.3	2.5	15.7	8.9
Turn off lights when not in use	10	-49.5	-41.4	-180.2	-150.9
Replace heating filter	1	5.8	4.6	21.0	16.8
Close shades	1	-0.7	-0.7	-2.7	-2.4
Use cold water in clothes washer	1	5.8	4.1	21.2	14.8
Use full load in clothes washer	3	10.6	8.8	38.7	32.2
Unplug electronics when not in use	4	-5.6	-4.2	-20.3	-15.4
Full Load Dishwashing	2	11.8	11.0	42.9	40.1
Other - Clothes Dryer	3	2.4	1.9	19.0	15.2
Total	**79**	**315.0**	**32.1**	**3,327.5**	**397.3**
Average per respondent who followed recommendation (n=57)		**5.5**	**0.6**	**58.4**	**7.0**

The data detailed in the above tables are calculated for the households that indicated they followed a recommendation made by the auditor. To obtain a per household savings estimate, it is necessary to apply the savings across all households surveyed, regardless of whether they said they had followed an auditors' recommendations.

We then extrapolate the analysis to the survey responses to provide a per participant estimate, as seen in Table 2-8 below. The audit service provided through the AMBAG program yields a net per participant annual savings of approximately 100 kWh, 0.01 kW, and .2 therms. The lifecycle savings yield slightly different net-to-gross ratios than the annual savings, most significantly for the kW savings. This difference is a result of higher attribution for measures that have shorter EULs, which in turn decrease the lifecycle net-to-gross ratio for kW savings.

Table 2-8. Average Indirect Impacts per Household for AMBAG Residential *(n=171 Survey Respondents) (AF9)*

Savings	kWh savings			kW savings			therm savings		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	124	100	81%	0.02	0.01	67%	1.8	0.2	10%
Lifecycle Savings	562	445	79%	NA	NA	NA	19.5	2.3	12%

Table 2-8 shows that the net-to-gross ratios for annual and lifecycle therms savings are 10 and 12%, respectively. However, it is important to note that the savings take into account therms penalties applied where recommendations would have HVAC interaction effects. Less efficient equipment (e.g., CFLs) tends to emit heat. The assumption is that during the heating season, this energy goes to warm the conditioned space, thus offsetting the some of the need for space heating. Therefore, the removal of the less efficient equipment has the affect of reducing the amount of heat emitting from the equipment and increasing the natural gas required to heat the home.

As noted in the above table, the program realized the greatest kWh savings from CFL installations. These installations also had an impact on the overall therms savings. These negative savings, as well as high program attribution reported by participants, reduced the net-to-gross ratio for therms savings.

The below Table 2-9 shows the level of precision at the 90% confidence interval around several statistics: the percentage of participants that made a change and program attribution (or net-to-gross ratios). As both gross and net savings estimates are derived from survey results, it is necessary to account for sampling error by estimating error bands. We recognize there are other potential sources of error that could affect the savings estimates which are not represented in the error bands below. These are discussed in the Introduction within this report under the Section 1.4.2, Accounting for Sampling Error and Uncertainty.

Table 2-9. AMBAG Level of Precision around Survey Statistics *(Population=1,276 Households; 171 Surveyed)*

Analysis	Point estimate	Level of precision at 90 percent confidence level
Percent of participants that made a change	32%	+/- 5.4%
Annual kWh net-to-gross ratio	81%	+/- 7.9%
Annual kW net-to-gross ratio	67%	+/- 9.5%
Annual therms net-to-gross ratio	10%	+/- 6.1%

The final step is to extrapolate this data to the population of program participants. The survey sample was randomly selected from a program population of 1,276 households. Applying the above average analysis results in a net impact of approximately 124,000 kWh, 16 kW, and 232 therms (Table 2-10). The net savings across the life of the measure are approximately 495,000 kWh, 75 kW, and 2,000 therms.

Table 2-10. Indirect Impacts Applied to AMBAG Residential Participants in the 2006 – 2008 Program Cycle *(Population=1,276 Households) (AF10)*

Savings	kWh savings		kW savings		therms savings	
	Gross	Net	Gross	Net	Gross	Net
Annual Savings	158,471	127,649	22	16	2,350	239
Lifecycle Savings	717,030	567,746	NA	NA	24,830	2,965

2.4.3 Recommendations for Future Program and Evaluation Efforts and Next Steps

***This AMBAG audit effort funded and directed by the CPUC is the first for these programs to capture program-attributable indirect impacts. This should not be the last* (AR6).** Programs mature over time, as do households and their depth of knowledge related to energy efficiency and conservation. We recommend that these types of research be conducted regularly (e.g., once a program cycle) to capture and provide input to utilities regarding their non-resource efforts.

As noted above, the AMBAG program does not capture recommendation data related to each program participant. Collecting this recommendation data and linking it to the participant contact information will enable more accurate estimates of indirect impacts resulting from non-resource program elements, such as the free home energy survey.

2.5 Community Energy Partnerships / Energy Coalition Residential Survey Results

The Community Energy Partnerships / Energy Coalition (CEP) program is a multidimensional program that has the goal of delivering sustainable energy-efficiency services to customers in Southern California. The two participating utilities—Southern California Edison and Southern California Gas—partnered with the Energy Coalition to administer the program. The program's primary focus was delivering energy

savings through a variety of initiatives including direct installation to residential and small business customers.

This section focuses on the direct installation and audit services offered to residential customers (also referred to as the Tune-Up program). Through this offering, the Energy Coalition completes walk-through audits and provides energy efficiency and energy conservation recommendations. The recommendations include specific appliances and household equipment installation recommendations (e.g., install an ENERGY STAR refrigerator) and low or no-cost behaviors modifications that the home owner could implement (e.g., turn down the thermostat during the heating season). The program also provides direct installation of measures through the audit process to customers. Measures include efficient lighting, low-flow showerheads, faucet aerators, and weather-stripping.

2.5.1 Study and Sampling Methodology

The Energy Coalition developed a web-based database that captures all activities through the Tune-Up component of the program. This database captures project-specific details such as the date the program installed the measure(s), contractor name, customer contact information, and whether the customer completed a follow-up survey and the results of that survey.

The database also provides specific audit details, completed by the contractor. Information retained includes energy-saving recommendations and utility programs to which program participants were referred. Having this level of documentation allowed survey interviewers to use specific audit recommendations with survey respondents, which in turn strengthened the study.

The residential participant database, from which we sampled, contained both resource measure and walk-through recommendation data for the 4,791 audits completed over the entire program cycle (through October 2009). In order to interview enough households to provide statistically robust data, a sample of 400 households was randomly drawn from the participant population. From this sample, we conducted 150 interviews between December 20, 2008 and January 22, 2009. Table 2-11 provides an overview of the survey responses rate. Overall, the CEP residential survey had a response rate of 54%. This high response rate reduces potential non-response bias. One of the 150 participants interviewed responded "don't know" when asked about specific recommendations. This participant was dropped from analysis.

Table 2-11. CEP Residential Survey Response Rate

Program population (January 2006 – October 2009)	**4,791**
Starting sample	**400**
No/bad phone number	111
Ineligible[14]	12
Adjusted sample	**277**
Refused	37
Language barrier	22
Over 12 attempts made; no longer active sample	68
Completed interviews	**150**
Response rate	**54%**

In order to obtain accurate responses about recommendations that were made as part of the audit, the interviewer first asked respondents if they recalled any of the recommendations that were made by the auditor. If the recommendations that were recorded in the participant population data were not mentioned by the respondent, the survey prompted him or her regarding those specific recommendations.

2.5.2 Gross and Net Savings Results

As part of the CEP Residential telephone survey, 150 participants answered questions regarding the recommended equipment purchases and behavior changes they have made since receiving the audit. To estimate indirect impacts, we first assess the annual gross and net savings reported by survey respondents that indicated they followed recommendations made by auditors.

Forty-six out of 150 respondents (31%) reported making at least one behavioral change or purchase-related decision since receiving the audit. The survey also asked if the respondents received a rebate from a utility program for the purchases made. Respondents confirmed they did not receive a utility rebate for the equipment.

Table 2-12 through Table 2-14 detail the annual gross and net kWh, kW, and therms savings resulting through the installation of individual measures or the modifications to behaviors, as reported by respondents. The tables present the information annually and across the effective useful life (EUL) of the measure. Note that the net-to-gross ratios differ for kWh and kW impacts. This is due to the fact that the results are weighted by respective savings, which differs for each measure and each case.

As Table 2-12 illustrates, the retirement of a freezer realized the greatest annual kWh savings (both net and gross) followed by the installation of CFLs (net) and the retirement of a refrigerator (net). Retiring a freezer was identified by eight respondents as actions taken after the audit, which realized the highest gross and net kWh savings for the program. This activity, which in some ways takes a higher commitment from respondents than other actions (such as installing CFLs), indicates that the program is focusing its

[14] "Ineligible" includes those records in which no household member recalled participating in the program.

recommendations on higher energy saving opportunities as well as the more standard opportunities. While cleaning or replacing an AC filter realized a large gross kWh savings, participants claimed low program attribution for performing that action, reducing the net savings.

Table 2-12. Detailed Annual kWh Savings Results from CEP Residential Survey *(n=46 Respondents who took Action on One or More Recommendation(s)) (AF11)*

Measure	Count	Annual kWh Savings		Lifecycle kWh Savings	
		Gross savings	Net savings	Gross savings	Net savings
Installed energy efficient refrigerator	2	262	210	2,658	2,126
Installed windows	5	863	759	12,478	10,972
Installed CFLs	5	4,232	2,873	19,051	12,936
Less heating	9	131	131	475	475
Less cooling	2	158	95	577	346
Retire refrigerator	3	3,576	1,966	13,026	7,163
Retire freezer	8	7,044	4,924	20,594	14,396
Turn off lights	2	440	426	1,602	1,551
Unplug electronics	4	266	238	970	866
Clean refrigerator coil and gaskets	10	186	99	679	362
Clean/replace AC filter	33	3,517	1,591	12,811	5,797
Total	**83**	**20,676**	**13,313**	**84,922**	**56,991**
Average per respondent who took action on recommendation (n=46)		**449**	**289**	**1846**	**1239**

Table 2-13 provides the annual kW savings resulting from the CEP residential audit. The analysis showed a gross impact of approximately 7 kW and net impact of 4 kW annually for those that reported making changes.

Table 2-13. Detailed kW Savings Results from CEP Residential Survey (n=46 *Respondents who took Action on One or More Recommendation(s)) (AF12)*

Measure	Count	Annual kW Savings	
		Gross savings	Net savings
Installed energy efficient refrigerator	2	0.05	0.04
Installed weather-stripping	1	0.01	0.01
Installed windows	5	0.83	0.71
Installed CFLs	5	0.50	0.35
Less cooling	2	0.13	0.08
Retire refrigerator	3	0.66	0.37
Retire freezer	8	1.27	0.91
Turn off lights	2	0.08	0.08
Unplug electronics	4	0.00	0.00
Clean refrigerator coil and gaskets	10	0.04	0.02
Clean/replace AC filter	33	3.15	1.44
Total	**75**	**6.7**	**4.0**
Average per respondent that who action on recommendation (n=46)		**0.15**	**0.09**

As seen in Table 2-14, lowering the thermostat setting during the heating season comprised the bulk of the gross and net therms savings, followed by window installation. While installing a new water heater realized a large amount of gross savings, the participant claimed zero program attribution, reducing the net savings to 0 therms. Likewise, much of the therms savings realized by cleaning or replacing furnace filters was reduced due to low program attribution.

Table 2-14 also includes therm penalties applied where recommendations would have HVAC interaction effects. Less efficient equipment (e.g., CFLs) tends to emit heat. The assumption is that during the heating season, this energy goes to warm the conditioned space, thus offsetting some of the need for space heating. Therefore, the removal of the less efficient equipment has the effect of reducing the amount of heat emitting from those equipment and increasing the natural gas required to heat the home.

Table 2-14. Detailed Annual Therms Savings Results from CEP Residential Survey *(n=46 Respondents who Followed Recommendation) (AF13)*

Measure	Count	Annual Therms Savings		Lifecycle Therms Savings	
		Gross savings	Net savings	Gross savings	Net savings
Installed energy efficient refrigerator	2	(0.5)	(0.4)	(5)	(4)
Installed weather-stripping	1	1.6	0.8	2	1
Installed windows	5	107.7	85.6	1,557	1,238
Installed water heater	1	38.3	-	306	-
Installed CFLs	5	(6.5)	(4.2)	(29)	(19)
Less heating	9	374.0	236.2	1,362	860
Lower hot water temperature	3	7.4	5.9	27	21
Retire refrigerator	3	(2.3)	(0.7)	(8)	(3)
Retire freezer	8	(3.4)	(2.1)	(10)	(6)
Turn off lights	2	(0.9)	(0.8)	(3)	(3)
Unplug electronics	4	(0.5)	(0.4)	(2)	(2)
Clean refrigerator coil and gaskets	10	(0.4)	(0.2)	(1)	(1)
Clean/replace furnace filter	22	29.5	11.9	107	43
Total	**75**	**544**	**332**	**3,303**	**2,128**
Average per respondent that who action on recommendation (n=46)		**12**	**7**	**72**	**46**

The information detailed in the above tables is calculated for the households that indicated they followed a recommendation made by the auditor. To obtain a per household savings estimate, it is necessary to apply the savings across all households surveyed, regardless of if they said they followed an auditors' recommendations.

The analysis is extrapolated to the survey responses to provide a per participant estimate. One hundred fifty households responded to the CEP survey and one participant was dropped from net impact analysis due to missing data. The audit service provided through the CEP program yields a net per participant annual savings of approximately 89 kWh, 0.03 kW, and 2 therms (Table 2-15). The net lifecycle savings are 382 kWh and 14 therms per participant.

Table 2-15. Average Indirect Impacts per Household for CEP Residential *(n=149 Survey Respondents) (AF14)*

Savings	kWh savings			kW savings (peak coincident)			therms savings		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	139	89	64%	0.05	0.03	60%	4	2	61%
Lifecycle Savings	570	382	67%	NA	NA	NA	22	14	64%

The below Table 2-16 shows the level of precision at the 90% confidence interval around several statistics: the percentage of participants that made a change and program attribution (or net-to-gross ratios). As both gross and net savings estimates are derived from survey results, it is necessary to account for sampling error by estimating error bands. We recognize there are other potential sources of error that could affect the savings estimates which are not represented in the error bands below. These are discussed in the Introduction within this report under Section 1.4.2.

Table 2-16. CEP Residential Level of Precision around Survey Statistics *(Population=4,906 Households; 150 Surveyed)*

Analysis	Point estimate	Level of precision at 90 percent confidence level
Percent of businesses that made a change	30%	+/- 6.1%
Annual kWh Net-to-gross Ratio	64%	+/- 11.5%
Annual kW Net-to-gross Ratio	60%	+/- 11.7%
Annual Therms Net-to-gross Ratio	61%	+/- 11.6%

The final step is to extrapolate this data to the population of program participants. The survey sample was randomly selected from a program population of 4,906 households.[15] Applying the above average analysis results in a net impact of approximately 438,338 kWh, 132 kW, and 10.916 therms (Table 2-17).

[15] Number of participants for the 2006 – 2008 program cycle obtained through Energy Coalition's Tune-up Database, report ran 10/22/2009 searching for residential participants from 1/1/2006 through 12/31/2008.

Table 2-17. Indirect Impacts Applied to CEP Residential Participants for 2006 – 2008 Program Cycle *(Population=4,906 Households) (AF15)*

Savings	kWh savings		kW savings		therms savings	
	Gross	Net	Gross	Net	Gross	Net
Annual Savings	680,776	438,338	221	132	17,917	10,916
Lifecycle Savings	2,796,172	1,876,497	NA	NA	108,763	70,053

2.5.3 Recommendations for Future Program and Evaluation Efforts and Next Steps

As noted above, the CEP program does well in capturing their non-resource activities. The program also appears to be referring customers to other programs, which is also documented in the tracking database (and partially confirmed in the survey by about half of respondents).

***The CEP residential program should continue to clearly document recommendations and other non-resource activities provided to households. As the program shifts, the database should shift along with it* (AR7).** Additionally, this effort, funded and directed by the CPUC, is the first of these programs to capture program-attributable indirect impacts. This should not be the last. Programs mature over time, as do households and their depth of knowledge related to energy efficiency and conservation. We recommend that these types of research be conducted regularly (e.g., once a program cycle) to capture and provide input to utilities regarding their non-resource efforts. Recommended database fields are presented in Appendix M, Program Database Tracking System Recommendations.

2.6 Community Energy Partnerships / Energy Coalition Small Business Survey Results

The Community Energy Partnerships / Energy Coalition (CEP) program is a multidimensional program that has the goal of delivering sustainable energy-efficiency services to customers in Southern California. The two participating utilities—Southern California Edison and Southern California Gas—partnered with the Energy Coalition to administer the program. The program's primary focus was delivering energy savings through a variety of initiatives including direct installation to small business customers.

This section focuses on the direct installation and audit services offered to small business customers (also referred to as the Tune-Up program). Through this offering, the Energy Coalition completes walk-through audits and provides energy efficiency and energy conservation recommendations. The recommendations include equipment specific installation recommendations (e.g., replace heating system and install tinted window film) and low or no-cost behaviors modifications that the business could implement (e.g., turn down the thermostat during the heating season). The program also provides direct installation of measures through the audit process to customers. Measures include efficient lighting, pre-rinse spray valves, and the installation of LED exit signs.

2.6.1 Study and Sampling Methodology

The Energy Coalition developed a web-based database that captures all activities through the Tune-Up component of the program. This database captures project-specific details, such as the date the program

installed measure(s), contractor name, customer contact information, and whether the customer completed a follow-up survey and the results of that survey.

The database also provides specific audit details, completed by the contractor. Information retained includes energy-saving recommendations and utility programs to which program participants were referred. Having these recommendations documented was essential in that it allowed survey interviewers to verify specific audit recommendations and results with survey respondents, which in turn strengthened the study.

The small business participant database from which we sampled contained both resource measure and walk-through recommendation data for 489[16] audits. In order to interview enough participants to provide statistically robust data, the survey sample comprised of a census of all participants. From this sample, we conducted 177 interviews between March 12, 2009 and April 6, 2009. Table 2-18 below provides the overall survey responses rate of 50%. This high response rate reduces potential non-response bias.

Table 2-18. CEP Small Business Survey Response Rate

Program population (January 2006 – October 2009)	**489**
Starting sample	**489**
No/bad phone number	98
Ineligible[17]	38
Adjusted sample	**353**
Refused	73
Language barrier	31
Over 12 attempts made; no longer active sample	72
Completed interviews	**177**
Response rate	**50.1%**

In order to obtain accurate responses about recommendations that were made as part of the audit, the interviewer first asked respondents if they recalled any of the recommendations that were made by the auditor. If the recommendations that were recorded in the participant population data were not mentioned by the respondent, the survey prompted him or her regarding those specific recommendations.

2.6.2 Gross and Net Savings Results

As part of the CEP Small Business telephone survey, 177 participants answered questions regarding the recommended equipment purchases and behavior changes they have made since receiving the audit. To estimate the indirect impacts, we first assess the annual gross and net savings reported by survey respondents that said they followed recommendations made by auditors.

[16] Note: the number of audits represented in this sample table (489) is higher than the number presented as the population for the 2006 – 2008 program cycle. There may be duplicate cases in the sample that are not accounted for in the population counts, increasing the population size.

[17] "Ineligible" includes those records in which no one at the business recalled participating in the program.

Forty-eight out of 177 respondents (27.1%) reported making at least one behavioral change or purchase-related decision since receiving the audit. The survey also asked if the respondents received a rebate from a utility program for the purchases recommended by the program. Respondents confirmed they did not receive a utility rebate for the equipment. Six of the 177 respondents surveyed responded "don't know" when asked about specific recommendations. These participants were dropped from the net impact analysis.

Table 2-19 and Table 2-20 detail the annual gross and net kWh and kW savings resulting from installation of individual measures or modifications to behaviors, as reported by respondents. The tables present the information annually and across the effective useful life (EUL) of the measure. The net-to-gross ratios differ for kWh and kW impacts because the results are weighted by respective savings, which differs for each measure and each case.

Respondents did not report changes that provided significant therms savings. Only two respondents mentioned activities that yielded positive therms savings – lowering heating thermostat and adding weather stripping. These two measures accounted for only 20 therms across all survey respondents. If extrapolated to the population, this would result in a gross annual therms savings of 54 therms and annual net savings of 46 therms; therefore, therms savings are not detailed within this analysis.

As Table 2-19 illustrates, the net annual kWh indirect impacts calculated for the CEP Small business program for survey respondents was 26,819 kWh. The net lifecycle savings is 123,781 kWh. Lighting measures (retrofitting lighting and turning off lights) comprised the greatest savings, although a significant amount of kWh savings was also attributed to maintaining their HVAC systems through the cleaning of filters.

Table 2-19. Detailed Annual kWh Savings Results from CEP Small Business Survey
(n=48 Respondents who took Action on One or More Recommendation(s)) (AF16)

Measure	Count	Annual kWh Savings		EUL kWh Savings	
		Gross savings	Net savings	Gross savings	Net savings
Install tinted window film	1	1,383	1,106	10,017	8,014
Add interior shades/drapes	1	564	451	4,084	3,267
Add weather stripping	1	10	7	36	25
Add door shoe	1	30	27	217	196
Replace water heater	1	19	9	205	103
Replace cooling system	1	910	728	9,878	7,903
Add or retrofit lighting	2	9,555	5,114	55,452	29,682
Lower heating thermostat	1	20	16	73	58
Increase AC setting	2	1,854	534	6,752	1,944
Turn off lights	5	7,143	6,386	26,020	23,263
Clean refrigerator coils and gasket	18	3,193	2,413	11,632	8,789
Replace or clean the AC filter	25	12,755	8,892	46,461	32,392
Other - Wrap Hot water heater	1	45	36	227	181
Other - Replace vending machine	1	1,099	1,099	7,965	7,965
Total	**61**	**38,579**	**26,819**	**179,019**	**123,781**
Average per respondent who took action on recommendation (n=48)		**804**	**559**	**3,730**	**2,579**

Table 2-20 provides the kW savings resulting from the CEP small commercial audit (annual and across the EUL of the measure). The annual kW savings have a gross impact of approximately 12 kW and net impact of nearly 9 kW annually for those that reported making changes.

Table 2-20. Detailed kW Savings Results from CEP Small Business Survey *(n=48 Respondents who took Action on One or More Recommendation(s)) (AF17)*

Measure	Count	Annual kW Savings	
		Gross savings	Net savings
Install tinted window film	1	0.95	0.76
Add interior shades/drapes	1	0.35	0.28
Add weather stripping	1	0.04	0.03
Add door shoe	1	0.06	0.06
Replace water heater	1	0.00	0.00
Replace cooling system	1	0.40	0.32
Add or retrofit lighting	2	1.69	0.93
Lower heating thermostat	1	0.00	0.00
Increase AC setting	2	0.88	0.27
Turn off lights	5	3.20	2.77
Clean refrigerator coils and gasket	18	0.32	0.24
Replace or clean the AC filter	25	4.25	2.85
Other - Wrap Hot water heater	1	0.01	0.01
Other - Replace vending machine	1	0.00	0.00
Total	**61**	**12.2**	**8.5**
Average per respondent who took action on recommendation (n=48)		**0.25**	**0.18**

The information detailed in the above tables is calculated for the participating businesses that indicated they followed a recommendation made by the auditor. To obtain a per participant savings estimate, it is necessary to apply the savings across all businesses surveyed, regardless if they said they followed an auditors' recommendations.

The analysis is extrapolated to the survey responses to provide a per participant estimate. One hundred seventy seven participants responded to the CEP Small Business survey. Of those, six participants responded "don't know" when asked about specific recommendations. These participants were dropped from the net impact analysis. The audit service provided through the CEP Small Business program yields a net per participant annual savings of approximately 157 kWh and 0.05 kW (Table 2-21).

Table 2-21. Average Indirect Impacts per Participant for CEP Small Business Participants *(n=177 Survey Respondents) (AF18)*

Savings	kWh savings			kW savings (peak coincident)		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	227	157	70%	0.07	0.05	70%
Lifecycle Savings	1,047	724	69%	NA	NA	NA

The below Table 2-22 shows the level of precision at the 90% confidence interval around several statistics: the percentage of participants that made a change and program attribution (or net-to-gross ratios). As both gross and net savings estimates are derived from survey results, it is necessary to account for sampling error by estimating error bands. We recognize there are other potential sources of error that could affect the savings estimates which are not represented in the error bands below. These are discussed in the Introduction within this report under the Section 1.4.2, Accounting for Sampling Error and Uncertainty.

Table 2-22. CEP Small Business Level of Precision around Survey Statistics

Analysis	Point estimate	Level of precision at 90 percent confidence level
Percent of businesses that made a change	27%	+/- 4.3%
Annual kWh Net-to-gross Ratio	70%	+/- 8.6%
Annual kW Net-to-gross Ratio	70%	+/- 8.6%

The final step is to extrapolate this data to the population of program participants. When applied to the population of participants[18] from the 2006 -2008 program cycle, the net annual indirect impacts attributed to the program are 75,596 kWh and 24 kW. The stream of net savings across the EUL of each measure or behavior is 348,903 kWh (Table 2-23).

[18] Number of participants for the 2006 – 2008 program cycle obtained through Energy Coalition's Tune-up Database, report ran 10/22/2009 searching for small business participants from 1/1/2006 through 12/31/2008.

Table 2-23. Indirect Impacts Applied to CEP Small Business Participants for 2006 – 2008 Program Cycle *(Population=482 Participants) (AF19)*

Savings	kWh savings		kW savings (peak coincident)	
	Gross	Net	Gross	Net
Annual Savings	108,744	75,596	34	24
Lifecycle Savings	504,603	348,903	NA	NA

2.6.3 Recommendations for Future Program and Evaluation Efforts and Next Steps

As noted above, the CEP does well in capturing the recommendations made to businesses throughout the audit process.

California programs that provide non-resource activities, such as training and education, should continue to clearly document recommendations and other non-resource activities provided to businesses. Similarly, as the program shifts, the database should shift along with it (AR8). Additionally, this effort, funded and directed by the CPUC, is the first of these programs to capture program-attributable indirect impacts. This should not be the last. Programs mature over time, as do businesses and their depth of knowledge related to energy efficiency and conservation. We recommend that these types of research be conducted regularly (e.g., once a program cycle) to capture and provide input to utilities regarding their non-resource efforts. Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations.

2.7 California Youth Energy Services Survey Results

The California Youth Energy Services (CYES) program offers in-home audits to residents in the East Bay and Marin County areas. The program employs teams of youth to conduct the walk-through audits under the supervision of an adult auditor. During the audit, the teams recommend ways that the participant could save energy in his or her household. These recommendations include specific appliances and household equipment installation recommendations (e.g., install an ENERGY STAR refrigerator) and low or no-cost behaviors that the home owner could implement (e.g., turn down the thermostat during the heating season). As part of the audit, the teams also install energy efficient lighting, low-flow showerheads, faucet aerators, and retractable clotheslines.

Pacific Gas and Electric (PG&E) is the lead utility for the program. Rising Sun Energy Center manages and implements program delivery. They establish the procedures employed to deliver program services. They also provide relevant training to all staff, including the youth.

2.7.1 Study and Sampling Methodology

Rising Sun Energy Center provided PA Consulting Group with program participant data from which to select the survey sample. Two waves of surveys were completed as a part of this research effort. The first wave sampled a participant population from 2006-2007. The survey results show that few households (33%) recall receiving any recommendations from the program even though early in the investigative

stage program managers stated that the program provided recommendations and information through the audit process.

Given the inconsistency of the survey data with information provided by program managers, PA conducted subsequent interviews with program managers and identified that the program underwent program design changes in 2008. Program managers noted that the program recognized the need for additional training of the youth and supplementary recommendations to homeowners. Therefore, the program made operational modifications prior to the 2008 summer season and provided more formal training for the youth delivering the services. Additionally, the program began capturing recommendation information provided to each participant, which had not been done in previous years.

Given this significant shift in program efforts, the team decided to request an updated participant sample database from Rising Sun that included households serviced since the programmatic changes were made. This second effort included 2008 participants only. For this group, the program database contained data on both resource measures installed during the audit and recommendations that were made to the participant.

The program cycle savings are based solely on 2008 participants. Given the relatively small percentage of 2006 and 2007 participants that recalled the program providing recommendations (33%), we believe indirect impacts would be minimal and are not accounted for in the program cycle savings.

After de-duplication, the database contained records for 2,104 2008 program participants. In order to interview enough households to provide statistically robust data, a sample of 350 households was randomly draw from the participant population. From this sample, we conducted 73 interviews between December 20, 2008 and January 14, 2009.

Table 2-24 provides an overall survey responses rate (34%). A significant portion of households were not contacted due to non-working telephone numbers. PA conducted tracking efforts to find accurate telephone numbers without success. For future evaluations and program follow-up efforts, we recommend that better contact information be retained in the CYES database.

Table 2-24. CYES Telephone Survey Response Rate

2008 program population	**2,104**
Starting sample	**350**
No/bad phone number	132
Ineligible[19]	4
Adjusted sample	**214**
Refused	27
Language barrier	18
Over 12 attempts made; no longer active sample	96
Completed interviews	**73**
Response rate	**34%**

[19] "Ineligible" includes those records in which no household member recalled participating in the program.

In order to obtain accurate responses regarding recommendations made as a part of the audit, the interviewer first asked respondents if they recalled any of the recommendations that were made by the auditor. If the recommendations that were recorded in the participant population data were not mentioned by the respondent, the survey prompted him or her regarding those specific recommendations.

2.7.2 Gross and Net Savings Results

As a part of the CYES audit telephone survey, 73 participants answered questions regarding the recommended equipment purchases and behavior changes they have made since receiving the audit. Two of these 73 participants responded "don't know" when asked about specific recommendations. These participants were dropped from the net impact analysis. To estimate the indirect impacts, we first assess the annual gross and net savings reported by survey respondents that said they followed recommendations made by auditors.

Thirty-six out of 73 respondents, about half of those surveyed, reported making at least one behavior change or purchase-related decision since receiving the audit. The survey also asked if the respondents received a rebate from a utility program for the purchases recommended by the program and made. These respondents confirmed they did not receive a utility rebate for the equipment, meaning the savings are not duplicative of the resource savings claimed by the program.

Table 2-25 through Table 2-27 detail the annual gross and net kWh, kW, and therms savings resulting from installation of individual measures or modification to behaviors, as reported by respondents. The tables present the information annually and across the effective useful life (EUL) of the measure. The net-to-gross ratios differ for kWh, kW, and therms impacts, as the results are weighted by respective savings, which differs for each measure and each case.

Approximately 50% of those surveyed said they took action and are represented in Table 2-25 through Table 2-27. However, the sample size upon which the analysis is based is still limited (n=36); therefore, the reader should take caution in interpreting these results.

As illustrated in Table 2-25, turning off lights when not in use realized the greatest annual kWh savings (both net and gross). The installation of CFLs (outside of the direct installations provided through the program) resulted in the next highest annual kWh savings and the highest lifecycle kWh savings.

Table 2-25. Detailed Annual kWh Savings Results from CYES Residential Survey
(n=36 Respondents who took Action on One or More Recommendation(s)) (AF20)

Measure	Count	Annual kWh Savings		Lifecycle kWh Savings	
		Gross savings	Net savings	Gross savings	Net savings
Installed energy efficient refrigerators	2	98	87	989	885
Installed energy efficient clothes washer	1	21	10	164	82
Installed CFLs	8	3,692	2,767	16,623	12,457
Turn down thermostat during heating season	5	467	323	1,700	1,175
Turn up thermostat during cooling season	1	6	3	21	11
Turn off lights when not in use	8	3,931	2,986	14,319	10,876
Take shorter showers	5	218	218	795	795
Use clothesline	3	350	350	1,273	1,273
Turn on energy saving button in refrigerator	3	150	144	545	524
Reduce refrigerator temperature setting	6	180	148	656	540
Reduce water pressure	1	7	7	24	24
Unplug electronics	6	69	65	253	236
Total	**49**	**9,189**	**7,107**	**37,362**	**28,879**
Average per respondent who took action on recommendation (n=36)		**255**	**197**	**1039**	**802**

Table 2-26 provides the kW savings resulting from the CYES residential audit. The annual kW savings have a gross impact of approximately one kW and a net impact of less than one kW annually for those that reported following a recommendation.

Table 2-26. Detailed kW Savings Results from CYES Residential Survey *(n=36 Respondents who took Action on One or More Recommendation(s)) (AF21)*

Measure	Count	Annual kW Savings	
		Gross savings	Net savings
Installed energy efficient refrigerators	2	0.02	0.01
Installed energy efficient clothes washer	1	0.00	0.00
Installed CFLs	8	0.49	0.37
Turn up thermostat during cooling season	1	0.11	0.05
Turn off lights when not in use	8	0.32	0.24
Take shorter showers	5	0.02	0.02
Use clothesline	3	0.13	0.13
Turn on energy saving button in refrigerator	3	0.03	0.03
Reduce refrigerator temperature setting	6	0.03	0.03
Unplug electronics	6	0.01	0.01
Total	**43**	**1.2**	**0.9**
Average per respondent who took action on recommendation (n=36)		**0.03**	**0.03**

As Table 2-27 shows, taking shorter showers and turning down the thermostat during the heating season comprised the bulk of the therms savings. These actions also yielded significant net therms savings.

Table 2-27 also includes therm penalties applied where recommendations would have HVAC interaction effects. Less efficient equipment (e.g., CFLs) tends to emit heat. The assumption is that during the heating season, this energy goes to warm the conditioned space, thus offsetting the some of the need for space heating. Therefore, the removal of the less efficient equipment has the effect of reducing the amount of heat emitting from those equipment and increasing the natural gas required to heat the home.

Table 2-27. Detailed Annual Therms Savings Results from CYES Residential Survey *(n=36 Respondents who Followed Recommendation) (AF22)*

Measure	Count	Annual Therms Savings		Lifecycle Therms Savings	
		Gross savings	Net savings	Gross savings	Net savings
Installed energy efficient refrigerators	2	(0)	(0)	(2)	(2)
Installed weatherstripping	1	6	5	9	7
Installed windows	1	47	33	685	480
Installed energy efficient clothes washer	1	7	4	56	28
Installed CFLs	8	(7)	(5)	(31)	(23)
Installed/improved insulation	1	6	5	91	73
Installed faucet aerators/low flow showerheads	2	18	13	130	91
Turn down thermostat during heating season	5	212	94	773	343
Turn off lights when not in use	8	(6)	(5)	(22)	(17)
Take shorter showers	5	363	297	1,323	1,081
Use cold water for clothes washing	1	18	9	65	32
Use clothesline	3	20	19	72	71
Turn on energy saving button in refrigerator	3	(0)	(0)	(1)	(1)
Reduce refrigerator temperature setting	6	(0)	(0)	(1)	(1)
Reduce water pressure	1	7	7	24	24
Total	**48**	**690**	**474**	**3,171**	**2,186**
Average per respondent who took action on recommendation (n=36)		**19**	**13**	**88**	**61**

The data detailed in the above tables are calculated for the households that indicated they followed a recommendation made by the auditor. To obtain a per household savings estimate, it is necessary to apply the savings across all households surveyed, regardless if they said they followed an auditors' recommendations.

We extrapolate the analysis to the survey responses to provide a per participant estimate. Seventy three households responded to the CYES survey. The audit service provided through the CYES program yields a net per participant savings of approximately 97 kWh, 0.01 kW, and 6.5 therms (Table 2-28). The resulting net lifecycle savings is 396 kWh and 30 therms per participant.

Table 2-28. Average Indirect Impacts per Household for CYES Residential Participants for Program Year 2008 *(n=73 Survey Respondents) (AF23)*

Savings	kWh savings			kW savings			therm savings		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	129	100	77%	0.02	0.01	77%	9.7	6.7	69%
Lifecycle Savings	527	407	77%	NA	NA	NA	45	31	68%

Table 2-29 shows the level of precision at the 90% confidence interval around several statistics: the percentage of participants that made a change and program attribution (or net-to-gross ratios). As both gross and net savings estimates are derived from survey results, it is necessary to account for sampling error by estimating error bands. We recognize there are other potential sources of error that could affect the savings estimates which are not represented in the error bands below. These are discussed in the Introduction within this report under the Section 1.4.2, Accounting for Sampling Error and Uncertainty.

Table 2-29. CYES Level of Precision around Survey Statistics *(Population=5,363 Households; 73 Surveyed)*

Analysis	Point estimate	Level of precision at 90 percent confidence level
Percent of participants that made a change	49%	+/- 9.6%
Annual kWh net-to-gross ratio	77%	+/- 8.2%
Annual kW net-to-gross ratio	77%	+/- 8.2%
Annual therms net-to-gross ratio	69%	+/- 8.9%

As a final step, we extrapolate this data to the population of program participants. The survey sample was randomly selected from a program population of 2,104 households. Applying the above analysis results in an annual net impact of nearly 210,618 kWh, 27 kW, 14,058 therms, and an EUL net impact of 855,797 kWh and 64,779 therms (Table 2-30).

Table 2-30. Indirect Impacts Applied to CYES Residential Participants for 2006 – 2008 Program Cycle *(Population=5,363 Households[20]) (AF24)*

Savings	kWh savings		kW savings		therms savings	
	Gross	Net	Gross	Net	Gross	Net
Annual Savings	272,293	210,618	35	27	20,461	14,058
Lifecycle Savings	1,108,425	855,797	NA	NA	93,971	64,779

[20] Analysis is based on 2008 only households, population size 2,104.

2.7.3 Recommendations for Future Program and Evaluation Efforts and Next Steps

As noted above, the CYES program initially did not capture recommendations made during the audit process. In fact, it was not apparent that recommendations were made formally to households through the program. The revision in program documentation requirements was a positive one and survey efforts that included reference to documented recommendations proved to be more successful in ascertaining the indirect impacts as interviewers were able to reference specific program information.

The CYES program should continue to clearly document recommendations and other non-resource activities provided to households. As the program shifts, the database should shift along with it (AR9). Additionally, this effort funded and directed by the CPUC is among the first for these programs to capture program-attributable indirect impacts. This should not be the last. Programs mature over time, as do households and their depth of knowledge related to energy efficiency and conservation. We recommend that these types of research be conducted on regularly (e.g., once a program cycle) to capture and provide input to utilities regarding their non-resource efforts. Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations.

2.8 Association for Bay Area Governments

This chapter presents the approach used, key findings, and recommendations for the Association for Bay area Governments Energy Watch (ABAG) non-resource audit program. These results are segregated from the other audit surveys because, by the request of the California Public Utilities Commission (CPUC), the survey was tailored to explore the effectiveness of the program's multi-tiered audit approach.

This program operated in the 2006–2008 program cycle; however, it was discontinued for the 2009–2011 program cycle. The ABAG audit program focused on recruiting and providing energy efficiency services to local government facilities, through the use of a multi-audit approach. This multi-tiered approach consisted of three types of audit activities. The first tier of the approach is the energy assessment report, which provides participants with a snapshot of all their municipal facilities and related energy use. Program staff met with participants to review the energy assessment report and determine which facilities should be part of the next stage in the process – the walk-through audit. The results of this audit fed into the energy action plan, which reported specifically on the buildings and technologies on which the local governments should focus for energy efficiency improvements. Participants and program staff prioritized the activities presented in the energy action plan, followed by the program completing an investment-grade audit focusing on selected energy efficient measures. The final product from this investment-grade audit is an energy audit report, which included a detailed review of the cost, savings, and return on investment for projects.

The CPUC requested that we explore the effectiveness of this multi-tiered audit approach with local government facilities. Additionally, a review of progress in the 2006–2008 program cycle showed that programs experienced difficulty in engaging local governments for a variety of reasons. The CPUC requested that PA explore the reasons why energy efficiency program uptake was not higher for this non-residential sector. To fulfill these objectives, we conducted in-depth interviews of facilities that received an audit as part of the ABAG partnership program. Sixteen interviews were conducted as part of this research effort.

2.8.1 Overview of Key Findings and Recommendations

The interviews captured rich data regarding interviewed local governments' participation in the program. Additionally, the interviews collected background information from each responding local government such as decision making procedures, approval requirements, and perception of energy efficiency within the local government. Following are high-level findings, which are further expanded upon later in this section.

Respondents spoke highly of the implementation contractor, Energy Solutions, and the services they provided them (AF25). Survey respondents viewed them as knowledgeable and helpful in the specification and implementation stages. None of the respondents provided negative feedback regarding Energy Solutions.

Of the three audit types, the investment-grade audit was the most influential in moving local governments to complete energy efficiency projects (AF26). Respondents also appreciated the information provided through the report that benchmarked the facilities against each other; however, most respondents did not recall receiving the walk-through audit report.

Although the in-depth audits and financial incentives are important in moving projects forward, respondents indicated that the turnkey approach provided by the program was equally important (AF27). The local governments interviewed commented extensively on their staffing and time constraints. Having a program that not only completes the audit, but also identifies contractors, completes the rebate applications, and manages the process is a major benefit of the program.

Respondents also discussed the importance of the energy champion's role to help move energy efficiency projects from concepts to activity (AF28). An energy champion is someone in a community or organization that raises awareness of energy issues within local government organizations. Local government financial and staffing constraints oftentimes equate to an inability for energy efficiency projects to be incorporated into the planning process. Staff often have too many responsibilities to be highly effective in their multi-function role, making it difficult for them to focus on energy efficiency specifically. Another benefit of the ABAG program is that the consultants that provided energy efficiency services as an outside party can be influential in moving the energy projects into the planning and implementation stages.

Financial constraints are the most commonly noted barrier to implementing energy efficiency projects (AF29). Other noted barriers were staffing constraints, lack of education or information necessary to push energy efficiency projects to key decision-makers, and the three-year program cycle.

Respondents indicated that energy efficiency is not typically budgeted separately from other capital improvement projects (AF30). Without a placeholder for energy efficiency it is oftentimes not an issue raised as a priority in the budgeting process.

Given the value of the program to them, several respondents were surprised when they spoke with other local governments and found out that they were not aware of the program (AF31). These participants believed that local governments could benefit from the services the ABAG provided. Several respondents voiced surprise that non-participating cities were not more familiar with the program. They provided suggestions for marketing the program, which included: working with regional and local agencies; developing case studies to illustrate program benefits; educating customers about the potential to improve energy efficiency in newer facilities; and reaching all levels of staff within the local government's system (e.g., facility managers, engineering staff, board of directors) that may be involved in the decision-making processes.

Respondents were generally very satisfied with all the offerings provided through the program (AF32). Interviewers asked if there were other opportunities or services the program could have offered from which they believe they would have benefited. Respondents identified several opportunities for programs such as the ABAG program. These opportunities include funding renewable energy technologies, provide a greater level of follow-up after projects are complete (including validating energy savings and assuring savings are maintained), and taking a more holistic approach to treating facilities.

We make the following recommendations for reaching and serving local government facilities based on these key findings.

Program staff (both utility and partnership staff) should offer and tout the program's ability to provide turnkey services to local governments (AR10). A prevailing theme among municipal facilities is the time and staffing constraints that they experience. Interviewed participants commented that the turnkey services provided through the program was a significant benefit of the program. When targeting services to a local government, programs such as ABAG should emphasize how the program can relieve the pressure of those constraints *at little to no additional cost to the local government.*

To most effectively encourage energy efficiency projects, provide participants with a deeper audit experience (AR11). A deeper analysis moves participants from a conceptual "would be nice" perspective to providing numbers that concretely show the benefits of energy efficiency. A deeper audit provides an energy analysis to show the benefits of the projects to the participants and it includes information about how to sustain the energy savings, such as operations and maintenance activities.

Develop detailed case studies to market the program (AR12). When considering marketing opportunities, programs such as ABAG need to think about whether the program is reaching the target audience, as well as whether the information they provide is influential enough to encourage participation. Providing case studies can be a powerful means for promoting the program by providing potential participants references and successful implementation plans for energy efficient projects.

Include within the program a staff member or consultant who reports and acts on the behalf of the local government (AR13). Active energy champions work with local government staff to campaign to decision makers for energy efficiency improvements within the municipalities. The ABAG program model inherently lends itself to an energy champion role in the ABAG consultant. To most effectively move projects from concept to completion, the ABAG consultant should provide services as an energy champion as well as an auditor.

Provide a complete set of program services, which should include project assessment, planning implementation, completion, follow-up support, and project documentation (AR14). The program, as designed, provided a full range of services ranging from project initiation to rebate assistance to project completion. Several respondents noted the desire for the program to continue to work with them and validate energy savings after the projects were complete. This service will then provide an additional component to market as a benefit to participants. Illustrating how the program will continue to be a part of their operations – along with the turnkey approach provided – may provide further benefits to those that are especially staff constrained.

Consider offering a holistic building audit in addition to the targeted measure-specific audit (AR15). The analysis of the program database indicated that most projects are measure-specific (e.g., lighting). Several respondents in this study referenced the need for the program to serve their building more holistically, or as a whole. To further the effectiveness of the program, it should include less cost-effective measures that will yield sustaining savings (e.g., shell measures) as well as more cost-effective measures.

Continue to provide education and outreach opportunities for local governments, specifically targeting groups, such as purchasing agents, that could influence the decision-making process or installation of energy efficient equipment (AR16). The research indicates that local governments need staff who are knowledgeable of energy efficiency benefits. The more local community decision makers buy into the benefits of improved energy efficiency, the more opportunity to push these types of projects through. The program provided education and training opportunities that should be continued; however, program managers should also identify all key target markets relevant to local governments and ensure the educational efforts are relevant to these targets, such as purchasing agents. The remainder of this memorandum summarizes the key findings from interviews with local government staff involved in the ABAG multi-tiered audit program. Prior to presenting the detailed key findings, we first discuss the study background, methodology, and the sample plan. The in-depth interview guide used for this study is included in Appendix J.

2.8.2 Background

Pacific Gas and Electric (PG&E), the Association for Bay Area Governments (ABAG), and Energy Solutions (the implementation contractor) partnered to form the ABAG Energy Watch local government partnership (LGP). This partnership program provided energy efficiency solutions to local governmental agencies, including cities, counties, and special districts in eight counties: Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano, and Sonoma. The goal of the program was to reduce energy use through holistic services to the agencies, including technical assistance, financial incentives, and information necessary to encourage the adoption of energy efficiency projects.

The primary focus of this study was to examine the audit offerings provided through the program and assess their effectiveness. The term energy audit is often used generically, but there is considerable variability in the types of audits available. The two audit types discussed in this chapter are the walk-through and investment-grade audits.

- **Walk-through audit:** This audit, also referred to as a simple audit, is the most basic audit type. The audit includes minimal time speaking with facility personnel, may include a review of energy bills and a walk-through of the facility to identify energy-saving opportunities. The walk-through audit may form the basis of the more rigorous, follow-up audit, as was the case for the ABAG program

- **Investment-grade audit:** Also referred to as a comprehensive or technical analysis audit, the investment-grade audit is typically employed for larger, system-wide energy efficiency projects. The audit expands on the general audit and models the energy use and savings resulting from the investment to calculate the return on investment (ROI). When competing for non-energy related capital funds, facility managers rely on ROI analyses to obtain buy-in for these energy efficiency projects.

  The investment-grade audit may also provide a building simulation that leverages existing utility data and data resulting from submetering of energy consuming equipment data. These data are used to show the current (baseline) energy use, which is then compared with the energy use after the adoption of the proposed technologies.

ABAG operated its energy efficiency retrofit audit model using a combination of these audit approaches. The audits resulted in up to three deliverables, as discussed below.

Participants reviewed energy use of their facilities, resulting in the first program deliverable, an energy assessment report. This report provided participants with a snapshot of all their municipal facilities and related energy use. ABAG staff met with the local government staff and noted reasons why some

facilities used significantly more energy than others (e.g., the building is in operation 24 hours a day, seven days a week), and facilities where energy consumption seemed particularly high. PG&E provided the building-level data necessary to develop the energy assessment report.

Based on the analysis from the energy assessment report, program and facility staff determined which buildings were appropriate for a walk-through audit. When the walk-through audit was complete, the program submitted the second deliverable, an Energy Action Plan. The Energy Action Plan detailed recommendations for energy efficiency projects.

The third, and most in-depth, service provided to customers was the investment-grade audit. The results from this audit were documented in an energy audit report. The report provided a presentation of cost and savings values of a set of detailed building-specific and measure-specific recommendations.

2.8.3 Study Sampling and Methodology

Based on discussions with the members of the CPUC and the master evaluation contractor team (MECT), PA took a qualitative approach to evaluate the impacts associated with ABAG's audits. While other indirect impact studies are quantitatively estimating the net energy savings related to audit activities, this study has a varied list of objectives, which includes qualitatively identifying the effectiveness of the three-tiered audit approach and barriers for recommendation implementation.

These in-depth interviews took place between July and August 2009 and served the following objectives:

- Characterize respondents' level of participation within the program
- Identify the level of audit and information the facility(ies) received:
    - Energy Assessment Report, detailing energy costs and benchmarking facilities
    - Energy Action Plan, developed after the walk-through audit and discussions with facility staff regarding the prioritization of facilities
    - Energy Audit Report, the result of an investment-grade audit
- Discuss what information was provided in the reports, comprehensiveness of the audits and reports, recommendations made, and the sufficiency of the information provided by the program
- Investigate the process for seeking government decision-maker commitment/buy-in and the level of commitment/buy-in
- Identify the program's role in the decision to adopt energy efficiency projects and any additional energy-efficiency activities taken as a result of information
- Discuss the barriers for implementing recommended measures (e.g., financial, timing, and other capital investments)
- Identify the role that loan options have in improving facilities' ability to move projects forward

The interview was guided by an in-depth interview protocol, as seen in Appendix J. Senior PA staff contacted local governments that participated in the program from 2006–2008 to complete the interview. The interviews averaged between 45 minutes to an hour in length. Results for each interview were summarized in an Excel spreadsheet, which was used for analysis.

On October 23, 2008, Energy Solutions forwarded to PA a list of all audit projects completed, to date, within the 2006–2008 program cycle.[21] The file detailed the participant agency name, title, type, description of each document the agency received through the program, audit type, and date the document was delivered. Fifty-eight participating cities, towns, counties, and specialty districts were listed in the population file. The survey asked questions specifically related to the services received through the program to confirm what services they received through the program.

The population file included audit documents that go back as far as January 11, 2006. Due to recall limitations, it is not typically optimal to speak with participants whose participation dates as far back to 2006; however, we retained all participants, as ABAG's multi-tiered approach required longer participation periods compared to other programs. Data shows that the program had multiple contacts with these participants and, although the first deliverable may have been as early in 2006, subsequent deliverables were delivered as late as 2008.

Additionally, we believe it is useful to have variance in time lapse between the interview and when a participant received deliverables. Findings from other studies have shown the decision-making process for these participants takes a considerable amount of time; based on planning cycles, some may take upwards of five years. Therefore, having additional time in-between the program intervention and the interview process allowed evaluators to better capture this decision-making process and any program impacts that may have taken longer to come to fruition.

PA attempted to contact all local governments detailed in the participating database to schedule an interview for this study. We were only able to reach and schedule an interview with 20 of the municipalities listed in the database as receiving any services through the program. Sixteen interviews were completed from these 20 recruited municipalities. The four individuals who did not complete the interview were not available for the scheduled interview time and were either not available until after the study period or did not respond to our attempts to reschedule the interview.

Table 2-31. ABAG Population and Sample Statistics

ABAG Population	Count
Cities, towns, counties, and specialty districts listed in the program participant database	58
Recruited for in-depth interview	20
Completed interviews	16

2.8.4 Key Findings

This section presents the key findings identified through the ABAG evaluation. Please note that these findings are *qualitative* and are not intended to represent the views of the ABAG participant population or similar programs. As this is a qualitative study, we do not provide percentages of responses to survey questions; rather, we provide the number of respondents in more subjective terms (e.g., some or several) to illustrate the number of occurrences.

[21] ABAG Energy Watch_EAR_Action Plan_Audit List_10_23_08.xls.

Services Received through ABAG *(AF33)*

Energy Solutions was the implementation contractor for the ABAG Energy Watch program. Respondents spoke positively of Energy Solutions and the services they provided through the program. In describing the services received from Energy Solutions, respondents noted the contractor's strong technical capabilities, communication, and general support from project initiation to completion.

The level of interviewee program participation varied from just receiving the energy assessment report to receiving all audits and installing equipment. Interestingly, most respondents recalled receiving the initial energy assessment report and final energy audit report, though few recalled receiving the energy action plan (the interim report based on the walk-through audit). However, respondents tended to have difficulty distinguishing between the reports they received, which makes it difficult to assess whether respondents' recollections were accurate.

The final audit report, which was a result of the investment-grade audit, clearly held the greatest weight and was the most useful for respondents. This report provided all the documentation needed to support the project, from the energy savings that would be realized from the project to the financial return on investment analysis. The level of information provided was critical in enabling the facilities to install the recommended equipment.

This is not to say that the other reports were not useful. Respondents also discussed the usefulness of the benchmarking report, saying it was useful to see how their facilities compared in energy use as a means for prioritizing their projects. It was a first step in the process and, as one respondent noted, it helped to build the case for energy efficiency. However, it was the final audit report that often provided the information necessary to move a project through.

> *"The level of detail was a major benefit."*
>
> *"The auditing they [ENERGY SOLUTIONS] did made it clear what the payback would be and the benefits of those projects. It gave us support to do things we probably wouldn't have done internally."*

For the most part, respondents felt that the program as a whole, including the financial incentive provided to customers, was influential in their implementation of the energy efficiency projects. Asked on a zero to ten scale of influence, where zero was not at all influential and ten was extremely influential, respondents were asked how influential various program services were on their decision to implement the energy efficiency projects they did. As seen in Table 2-32, respondents rated the program, report, and financial incentive similarly in terms of their levels of influence. Respondents rated the audit report as having significant influence on their decision making processes; all but two respondents that provided a response rated the report an eight, nine, or ten. Those who did not rate the report as highly either said that they could not move forward with the projects because of staffing constraints or that they had planned to implement the project prior to the program and it was not influential in pushing them forward with the projects.

The analysis shown in Table 2-32 also illustrates the importance of the financial incentive. Seven respondents rated the influence of the financial incentive as a nine or ten (of ten). This compares to the four respondents that rated the audit report as a nine or ten (of ten), indicating that the incentive carries only slightly more influence than the audit report.

Table 2-32. Influence of Program Offerings on Decision to Implement Energy Efficient Projects

Rating	Average	1	2	3	4	5	6	7	8	9	10
Influence of program in general (n=11)	8.3			1			1		2	4	3
Influence of audit report (n=10)	8.3					1		1	4	1	3
Influence of financial incentive (n=10)	8.2				1	1		1		4	3

The participant responses to additional open-ended questions regarding the program's influence provide additional data that suggest it is the full program offerings that are influential to the respondents, not just the incentive. When asked how influential the program as a whole was in their adoption of energy efficiency projects, seven respondents rated the influence as a nine or two. Additionally, survey respondents were asked whether the full package or specific elements was most important in helping them move forward with the projects. Many respondents changed their response, indicating again that the full program offerings as being critical for them. Respondents attributed the program package as a whole as influencing their actions, highlighting the analysis of energy savings, the incentive, and the support provided by Energy Solutions.

> *"The program package was important. The support they gave in terms of knowledge and energy efficiency."*
>
> *"The full package. A beauty of the ABAG program was that they had pre-selected contractors…it took all the work out of there."*
>
> *"Overall program was important, but also the specific analysis of what they could save and the consultants knew what equipment was out there…"*

ABAG's Turnkey Approach *(AF34)*

Local governments differ from one another in size and sophistication regarding energy efficiency. Some of the interviewed local governments had facility managers and/or staff dedicated to energy efficiency (such as a sustainability coordinator). Other local governments are much smaller and the need for their staff to assume multiple roles is even more poignant for them.

One emergent theme in the interviews was the importance of programs, such as ABAG, providing a one-stop shopping experience for local governments. Regardless of local government size and sophistication, staffing constraints remain a significant issue. A number of respondents commented that one of the primary benefits of the program was that Energy Solutions provided a turnkey approach. The audit processes included only one step – although appreciated. Respondents also emphasized the fact that ABAG helped complete the paperwork (a time intensive process) and identified the contractors was a huge contributor to the success of the project in their eyes. The ability to go to one person or firm with all questions was also a significant benefit of the program.

> *"Cities have to be moving to cut-backs and layoffs and if it's too much work with short staffing they'll drop [energy efficiency improvements]. Bringing someone in that's a one stop shop for that work can help with various aspects…not so much budget issues, it is that workload constraints are the major issue."*

One respondent specifically said the reason they decided to participate in the program was because ABAG had selected the contractors for the local government. The respondent explained that often the bid process is too cumbersome to move projects forward; they do not have the time or resources to go through it if it is not a critical project. Having these contractors identified and part of the team removed the need to go out to bid for the work.

We have found, however, that the option to use selected contractors may hinder a program's progress. The Bakersfield Kern Energy Watch program, for example, ran into barriers with some of their local government projects because the local governments had strict requirements about using firms through their pre-selected contractor pool. This issue was not mentioned in these interviews; however, it is something to be aware of when designing a program for local government facilities that involves using program-identified contractors.

Priority of Energy Efficiency *(AF35)*

Nearly all interviewed individuals said that energy efficiency is either a priority or becoming a priority compared to other investments. Several individuals commented that the influx of new decision makers, such as council members and board members, is contributing to the increased importance of energy efficiency within facilities.

Others interviewed ranked energy efficiency in the "middle" of their priorities. Barriers to moving the priority to the top of the list include financial constraints and the need to prioritize other capital investments (e.g., life safety investments, road treatment, building operation failures, and general maintenance).

One respondent indicated that energy efficiency is not given the level of priority he thinks it should have. He said they spend a million dollars a year for electricity and a million dollars a year for street lights. Even so, energy efficiency is not on this particular local government's radar because of the perception that it is built into the building codes. Therefore, the only time they would move to a higher efficient product is when doing a retrofit or new construction project.

This latter example illustrates a good opportunity to educate local governments (and other commercial facilities) about the importance of implementing energy efficiency projects outside of the codes and standards requirements. Codes and standards are increasingly growing more stringent and the partnership programs have an abundant number of training opportunities around codes and standards. However, a significant number of energy savings opportunities may be missed if energy efficiency is only incorporated at the time that codes and standards are considered (e.g., remodel or new construction). This issue was only raised once in the interview process, so it is not a pervasive conception; however, the concept was unique enough to note for consideration.

For the most part, respondents did not envision that the priority for energy efficiency would shift dramatically over the next five years. The economy and budget constraints were the primary factors behind why the priority will not increase and changes in these constraints may also impact the priority for energy efficiency to change.

Those who did think energy efficiency would increase in priority provided reasons such as an internal climate action plan they are implementing, shortage of power, and any potential cost savings that could be realized as a result of energy efficiency. High utility fuel costs and regulatory changes were also mentioned as a means for increasing the prioritization of energy efficiency.

Education and Energy Champions *(AF36)*

Local governments need to be armed with information about the benefits of energy efficiency–-both financial and non-financial–-in order to increase the priority of energy efficiency within their facilities. Programs such as ABAG encourage this through their investment-grade audit reports as well as any support they provide to promote the projects to approval bodies. However, local governments need to go beyond the information and include some sort of energy champion or individual from within who can push energy efficiency projects through.

An energy champion is someone in a community or organization that raises awareness of energy issues within local government organizations. This person may be a trained member of the community or a more technically inclined individual, such as an engineer. More active energy champions also work with staff within local governments to campaign to decision makers for energy efficiency improvements within the municipalities.

One respondent described the frustrating process his staff went through to move the efficiency projects forward in his facilities. For three years prior to getting the ABAG program involved, the maintenance security advisor had been trying to move energy efficiency projects through the cities' facilities.

> *"…I was trying to push energy efficiency through the city all by myself and couldn't get it off the ground."*

The ABAG program provided the city with not just the rebates needed to push the investments through, but also the manpower and knowledge of how to get these types of projects approved.

Another respondent also commented on the importance of an energy champion helping to push these projects forward. This respondent filled the energy champion role and discussed how important it is to have someone who has both the time and capability to ensure the right parties are aware of the benefits of energy efficiency.

The energy champion model is employed in a number of partnership programs offered throughout California. The process evaluations of these programs highlighted the energy champion model as being particularly effective for promoting energy efficiency. This is particularly true for entities such as local governments, which are staffing constrained. Local governments that do not have an energy champion and experience significant staffing constraints may not be able to implement energy efficiency projects.

The respondents who emphasized the need for the role of an energy champion also provided insight into another area of need for local government facilities – that one central point of contact is needed to bridge the gap between the benefits of improved energy efficiency and local government political and budgetary needs. Having a program provide this energy champion model could serve effectively in increasing the priority of energy efficiency within local governments.

Barriers for Implementing Energy Efficiency Projects *(AF37)*

Respondents were asked what barriers existed to implementing energy efficiency projects. The number one barrier cited was funding. Nearly all respondents said internal budget constraints provided a significant barrier.

Table 2-33. Barriers to Implementing Energy Efficiency Projects (n=12)

Barrier	Count
Funding or budget constraints	7
Staffing constraints	5
Timing (of rebates and program cycle)	2
Lack of information	1
Historical limitations	1

Energy efficiency is typically not a separate line item in the budgeting process. Most interviewed local governments said that energy efficiency expenditures are simply a component of capital improvements. Local government budget cycles range anywhere between two and five years, although the budgets are typically revisited annually. Financial or budget constraints are compounded by the higher incremental cost of energy efficiency projects. Higher efficiency equipment is typically more costly to purchase than standard efficiency equipment, the difference of which is defined as the incremental cost between high and standard efficiency equipment. The incremental costs typically need to be justified by a return on investment or payback period analysis. Understanding local governments' thresholds for required payback periods is important in designing energy efficiency projects and reporting on recommended projects. The required payback period differed by respondent from as little as one or two years to as many as seven and a half years for energy efficiency improvements.

There was no one consistent response to the question of what the program can do to help overcome financial barriers. Several respondents said that the program can simply provide more funding or fund 100% of some projects rather than only a portion. Higher incentives shorten the resultant payback period which increases the potential approval of the project. In fact, when asked how influential the incentive was in the decision to install the energy efficiency projects, nearly all respondents rated the influence a nine or ten where ten was extremely influential (as shown in Table 2-32). One respondent rated the incentive value a seven, saying it was not large enough otherwise they would have rated it higher. Only two rated the influence of the incentive as "low."

Of course, a higher incentive value, which it might improve participants' payback period or cost-effectiveness of projects, will reduce the cost-effectiveness of the program itself. Programs such as ABAG are continuously attempting to strike a balance between high enough incentives to encourage higher participation with their need to be cost-effective as programs. The data shows that the incentives are highly influential; therefore, programs should continue to evaluate the optimal incentive value in light of the cost-effectiveness of the program.

Others suggested the program direct them to other funding sources outside of the program. These respondents would like to understand what other PG&E and non-utility incentives are available to subsidize the cost of the projects.

Another option for participants to overcome the financial barriers is loan programs. California customers have access to loan programs through entities such as the California Energy Commission to help overcome the up-front financial constraints of energy efficiency. Only a few respondents said they have leveraged loan programs to help fund energy efficiency projects or other capital improvement projects. Furthermore, there was minimal interest in taking advantage of loan programs. Reasons provided for the lack of interest included not wanting to increase their debt ratio and the difficulty in showing enough monetary savings to offset the cost of the loan itself.

The next most commonly noted barrier was staffing constraints followed by the need for more information or technical knowledge. Respondents explained the fact that budget reductions equate to staffing reductions, which means that it's a "tug of war" to have staff time. Additionally, according to respondents, it is difficult to make a decision on which projects to implement and/or push projects through without a higher level of technical knowledge. These two barriers combined speak to both the need for an energy champion and importance of programs helping to fill that role, discussed above. As one respondent noted, "*everyone's project loads are heavy and only the mission critical projects get completed. Consultants provided by ABAG's program really helped lay the groundwork.*"

Two respondents mentioned the three-year program cycle as a barrier for implementing energy efficiency. One respondent specifically said that the fact that local governments deal with fiscal years while rebates are based on calendar years further complicates the process. These respondents indicated that it is difficult for a local government to go through the audit process, get approval, and then complete the projects in time to get credit within the three-year program cycle. Although only one respondent mentioned this as a barrier in this study, it was an issue raised in the process evaluations of the partnership programs.

Marketing Opportunities *(AF38)*

Most respondents said that ABAG initially contacted their facilities to participate in the program. Only one interviewee said their facility proactively contacted the ABAG program. Word of mouth from other cities also proved a useful referral source. It was interesting, though, how many respondents said they were not aware of the program prior to being contacted by Energy Solutions. ABAG, as a program partner, was not mentioned as a means for hearing about or participating in the program; in fact, they were not mentioned at all throughout interviews.

Several respondents commented that they are surprised there were not more marketing efforts, as it is such a good program. One respondent referenced other cities that he works with, and said he was surprised that these cities were not aware of the program. Another respondent illustrated his excitement when he first heard about the program and benefits: "*[I said] what, are you kidding, there's free money for retrofit programs… Why aren't we doing this?*"

One respondent recommendation for marketing the program more effectively was to work with the regional and local agencies (such as climate leaders). These agencies tend to have connections with facility staff and can speak to program benefits.

Another respondent recommended that the program use case studies as marketing collateral. Case studies tend to be a powerful means of proving the benefits of implementing energy efficiency projects in similar type facilities. Although each local government varies in the types of facilities, some of the more standard retrofit equipment, such as lighting, can be profiled effectively through case studies. The case studies should, at minimum, profile the program's extensive interaction with the local government, the process to identify and install equipment, the initial return on investment and/or energy savings analysis, and the resulting energy savings. A case study could also include testimonials from local government staff that participated in the project that highlights the program's turnkey approach, anything they learned through the program, and ongoing benefits they are experiencing as a result of program services.

Identifying the opportunities within newer facilities, as well as older facilities, was also raised as a potential marketing focus. Several interviewed individuals described how the program identified savings opportunities through lighting retrofits in newer facilities (five years or newer), which surprised them. These respondents were under the impression that their facility's lighting was highly efficient, primarily because it was in a newer facility. When the program completed the audit, however, they found this was not the case. Either there were advances in the lighting technologies installed, or the lighting installed was

not high efficiency. This building proved to have high savings opportunities that they would not have identified on their own without the program.

There may be an education and/or marketing opportunity, related to the relationship between energy efficiency and equipment age, for programs such as ABAG. Unless high efficiency was explicitly specified in the project design phase, it is not necessarily the case that new facilities equate to high efficiency as this one local government found.

Lastly, several respondents mentioned the importance of reaching and educating different levels of staff in the local governments "from the bottom-up and top-down." It is important to ensure information gets to the appropriate decision maker. Unfortunately, it is not always clear who that person or those persons would be. Therefore, the more encompassing the program is in directing marketing, the better. One respondent noted that even the purchasing agent is a good target for marketing and education. The respondent provided an example, discussing how the local government recently purchased ice machines. The purchasing agent put in an order for standard efficiency ice machines; however, the purchasing agent may have considered energy efficient ice makers if he was more familiar with incentives available through programs such as ABAG. Other partnerships are offering training courses focused on environmentally preferred purchasing or energy efficient procurement. Increasing the purchasing department's knowledge of what is available may reduce financial barriers to some of the more accepted energy efficient equipment, especially if they are aware of possible rebates or incentives.

Other Opportunities for Local government Facilities *(AF39)*

The interviews discussed with participants the opportunities for program improvement, specifically what additional services they thought the program could provide or how they could provide a greater impact to local government facilities. A number of ideas were mentioned, but three suggestions stood out in the analysis: provide a more holistic approach to serving facilities; provide post-project analysis and follow-up after projects are complete; and explore the potential of providing incentives for renewable projects.

Holistic approach. Respondents voiced their perception that the program was focused on capturing the savings from the "low hanging fruit," rather than treating the building as a system. This was noted this as an opportunity for the program. The majority of participants interviewed completed lighting projects. Although these respondents identified lighting as a need, they also commented that they prefer to take a holistic approach to implementing improvement projects. Essentially, they prefer to treat the building as a system rather than treating the measure.

When asked about specific energy efficiency opportunities the program could provide, one interviewee mentioned the need for improving the building envelope. Examples of measures one interviewee identified as potential opportunities were cool roofs and window films.

Project follow-up. Numerous respondents mentioned their desire for post-project follow up. They envision the program providing follow-up services such as estimating resulting energy savings, identifying other energy efficiency opportunities, and ensuring the equipment is operating optimally. This would be completed through measurement and verification activities.

Renewable projects. Several respondents also mentioned renewable energy as an opportunity worth exploring. Incorporating renewable energy into the program has several benefits. Respondents said that renewable energy is looked upon differently than other capital investment type projects. The return on investment requirements tend to be much looser because of the "green" significance of renewable energy. For example, one respondent said their council is looking into the implementation of solar energy

projects. They are allowing the return on investment period to be longer because of the positive politics related to renewable energy.

Funding. When asked about funding strategies to consider, several of the respondents mentioned Assembly Bill 811. These respondents qualified that they believe it works the best for residential projects (although it has been used for commercial energy efficiency applications), but that it would be an interesting model to consider for financing municipal energy efficiency projects.

2.8.5 Recommendations

In light of the key findings described above, we make the following recommendations for programs that focus on reaching and serving local government facilities.

Both partner and utility program staff should offer and tout the program's ability to provide turnkey services to local governments (AR10). Emphasize how the program can relieve the pressure of both staffing and financial constraints *at little to no additional cost to the local government.* There were a number of respondents that noted the primary benefits of the program, beyond the financial incentive, that helped reduced the payback period were the turnkey services. Respondents mentioned the program's selection of contractors, the technical assistance, and the support the program provided from the initial audit through project completion as significant benefits to their organizations.

This turnkey approach is one of the most critical elements for local governments, as well as other nonresidential sectors, that are staffing and resource constrained. This is particularly true for those locales that do not have staff dedicated to energy efficiency projects, such as the small to medium sized local governments. The program should view this opportunity to provide turnkey services as more than just a means for implementing energy efficiency projects. It is also an opportunity to provide education to local governments that could have long-term sustaining effects.

To most effectively encourage energy efficiency projects, provide participants with a deeper audit experience (AR11). The program's multi-staged audit approach is intended to build awareness and buy-in from local governments. The investment-grade audit is the most expensive service provided through the program, so from the program's perspective it makes sense to gain buy-in before investing the funds in the extensive audit. However, the evaluation findings show that this investment-grade audit is the most memorable and influential in moving local governments to implement energy efficiency projects. The deeper analysis moves participants from a conceptual "would be nice" perspective to providing numbers that concretely show the benefits of energy efficiency.

A deeper audit provides an energy analysis to show the benefits of the projects to the participants. Not only does it involve the return on investment analysis, but it also includes information about how to encourage the energy savings to sustain, such as operations and maintenance activities. To further the effectiveness of the audit, it should include both analysis for the "low-hanging fruit" (e.g., lighting and HVAC equipment) and energy efficiency improvements that may be less cost-effective from the participant's perspective, but provide sustaining energy savings, such as building shell measures.

Develop detailed case studies to market the program (AR12). When considering marketing opportunities, programs such as ABAG need to think about whether the program is reaching the target audience, as well as whether the information they provide is influential enough to encourage participation. One respondent mentioned the possibility of illustrating the program's success with case studies. Case studies can be a powerful means for promoting the program. Provide references and encourage potential participants to contact other local governments that have completed projects through the program.

Case studies not only give the program credibility, but illustrate what the program did for other local governments. While each local government may be different in its facilities and energy use, the case studies can profile how the program can shape its offerings to fit the situation of each local government.

Include a program staff member or consultant that could be used as an energy champion for reporting to and acting on behalf of the local governments (AR13). An energy champion is someone in a community or organization that raises awareness of energy issues within local government organizations. More active energy champions also work with staff within local governments to campaign to decision makers for energy efficiency improvements within the municipalities.

As discussed above, the turnkey approach is critical to the interviewed participants. An offshoot of the turnkey approach is the offering of an energy champion. The energy champion serves various functions to push energy efficiency projects through the system, including: filling a staff resource gap, educating parties that need education on the benefits of energy efficiency projects, identifying further needs after project completion, understanding internal politics, and identifying unique barriers to implementing energy efficiency and opportunities for overcoming those barriers.

The program should ensure that the designated champion is familiar with the internal requirements for implementing energy efficiency projects (e.g., required return on investment or other analysis) and is armed with the technical and political knowledge to help facility staff overcome these barriers. The program should also do whatever necessary to take into account the timeframe needed for the participating local government to approve and implement projects. Several respondents noted the three-year program cycle as a barrier for implementing energy efficiency projects through the program within that program cycle. Understanding the internal limitations of each local government, including the approval processes, requirements, and impediments involved with capital improvements, may allow the program to identify ways to move the projects through the local governments more quickly.

Provide a complete set of program services that include project assessment, planning, implementation, completion, follow-up support, and project documentation (AR14). The program claims energy savings after the completion and verification processes. Afterwards, it is not uncommon for programs to either continue to work with the participant to identify additional opportunities (e.g., other energy efficiency improvements) or move to other prospects with other local governments.

The program as designed provided a full range of services from project initiation to rebate assistance to project completion. From the participant's perspective, however, the completion of the project only opens up to the next stage in the process for them—realizing both the energy savings and monetary benefits. Several respondents noted this as an area in which programs such as the ABAG Energy Watch can improve upon their services. Several respondents noted the desire for the program to continue to work with them and validate energy savings after the projects were complete. Local governments not only want to see what the return on investment was expected to be, they also want to see what happened *in actuality*. Illustrating how the program will continue to be a part of their operations, along with the turnkey approach provided, may provide further benefits to those that are especially staff constrained.

While benefiting program participants, post-program performance analyses could simultaneously provide useful tools for the program to continue reaching and serving local governments. First, it provides hard, factual data that can be used to promote the program through case studies and other marketing efforts. Additionally, the post-project analysis may provide evidence of monetary savings that may improve the chances of approval on other future projects.

Consider offering a holistic building audit in addition to the targeted measure-specific audit (AR15). The analysis of the program database indicated that most projects are measure-specific (e.g., lighting). This conclusion was confirmed through interviews with local government staff. However, several

respondents in this study referenced the need for the program to serve their building more holistically, or as a whole. Either they personally prefer to treat their building holistically, or the culture of their governing body (e.g., city council) prefers to address building issues this way.

Addressing the building holistically brings in a new dimension to project cost-effectiveness and return on investment. Because less cost-effective investments would be incorporated in a whole-building approach, the project financials will not appear as favorable as when only the most cost-effective projects are included. Additionally, this holistic approach requires even more need for technical specialization and more costly program reports, which could decrease the program's overall cost-effectiveness. That said, it may be useful to offer a service to participants that incorporates a holistic elements. Programs such as ABAG should consider offering a whole building service.

Continue to provide education and outreach opportunities for local governments, specifically targeting select groups, such as purchasing agents, that could influence the decision-making process or installation of energy efficient equipment (AR16). The research indicates a need for local governments to have staff who are knowledgeable of the benefits of energy efficiency. The more local community decision makers who buy into the benefits of improved energy efficiency, the more opportunity to push these types of projects through. The program provides numerous education and training opportunities that should be continued; however, program managers should also identify all key target actors and stakeholders and ensure the educational services are also relevant to these targets.

Groups that should be targeted vary by local governments, their structure, and their ability to encourage decision-makers to attend such trainings. Additionally, messages would need to be tailored for each group; building managers would receive a different level of information than public works directors. One example of a target group provided through interviews is purchasing agents. Purchasing agents have the capability of identifying opportunities for ordering high efficiency equipment. In the example provided by an interviewee, an ice maker was requested. The purchasing agent had the flexibility of ordering a high efficiency ice maker rather than a standard efficiency ice maker. Without this knowledge, these changes in ordering practices may not happen.

A review of the training offerings shows that the utility training centers offer courses directed to purchasing agents. However, programs such as ABAG can make a concerted effort to provide this education and training to select groups, such as the purchasing agents, as a part of their service offerings.

3 TRAINING

3.1 Training Overview

Trainings were a major component of several local government partnership (LGP) programs during the 2006-2008 program cycle. While LGPs offer several different types of educational and outreach opportunities, it was decided during the prioritization process (as discussed in the Introduction, Section 1.2) to focus the impact evaluation on training workshops as opposed to less intensive educational events (e.g., informational booths at fairs or trade shows). This decision was made primarily because attendee lists were available for the program training workshops. A secondary driver behind this decision was the hypothesis agreed upon during the prioritization process that only the training program interventions were substantial enough to incur any significant indirect impacts.

3.1.1 Attendee Characterization

The non-resource assessment completed by PA originally identified 16 Local Government Partnerships (LGP) programs that had training activities that warranted additional assessment. However, due to participant sample availability, the scope was reduced to include the evaluation of 12 workshops, in which both residential and non-residential applications are represented; this is discussed in Section 3.1.3. We categorized these 12 workshops into three different training categories, as follows:

- **Codes and Standards:** This type of training focuses on providing information to participants to update them on the latest Title 24 codes and standards and enable them to correctly implement and enforce them (as applicable).

- **Equipment:** These trainings provided detailed information on specific types of energy using equipment such as refrigeration and motors.

- **Process:** This category represents trainings that cover energy efficient practices that attendees would need to implement to realize energy savings such as commissioning and advanced framing techniques in construction.

All respondents were asked to categorize the situation that best described where they intended to apply the information they learned as a result of participation. Based on their responses, these respondents were categorized into three primary respondent type groups, as seen below.

- **End-Use Commercial Customers (EUCC):** This group consisted of commercial customers who intended to apply the information gained in the workshop at facilities that their business either occupied or managed.

- **Market Actors (MA):** This group said that the target for the knowledge they had learned through the workshop was primarily in facilities occupied or managed by customers to whom they provided services (e.g., architects, engineering firms, contractors, etc.).

- **End-Use Residential Customers (EUCR):** These respondents indicated that the primary application for information learned through their participation in the training was targeted specifically to their homes.

Figure 3-1 below shows the division of respondent types amongst the three training surveys. Across the three surveys, PA completed a total of 185 surveys. The majority of respondents were MAs (89 participants, representing 48%) followed closely by EUCC respondents who represented approximately 44% of respondents (82 participants). The smallest group consisted of EUCR respondents, with only 14 participants (eight percent).

Figure 3-1. Division of Respondent Types amongst Training Survey Participants

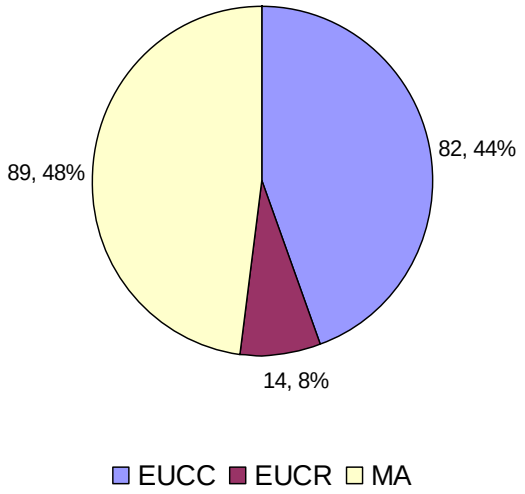

Table 3-1 provides a summary of the LGP training surveys, indicating the training categories (i.e., Codes and Standards, Equipment, or Process trainings), participating programs, training descriptions, and survey completes by respondent type.

Table 3-1. Impact Evaluation of LGP Trainings Survey Summary

Training Category	Program IDs	Program Name	Training Description(s)	Survey Completes by Respondent Type
Codes and Standards	SCE2519, SCG3521	Ventura County	Title 24 Codes and Standards	6 End-Use Commercial Customers 27 Market Actors
	SCE2525	San Gabriel Valley		
	SCE2567	LGEAR/Mammoth Lakes		
	SCE2568	LGEAR/Ridgecrest		
Equipment	PGE2016	AMBAG	Commercial and Business Refrigeration Workshop	22 End-Use Commercial Customers 7 End-Use Residential Customers 18 Market Actors
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	HVAC Workshop	
	PGE2028	Redwood	Motor Efficiency Workshop	
	SCE2525	San Gabriel Valley	Advanced Energy Efficiency Workshop	
Process	PGE2016	AMBAG	Advanced Framing for Resource and Energy Efficiency Workshop	54 End-Use Commercial Customers 7 End-Use Residential Customers 44 Market Actors
	SCE2530, SDGE3026, PGE2036, SCG3520	UC/CSU	EE Procurement Workshop	
			MBCx Workshop	
			Commissioning Workshop	
Total				**185**

3.1.2 Key Researchable Issues

The PA evaluation team, the CPUC contract manager, and the Master Evaluation Contractor Team (MECT) consultant agreed on the following key researchable questions to guide the training evaluation research. These included:

- Are the trainings reaching the correct stakeholders to build capacity in the LGP region?
- What is the knowledge and skill level of participants prior to and after attending training?
- Has the knowledge and skill gained in the training translated into changes in participants' behavior?
- What is the extent of these behavioral changes and what amount is attributable to the training?

- What energy savings can be defensibly estimated for the reported behavioral changes?

3.1.3 Evaluation Approach

Training activities were key to many LGP programs, as the partnerships sought to encourage increased energy efficiency behaviors among targeted groups. Trainings included sponsoring C-TAC trainings in the partnership's territory as well as customized trainings developed by the partnership.

The hypothesis for investigating the trainings was that the trainings were building capacity in the LGP territory that would result in increased energy efficiency. The trainings targeted key topic areas and segments identified by the LGP that would impact the knowledge and attitudes of attendees and would result in behavioral changes. These behavioral changes result in energy savings; therefore, the evaluation of LGP trainings focused on participant behavior changes that were attributable to the trainings in order to quantify energy savings resulting from those activities.

Once the training workshops were prioritized, as discussed in the Introduction (Section 1.2), we requested workshop participant lists, along with all available workshop collateral, which typically included workshop fliers, overviews of workshop goals and topics, as well as presentations. Upon review of data responses, four of the 16 programs were dropped from the evaluation due to data quality or evaluation overlap issues (Table 3-2). The PEC/ETC classes through SVEW were dropped in order to avoid overlap with ODC evaluation efforts. The City inspectors/Planners/FM workshop through Bakersfield-Kern and the Code compliance relative to current code workshop through Chula Vista were dropped due to insufficient information. The Implementing Energy Efficiency Projects Workshop through ABAG was also dropped after follow-up discussions with the CPUC contract manager and the ABAG program manager, based on the general nature of the workshop and the difficulty regarding measurement of behavioral changes inspired by the program.

Once collateral and attendee lists were received, PA proposed a list of key objectives for the follow-up surveys. It was then determined which workshops corresponded with the various training categories (Table 3-2). This also decreased respondent burden and improved data collection efficiency. While workshops were grouped into similar data collection efforts, surveys contained question modules specific to each training workshop. The surveys were also designed to collect information on overarching topics such as increase in knowledge and program awareness.

Opinion Dynamics Corporation (ODC) led the evaluation of the Marketing and Outreach (M&O) contract group. This contract group also looked to quantify indirect impacts and as part of that effort evaluated some of the trainings conducted by the utilities training centers. The team collaborated with ODC to discuss their approach for those efforts and based the initial core battery of the Title 24 survey on the core survey instrument ODC used to allow for comparability of results across the two different evaluation efforts. However, in order to obtain the data required from training participants, the team ultimately amended wording or developed more specific questions for the surveys.

Data collection was done using telephone interviews with a census of training workshop attendees. While it was originally expected that samples would be drawn from available attendees, the attendance numbers were low enough that it was feasible, and preferable, to call a census of all attendees. Table 3-2, below, provides a summary of training evaluations. This summary provides the original targeted population and sample sizes, which were supplied by the programs during the prioritization process. The actual sample sizes for each survey, which corresponds to the actual available attendees for each workshop, are also shown.

Table 3-2. Impact Evaluation of LGP Trainings Survey Summary

Category	Program ID	Program Name	Activity Description	Original Targeted Population	Original Targeted Sample Size	Actual Sample Size (Census)
Codes and Standards Survey	SCE2519, SCG3521	Ventura County	Title 24 Codes and Standards Workshops	43	10	39
	SCE2525	San Gabriel Valley		43	30	40
	SCE2567	LGEAR/Mammoth Lakes		18	10	17
	SCE2568	LGEAR/Ridgecrest		21	10	21
Equipment Survey	PGE2016	AMBAG	Commercial and Business Refrigeration	265	15	45
	PGE2028	Redwood	Education and training (Motor Efficiency Workshop)	35	20	27
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	HVAC		40	77
	SCE2525	San Gabriel Valley	Advanced Energy Efficiency	29	10	59
Process Survey	SCE2530, SDGE3026, PGE2036, SCG3520	UC/CSU	Commissioning	68	30	68
	SCE2530, SDGE3026, PGE2036, SCG3520	UC/CSU	MBCx	62	30	42
	SCE2530, SDGE3026, PGE2036, SCG3520	UC/CSU	EE Procurement	56	30	63
	PGE2016	AMBAG	Advanced Framing for Resource and Energy Efficiency	265	30	261
Dropped from Evaluation	PGE2015	ABAG	Implementing Energy Efficiency Projects Workshop	35	35	Dropped
	PGE2034	SVEW	PEC/ETC classes	123	65	
	SCE2521, SCG3523, PGE2017	Bakersfield-Kern	City inspectors/Planners/FM		15	
	SDGE3002	Chula Vista	Code compliance relative to current code	9	15	

Even though a key researchable issue for the evaluation was quantifying energy savings resulting from activities attributable to the training workshops, some of the topics did not lend themselves to that type of measurement. For instance, Title 24 was a broad update on codes and standards and Advanced Framing discussed more sustainable building practices, including alternative building materials, material saving techniques, and reducing construction waste.

In addition, participants of training workshops such as Title 24 and Advanced Framing were at least one step removed from the decision to install energy efficient equipment or implement energy saving projects, particularly Title 24, which focused on a group of attendees responsible for compliance not implementation. Therefore, the impact evaluation focused on EUCC participants for the equipment-specific training workshops where the battery of questions necessary to determine gross and net savings could be asked and respondents would be able to provide responses to those questions.

In order to avoid overlapping savings estimates with other resource evaluations, the team collected information for gross savings only from respondents who said they did not receive any financial assistance through a utility program. The detailed battery of equipment-specific questions was developed in conjunction with Summit Blue engineers, and once data was collected, it was sent to Summit Blue for the purpose of estimating gross savings by measure type. For the detailed analytical approach used, see Section 1.4, Approach and Methodology for Estimating Gross and Net Energy Savings.

Each of the key researchable questions was addressed in the data collection process and the evaluation results show the training workshops to be highly effective at educating and motivating customers and market actors regarding energy efficiency activities and opportunities. Key findings from the evaluation are discussed in the remainder of this section.

3.1.4 Key Findings

This section provides overarching key findings and recommendations related to the trainings. These key findings and recommendations are a direct result of research conducted through this study. We also developed metrics designed to provide qualitative indicators of program success. These metrics are presented at the beginning of this report in Section 1.7, Metrics and Indicators for Success.

Overarching Training Workshop Findings

Below, we present three high-level summary tables regarding the level of influence the training workshops had on participants. Table 3-3 provides percentages of respondents who reported an increase in knowledge as a result of attending the workshop. Table 3-4 presents the percentage of end-use commercial customers (EUCC) who reported that the workshop inspired them to take certain actions. Finally, Table 3-5 provides percentages of market actor (MA) participants who reported program influence on their decision to take action regarding energy efficiency.

The trainings have increased participant knowledge and understanding of covered energy efficiency concepts (TF1). Overall, almost all respondents reported that the workshops provided them with new information (95% of all 185 surveyed training participants). In addition, responses indicated the trainings positively impacted respondents' ability to understand and identify energy efficiency opportunities. This was true for all types of respondents: residential customers, non-residential customers, and market actors.

Table 3-3. Informing Participants

Source Survey Question	Information Gained	Codes and Standards	Equipment	Process	Total
K1	Percentage of respondents for whom course provided new information on training topic[22]	88%	98%	95%	95%
K4	Percentage of respondents who feel much more knowledgeable regarding the training topic[23]	27%	49%	60%	51%
K5b	Percentage of respondents who are more aware of utility sponsored energy efficiency programs[24]	55%	47%	35%	42%
K5c	Percentage of market actor respondents who are more familiar with the tools and/or techniques that will enhance the services provided to clients[3]	37%	39%	64%	51%
K5e	Percentage of EUCC respondents who better understand how to improve the energy efficiency at their facility after attending the course[3]	NA	50%	43%	47%
TC1b	Percentage of EUCC respondents who are better prepared to evaluate energy efficient options after course[3]	100%	55%	63%	62%
TC1c	Percentage of EUCC respondents who's recommendations regarding energy efficient technologies or practices are viewed as more informed by management after attending the course[3]	83%	50%	48%	51%

EUCC respondents who attended training workshops are better educated about energy efficient opportunities they have at their businesses and are taking action based on that knowledge (TF2). The training workshops have raised awareness of opportunities to be energy efficient, increased their confidence in implementing energy efficient actions, and influenced their decisions to implement those actions. Three-quarters of EUCC respondents made an effort to save energy since training and of those, 64% rated the influence of the training as strong (a six or seven on a seven point scale). Not only are the trainings having an impact on those who attend, they are reaching an even wider audience. Most of the EUCC respondents (93%) have shared the training information with others. In addition to sharing the information, EUCC respondents are actively trying to convince others internally to save energy (78%) as well as trying to convince others externally to save energy (79%).

[22] Percentage who answered "yes" to the survey question.

[23] Ratings of 6 or 7 where 1 is no more knowledgeable and 7 is significantly more knowledgeable.

[24] Ratings of 6 or 7 where 1 is strongly disagree and 7 is strongly agree.

Table 3-4. Influencing EUCC Participants to Take Action

Source Survey Question	Influence on Actions	Codes and Standards	Equipment	Process	Total
TC1a	Percentage of EUCC respondents who recommend energy efficient technologies or practices to management more often after course[25]	50%	50%	69%	62%
TC6_b	Percentage of EUCC respondents who shared information from workshop with colleagues[26]	83%	96%	93%	93%
TC6_c	Percentage of EUCC respondents who convinced others within their firm that energy efficiency actions are needed[5]	67%	77%	80%	78%
TC6_d	Percentage of EUCC respondents who convinced others outside their firm that energy efficiency actions are needed[5]	67%	73%	83%	79%
TC2	Percentage of EUCC respondents who made an efforts to apply the concepts taught in the workshop in a new facility since participating in the workshop[5]	100%	91%	67%	75%
TC3	Percentage of EUCC respondents influenced by the information to make an effort to apply the concepts from the workshop to save energy[27]	67%	55%	70%	64%

MA respondents who attended training workshops have altered their practices (TF3). Seventy-nine percent of MA respondents agree they are more familiar with tools and techniques to save energy after attending training workshops. Three quarters (78%) of market actors agreed with the statement, "I am more likely to recommend energy efficient equipment, designs or practices to my clients." A very large portion of MA respondents attribute changes in behavior to attending the training workshops. Eighty-two percent realized an increased desire to introduce energy efficiency in client work to attending a training workshop, 80% better understand methods to introduce energy efficiency in client work, and 71% acknowledge the ability to think differently regarding energy efficiency work (all rating five to seven on a seven point scale, seven meaning a great deal of influence). Eighty-six percent applied workshop concepts in the work they do with clients and 79% of those applications were influenced by the workshop. In addition, 80% of MA respondents agreed that they are more likely to recommend energy efficient options to clients after attending a training workshop.

[25] Ratings of 6 or 7 where 1 is strongly disagree and 7 is strongly agree.

[26] Percentage who answered "yes" to the survey question.

[27] Ratings of 6 or 7 where 1 is not at all influential and 7 is very influential.

Table 3-5. Influencing Market Actor Participants to Take Action

Source Survey Question	Influence on Actions	Codes and Standards	Equipment	Process	Total
TA1	Percentage of market actors who have applied **any** of the concepts taught in the workshop enhance the service they provide to clients[28]	84%	89%	86%	86%
TA0	Percentage of market actors more likely to recommend energy efficient equipment, designs, or practices to clients as a result of the workshop[29]	50%	50%	82%	66%
TA2a	Percentage of market actors now specifying energy efficient measures of which they were unfamiliar with prior to taking the course[7]	33%	75%	74%	63%
TA2b	Percentage of market actors now specifying energy efficient measures more frequently than prior to taking the course[7]	29%	75%	82%	65%
TA2c	Percentage of market actors now applying building or system design principals or elements of which they were unfamiliar with prior to taking the course[7]	29%	63%	71%	57%
TA2d	Percentage of market actors now utilizing diagnostic tools or practices of which they were unfamiliar with prior to taking the course[7]	10%	69%	18%	27%
TA2e	Percentage of market actors now utilizing building or system design tools or practices of which they were unfamiliar with prior to taking the course[7]	19%	69%	58%	49%
TA2f	Percentage of market actors changing the manner in which they install or maintain energy consuming equipment[7]	33%	44%	42%	42%
TA2g	Percentage of market actors changing the methods they use to size and specify new energy consuming equipment for clients[7]	29%	63%	50%	49%
TA3c	Percentage of market actors influenced by the information provided in the course to make the changes they described[30]	38%	50%	66%	55%

[28] Percentage who answered "yes" to the survey question.

[29] Ratings of 6 or 7 where 1 is strongly disagree and 7 is strongly agree.

[30] Ratings of 6 or 7 where 1 is not at all influential and 7 is very influential.

Training workshops are reaching correct stakeholders (TF4). Title 24 workshops were targeted at the correct audience and attendees represented an appropriate range of professional positions including architects, engineers, business owners or directors, draftspersons, planners, public officials, general contractors, building inspectors, and building department staff. Equipment-specific training workshops were attended by commercial customers and market actors who found the information useful and applicable. In fact, many contractors attended multiple HVAC workshops in the series. The Commissioning and Advanced Framing workshops also had appropriate attendance by those groups who would gain the most from attending.

End-use customers (both EUCC and EUCR) have greater understanding of energy efficiency opportunities at their facilities and market actors indicate increased understanding and confidence in delivering energy efficiency services to customers (TF5). End-use customers' answers across three statements indicated the workshops positively impact their ability to identify and implement energy efficiency opportunities at their facilities. Market actors indicated increased understanding in both familiarity with tools and/or techniques to enhance the services they provide and greater confidence in making recommendations for improving energy efficiency at client sites.

Increased understanding increases efforts to save energy (TF6). Participant responses emphasize the correlation between a participant's understanding and/or awareness of energy efficiency opportunities and the likelihood that the participant has made any effort to save energy at their facility. Participants who report a high increase in understanding are also likely to have an increased awareness of available energy efficiency opportunities. Furthermore, these participants also demonstrate an increased tendency to make efforts to save energy at their facilities and they attribute the workshop(s) they attended as influencing their decision to make these efforts.

Codes and Standards Workshop Findings

Because of the training, respondents have an improved understanding of Title 24 standards (TF7). Survey respondents were asked to rate the degree in which their understanding of Title 24 standards had increased on a seven-point scale, where one meant not at all and seven meant a great deal. MA respondents reported a mean rating of 4.7 and EUCC respondents reported a mean rating of 5.7.

Survey results indicate that the workshop increased participants' knowledge of Title 24 standards (TF8). Eighty-eight percent of respondents received new information by attending the workshop and 61% reported at least some increase in knowledge regarding the Title 24 standards after attending. Furthermore, participants reported they are better prepared to meet and implement Title 24 standards as a result of the training.

Survey responses suggest that the workshop has positively influenced participants' behavior in terms of Title 24 standards and energy efficiency (TF9). The workshop has positively influenced the market actor participants' behavior in terms of Title 24 standards and energy efficiency. Workshop influence on participants' behavior across three questions was higher on average for EUCC participants (just over six on a seven-point scale) than for MA participants (just over four on the same seven-point scale).

Equipment-Specific Workshop Findings

The equipment-specific training workshops have increased participant knowledge (TF10). Overall, almost all respondents (98%) reported that the workshops provided them with new information. In addition, responses indicated the workshops positively impacted respondents' ability to understand and identify energy efficiency opportunities. This was true for all types of respondents: residential customers, non-residential customers, and market actors.

Equipment-specific knowledge is being shared with others (TF11). Most end-use commercial participants reported that they shared the information they had learned at the workshop with a colleague (96%). All residential participants have shared the information they learned at the workshop with family, friends, or neighbors (100%). Overall, these results indicate strong positive market effects.

Both residential and non-residential customers are taking energy efficient actions as a result of the equipment-specific trainings (TF12). Since participating in the workshops, 91% of the end-use commercial participants have made an effort to save energy at the facility[ies] their business occupies or manages and applied the concepts from the workshop. And since participating in the workshops, 71% of the end-use residential participants have made an effort to save energy in their homes and applied the concepts from the workshop.

Market actors have changed their practices as a result of attending the equipment-specific training workshops (TF13). The majority of market actors also indicated they are employing energy efficiency actions as a result of the trainings and for most those changes have become standard practice. Three quarters (78%) of market actors agreed with the statement, "I am more likely to recommend energy efficient equipment, designs or practices to my clients." Eighty-nine percent of market actors have applied concepts taught in the workshop to change or enhance the service they provide to their clients.

Analysis indicates that the equipment-specific trainings indirectly provide energy savings for EUCC participants, as well as directly impact their savings through technologies directly installed (TF14). Employing the methodology reviewed and approved by the California Public Utilities Commission (CPUC), the evaluation team calculated the indirect energy savings resulting from information provided by four training workshops that specifically emphasized equipment. The four trainings were 1) Advanced Energy Efficiency (Advanced EE); 2) Motor Efficiency; 3) Heating, Ventilation and Air Conditioning (HVAC); and 4) Commercial Refrigeration workshops. The analysis estimates program-attributable (or net) savings of 23,153 kWh, 6.67 kW (peak coincident), and 120.88 therms on a per-commercial-respondent basis, as seen in Table 3-6 below.

Table 3-6. Average Indirect Impacts per Small Business from Training (n=22 EUCC survey respondents)

Savings	kWh savings			kW savings			therm savings		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	77,227.3	23,152.6	30%	22.76	6.67	29%	167.30	120.88	72%
Lifecycle Savings	755,583.6	206,944.5	27%	NA	NA	NA	444.74	513.73	116%

Process Workshop Findings

As found for prior training workshops, the survey results indicate the process training workshops positively impacted participants' knowledge of covered topics (TF15). The majority of respondents reported the workshops provided them with new information (95%). Twenty-nine percent of participants said the workshop significantly increased their knowledge (a rating of seven), while another 50% said they saw some increase in knowledge (ratings of five and six). Participants' responses to a series of questions indicated the workshops positively impacted participants' understanding of topics covered.

Process training workshop participants are sharing the information that they learned through the workshops (TF16). The majority of commercial end-use participants (93%) said they have shared the information they learned at the workshop with a colleague. Almost all (six of seven) residential participants have shared the information they learned at the workshop with family, friends, or neighbors.

The Commissioning workshops are increasing the commissioning practice with several reported benefits, including energy savings, although participants were not able to quantify the energy savings (TF17). Twelve of the 19 respondents who participated in the introduction and full commissioning workshops said they implemented commissioning at buildings for which they were responsible since participating in the training. Three of the twelve monitoring-based commissioning (MBCx) participants were using MBCx prior to attending the workshop; however, eight indicated that they adopted MBCx practices afterwards. Participants reported realizing many benefits from implementing commissioning or MBCx in their new buildings including reduced crisis maintenance, reduced operation and maintenance costs, properly trained operational staff, and energy savings. However, despite several attempts with multiple contacts at the campuses, we were not able to get accurate savings estimates regarding how much participants have saved through the implementation of commissioning or MBCx practices.

Advanced Framing is being implemented by over half of training participants (TF18). Sixty percent of training participants have implemented the techniques discussed in the workshop after participating, although the specific advanced framing techniques for which participants have said they have implemented vary widely.

The survey results provide evidence of improved energy efficiency behavior attributable to the process training workshops for all types of participants (TF19). Fifty percent of end-use commercial customers strongly agreed with the statement that they recommend energy efficient technologies or practices more often to their management. Since participating in the workshops, 67% of the EUCC participants have made an effort to save energy at the facility[ies] their business occupies or manages and applied the concepts from the workshop. Seventy percent of these participants rated the workshop as influential on their decision to make the effort to save energy. Since participating in the workshops, four of the seven end-use residential (EUCR) participants have made an effort to save energy in their homes and apply the concepts from the workshop. When asked to rate the influence of the workshop on their decision to make the effort to save energy on a scale of zero to ten, with ten being very influential, all EUCR participants rated the workshop a seven or higher (mean rating of nine). Eighty-two percent of market actors (MA) indicated they are more likely to recommend energy efficient equipment, designs, or practices to clients. Eighty-six percent of market actor participants report having applied concepts taught in the workshop to change or enhance the service they provide to their clients.

3.1.5 Recommendations

We specifically recommend that training should accompany changes in codes and standards to make sure the codes and standards are properly understood, implemented and enforced in order to realize the expected energy savings (TR1). The Title 24 survey results demonstrate the importance of training on codes and standards. The survey results indicate that the workshop increased participants' knowledge of Title 24 standards and participants are better prepared to meet, implement and/or enforce, where applicable, Title 24 standards as a result of the trainings.

Based on the above key findings, we recommend that training workshops continue to be part of program and portfolio offerings in California as they are resulting in energy savings even though they can be difficult to quantify (TR2). To the extent that it is important to quantify the energy savings realized through various types of trainings, we recommend that a more rigorous methodology be employed. This would include conducting a pre-training survey with all participants and then a post-

training survey approximately six months following the training. Because of the timing of this evaluation, we were not able to employ this methodology. This methodology could be further enhanced by on-site inspections and monitoring of specific participant facilities or analysis of energy bills for participants' facilities.

Standardize tracking of program participation across local government partnerships (TR3). Standardization of a tracking system to record attendees as well as methods of marketing, exit survey results, and training materials used would assist in a more robust evaluation. Consistent capture of information such as contact information, company name, title, and role would greatly improve sampling and analysis opportunities that could in turn help quantify more savings benefits from training workshop efforts.

3.1.6 Section Organization

The remainder of this chapter presents detailed information on the results of the training impact evaluation as follows:

- Description of the training process (Section 3.2)
- Cross-cutting results (Section 3.3)
- Results for the codes and standards survey (Section 3.4)
- Results for the equipment survey (Section 3.5)
- Results for the process survey (Section 3.6)

First, we present a summary of the training process, including descriptions for each of the training workshops. Then detailed survey results are presented for each training category—codes and standards, equipment, and process. We also provide a detailed discussion regarding participant responses across all surveys as well as a detailed summary of key findings and recommendations.

3.2 Summary of Training Process

Trainings were a major component of several local government partnership (LGP) programs during the 2006-2008 program cycle. While LGPs offer several different types of educational and outreach opportunities, it was decided during the prioritization process to focus the impact evaluation on training workshops as opposed to less intensive educational events (e.g., informational booths at fairs or trade shows). This decision was made primarily because attendee lists were available for the program training workshops. A secondary driver behind this decision was that only the training program interventions were substantial enough to incur any significant indirect impacts.

3.2.1 Training Process

Each partnership had unique approaches to how they prioritized training workshops.

- ABAG training and education workshops were targeted to government employees and provided policy assistance.

- AMBAG training and education focused on City and County staff and trade allies. Energy assessment reports were offered to municipalities providing a detailed analysis of the past 2 years of energy use for the jurisdiction's municipal buildings. The report graphically compared and benchmarked the buildings on various metrics (overall energy use, energy/square foot, etc).
- Redwood training and education also focused on City and County staff and trade allies.
- Ventura County training and education efforts were directed at public agencies, local government officials, city engineers, chambers of commerce and pre-school facilities primarily for codes and standards updates.
- Bakersfield-Kern trainings and education shifted its approach to train contractors, designers, installers and inspectors rather than end-users.
- San Gabriel Valley training and education sponsored several non-residential training workshops focusing on different technologies.
- The UC/CSU training and education portion of the program was heavily frontloaded to help identify potential projects. Most training (e.g., Building operation certification and MBCx training) related directly to the program's energy savings.
- LGEAR/Mammoth Lakes and LGEAR/Ridgecrest training and education partnerships focused their off-site training workshops on Title 24.

3.2.2 Training Descriptions

The evaluation covered eight different training workshops which are discussed below.

- *Title 24* was a 2-hour workshop covering the California 2005 Title 24 Energy Efficiency Standards to inform participants of building envelope, lighting, and mechanical requirements under Title 24 that impact commercial and residential new construction and renovation. Title 24 workshops were sponsored by the Mammoth Lakes, Ridgecrest, San Gabriel Valley, and Ventura County partnership programs.
- *Advanced Energy Efficiency* was offered to educate and assist cities and businesses within the San Gabriel Valley area in meeting demand reduction and energy conservation goals and provide cities and businesses with links to energy-efficiency resources, such as rebates and incentives offered by Southern California Edison. Workshops were one day in length and held between May and August of 2007. A separate workshop was offered for organizations within the San Gabriel Valley area in December of 2007.
- *Motor Efficiency* was offered by the Redwood partnership to provide information on how to manage motors, electric motors and systems, and implement energy efficient motors. It also discussed the choices available for adjustable speed drives, and the energy cost savings made possible by this technology. The workshop was one day in length and held in May of 2007.
- *Commercial Refrigeration*, offered by the Association of Monterey Bay Area Governments (AMBAG) partnership, provided information on refrigeration equipment that help food and wine service business owners cut their utility costs. The workshop was one day long and held in November and December of 2006 as well as April of 2007.
- *HVAC* was a series of one-day workshops from March of 2006 to May of 2008, offered by the Bakersfield-Kern partnership. Workshops were designed to familiarize HVAC contractors and service mechanics with the following: effective methods of installing and charging HVAC systems; effects on energy efficiency of various air flow and pressure obstacles; ACCA Quality

installation standards for HVAC systems; ACCA Manual J software use; ways to solve residential comfort and energy problems using zoned HVAC systems in both new and existing single-family and multifamily homes; advanced ACCA Manual D topics; maximizing airflow performance of a premium furnace out of a standard furnace; adjustments and parts replacements needed to make a superior California air conditioning system; and air conditioner interaction with HVAC systems. Information dissemination was a combination of demonstrations, presentations, computer-based sessions, as well as hands-on exercises. Specific workshops included:

  - Proper Procedures for Charging Air Conditioners & Heat Pumps (3/06)
  - HVAC Quality Installation (3/06)
  - HVAC System Air Flow and Static Pressure Diagnostics (4/06)
  - Overview of ACCA Quality Installation Standards (10/07)
  - Equipment Sizing & Selection Using ACCA Manual J (11/07)
  - Advanced ACCA Manual D (12/07)
  - Zoning Design and Beyond (12/07) zoning for HVAC?
  - Optimizing Air Conditioners in California's Climate (5/08)

- *Advanced Framing* outlined opportunities for energy and resource improvements and the magnitude of those opportunities, explored alternatives to conventional framing, and practiced conveying advanced framing information on construction documents.
- *Intro to Commissioning* served as a one-day workshop for decision makers as well as an introduction to the five-day training workshop. It provided an overview to support implementation of the commissioning process by those who attend the full workshop.
- *Commissioning* was a five-day workshop on effectively implementing the principles of the commissioning process on a campus, resulting in a national certification as a Commissioning Authority – Process (CxAP) for those that completed the full workshop and passed the final test. Its goal was to provide a full understanding of the commissioning process to enable support or implementation of the commissioning process for campus projects
- *Monitoring Based Commissioning (MBCx)* provided information on monitoring-based commissioning by clearly identifying what it is, why it is important for campuses, and how to measure and monitor building energy usage to achieve savings. It covered an overview as well as the process, sample diagnostics, measurement and verification, case studies and reporting requirements used.

3.3 Cross-Cutting Participant Results

This section provides an analysis of participant responses for questions that were asked for all respondents across all of the training surveys. PA conducted 185 surveys with the 2006-2008 workshop attendees for 12 non-resource program activities. These surveys were fielded in three separate waves, according to the workshop type. The three workshop types or categories were Codes and Standards workshops[31], Equipment Training workshops[32], and Process Training workshops[33]. Individual methodologies are included in the survey-specific sections of this chapter.

[31] This included four workshops regarding Title 24 Codes and Standards; offered through the Ventura County, San Gabriel Valley, LGEAR/Mammoth Lakes, and LGEAR/Ridgecrest programs.

3.3.1 Key Findings

Trainings increase participants' knowledge of energy efficient applications (TF20). Approximately 95% of respondents indicated that the training had increased their level of knowledge regarding the training topic.

Respondents are more knowledgeable about how to incorporate energy efficiency in their work (TF21). Approximately 74% of EUCC respondents indicated that they are better able to understand avenues in which they can improve the energy efficiency of their facilities (a rating of five or higher on a seven-point scale, where seven means a great deal more aware). MA respondent types also indicated the workshop information has influenced their ability to incorporate energy efficient measures in their client work. Seventy-nine percent of respondents said that the workshop had increased their familiarity with energy efficient tools or techniques. Furthermore, 86.2% have applied workshop concepts to client services.

Participants share workshop information with both colleagues and clients as a result of the trainings they attend (TF22). Ninety-three percent of EUCC respondents reported having shared workshop information with others. Similarly, 80.3% of MA respondents indicated, on a seven-point scale, where seven indicates strongly agree, that they share workshop information with clients (a rating of five or higher).

Training workshops have a significant influence on participants (TF23). Generally, both EUCC and MA respondent types indicated that the workshop had made an impact on their knowledge and understanding of energy efficient applications, which in turn influenced the likelihood that they would implement and recommend these practices to colleagues and clients. Furthermore, where applicable, participants were more likely to participate in additional activities, particularly audits.

3.3.2 Detailed Cross-cutting Results

Attendee Characterization

As discussed in Section 3.1, all respondents were asked to categorize the situation that best described where they intended to apply workshop information (i.e., end-use commercial applications (EUCC types), market applications (MA types), and end-use residential applications (EUCR types)). Across the three surveys, the majority of respondents were MAs (89 participants, representing 48%). EUCC participants represented approximately 44% of respondent types (82 participants). The smallest group consisted of EUCR respondents, with only 14 participants (eight percent).

Below, we provide a discussion regarding knowledge effects found across all respondent types. We then discuss findings specific to respondent type (i.e. EUCC, MA). Due to the small number of EUCR participants (14), we do not include detailed cross-cutting findings that are specific to that group. All of the cross-cutting data for this respondent type category can be found in Appendix B.

[32] This included four workshops regarding Commercial and Business Refrigeration, HVAC, Motor Efficiency, and Advanced Energy Efficiency; offered through the AMBAG, Bakersfield-Kern, Redwood, and San Gabriel Valley programs.

[33] This included four workshops regarding Commissioning, Monitoring-Based Commissioning, Advanced Framing, and EE Procurement; offered through the AMBAG and UC/CSU programs.

Knowledge Effects

All contacted participants were asked whether they had gained new information as a result of their participation in the training. As seen in Table 3-7, a total of 94.6% of participants indicated that their knowledge had increased due to their participation in the training workshop. By training, 87.9%, 97.9%, and 95.2% of participants agreed with the statement that their knowledge had increased from their participation in the Codes and Standards, Equipment, and Process trainings, respectively. Approximately five percent of participants said they hadn't learned any new information from the workshops they attended.

Table 3-7. Workshop Provided New Information by Training Survey [34]

Response		Codes and Standards	Equipment Training	Process Training	Total
Don't Know	Count	0	1	0	1
	Percent	0.0%	2.1%	0.0%	.5%
Yes	Count	29	46	100	175
	Percent	87.9%	97.9%	95.2%	94.6%
No	Count	4	0	5	9
	Percent	12.1%	0.0%	4.8%	4.9%
Total	**Count**	**33**	**47**	**105**	**185**

When asked to rate their knowledge of workshop objectives, prior to participation, on a scale of one to seven, where one meant no knowledge and seven meant significant knowledge (Table 3-8), the majority of respondents (71.9%) rated their knowledge as being "some knowledge" (a rating of two through five). Thirty four participants (18.4%) rated their knowledge prior to workshop participation as significant, rating six or seven on a seven-point scale. However, of those who attended the Codes and Standards workshop, approximately one-third indicated that prior to taking the training they had significant knowledge of Title 24 rules and regulations, suggesting that those who reported that they had not learned anything new from the training workshop were already very familiar with the workshop material.

[34] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question K1.

Table 3-8. Knowledge Level Prior to Workshop Attendance by Training Survey[35]

Knowledge Level		Codes and Standards	Equipment Training	Process Training	Total
No knowledge (1)	Count	4	4	10	18
	Percent	12.1%	8.5%	9.5%	9.7%
Some knowledge (2-5)	Count	18	38	77	133
	Percent	54.5%	80.9%	73.3%	71.9%
Significant knowledge (6-7)	Count	11	5	18	34
	Percent	33.3%	10.6%	17.1%	18.4%
Total	**Count**	**33**	**47**	**105**	**185**

The ten participants who either said that they didn't know whether they had gained new knowledge from the training or that they had not gained new knowledge as a result of the training were asked if their participation had made them more likely to implement energy saving efforts that they had been considering prior to attending the workshop. Across all surveys, 70% of respondents said that the training had encouraged them to adopt energy saving practices (Table B-1; Appendix B).

Respondents were then asked to rate the increase in knowledge, regarding workshop objectives, they experienced as a result of participation. As seen in Table 3-9, the majority of participants (51.4%) indicated that, as a result of training participation, their knowledge of the objectives covered in the training had increased significantly (a rating of six or seven on a seven-point scale). Similarly, a large portion or respondents (48.1%) said that they experienced some increase in knowledge due to workshop participation (a rating of two to five on a seven-point scale). Only one respondent (0.05 percent) indicated that they had not learned any new information as a result of participating in the training. This implies that nearly all of those who participate in IOU sponsored training workshops learn at least something from the training.

[35] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question K3.

Table 3-9. Impact of Workshop on Knowledge Level by Training Survey [36]

Rating		Codes and Standards	Equipment Training	Process Training	Total
No more Knowledgeable (1)	Count	0	0	1	1
	Percent	0.0%	0.0%	1.0%	0.5%
(2)	Count	4	1	4	9
	Percent	12.1%	2.1%	3.8%	4.9%
(3)	Count	7	3	6	16
	Percent	21.2%	6.4%	5.7%	8.6%
(4)	Count	6	6	10	22
	Percent	18.2%	12.8%	9.5%	11.9%
(5)	Count	7	14	21	42
	Percent	21.2%	29.8%	20.0%	22.7%
(6)	Count	5	8	33	46
	Percent	15.2%	17.0%	31.4%	24.9%
Significantly more Knowledgeable (7)	Count	4	15	30	49
	Percent	12.1%	31.9%	28.6%	26.5%
Total	**Count**	**33**	**47**	**105**	**185**

PA also included a question asking participants to rate, on a scale of one to seven (one meaning strongly disagree and seven meaning strongly agree), their level of agreement with the statement "As a result of the course, I am more aware of utility sponsored energy efficiency programs." As seen in Table 3-10, nearly 70% indicated that their awareness of utility sponsored programs had increased because of their participation in the training (rated between a five and seven on a seven-point scale).

[36] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question K4.

Table 3-10. Impact of Workshops on Awareness of Utility Sponsored Programs by Training Survey[37]

Response		Codes and Standards	Equipment Training	Process Training	Total
Strongly Disagree (1)	Count	1	1	9	11
	Percent	3.0%	2.1%	8.6%	5.9%
(2)	Count	1	1	9	11
	Percent	3.0%	2.1%	8.6%	5.9%
(3)	Count	5	0	8	13
	Percent	15.2%	0.0%	7.6%	7.0%
(4)	Count	3	6	11	20
	Percent	9.1%	12.8%	10.5%	10.8%
(5)	Count	5	17	31	53
	Percent	15.2%	36.2%	29.5%	28.6%
(6)	Count	9	6	20	35
	Percent	27.3%	12.8%	19.0%	18.9%
Strongly Agree (7)	Count	9	16	17	42
	Percent	27.3%	34.0%	16.2%	22.7%
Total	**Count**	**33**	**47**	**105**	**185**

Feedback from respondents suggests that trainings are positively influencing participants through their general knowledge of a given subject, such as Title 24 codes and standards, as well as their awareness of other utility sponsored programs. Respondent comments included:

> *"I was glad I did attend the presentation. It was very informative and I learned a lot."*

> *"I enjoyed the course. I thought the doctor who taught it was excellent. I would take that course again. I would recommend that course to anybody. I thought the information provided regarding implementing the commissioning process for enhancing delivery and quality of new and existing buildings was very beneficial for a university."*

> *"Class was well put together. The person presenting it seemed very well-informed. I learned a lot from it."*

[37] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question K5b.

The level of engagement featured specifically in trainings is likely the driving factor behind their success. Participants are given information pertinent to them in a more personal setting and, as the workshop topics generally dictate the recommendations made for other utility programs, the funneling that takes place is appropriate and, therefore, more likely to be successful.

3.3.3 End-Use Commercial Customers (EUCC)

PA developed a series of questions specifically geared towards end-use commercial customers who applied workshop information at facilities that their business occupied or managed. This section provides a detailed analysis of EUCC participant responses, highlighting overarching trends seen in this specific participant group. For additional detailed results, please refer to Appendix B.

For the equipment and process trainings, respondents were asked to agree or disagree with the statement that, as a result of the workshop, they were better able to understand how to improve the energy efficiency of their facility or the facilities which they managed. On a seven-point scale (one indicating strongly disagree and seven indicating strongly agree), participants indicated their level of agreement with the statement, as seen in Table 3-11 below. Approximately 74% of respondents agreed that their participation in the training increased their understanding of ways to improve the efficiency of their facilities (a rating of five or higher). Respondents were also asked whether their participation in the training had increased the level of regard their energy recommendations are viewed (see Table B-6; Appendix B). Approximately 72% of respondents reported that their recommendations regarding energy efficiency improvements were viewed as more informed as a result of attending the training workshop.

Table 3-11. EUCC Rating of Assertion that Understanding of how to Improve Energy Efficiency in Facilities has Increased by Training Survey[38]

Response		Equipment Training	Process Training	Total
Strongly Disagree (1)	Count	0	3	3
	Percent	0.0%	5.6%	3.9%
(2)	Count	0	6	6
	Percent	0.0%	11.1%	7.9%
(3)	Count	1	3	4
	Percent	4.5%	5.6%	5.3%
(4)	Count	1	6	7
	Percent	4.5%	11.1%	9.2%
(5)	Count	9	11	20
	Percent	40.9%	20.4%	26.3%
(6)	Count	5	18	23
	Percent	22.7%	33.3%	30.3%
Strongly Agree (7)	Count	6	7	13
	Percent	27.3%	13.0%	17.1%
Total	**Count**	**22**	**54**	**76**

Survey respondents were also asked to rate the degree, on a seven-point scale, in which the workshop caused them to think differently about taking advantage of energy efficiency opportunities at their facilities (Appendix B, Table B-3). Seventy-four percent of participants rated the workshop's influence as a five or higher (one meaning no influence at all; seven meaning a great deal of influence). Participants were then asked to describe how the workshop had affected their thoughts regarding energy efficiency. Responses included:

> *"I am able to identify more opportunities than I previously thought possible."*

> *"It helped me realize how the long term fiscal impacts are related to energy costs, as well as help me focus on the fundamental commissioning of energy systems to make sure the systems are operating optimally in accord with manufacturer's requirements or in accord with plans and specs, which in turn relate to energy cost savings."*

[38] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question K5e.

"Basically, it is just that there are things we can do and can control within the office. I was not aware of certain measures we could do at our own office/desks. I am more aware now."

The equipment and process training participants were also asked to rate the degree in which their awareness of methods for taking advantage of energy efficiency opportunities at their facilities had increased as a result of taking the training (Table 3-12). On a scale of one to seven, where one indicated no increase in knowledge and seven indicated a great deal of increase in knowledge, 25% of respondents said that the training had increased their awareness a great deal (seven out of seven). Only five participants (of 76) indicated that the training had not affected their awareness.

Table 3-12. EUCC Rating of Increase in Awareness of Methods to take Advantage of Energy Efficiency Opportunities in Facilities by Training Survey[39]

Response		Equipment Training	Process Training	Total
Not at All (1)	Count	0	5	5
	Percent	0.0%	9.3%	6.6%
(2)	Count	0	5	5
	Percent	0.0%	9.3%	6.6%
(3)	Count	1	3	4
	Percent	4.5%	5.6%	5.3%
(4)	Count	3	2	5
	Percent	13.6%	3.7%	6.6%
(5)	Count	6	10	16
	Percent	27.3%	18.5%	21.1%
(6)	Count	8	14	22
	Percent	36.4%	25.9%	28.9%
A Great Deal (7)	Count	4	15	19
	Percent	18.2%	27.8%	25.0%
Total	**Count**	**22**	**54**	**76**

PA asked participants for each of the three surveys whether or not they had made any efforts to save energy at the facility[ies] managed or occupied by their business. As seen in Table 3-13, 74.7% of respondents affirmed that they had made efforts to save energy since the date of their participation.

[39] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question A1c.

Table 3-13. EUCC - Has made Efforts to Apply Concepts Taught in the Workshop by Training Survey[40, 41]

Response		Codes and Standards	Equipment Training	Process Training	Total
Yes	Count	3	20	36	59
	Percent	100.0%	90.9%	66.7%	74.7%
No	Count	0	2	16	18
	Percent	0.0%	9.1%	29.6%	22.8%
Don't Know	Count	0	0	2	2
	Percent	0.0%	0.0%	3.7%	2.5%
Total	**Count**	**3**	**22**	**54**	**79**

Of participants who had made efforts to save energy at their facilities (Table 3-13), PA asked them to rate the level of influence the training had on their decision to pursue energy savings. As seen in Table 3-14, participants rated the workshop's influence on a seven-point scale where one meant not at all influential and seven meant very influential. Approximately 64% of respondents reported that the workshop had a strong influence (a rating of six to seven on a seven-point scale) on their decision to pursue energy saving efforts at their facilities.

[40] Three Codes and Standards participants skipped out of this question based off of a screener question.

[41] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TC2.

Table 3-14. EUCC Rating that Workshop Information Influenced Decision to Save Energy by Training Survey[42]

Response		Codes and Standards	Equipment Training	Process Training	Total
Not at all Influential (1)	Count	0	0	3	3
	Percent	0.0%	0.0%	8.3%	5.1%
(2)	Count	0	1	1	2
	Percent	0.0%	5.0%	2.8%	3.4%
(3)	Count	0	3	2	5
	Percent	0.0%	15.0%	5.6%	8.5%
(4)	Count	0	2	2	4
	Percent	0.0%	10.0%	5.6%	6.8%
(5)	Count	1	3	3	7
	Percent	33.3%	15.0%	8.3%	11.9%
(6)	Count	1	6	15	22
	Percent	33.3%	30.0%	41.7%	37.3%
Very Influential (7)	Count	1	5	10	16
	Percent	33.3%	25.0%	27.8%	27.1%
Total	**Count**	**3**	**20**	**36**	**59**

Generally, the participant responses seen in Tables 3-11 through 3-14 emphasize the correlation between a participant's understanding and/or awareness of energy efficiency opportunities and the likelihood that the participant has made any effort to save energy at their facility. Participants who report a high increase in understanding are also likely to have an increased awareness of available energy efficiency opportunities. Furthermore, these participants also demonstrate an increased tendency to make efforts to save energy at their facilities and, as seen in Table 3-11, they attribute the training(s) they attended as influencing their decision to make these efforts.

Those who indicated that they had not attempted to save energy at the faciliy[ies]that their business owns or manages, were asked to rate the likelihood that they would attempt to make energy saving efforts using training workshop concepts within the next 12 months (Appendix B, Table 3-16). Overall, 34.6% of respondents indicated that they were not at all likely to make an effort to save energy in their facility; however, approximately 58% reported that they did intend to make this effort in the near future (rating a four or higher on a seven-point scale, where one indicated not at all likely and seven indicated very likely).

[42] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TC3.

Table 3-15. EUCC - Shared Information from Workshop with a Colleague by Training Survey[43]

Response		Codes and Standards	Equipment Training	Process Training	Total
Yes	Count	5	21	50	76
	Percent	83.3%	95.5%	92.6%	92.7%
No	Count	1	1	4	6
	Percent	16.7%	4.5%	7.4%	7.3%
Total	**Count**	**6**	**22**	**54**	**82**

PA also designed a series of questions to gauge how much participants recommend energy efficient technologies as a result of workshop participation. Approximately 93% of participants indicated that they had shared workshop information a colleague, as seen in Table 3-15, above. Only six participants (of 82) indicated that they had not shared any workshop-related information with a colleague.

Table 3-16. EUCC - Convinced Others within Organization that Energy Saving Actions are Needed by Training Survey[44]

Response		Codes and Standards	Equipment Training	Process Training	Total
Yes	Count	4	17	43	64
	Percent	66.7%	77.3%	79.6%	78.0%
No	Count	2	5	11	18
	Percent	33.3%	22.7%	20.4%	22.0%
Total	**Count**	**6**	**22**	**54**	**82**

We also asked respondents whether they had attempted to convince others, both inside and outside their organization, that energy saving actions were needed. Seventy-eight percent of respondents indicated that they had convinced colleagues within their organization that these actions were necessary (Table 3-16). As seen in Table 3-17, even more respondents (79.3%) report having convinced others outside their organization that energy saving actions are needed.

[43] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TC6_b.

[44] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TC6_c.

Table 3-17. EUCC - Convinced Others outside Organization that Energy Saving Actions are Needed by Training Survey[45]

Response		Codes and Standards	Equipment Training	Process Training	Total
Yes	Count	4	16	45	65
	Percent	66.7%	72.7%	83.3%	79.3%
No	Count	2	6	9	17
	Percent	33.3%	27.3%	16.7%	20.7%
Total	**Count**	**6**	**22**	**54**	**82**

All EUCC respondents who participated in the equipment and process training surveys were asked if they or their facility had participated in an energy audit in the past three years. When asked, 51.3% of respondents indicated that they had participated in an energy audit (Table B-9, Appendix B). These respondents were then asked to rate the influence the workshop had on their decision to participate in the energy audit, as seen in Table 3-18. Using a seven-point scale, approximately 33% of respondents said that the training had a significant level of influence in their decision to participate (a rating or five or higher), showing that trainings are motivating customers to participate in additional programs.

[45] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TC6_d.

Table 3-18. EUCC Rating of Workshop Influence on Decision to have Audit by Training Survey[46]

Response		Equipment Training	Process Training	Total
Not at all Influential (1)	Count	4	7	11
	Percent	25.0%	30.4%	28.2%
(2)	Count	1	2	3
	Percent	6.2%	8.7%	7.7%
(3)	Count	0	2	2
	Percent	0.0%	8.7%	5.1%
(4)	Count	5	3	8
	Percent	31.2%	13.0%	20.5%
(5)	Count	0	3	3
	Percent	0.0%	13.0%	7.7%
(6)	Count	2	4	6
	Percent	12.5%	17.4%	15.4%
Very Influential (7)	Count	2	2	4
	Percent	12.5%	8.7%	10.3%
Audit prior to training	Count	2	0	2
	Percent	12.5%	0.0%	5.1%
Total	**Count**	**16**	**23**	**39**

3.3.4 Market Actors (MA)

PA also developed a series of questions that specifically targeted market actors (MA) – those who implement energy saving methods for customers to whom they provided services (e.g., architects, engineering firms, contractors, etc.). Though these respondents did not make the decision to implement energy efficient projects, they can adopt better energy practices, and they play a significant role in the decision making process of their clients. This section provides a detailed analysis of MA participant responses, highlighting overarching trends seen in this specific participant group. For additional detailed results, please refer to Appendix B.

[46] Source: Partnership Program Indirect Impacts Evaluation, Equipment Participant Survey, and Process Participant Survey, question TC10.

Table 3-19. MA – More Familiar with Workshop Tools or Techniques Learned to Enhance Client's Services by Training Survey[47]

Response		Codes and Standards	Equipment Training	Process Training	Total
Strongly Disagree (1)	Count	2	0	0	2
	Percent	7.4%	0.0%	0.0%	2.2%
(2)	Count	1	0	0	1
	Percent	3.7%	0.0%	0.0%	1.1%
(3)	Count	1	3	1	5
	Percent	3.7%	16.7%	2.3%	5.6%
(4)	Count	7	0	4	11
	Percent	25.9%	0.0%	9.1%	12.4%
(5)	Count	6	8	11	25
	Percent	22.2%	44.4%	25.0%	28.1%
(6)	Count	4	3	11	18
	Percent	14.8%	16.7%	25.0%	20.2%
Strongly Agree (7)	Count	6	4	17	27
	Percent	22.2%	22.2%	38.6%	30.3%
Total	**Count**	**27**	**18**	**44**	**89**

MA respondents were given a statement regarding the workshop's effect on their understanding of energy efficient solutions (Table 3-19). Each respondent rated the degree to which they agreed with the statement on a seven-point scale, where one indicated that they strongly disagreed with the statement and seven indicating that they strongly agreed. When asked whether they agreed or disagreed with the statement "As a result of taking the workshop, I am now more familiar with the tools and/or techniques that will enhance the service I provide to my clients," approximately 79% of participants responded positively, rating their agreement with the statement as a five or higher (Table 3-19).

In order to gauge the level of influence the workshops had on participants' outlooks and decisions, PA asked a series of questions that required respondents to consider the level of influence the training had them. Participants then rated the training on a scale of one to seven, where one meant the training had no influence and seven meant that the workshop had a great deal of influence. The first question asked participants to rate the workshop's influence on their ability to think differently regarding the introduction of energy efficiency concepts in their work for clients (Table 3-20). Sixty-two (71.3%) participants rated the workshops' influence as a five or higher. When asked to rate the influence the workshop had on their

[47] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question K5c.

desire to introduce energy efficiency in client work, 82.3% of respondents rated the workshops' influence as being a five or higher (Table B-27, Appendix B). Similarly, when asked if the workshop had increased participants' awareness of methods to introduce energy efficiency into their client work, approximately 80% rated the workshop as having an influence of five or higher (Table B-28, Appendix B)

Table 3-20. MA Rating of Workshop's Influence on Ability to Think Differently Regarding Opportunities to Introduce Energy Efficiency to Work for Clients by Training Survey[48, 49]

Response		Codes and Standards	Equipment Training	Process Training	Total
Not at All (1)	Count	4	0	0	4
	Percent	16.0%	0.0%	0.0%	4.6%
(2)	Count	1	0	2	3
	Percent	4.0%	0.0%	4.5%	3.4%
(3)	Count	3	3	1	7
	Percent	12.0%	16.7%	2.3%	8.0%
(4)	Count	3	2	6	11
	Percent	12.0%	11.1%	13.6%	12.6%
(5)	Count	8	6	15	29
	Percent	32.0%	33.3%	34.1%	33.3%
(6)	Count	2	1	9	12
	Percent	8.0%	5.6%	20.5%	13.8%
A Great Deal (7)	Count	4	6	11	21
	Percent	16.0%	33.3%	25.0%	24.1%
Total	**Count**	**25**	**18**	**44**	**87**

When asked to briefly explain how the workshop had influenced their thoughts regarding opportunities to introduce energy efficiency into their client work, responses included:

> *"I see the mistakes that everyone's making in their ideas of what is energy efficient and how to correct it. The course definitely pointed out how to correct it. The entire course was predicated on video and pictures of mistakes in the field and the steps to be taken to correct them."*

[48] Two participants from the Codes and Standards series skipped out of this question based on their previous responses.

[49] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question A3a.

"It improved for me the accessibility of energy efficiency improvements as solutions for my customers. It is often a threshold difficult to cross when working with customers with limited budgets. I could better explain the cost -effectiveness of energy efficiency measures."

"I am more aware of what we have to do, so that creates a greater communication to the customer to explain the process. I'm also more aware of the process to help ensure to get a better diagnosis of the customer's problem."

MA respondents were asked to indicate the degree to which they agreed with the statement, "As a result of taking the workshop, I am more likely to recommend energy efficient equipment, designs or practices to my clients." Over 80% of participants said that the workshops had positively influenced their likelihood of recommending energy efficient options (Table 3-21). This suggests that respondents are more knowledgeable about how to incorporate energy efficiency in their client work and therefore, more likely to recommend these practices to their clients.

Table 3-21. MA Rating of Likelihood to Recommend Efficient Equipment, Designs, or Practices to Clients by Training Survey[50, 51]

Response		Codes and Standards	Equipment Training	Process Training	Total
Strongly Disagree (1)	Count	5	1	0	6
	Percent	20.8%	5.6%	0.0%	7.0%
(2)	Count	0	1	0	1
	Percent	0.0%	5.6%	0.0%	1.2%
(3)	Count	3	0	2	5
	Percent	12.5%	0.0%	4.5%	5.8%
(4)	Count	1	2	2	5
	Percent	4.2%	11.1%	4.5%	5.8%
(5)	Count	3	5	4	12
	Percent	12.5%	27.8%	9.1%	14.0%
(6)	Count	4	1	6	11
	Percent	16.7%	5.6%	13.6%	12.8%
Strongly Agree (7)	Count	8	8	30	46
	Percent	33.3%	44.4%	68.2%	53.5%
Total	**Count**	**24**	**18**	**44**	**86**

[50] Three participants from the Codes and Standards series skipped out of this question based on their previous responses.

[51] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TA0.

We also asked respondents whether or not they had applied any of the workshop concepts to change or enhance their client services. Approximately 86% or respondents indicated that they had applied workshop concepts to their client work, while 13.8% said they had not (Table 3-22).

Table 3-22. Applied Concepts to Enhance MA Service to Clients by Training Survey[52, 53]

Response		Codes and Standards	Equipment Training	Process Training	Total
Yes	Count	21	16	38	75
	Percent	84.0%	88.9%	86.4%	86.2%
No	Count	4	2	6	12
	Percent	16.0%	11.1%	13.6%	13.8%
Total	**Count**	**25**	**18**	**44**	**87**

We included several follow-up questions in which respondents were given the opportunity to share what kind(s) of changes they had made. Each is highlighted below and Tables B-29 to B-35 in Appendix B show more detailed data for each question.

- Sixty-five percent (49 of 75) now specify energy efficient measures more frequently than prior to taking workshop.
- Sixty-three percent (47 of 75) now specify energy efficient measures that they were unfamiliar with prior to taking the workshop
- Fifty-seven percent (43 of 75) apply building or system design principals or elements that they were unfamiliar with prior to taking the workshop.
- Forty-nine percent (37 of 75) utilize building or system design tools or practices that they were unfamiliar with prior to taking the workshop.
- Forty-nine percent (33 of 68) changed the methods that they use to size and specify new energy consuming equipment for their clients.
- Forty-two percent (24 of 57) made changes to the manner in which they install or maintain energy consuming equipment.
- Twenty-seven percent (20 of 75) utilize diagnostic tools or practices that they were unfamiliar with prior to taking the workshop.

PA then asked the respondents to rate the influence workshop information had on their decision to apply workshop concepts in their services to clients. This was done using a scale of one to seven, where one indicated that the workshop had no influence and seven indicated that it had a great deal of influence, as

[52] Two participants from the Codes and Standards series skipped out of this question based on their previous responses.

[53] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TA1.

seen in Table 3-23. Approximately 79% of MAs rated the workshop as having an influence (a rating of five or higher) on the decision to apply workshop concepts to their work.

Table 3-23. MA Rating of Workshop Influence on Decision to Save Energy by Training Survey[54]

Response		Codes and Standards	Equipment Training	Process Training	Total
Skipped	Count	1	0	0	1
	Percent	4.8%	0.0%	0.0%	1.3%
Not at all Influential (1)	Count	3	1	1	5
	Percent	14.3%	6.2%	2.6%	6.7%
(2)	Count	2	0	0	2
	Percent	9.5%	0.0%	0.0%	2.7%
(3)	Count	0	1	1	2
	Percent	0.0%	6.2%	2.6%	2.7%
(4)	Count	2	1	3	6
	Percent	9.5%	6.2%	7.9%	8.0%
(5)	Count	5	5	8	18
	Percent	23.8%	31.2%	21.1%	24.0%
(6)	Count	6	3	9	18
	Percent	28.6%	18.8%	23.7%	24.0%
Very Influential (7)	Count	2	5	16	23
	Percent	9.5%	31.2%	42.1%	30.6%
Total	**Count**	**21**	**16**	**38**	**75**

3.4 Codes and Standards Survey Results

The California 2005 Title 24 Energy Efficiency Standards workshop is a two-hour workshop designed to inform participants of building envelope, lighting, and mechanical requirements under Title 24 (also known as the California Building Standards Code) that impact commercial and residential new construction and renovation.

[54] Source: Partnership Program Indirect Impacts Evaluation, Title 24 Participant Survey, Equipment Participant Survey, and Process Participant Survey, question TA3c.

3.4.1 Key Findings

The respondents who attended the Title 24 Energy Efficiency Standards workshop consisted of both end-use commercial customers (EUCC) and market actors (MA). Below we provide detailed key findings from the Codes and Standards survey.

Because of the training, respondents have an improved understanding of Title 24 standards (TF24). Survey respondents were asked to rate the degree in which their understanding of Title 24 standards had increased on a seven-point scale, where one meant not at all and seven meant a great deal. MA respondents reported a mean rating of 4.7 and, for EUCC respondents, rated the increase as a 5.*7*

The workshop successfully attracted a range of professionals who are primarily involved with code compliance and enforcement (TF25). Respondents represent a range of professional positions including architects, engineers, business owners or directors, draftspersons, planners, public officials, general contractors, building inspectors, and building department staff.

Survey results indicate that the workshop increased participants' knowledge of Title 24 standards (TF26). Furthermore, participants are better prepared to meet and implement Title 24 standards as a result of the training.

Survey responses suggest that the workshop has positively influenced the EUCC participants' behavior in terms of Title 24 standards and energy efficiency (TF27). Similarly, the workshop has positively influenced the market actor participants' behavior in terms of Title 24 standards and energy efficiency.

3.4.2 Methodology

PA conducted 33 surveys with 2006–2008 Title 24 workshop participants. The 33 participant surveys included 27 market actors and six end-use commercial customers (EUCC). PA implemented these surveys in December 2008. Participants attended Title 24 workshops sponsored by the Mammoth Lakes, Ridgecrest, San Gabriel Valley, and Ventura County partnership programs.

Table 3-24 presents overall and partnership program survey response rates. The overall response rate was 39.9%; individually, the response rate was highest for the San Gabriel partnership program.

Table 3-24. Title 24 Codes and Standards Training Survey Response Rate[55]

Sample	San Gabriel[56]	Mammoth Lakes[57]	Ridgecrest[58]	Ventura County[59]	Overall
Starting Sample	**40**	**17**	**21**	**39**	**117**
No/bad phone number	**5**	**2**	**5**	**11**	**23**
Ineligible	**2**	**5**	**1**	**2**	**10**
Adjusted Sample	**33**	**10**	**15**	**26**	**84**
Refused	6	1	1	3	11
Unavailable for duration	1	0	1	1	3
Do not recall training	1	0	0	10	11
Called out (at least 6 attempts made)	8	5	6	7	26
Complete	**17**	**4**	**7**	**5**	**33**
Response Rate	**51.5%**	**40.0%**	**46.7%**	**19.2%**	**39.3%**

3.4.3 Detailed Survey Results

Attendee Characterization

Respondents cited the main reason for attending the Title 24 workshops as the opportunity to learn something they could apply at their business or a property they manage (88%).

Survey respondents primarily represent market actors (MA)—those who intend to apply the information they learned in the workshop at facilities occupied or managed by customers to whom they provide services (69%, 24/33) or businesses they manage (seven percent, 3/33). Participants planning to apply the workshop information at their own business were represented to a lesser degree (14%, 6/33).

Respondents represent a range of professional positions including architects, engineers, business owners or directors, draftspersons, planners, public officials, general contractors, building inspectors, and building department staff.

Seventy-five percent of MA respondents serve both commercial and residential customers; approximately 20% serve residential only. For those who serve commercial customers—17 serve commercial most frequently and one serves industrial companies more frequently. None of the contacted participants serve agricultural customers.

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[55] In general, the overall survey response rate was relatively high. This was lowered because of the significantly lower response rate for the workshop administered by Ventura County in 2006. This low response rate is likely due to the fact that a large interval of time passed between workshop participation and survey fielding.

[56] This Title 24 workshop was offered on 12/3/07 and 7/16/08 by the San Gabriel (SCE2525) program.

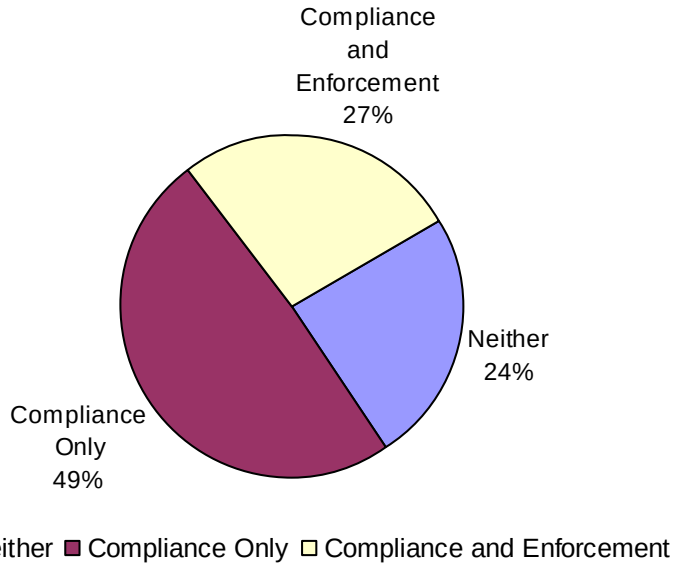
[57] This Title 24 workshop was offered on 7/14/07 through the Mammoth Lakes (SCE2567) program.

[58] This Title 24 workshop was offered on 12/18/07 through the Ridgecrest (SCE2568) program

[59] This Title 24 workshop was offered on 2/28/06, 3/1/06, 4/26/06, 5/10/06, and 4/17/07 through the Ventura County (SCE2519) program.

Half of participants indicated that they are involved only with code compliance; a quarter are responsible for both code compliance and enforcement. Twenty-four percent of respondents indicated that they are responsible for neither code compliance nor enforcement (Figure 3-2).

Figure 3-2. Participant Responsibility[60] for Code Compliance and Enforcement (n=33)



As seen in Figure 3-2 above, code compliance and/or enforcement is the primary responsibility of participants reporting they are involved in either compliance, or compliance and enforcement. An average of 62% of MA participants spend their typical work week on code compliance or compliance and enforcement.

Of surveyed MA respondents, public employees spend, on average, more time on code compliance and enforcement than private employee respondents (70% vs. 43%). Furthermore, public employee respondents are four times as likely to be involved in enforcement activities along with compliance as private employee respondents. As expected, private employee respondents are more concerned with compliance only, as seen in Table 3-25.

[60] The original question read "Are you responsible for code compliance, code enforcement, both, or neither?" Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question AC4

Table 3-25. MA Respondent Code Responsibility by Type of Employee[61]

Responsibility	Private	Public	Total
Compliance	7	7	14
	78%	39%	52%
Both	1	8	9
	11%	44%	33%
Neither	1	3	4
	11%	17%	15%
Total	**9**	**18**	**27**

Sixty-four percent of end-use commercial customers (EUCC) categorized themselves as small businesses and another 18% considered themselves as medium businesses. Fifty-four percent of EUCC respondents own their business and 27% lease, while the remainder have other arrangements. The average length of time their businesses had occupied their current location was 29 years.[62] The EUCC respondents surveyed represented businesses occupying both single locations and multiple locations.

Knowledge Effects

Almost all respondents reported the Title 24 workshop provided them with new information on Title 24 codes and standards (88%). PA asked participants to rank the increase in their knowledge from attending the workshop on a seven-point scale (one meaning little or no increase; seven meaning significant increase in knowledge). Approximately a quarter of participants (27%) indicated that the workshop had increased their knowledge significantly (a rating of six or seven), while over half (61%) said they saw some increase in knowledge (a rating between three and five). Generally, the workshop impacted respondents' knowledge of Title 24 standards positively and no one reported that they were no more knowledgeable after attending the workshop (Table 3-26).

[61] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question AC4

[62] Excluding one outlier of 209 years at one location, the range was two years to 115 years.

Table 3-26. Impact of Workshop on Understanding of How to Meet Title 24 Codes and Standards[63]

Response	Private (n=9)	Public (n=18)	Overall (n=33)
No more knowledgeable (1)	0.0%	0.0%	0.0%
(2)	11.1%	16.7%	12%
(3)	33.3%	22.2%	21%
(4)	22.2%	11.1%	18%
(5)	22.2%	22.2%	21%
(6)	11.1%	11.1%	15%
Significantly more knowledgeable (7)	0.0%	16.7%	12%
Mean Rating	**3.9**	**4.4**	**4.4**

The percentage of respondents reporting that they learned learning new information as a result of participating in the workshop is impressive, as the majority (88%) of participants indicated that their level of knowledge of Title 24 codes and standards ranged between adequate and extensive *prior* to attending the workshop (Figure 3-3).

As seen in Table 3-27, below, 70% of respondents agreed (a rating between five and seven on a seven-point scale) that as a result of taking the workshop they have a better understanding of how to meet Title 24 standards and that they are more aware of utility sponsored energy efficiency programs. Sixty percent of market actors agreed that as a result of taking the workshop they are now more familiar with the tools and/or techniques that will enhance the service they provide to clients and that they are more confident when providing service that it will meet Title 24 standards. Furthermore, as a result of taking the workshop, eighty-three percent of EUCC respondents feel that they better understand how to meet Title 24 standards at the facility they manage. Half of EUCC respondents strongly agree (rating of seven) that as a result of taking the workshop they also have more confidence that any improvements they make will meet Title 24 standards.

[63] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, questions K4

Table 3-27. Impact of Title 24 Workshop on Understanding and Application of Standards[64]

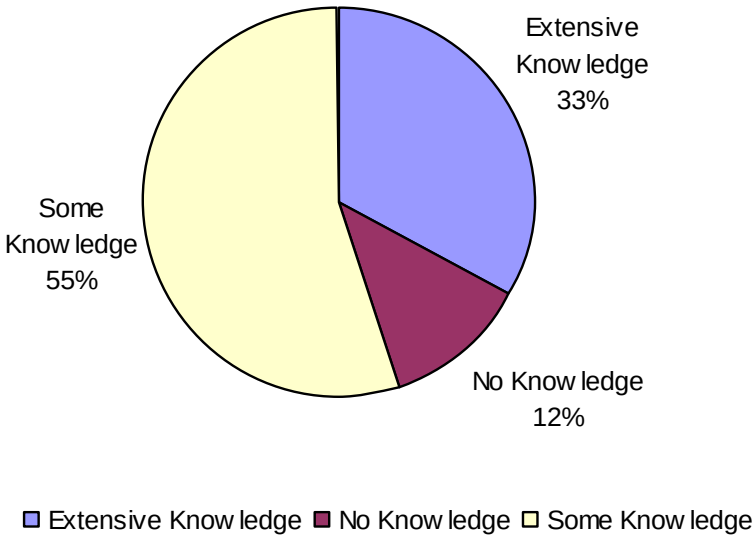
Asked of	Statement (1=Strongly Disagree, 7=Strong Agree)	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)	Mean Rating
All (n=33)	As a result of taking the course, I have a better understanding of how to meet Title 24 standards.	0.0%	9.1%	6.1%	15.2%	27.3%	15.2%	27.3%	5.2
All (n=33)	As a result of taking the course, I am more aware of utility sponsored energy efficiency programs.	3.0%	3.0%	15.2%	9.1%	15.2%	27.3%	27.3%	5.2
Market actors (n=27)	As a result of taking the course, I am now more familiar with the tools and/or techniques that will enhance the service I provide to my clients.	7.4%	3.7%	3.7%	25.9%	22.2%	14.8%	22.2%	4.9
Market actors (n=27)	As a result of taking the course, I have more confidence when I [inspect or review plans] or [specify equipment or building practices] that they will meet Title 24 standards.	11.1%	11.1%	11.1%	7.4%	11.1%	33.3%	14.8%	4.6
EUCC (n=6)	As a result of taking the course, I better understand how to meet Title 24 standards at my facility/the facilities I manage.	16.7%	0.0%	0.0%	0.0%	16.7%	50.0%	16.7%	5.2
EUCC (n=6)	As a result of taking the course, I have more confidence that any improvements I make will meet Title 24 standards.	16.7%	0.0%	0.0%	0.0%	16.7%	16.7%	50.0%	5.5

[64] Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, questions K5 series

The percentage reporting learning something new in the workshop is impressive since the majority (88%) of participants report that they had some or extensive knowledge of Title 24 standards before attending the workshop. (Figure 3-3).

Public employees were more likely to indicate they had extensive knowledge of Title 24 standards before attending the workshop than private employees (44% vs. 22%). Private employees were more likely to indicate they had some knowledge than public employees (67% vs. 39%).

Figure 3-3. Participant Description of Title 24 Knowledge Prior to Workshop Participation[65] (n=33)



Two-thirds (67%) of respondents reported that as a result of the training they find it 'easier' to either enforce/specify or comply with/understand Title 24 codes and standards (depending on their professional area of responsibility)[66]. Participants were asked to determine, on a seven-point scale (one meaning extremely difficult; seven meaning extremely easy), to rate their ability to enforce/specify or comply with/understand Title 24 codes and standards in the new construction or renovation projects with which they were involved. The mean ranting was a five out of seven, as seen in Table 3-28.

[65] The original question read "Which of the following statements best describes the amount of knowledge you had regarding Title 24 standards for new construction and renovation prior to your participation in the course?" Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question K3

[66] The proportion finding it easy to enforce/specify or comply with/understand Title 24 standards increased to seventy percent for public employees and was fifty-five percent for private employees without any significant shift in the mean rating.

Table 3-28. Ability to Enforce/Specify or Comply with/Understand Title 24 Standards in New Construction or Renovation Projects[67]

Response	Private (n=9)	Public (n=17)	Overall (n=30)
Extremely Difficult (1)	0.0%	0.0%	0.0%
(2)	0.0%	5.9%	3.3%
(3)	11.1%	23.5%	16.7%
(4)	33.3%	0%	13.3%
(5)	11.1%	41.2%	30.0%
(6)	33.3%	5.9%	16.7%
Extremely Easy (7)	11.1%	23.5%	20.0%
Mean rating	**5.0**	**4.9**	**5.0**

Using a seven-point scale, where one indicated the workshop information was not at all useful and seven indicating the information was very useful, participants were asked to rate the level of usefulness they found the workshop information to be. All participants found the information presented at the Title 24 workshop useful, rating a five or higher on a seven-point scale; over half (58%) found it very useful (a ranting of seven). The overall mean ranting was 5.7, as seen in Table 3-29 below.

Table 3-29. Rating of Usefulness of the Information Presented in the Title 24 Workshops[68]

Response	Private (n=9)	Public (n=18)	Overall (n=33)
Not at all Useful (1)	0.0%	0.0%	0.0%
(2)	0.0%	0.0%	0.0%
(3)	11.1%	5.6%	6.1%
(4)	22.2%	0%	9.1%
(5)	22.2%	33.3%	27.3%
(6)	33.3%	33.3%	27.3%
Very Useful (7)	11.1%	27.8%	30.3%
Mean Rating	**5.1**	**5.8**	**5.7**

Only 12% of respondents indicated that they have taken additional in-depth training on Title 24 requirements.

[67] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question R1

[68] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question R2

3.4.4 Attribution

EUCC participants were asked to rate how much the workshop positively affected their understanding and application of Title 24 codes and standards. Respondent answers across all four questions indicated the workshop had a positive impact on their ability to meet Title 24 codes and standards, as seen in Table 3-30.

Table 3-30. Influence of Workshop on EUCC Respondent Understanding and Application of Title 24 Code and Standards (n=6) [69]

Statement (1=Not at all, 7=A Great Deal)	Not at All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree do you think more about energy efficiency in new construction/renovation improvements at your facility as a result of the information presented in the course?	16.7%	0.0%	0.0%	0.0%	16.7%	16.7%	50.0%	5.5
To what degree did the course lead you to take advantage of energy efficiency opportunities at your facility?	16.7%	0.0%	0.0%	0.0%	50.0%	0.0%	33.3%	5.0
To what degree did the course increase your awareness of the requirements to meet Title 24 standards at your facility?	16.7%	0.0%	0.0%	0.0%	16.7%	33.3%	33.3%	5.3
To what degree did the course increase your understanding of specific requirements for meeting Title 24 standards or ways the Title 24 standards can be met at your facility?	0.0%	0.0%	0.0%	16.7%	33.3%	16.7%	33.3%	5.7

Similarly, MA respondents were asked a series of questions designed to assess how their participation in the workshop influenced their awareness of or behavior toward Title 24 codes and standards. Again, the answers to these questions indicate that the workshop had a positive influence on respondent understanding and implementation of Title 24 codes and standards. As seen in Table 3-31 below, respondents rated the degree to which their participation in the workshop influenced their awareness or behaviors on a seven-point scale (one indicating not at all; seven indicating a great deal).

The workshop had the most influence on increasing participant awareness of the requirements to meet Title 24 standards in the work they do for clients (64% rated the workshop influence as a four or higher). It had less influential in explaining the importance of helping their clients meet Title 24 standards (44% rated the workshop influence as a four or higher).

[69] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question A1 series

Table 3-31. Influence of Workshop on MA Respondent Understanding and Application of Title 24 Code and Standards (n=25)[70]

Statement (1=Not at all, 7=A Great Deal)	Not at All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree do you think more about energy efficiency in new construction or renovation improvements at client sites as a result of the information presented in the course?	16%	4%	12%	12%	32%	8%	16%	4.3
To what degree did the course improve your ability to help your clients comply with Title 24 standards?	8%	8%	12%	20%	24%	24%	4%	4.3
To what degree did the course increase your awareness of the requirements to meet Title 24 standards in the work you do for your clients?	4%	8%	12%	12%	28%	28%	8%	4.7
To what degree did the course explain the importance of helping your clients meet Title 24 standards?	4%	16%	16%	20%	4%	24%	16%	4.4

The majority of participants (70%) also said they were more aware of utility-sponsored energy efficiency programs as a result of taking the workshop. This suggests that the workshop may also increase participants' energy efficiency behavior.

3.4.5 End-use Commercial Customers (EUCC)

All EUCC respondents agree that they recommend Title 24 energy efficient technologies or practices more often to their management. Five of the six EUCC respondents also think that management views their recommendations as better informed because of their training. All of the respondents believe they are also better prepared to evaluate Title 24 options as a result of the workshop (Table 3-32).

[70] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question A3 series

Table 3-32. Workshop Influence on EUCC Respondents (n=6)[71]

Statement (1=Strongly Disagree, 7=Strong Agree)	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)	Mean Rating
As a result of taking the course, I recommend Title 24 energy efficient technologies or practices to my management more often than I did prior to taking the course.	0.0%	0.0%	0.0%	0.0%	33.3%	16.7%	33.3%	6.3
As a result of taking the course, I am better prepared to evaluate Title 24 energy efficient options.	0.0%	0.0%	0.0%	0.0%	0.0%	50%	50%	6.5
As a result of taking the course, my recommendations regarding Title 24 energy efficient technologies or practices are viewed by my management as more informed.	0.0%	0.0%	0.0%	16.7%	0.0%	50%	33.3%	6.0

Three of the six EUCC respondents we contacted have begun a new construction or major renovation(s) at the facilities they occupy or manage since participating in the Title 24 Energy Efficiency Standards workshop. All of those undertaking a new project have applied the concepts taught in the workshop and had met all of the Title 24 codes and standards.

Those undertaking a new project credited the workshop as being the primary influence behind their application of the concepts covered in the workshop. Four of the six EUCC respondents rated the workshop as "very influential."

Two of the six EUCC respondents felt that the changes or enhancements they made resulted in measurable energy savings in their facilities. One of them thought that the savings were moderate and the other thought the savings were significant. Neither of the EUCC respondents estimated the actual building savings.

EUCC respondents reported a high likelihood of using the concepts taught in the workshop for future new construction or renovation efforts. The mean ranting was 6.5 out of seven (one indicating not at all likely; seven indicating very likely). One reported that they were somewhat likely and the other five that they were very likely to use the concepts covered in the workshop.

Only two of the six EUCC respondents sought out additional information on Title 24 codes and standards; however, four of the six shared information with others or convinced others to meet Title 24 standards.

[71] Source: Partnership Program Indirect Impacts Evaluation – Title 24 Participant Survey, questions TC1 series

3.4.6 Market Actor (MA)

Eighty-four percent of the MA respondents have applied concepts taught in the Title 24 Energy Efficiency Standards workshop to change or enhance the services they provide to their clients. Table 3-33 shows the specific actions that respondents have taken as well as the average number of time they took these actions in 2008. Eighty percent of MA respondents say they have made these changes or enhancements standard practice.

MA respondents indicated the information provided in the workshop was somewhat influential in their decision to make the changes that they did (a mean of 4.5 on a seven-point scale where one signifies not at all influential and seven signifies very influential). The workshop had little influence for a quarter of the respondents; however, 40% reported that they found it very influential.

Table 3-33. Actions Taken by Market Actor Respondents since Workshop Participation (n=21)[72]

Action	Percent Taking Action	Average Number of Times Action Taken in 2008
Specify Title 24 standards unfamiliar with prior to course	41%	20
Specify Title 24 standards used more frequently than prior to course	35%	43
Apply bldg or system design principals unfamiliar with prior to course	35%	31
Use diagnostic tools or practices unfamiliar with prior to course	12%	2
Utilize bldg or system design tools unfamiliar with prior to course	24%	19
[OTH] Change the manner of installing or maintaining energy consuming equipment	6%	—[73]
[INS] Change the manner of enforcing EE standards	18%	30
[SPE] Change the methods used to size and specify new energy consuming equipment	24%	7
[INS] Integrate Title 24 standards into building plan checks	18%	52

Eighty-one percent of MA respondents felt that the changes or enhancements they've made to the service they provide resulted in measurable energy savings in their clients' facilities. The majority of market actors (71%) characterize the energy savings realized by their customers as a result of their participation

[72] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, questions TA2 and TA5 series

[73] The respondent who indicated that they took an action would not provide a response regarding the number of times they took that action.

in the workshop as "moderate". Another 29% characterize the savings as "significant." Although able to characterize the savings, none of the respondents were able to provide estimates.

3.4.7 Satisfaction

Overall, respondents were satisfied with the Title 24 workshop rating the mean satisfaction level as a 6.2 on a seven-point scale (one meaning not at all satisfied; seven meaning very satisfied). Eighty-five percent of respondents indicated they were very satisfied with the workshop, as seen in Table 3-34.

Table 3-34. Satisfaction with the Title 24 workshop[74]

Response	Private (n=9)	Public (n=18)	Overall (n=33)
Not at all Satisfied (1)	0%	0%	0%
(2)	0%	0%	0%
(3)	11.1%	0%	3.0%
(4)	0%	5.6%	3.0%
(5)	11.1%	11.1%	9.1%
(6)	56.6%	38.9%	42.4%
Very Satisfied (7)	22.2%	44.4%	42.4%
Mean Rating	**5.8**	**6.2**	**6.2**

Approximately 89% of respondents felt the overall length (two hours) of the Title 24 workshop was appropriate. No one felt it was too long. When asked about the length of specific topic areas at the workshop, most were considered to be about right (Table 3-35). Areas that respondents felt could use additional time included: residential parking lot and garage lighting, demand control ventilation, nonresidential ducts, and duct leakage testing.

[74] Source: Partnership Program Indirect Impacts Evaluation—Title 24 Participant Survey, question R2c

Table 3-35. Participant Rating of Title 24 Workshop Topic Discussions (n=33)[75]

Application	Too little	About right	Too much	NA
Nonresidential indoor lighting	15%	70%	3%	12%
Residential lighting	18%	64%	3%	15%
Residential parking lots and garage lighting	33%	49%	0%	18%
Outdoor lighting	24%	67%	3%	6%
Nonresidential ducts	33%	39%	3%	24%
Demand control ventilation	30%	42%	3%	24%
Residential ducts	18%	61%	2%	18%
Insulation	18%	73%	0%	9%
Duct leakage testing	33%	46%	3%	18%

3.5 Equipment Specific Survey Results

This interim memorandum is the second in a series of three interim memorandums that summarize the results of surveys with participants of trainings offered through local government partnership (LGP) programs during the 2006-2008 program cycle. This memorandum details the key findings, methodology, and analysis to estimate the indirect impacts resulting from four trainings offered through LGP programs. The approved methodology used to determine the estimates are documented in the memorandum *Indirect Impact Net-to-Gross Analysis Methodology*[76] and follows the approaches specified in the California Evaluation Protocols of April 2006.

The four trainings summarized in this memo are the 1) Advanced Energy Efficiency (Advanced EE), 2) Motor Efficiency, 3) Heating, Ventilation and Air Conditioning (HVAC), and 4) Commercial Refrigeration workshops. All four of these trainings focused on specific types of equipment. Both residential and non-residential applications are represented, as discussed below.

3.5.1 Key Findings

Employing the methodology reviewed and approved by the California Public Utilities Commission (CPUC), the evaluation team calculated the indirect energy savings resulting from information provided during the training workshops. The analysis indicates that these equipment-specific trainings indirectly provide energy savings, as well as directly impact their savings through technologies directly installed. The analysis estimates program-attributable (or net) savings of 23,153 kWh, 6.67 kW (peak coincident), and 120.88 therms on a per-commercial-respondent basis. These equate to an effective useful life net savings of 206,944 kWh and 513.73 therms per commercial respondent (Table 3-36).

The annual net savings represent kWh, kW, and therms net-to-gross ratios of 30%, 29%, and 72%, respectively (TF28). These net-to-gross ratios represent the percent of commercial respondents who

[75] Source: Partnership Program Indirect Impacts Evaluation – Title 24 Participant Survey, questions R2e series

[76] Drafted May 26th and finalized based on the review meeting June 18th

attribute their energy efficient action(s) to the training they attended. The training with the highest estimated attributable savings for all three measurements was the Commercial Refrigeration workshop.

Table 3-36. Average Indirect Impacts per Small Business from Training (n=22 EUCC survey respondents)

Savings	kWh savings			kW savings			therm savings		
	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio	Gross	Net	Net-to-Gross Ratio
Annual Savings	77,227.3	23,152.6	30%	22.76	6.67	29%	167.30	120.88	72%
Lifecycle Savings	755,583.6	206,944.5	27%	NA	NA	NA	444.74	513.73	116%

Unlike the audit savings analysis we are unable to effective savings up to a known population. However, we can offer an estimate of annual and effective useful life savings for the population of training attendees covered by this survey. Because the respondent type (EUCR, EUCC, or MA) was determined by a question in the survey, we do not know the exact number of training attendees who were end use commercial customers (EUCC). The number of EUCC attendees was estimated by taking the proportion of EUCC respondents (.468) times the population of Equipment Specific Training attendees (208) resulting in an estimate of 97 EUCC attendees.

When applied to the population of training attendees covered by the Equipment Specific Training survey, the net annual indirect impacts attributed to the program are 7,491,050 kWh, 2,207 kW, and 16,228 therms. The stream of net savings across the effective useful life of each measure or behavior is 73,291,512 kWh and 43,140 therms.

Table 3-37. Indirect Impacts Applied to Equipment Specific Training Attendees (n=97 training attendees)

Savings	kWh savings		kW savings		therms savings	
	Gross	Net	Gross	Net	Gross	Net
Annual Savings	7,491,050	2,245,800	2,207	647	16,228	11,725
Life Cycle Savings	73,291,512	20,073,614	NA	NA	43,140	49,832

In addition to the estimates of annual and life cycle savings, there were several other key findings.

The trainings have increased participant knowledge (TF29). Overall, almost all respondents (98%) reported that the workshops provided them with new information. In addition, responses indicated the workshops positively impacted respondents' ability to understand and identify energy efficiency opportunities. This was true for all types of respondents: residential customers, non-residential customers, and market actors.

Knowledge is being shared with others (TF30). Most end-use commercial participants reported that they shared the information they had learned at the workshop with a colleague (96%). All residential participants have shared the information they learned at the workshop with family, friends, or neighbors (100%). Overall, these results indicate strong positive market effects.

Workshops are positive influence on understanding of energy efficient opportunities (TF31). For some, attending the workshop made them more aware of energy efficiency in general, while for others it gave them new ideas on energy efficiency improvements they could make. Attendance also resulted in a deeper understanding of how to be energy efficient and reinforced commitments to do so for attendees. In addition, 50% of EUCC respondents feel they are better prepared to evaluate energy efficiency options since they attended the workshop.

Both residential and non-residential customers are taking energy efficient actions as a result of trainings (TF32). Since participating in the workshops, 91% of the end-use commercial participants have made an effort to save energy at the facility[ies] their business occupies or manages and applied the concepts from the workshop. And since participating in the workshops, 71% of the end-use residential participants have made an effort to save energy in their homes and applied the concepts from the workshop.

Market actors have changed their practices as a result of attending workshops (TF33). The majority of market actors also indicated they are employing energy efficiency actions as a result of the trainings and for most those changes have become standard practice. Three quarters (78%) of market actors agreed with the statement, "I am more likely to recommend energy efficient equipment, designs or practices to my clients." Eighty-nine percent of market actors have applied concepts taught in the workshop to change or enhance the service they provide to their clients.

3.5.2 Methodology

PA completed 47 surveys with 2006–2008 workshop participants, as seen below (Table 3-38). The respondents included 18 market actors (MA), 22 end-use commercial customers (EUCC), and seven end-use residential customers (EUCR). PA implemented the surveys in April 2009. Table 3-38 represents the overall survey response rate as well as response rates by partnership program.

Table 3-38. Equipment Specific Training Survey Response Rates

Sample	Advanced EE[77]	Commercial Refrigeration[78]	Motor Efficiency[79]	HVAC[80]	Overall
Starting Sample	**59**	**45**	**27**	**77**	**208**
No/bad phone number	**11**	**14**	**8**	**38**	**71**
Ineligible	**9**	**2**	**1**	**2**	**14**
Adjusted Sample	**39**	**29**	**18**	**37**	**123**
Refused	4	2	1	3	10
Unavailable for duration	0	0	0	0	0
Do not recall training	8	10	1	0	19
Called out (8 attempts)	11	4	8	24	47
Available sample	**0**	**0**	**0**	**0**	**0**
Complete	**16**	**13**	**8**	**10**	**47**
Response Rate	**41.0%**	**44.8%**	**44.4%**	**27.0%**	**38.2%**

The surveys asked about the participant's knowledge gained from the workshops and the workshop's influence on their reported level of knowledge. The survey then asked if the respondent took an 'action.' An action is defined broadly to capture the range of activities that can result in savings, such as having purchased an efficient technology, employing an energy efficient practice, or making a behavioral change.

Gross savings analysis was conducted on actions reported for the 22 EUCC participants. Summit Blue estimated gross savings for each action made. Prior to fielding the survey, PA worked with Summit Blue to develop questions that would capture the necessary information to assess the gross savings. These series of questions included equipment and building characteristics as well as participant behaviors. The detailed description of the process for estimating gross savings can be found in Section 1.4.

3.5.3 Detailed Survey Results

Attendee Characterization

Survey respondents primarily represented end use commercial customers—those who intend to apply the information they learned in the workshop at businesses they owned or managed (47%, 22/47). Market actors who attended to learn about how they could apply the information to facilities occupied or

[77] The Advanced EE workshop was offered on 5/21/07, 6/20/07, 8/29/07 and 12/14/07 by the San Gabriel (SCE2525) program.

[78] The Commercial Refrigeration workshop was offered on 11/1/06 and 4/2/07 through the Association of Monterey and Bay Area Governments (PGE2016 – AMBAG) program. From the attendee list we removed many Institute for Technology students as they were no longer in school and not reachable.

[79] The Motor Efficiency workshop was offered on 5/8/07 through the Redwood (PGE2028) program.

[80] The series of HVAC workshops were offered on multiple dates in 2006 and 2007 through the Bakersfield-Kern (SCE2521) program. Many participants attended multiple workshops within this HVAC series.

managed by customers to whom they provide services were also well represented (38%, 19/47). Participants who planned to apply the workshop information at their own home were represented to a lesser degree (15%, 7/47).

Respondents represented a range of professional positions including owners, managers, administrative assistants, engineers, public staff, maintenance staff and technicians.

Thirty-three percent of market actors served both commercial and residential customers, 44% served residential only. For those who served non-residential customers, seven attendees served commercial customers, two attendees served industrial customers, and one served agricultural customers.

Twenty-three percent of end-use commercial customers own their business and 68% lease, while the rest have other arrangements. The average length of time at a location was 33.5 years (the range was two years–60 years). Only 10.5% were in a newer building that was less than 10 years old. Forty-one percent of end-use commercial customers surveyed were businesses with a single location and another 32% had between two to four locations.

End-use residential respondents are mostly living in small to modest (900-2700 sq ft), 20 year old (or older) single-family homes. Fifty-seven percent have a college degree. The number of residents living in the homes and annual household income vary widely.

Knowledge Effects

Thirty-one percent of participants attended the workshops to get information and ideas on how to conserve energy and along with that, money. Another 25% attended for general information and education on the topics covered. Thirteen percent were interested in new energy efficient technologies, and the rest hoped to learn more about the specific equipment covered at each workshop.

Almost all respondents reported the workshops provided them with new information (98%). Only one attendee of the refrigeration workshop did not know if the workshop provided any new information.

The survey asked participants to rank the increase in their knowledge from attending the workshop on a seven-point scale (one meaning little or no increase; seven meaning significant increase). A third of participants (32%) said the workshop significantly increased their knowledge (a rating of seven), while over half (60%) said they saw some increase in knowledge (ratings between four and six).

In general, the workshops positively impacted their knowledge of topics covered (Table 3-39).

Eight percent of respondents reported they had no knowledge of the workshop topic before the workshop and only two percent reported having significant knowledge prior to attending.

Table 3-39. Impact of Workshops on Understanding of Energy Efficiency Options[81]

Asked of	Statement (1=Strongly Disagree, 7=Strongly Agree)	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)	Mean Rating
All (n=47)	As a result of taking the course, I am better able to implement energy efficient solutions.	1 of 47	0 of 47	5 of 47	6 of 47	9 of 47	12 of 47	14 of 47	5.4
All (n=47)	As a result of taking the course, I am more aware of utility sponsored energy efficiency programs.	1 of 47	1 of 47	0 of 47	6 of 47	17 of 47	6 of 47	16 of 47	5.5
Market actors (n=18)	As a result of taking the course, I am now more familiar with the tools and/or techniques that will enhance the service I provide to my clients.	0 of 18	0 of 18	3 of 18	0 of 18	8 of 18	3 of 18	4 of 18	5.3
Market actors (n=18)	As a result of taking the course, I have more confidence when I make recommendations for improving energy efficiency at my client's facilities that the expected level of energy savings will actually occur.	0 of 18	0 of 18	3 of 18	1 of 18	7 of 18	0 of 18	7 of 18	5.4
EUCC (n=22)	As a result of taking the course, I better understand how to improve the energy efficiency at my facility or the facilities I manage.	0 of 22	0 of 22	1 of 22	1 of 22	9 of 22	5 of 22	6 of 22	5.6
EUCC (n=22)	As a result of taking the course, I have more confidence when I take steps to improve the energy efficiency at my faciliy[ies]that the expected level of energy savings will actually occur.	0 of 22	0 of 22	3 of 22	4 of 22	2 of 22	7 of 22	6 of 22	5.4

[81] Source: Partnership Program Indirect Impacts Evaluation—Equipment Specific Training Participant Survey, questions K5 series

3.5.4 Workshop Influence

End-use commercial customer participants were asked how much influence the workshops had on their understanding of energy efficiency opportunities. Respondent answers across all three statements indicated the workshop did positively impact their ability to identify energy efficiency opportunities (Table 3-40).

Table 3-40. Influence of Workshop on EUCC Understanding of Energy Efficiency Opportunities (n=22)[82]

Statement (1=Not at all, 7=A Great Deal)	Not at All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree did the course cause you to think differently about how to take advantage of energy efficiency opportunities at your facility?	0 of 22	0 of 22	4 of 22	4 of 22	5 of 22	5 of 22	4 of 22	5.0
To what degree did the course cause you to want to take advantage of energy efficiency opportunities at your facility?	1 of 22	1 of 22	1 of 22	2 of 22	6 of 22	5 of 22	6 of 22	5.3
To what degree did the course increase your awareness of methods for taking advantage of energy efficiency opportunities at your facility?	0 of 22	0 of 22	1 of 22	3 of 22	6 of 22	8 of 22	4 of 22	5.5

End-use commercial customers who rated the influence of the workshop as a four or higher were asked how they view energy efficiency improvements differently as a result of attending the workshop. For some (5), attending the workshop made them more aware of energy efficiency in general, while for others (5) it gave them new ideas on energy efficiency improvements they could make. Attendance also resulted in a deeper understanding of how to be energy efficient (4) and reinforced commitments to do so (2) for attendees. These results are illustrated with respondent comments shown below:

> *"It was a great help because it provided new ideas for AC and lighting and different types of light bulbs."*
>
> *"I made some improvements around the cooling boxes so there's better ventilation so they would be more efficient and create shade for them in the summer."*
>
> *"I have a better understanding of how a refrigeration system works completely from one end to the other."*
>
> *"I guess I was committed to conservation of all sorts especially energy but this helped us see what went into it and what simple things we could do. It was very helpful and cemented our commitment to energy conservation."*

[82] Source: Partnership Program Indirect Impacts Evaluation— Equipment Specific Training Participant Survey, question A1 series

"Now I do more of a premium motor because I know more about longevity, repair vs. replacement and energy efficiency."

"I am much more aware of heat loss through insulation that is very costly to my operation."

"It gave me the knowledge of using CFLs more throughout the whole facility. I changed every single bulb to CFLs and T8s (over 1000 bulbs)."

"I think just overall awareness and particularly on the maintenance side for efficiency. I think we have improved the maintenance of our equipment. I didn't realize how much the maintenance adds to the efficiency."

End-use residential customer participants were asked a similar series of questions to assess how their participation in the workshop influenced their understanding of energy efficiency opportunities. Again, the answers to these questions indicate that the workshop had a positive influence on the understanding of energy efficiency opportunities (Table 3-41). Respondents were asked to rate the degree to which their participation in the workshop influenced their awareness or behavior on a seven-point scale (one meaning not at all; seven meaning a great deal).

Table 3-41. Influence of Workshop on EUCR Understanding of Energy Efficiency Opportunities (n=7)[83]

Statement (1=Not at all, 7=A Great Deal)	Not at All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree did the course cause you to think differently about how to take advantage of energy efficiency opportunities at your home?	0 of 7	0 of 7	1 of 7	1 of 7	1 of 7	3 of 7	1 of 7	5.3
To what degree did the course cause you to want to take advantage of energy efficiency opportunities at your home?	0 of 7	0 of 7	1 of 7	1 of 7	2 of 7	1 of 7	2 of 7	5.3
To what degree did the course increase your awareness of methods for taking advantage of energy efficiency opportunities at your home?	0 of 7	0 of 7	1 of 7	1 of 7	3 of 7	1 of 7	1 of 7	4.9

End-use residential customers who rated the influence of the workshop as a four or higher were asked how they view energy efficiency improvements differently as a result of attending the workshop. The residential respondents saw an increase in awareness.

Market actors were asked a similar series of questions to assess how their participation in the workshop influenced their understanding of energy efficiency opportunities. Again, the answers to these questions indicate that the workshop had a positive influence on the understanding of energy efficiency opportunities (Table 3-42). Respondents were asked to rate the degree to which their participation in the workshop influenced their awareness or behavior on a seven-point scale (one meaning not at all; seven meaning a great deal).

[83] Source: Partnership Program Indirect Impacts Evaluation— Equipment Specific Training Participant Survey, question A2 series

Table 3-42. Influence of Workshop on Market Actor Understanding of Energy Efficiency Opportunities (n=18)[84]

Statement (1=Not at all, 7=A Great Deal)	Not at All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean rating
To what degree did the course cause you to think differently about how to take advantage of opportunities to introduce energy efficient elements to the work you do for your clients?	0 of 18	0 of 18	3 of 18	2 of 18	6 of 18	1 of 18	6 of 18	5.3
To what degree did the course cause you to want to take advantage of energy efficiency opportunities to introduce energy efficient elements to the work you do for your clients?	0 of 18	0 of 18	2 of 18	2 of 18	5 of 18	4 of 18	5 of 18	5.4
To what degree did the course increase your awareness of methods for introducing energy efficient elements to the work you do for your clients?	0 of 18	1 of 22	1 of 18	2 of 18	6 of 18	3 of 18	5 of 18	5.3

Market actors who rated the influence of the workshop as a four or higher were asked how they view energy efficiency improvements differently as a result of attending the workshop. Some can now better communicate benefits of the program to their customers and provide better service as a result of what they learned. Others have a better understanding of cost, lost efficiency and expected effectiveness of equipment. A few just have an increased awareness in general of energy efficiency options available to them. These results are illustrated with respondent comments shown below:

> *"I see the effectiveness more on certain areas of it. I wasn't as aware of the cost or loss of efficiency on some of the units."*
>
> *"I have more aware of what we have to do, so that creates a greater communication to the customer to explain the process. More aware of the process to help ensure a better diagnosis of the customer's problem."*
>
> *"Prior to the course, I had no idea what benefits the program provided in terms of energy conservation. Now the course has enhanced my knowledge and given me the ability to discuss the benefits."*
>
> *"It just improved for me the accessibility of energy efficiency improvements as solutions for my customers. It is often a threshold difficult to cross when working with customers with limited budgets. I could better explain the cost -effectiveness of energy efficiency measures."*
>
> *"I've always thought it was important but how to achieve efficiency was something I needed more knowledge on which was one of the reasons I attend these workshops."*

[84] Source: Partnership Program Indirect Impacts Evaluation—Equipment Specific Training Participant Survey, question A3 series

3.5.5 End-use Commercial Customer (EUCR) Actions Taken

Thirty-six percent of end-use commercial customers strongly agree that they recommend energy efficient technologies or practices more often to their management. Fifty percent of EUCC respondents think that they are better prepared (rating 6-7) to evaluate energy efficient options since the workshops (Table 3-43).

Table 3-43. Workshop influence on end use commercial customers (n=22)[85]

Statement (1=Not at all, 7=A Great Deal)	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)	Mean rating
As a result of taking the course, I recommend energy efficient technologies or practices to my management more often.	0 of 22	1 of 22	1 of 22	4 of 22	5 of 22	3 of 22	8 of 22	5.5
As a result of taking the course, I am better prepared to evaluate energy efficient options	0 of 22	0 of 22	1 of 22	3 of 22	7 of 22	5 of 22	6 of 22	5.6
As a result of taking the course, my recommendations regarding energy efficient technologies or practices are viewed by my management as more informed.	1 of 22	1 of 22	2 of 22	3 of 22	4 of 22	5 of 22	6 of 22	5.1

Since participating in the workshops, 91% of the end-use commercial participants have made an effort to save energy at the facility[ies] their business occupies or manages and applied the concepts from the workshop. Fifty-five percent of participants rated the workshop as influential (rating of 6-7) on their decision to make the effort to save energy. Twenty percent thought the workshop had little influence on their efforts to save energy (rating of 2-3). No one thought it had no influence.

For the two participants who had not already made an effort to save energy since attending the workshop, they felt they were only somewhat likely to make an effort within the next 12 months to save energy at the facility[ies] their business occupies or manages using the concepts taught in the workshops.

Participants were most likely to have shared the information they learned at the workshop with a colleague (96%) (Table 3-44).

[85] Source: Partnership Program Indirect Impacts Evaluation – Equipment Specific Training Participant Survey, questions TC1 series

Table 3-44. Actions taken by end-use commercial customers since participation (n=22)[86]

Action	Number Taking Action
Shared information you learned in the course with a colleague	21 of 22
Sought out additional information related to the concepts taught in the course	17 of 22
Helped convince others in your organization that energy saving actions are needed	17 of 22
Helped convince others outside of your organization that certain types of actions help save energy	16 of 22

Seventy-three percent of participants had an audit done of their facility and one-quarter of them had it done as a result of attending the workshop. One-quarter of the participants said the workshop did not influence their decision to have an audit done and 12% had the audit done prior to attending the workshop. Three-quarters of the participants who had an audit took some actions as a result of the audit. The six participants who didn't have audits done mentioned reasons such as they are too small, they haven't done them in the past, and they didn't know that audits were available.

3.5.6 End-use Residential Customers (EUCR) Actions Taken

Since participating in the workshops, 71% of the end-use residential participants have made an effort to save energy in their homes and applied the concepts from the workshop. Twenty-nine percent of participants rated the workshop as influential (rating of 6-7) on their decision to make the effort to save energy. Fourteen percent thought the workshop had little influence on their efforts to save energy (rating of 2-3). None of the respondents thought the workshop had no influence.

For the two participants who had not already made an effort to save energy since attending the workshop, they felt they were only somewhat likely to make an effort within the next 12 months to save energy at their home using the concepts taught in the workshops. The one participant who does not think it's likely he will make an effort cited lack of product availability as the reason.

All participants have shared the information they learned at the workshop with family, friends or neighbors (100%) (Table 3-45).

[86] Source: Partnership Program Indirect Impacts Evaluation— Equipment Specific Training Participant Survey, questions TC6 series

Table 3-45. Actions taken by end-use residential customers since participation (n=7)[87]

Action	Number Taking Action
Shared information you learned in the course with family, a friend, or neighbor	7 of 7
Sought out additional information related to the concepts taught in the course	4 of 7

Only one residential participant had an audit done of their home. However, they rated their workshop participation as very influential on their decision to have an audit done and they took action as a result of the audit.

The six participants who didn't have audits done mentioned reasons such as they were too busy to think about it, they thought it was too costly, or they had already remodeled and didn't need one.

3.5.7 Market Actor Actions Taken

Using a scale of 1 to 7 where 1 is strongly disagree and 7 is strongly agree, respondents were asked to indicate the degree to which they agreed with the statement: As a result of taking the workshop, I am more likely to recommend energy efficient equipment, designs or practices to my clients. Seventy-eight percent agreed with the statement, 44% of them strongly agreed. The mean rating was 5.4 across 18 respondents.

Eighty-nine percent of participants have applied concepts taught in the workshop to change or enhance the service they provide to their clients. Fifty-one percent of them said the workshop information was influential in their decision to make the changes that they did (mean of 5.4 on a seven-point scale where one means not at all influential and seven means very influential), and 31% thought it was very influential (a rating of seven).

Table 3-46. Actions taken by market actors since participation (n=16)[88]

Action	Number Taking Action
Specify energy efficient measures unfamiliar with prior to course	12 of 16
Specify energy efficient measures more frequently than prior to course	12 of 16
Use diagnostic tools or practices unfamiliar with prior to course	11 of 16
Utilize building or system design tools unfamiliar with prior to course	11 of 16
Apply bldg or system design principals unfamiliar with prior to course	10 of 16
Change the methods used to size and specify new energy consuming equipment	10 of 16
Change the manner of installing or maintaining energy consuming equipment	7 of 16

[87] Source: Partnership Program Indirect Impacts Evaluation— Equipment Specific Training Participant Survey, questions TR4 series

[88] Source: Partnership Program Indirect Impacts Evaluation— Equipment Specific Training Participant Survey, questions TA2 series

Ninety-four percent of those market actors making changes or enhancements to the services they provide believe that those changes are now standard practice for them.

Ninety-four percent of those who made changes felt that the changes they made provided measurable energy savings to their clients. When asked to characterize the energy savings their customers realized as a result of those changes, 47% thought the savings were significant, another 47% thought they were moderate, and seven percent viewed them as minimal savings. Only two participants estimated the savings amount and both used payback time as their estimate method.

3.5.8 Detailed Gross and Net Savings Results

As part of the training follow-up telephone survey, 208 participants answered questions regarding the equipment purchases and behavior changes they have made since attending. The first step in estimating the indirect impacts is to assess the annual gross and net savings reported by survey respondents that said they implemented and energy efficient activity.

Because the trainings were focused on end use commercial customers and market actors, we did not ask the very limited number of end use residential customers who attended trainings the full battery of equipment questions. Since market actors are not directly able to report savings from energy efficient actions taken by customers, the full battery of equipment specific questions was limited to end use commercial customers.

Ninety-one percent of those EUCC respondents surveyed (20 of 22) reported behavioral changes or purchases of energy efficient equipment. The survey asked if the respondents received a rebate from a utility program for any purchases made. These respondents confirmed they did not receive a utility rebate for the equipment.

Table 3-47 through Table 3-49 detail the annual gross and net kWh, kW, and therms savings resulting from individual measure installation or behavior changes reported by these small businesses. Note that the net-to-gross ratios differ for kWh, kW, and therms impacts. This is because the results are weighted by its respective savings, which differs for each measure and each case.

As Table 3-47 illustrates, efficient motors, controls and HVAC tune-ups realized the greatest annual kWh savings (both net and gross) followed by turning off lights and installing efficient lighting. Other actions contributed relatively low savings, although the net-to gross ratio was fairly high for many of them (e.g., tinted window film, interior shades, solar PVs).

Table 3-47. Detailed Annual kWh Savings Results from Equipment Specific Training survey (n=20 respondents who took one or more actions)

Measure	Count	Annual kWh Savings		Lifecycle kWh Savings	
		Gross savings	Net savings	Gross savings	Net savings
Refrigerator	9	19,873	8,949	143,983	64,839
Tinted Window Film	5	2,380	1,379	17,244	9,991
Interior Shades	7	10,760	6,104	39,194	22,234
Awning	3	1,930	417	7,030	1,519
Weatherization	1	-	-	-	-
Dishwasher	3	-	-	-	-
Insulation	8	4,469	888	64,612	12,837
White Roof	2	271	136	2,945	1,473
Windows	4	2,740	783	39,613	11,320
Water Heater	7	5,398	1,619	58,571	17,571
Controls	8	169,658	65,295	1,351,554	520,167
HVAC System	6	12,946	3,268	140,477	35,463
Pre-Rinse Spray Valve	6	-	-	-	-
Solar PVs	4	15,603	8,455	225,574	122,234
Lighting	7	83,012	31,870	721,159	276,870
HVAC Tune-up	6	77,691	46,406	171,473	102,423
Motors	15	1,236,748	294,922	13,419,868	3,200,173
Fans	1	4,795	3,357	34,741	24,319
Turn Off Lights	1	50,727	35,509	184,779	129,345
Total	**103**	**1,699,001**	**509,357**	**16,622,817**	**4,552,778**
Average (per respondent) who followed recommendation (n=20)		**84,950**	**25,468**	**831,141**	**227,639**

As seen in Table 3-48, efficient motors and controls comprised the bulk of the kW savings. However, although other actions contributed relatively low savings, their net-to gross ratios were fairly high (e.g., installing fans, turning off lights, HVAC tune-ups, interior shades).

Table 3-48. Detailed kW Savings Results from Equipment Specific Training Survey (n=20 respondents who took one or more actions)

Measure	Count	Annual kW Savings	
		Gross savings	Net savings
Refrigerator	9	1.9673775	0.8859609
Tinted Window Film	5	2.22666667	1.08866667
Interior Shades	7	13.4266667	7.57066667
Awning	3	1.32	0.31433333
Weatherization	1	0.02666667	0.01866667
Dishwasher	3	0	0
Insulation	8	21.3295736	5.20525072
White Roof	2	0.3065969	0.15329845
Windows	4	6.42	0.78
Water Heater	7	0.53978082	0.16193424
Controls	8	37.9312369	16.1532444
HVAC System	6	9.6201565	2.5008281
Pre-Rinse Spray Valve	6	0	0
Solar PVs	4	3.60171118	1.95462407
Lighting	7	41.0410937	9.92384445
HVAC Tune-up	6	21.0775043	12.5075993
Motors	15	325.016442	77.1926735
Fans	1	3.892	2.7244
Turn Off Lights	1	10.886031	7.6202217
Total	**103**	**500.6**	**146.8**
Average (per respondent) who followed recommendation (n=20)		**25.03**	**7.34**

HVAC tune-ups comprised the bulk of the therm savings, as seen in Table 3-49. Other contributors were efficient water heaters and insulation. However, although other actions contributed relatively low savings, their net-to gross ratios were fairly high (e.g., replacing HVAC system, weatherization).

Table 3-49. Detailed Annual Therms Savings Results from Equipment Specific Training Survey
(n=20 respondents who took one or more actions)

Measure	Count	Annual Therms Savings		Lifecycle Therms Savings	
		Gross savings	Net savings	Gross savings	Net savings
Refrigerator	9	0.0	0.0	0.0	0.0
Tinted Window Film	5	-115.1	-56.0	-833.9	-405.8
Interior Shades	7	-1,056.8	-675.7	-3,849.5	-2,461.1
Awning	3	-98.1	-20.4	-357.3	-74.4
Weatherization	1	18.5	13.0	267.5	187.2
Dishwasher	3	630.0	293.0	4,564.6	2,122.9
Insulation	8	894.6	500.2	12,933.3	7,231.0
White Roof	2	-23.5	-11.8	-255.3	-127.6
Windows	4	552.9	325.4	7,993.3	4,704.2
Water Heater	7	1,119.0	626.8	12,141.9	6,801.3
Controls	8	-1,868.2	-722.4	-14,882.7	-5,754.6
HVAC System	6	60.5	51.2	656.7	555.5
Pre-Rinse Spray Valve	6	680.0	68.0	2,477.0	247.7
Solar PVs	4	0.0	0.0	0.0	0.0
Lighting	7	-2,527.6	-991.6	-21,958.0	-8,614.1
HVAC Tune-up	6	5,767.3	3,455.7	12,729.1	7,627.2
Motors	15	-111.0	-26.8	-1,204.7	-290.9
Fans	1	67.6	47.3	489.9	343.0
Turn Off Lights	1	-309.5	-216.7	-1,127.4	-789.2
Total	**103**	**3,680.6**	**2,659.3**	**9,784.2**	**11,302.2**
Average (per respondent) that followed recommendation (n=20)		**184.0**	**133.0**	**489.2**	**565.1**

The information detailed in the above tables is calculated for the commercial participants who said they installed efficient equipment or made a behavioral change. To obtain a per-business savings estimate, it is necessary to apply the savings across all businesses surveyed, regardless of whether or not they made and energy efficient changes. The result of this per-commercial participant savings are presented, in detail, at the beginning of this chapter.

3.6 Process Training Survey Results

The four trainings summarized in this memo include Commissioning (Cx), Monitoring-based Commissioning (MBCx), Environmentally Preferable Purchasing, and Advanced Framing workshops (please refer to Section 3.2 for program descriptions). Both residential and non-residential applications are represented.

3.6.1 Key Findings

As found for prior training workshops, the survey results indicate the trainings positively impacted participants' knowledge of covered topics (TF34). The majority of respondents reported the workshops provided them with new information (95%). Twenty-nine percent of participants said the workshop significantly increased their knowledge (a rating of seven), while another 50% said they saw some increase in knowledge (ratings of five and six). Participants' responses to a series of questions indicated the workshops positively impacted participants' understanding of topics covered.

End-use customers (both EUCC and EUCR) have greater understanding of energy efficiency opportunities at their facilities and market actors indicate increased understanding and confidence in delivering energy efficiency services to customers (TF35). End-use customers' answers across three statements indicated the workshops positively impact their ability to identify and implement energy efficiency opportunities at their facilities. Market actors indicated increased understanding in both familiarity with tools and/or techniques to enhance the services they provide and greater confidence in making recommendations for improving energy efficiency at client sites.

The survey results provide evidence of improved energy efficiency behavior attributable to the training workshops for all types of participants (TF36). Fifty percent of end-use commercial customers (EUCC) strongly agreed with the statement that they recommend energy efficient technologies or practices more often to their management. Since participating in the workshops, 67% of the EUCC participants have made an effort to save energy at the facility[ies] their business occupies or manages and applied the concepts from the workshop. Seventy percent of these participants rated the workshop as influential on their decision to make the effort to save energy. Since participating in the workshops, four of the seven end-use residential (EUCR) participants have made an effort to save energy in their homes and apply the concepts from the workshop. When asked to rate the influence of the workshop on their decision to make the effort to save energy on a scale of zero to ten, with ten being very influential, all EUCR participants rated the workshop a seven or higher (mean rating of nine). Eighty-two percent of market actors (MA) indicated they are more likely to recommend energy efficient equipment, designs, or practices to clients. Eighty-six percent of market actor participants report having applied concepts taught in the workshop to change or enhance the service they provide to their clients. The majority of market actors also said that the information provided in the workshop was influential in their decision to make the changes that they did.

Similar to previous training results, participants are sharing the information that they learned through the trainings (TF37). The majority of commercial end-use participants (93%) said they have shared the information they learned at the workshop with a colleague. Almost all (six of seven) residential participants have shared the information they learned at the workshop with family, friends, or neighbors.

The Commissioning workshops are increasing the commissioning practice with several reported benefits, including energy savings, although participants were not able to quantify the energy savings (TF38). Twelve of the 19 respondents who participated in the introduction and full commissioning workshops said they implemented commissioning at buildings for which they were responsible since

participating in the workshop. Three of the twelve monitoring-based commissioning (MBCx) participants were using MBCx prior to attending the workshop; however, eight indicated that they adopted MBCx practices afterwards. Participants reported realizing many benefits from implementing commissioning or MBCx in their new buildings including reduced crisis maintenance, reduced operation and maintenance costs, properly trained operational staff, and energy savings. Despite several attempts with multiple contacts at the campuses, however, we were not able to get accurate savings estimates regarding how much participants have saved through the implementation of commissioning or MBCx practices.

Advanced Framing is being implemented by over half of training participants (TF39). Sixty percent of training participants have implemented the techniques discussed in the workshop after participating, although the specific advanced framing techniques for which participants have said they have implemented vary widely.

3.6.2 Methodology

PA completed 105 surveys with 2006–2008 workshop participants, as summarized below. The respondents included 44 market actors (MA), 54 end-use commercial customers (EUCC), and seven end-use residential customers (EUCR). PA implemented these surveys in May 2009. Table 3-50 presents the overall survey response rate as well as response rates broken out by training workshop.

Table 3-50. General Training Survey Response Rates

Sample	Advanced Framing[89]	Cx[90]	MBCx[91]	Environmentally Preferable Purchasing[92]	Overall
Starting Sample	**261**	**68**	**42**	**63**	**434**
No/bad phone number	57	17	10	17	101
Ineligible	18	5	5	37	65
Adjusted Sample	**186**	**46**	**27**	**9**	**268**
Refused	19	6	1	0	26
Unavailable for duration	2	3	1	1	7
Do not recall training	7	1	2	5	15
Called out (8 attempts)	73	14	13	3	103
Available sample	9	5	0	0	14
Complete	**76**	**17**	**10**	**0**	**103**
Response Rate	**40.9%**	**37.0%**	**37.0%**	**0.0%**	**38.4%**

3.6.3 Detailed Survey Results

Attendee Characterization

Survey respondents primarily consisted of end use commercial customers (EUCC)—those who intend to apply the information they learned in the workshop at the businesses they owned or managed (51%; 54/105). Market actors (MA), those who attended the workshops in order to learn how they could apply the information to facilities occupied or managed by customers to whom they provide services, were also well represented (42%, 44/105). Participants who planned to apply the workshop information at their own home—end-use residential customers (EUCR)—were represented to a lesser degree (seven percent, 7/105).

Respondents represented a range of professional positions including owners (29%), architects (10.5%), project managers (9.5%), facility department staff (9.5%), inspectors (10%), and presidents/CEOs (8.5%).

[89] The Advanced Framing workshop was offered on 5/29/08 through the Association of Monterey and Bay Area Governments (PGE2016 – AMBAG) program.

[90] The Commissioning (Cx) workshop was offered March of 2007 through the University of California/California State University (SCE2530 – UC/CSU) program. This workshop was offered at UC Davis, located in the PG&E territory.

[91] This Monitoring Based Commissioning (MBCx) workshop was offered on 5/31/06 through the UC/CSU program (SCE2530). This workshop was offered at UC Santa Cruz, located in the PG&E territory.

[92] This sample included workshops on 1/25/06, 3/13/06, 8/25/06 for the Environmentally Preferable Purchasing workshop for UC/CSU (SCE2530). However, nearly 60 percent of the people we called told us they did not attend the workshop. We were unable to find any respondents who did attend the training. We have a call in to SCE to determine why no one attended. Therefore, there are no results to report for the UC/CSU Environmentally Preferable Purchasing workshop.

Fifty percent of MA respondents served both commercial and residential customers; 46% served residential only.

EUCR respondents generally live in 1,500 to 3,400 sq ft, single-family homes. They have college or graduate degrees. The number of residents living in the homes ranges from one to four and all had annual household incomes of more than $100,000 in 2008.

3.6.4 Knowledge Effects

Twenty-two percent of participants attended the workshops to get information and ideas on how to be more energy efficient. Another 21% attended for general information and education on the topics covered. Nineteen percent were interested in specific framing techniques, 14% were looking for a clearer understanding of commissioning, and another 13% wanted to learn more about sustainable construction.

The majority of respondents (95%) reported that the workshops provided them with new information. Of the five respondents who did not feel that the workshop had provided them with new information, three did think the workshop made them more likely to implement energy saving efforts.

Overall, only 17% of respondents felt they had a good deal of knowledge (a rating of six or seven) regarding the topic covered in the workshop prior to attending. Responses were rated on a seven-point scale where one signified the participant had no prior knowledge and seven meant they had significant knowledge prior to taking the training workshop (Table 3-51).

Table 3-51. Attendees Self-Perceived Knowledge Prior to Workshop[93]

Rating	Advanced Framing	Cx & MBCx
No prior knowledge (1)	9.5%	10.3%
(2)	17.1%	20.7%
(3)	14.3%	10.3%
(4)	21.0%	20.7%
(5)	21.0%	31.0%
(6)	8.6%	3.4%
Significant prior knowledge (7)	8.6%	3.4%
Count	**76**	**29**
Mean	**3.95**	**3.66**

The survey asked participants to rate the degree of which their knowledge had increased as a result of attending the workshop on a seven-point scale. Overall, twenty-nine percent of participants said the workshop significantly increased their knowledge (a rating of seven), while another 50% said they saw some increase in knowledge (ratings of five and six). The training results are shown below, in Table 3-52, by workshop type.

[93] Source: Partnership Program Indirect Impacts Evaluation—General Training Participant Survey, question K3 by topic

Table 3-52. Attendees Self-Perceived Knowledge Post Workshop Attendance[94]

Scale	Advanced Framing	Cx & MBCx
Little or No Increase (1)	1.3%	3.4%
(2)	3.9%	3.4%
(3)	6.6%	6.9%
(4)	10.5%	17.2%
(5)	21.1%	41.4%
(6)	27.6%	27.6%
Significant Increase (7)	28.9%	3.4%
Count	**76**	**29**
Mean	**5.45**	**5.72**

In general, the workshops positively impacted participants' knowledge of topics covered, as seen in Table 3-53. MA participants, specifically, indicated the highest increased understanding in familiarity with tools and/or techniques to enhance the services they provide, as well as greater confidence in making recommendations for improving energy efficiency at client sites.

[94] Source: Partnership Program Indirect Impacts Evaluation—General Training Participant Survey, question K4 by topic

Table 3-53. Impact of Workshops on Respondent Understanding of Energy Efficiency Options[95]

Asked	Statement (1=Strongly Disagree; 7=Strong Agree)	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)	Mean Rating
All (n=105)	As a result of taking the course, I am better able to implement energy efficient solutions.	2%	5%	6%	11%	23%	20%	34%	5.5
All (n=105)	As a result of taking the course, I am more aware of utility sponsored energy efficiency programs.	9%	9%	8%	11%	30%	19%	16%	4.7
MA (n=44)	As a result of taking the course, I am now more familiar with the tools and/or techniques that will enhance the service I provide to my clients.	0%	0%	2%	9%	25%	25%	39%	5.9
MA (n=44)	As a result of taking the course, I have more confidence when I make recommendations for improving energy efficiency at my client's facilities that the expected level of energy savings will actually occur.	0%	0%	5%	5%	23%	25%	43%	6.0
EUCC (n=54)	As a result of taking the course, I better understand how to improve the energy efficiency at my facility or the facilities I manage.	6%	11%	6%	11%	20%	33%	13%	4.8
EUCC (n=54)	As a result of taking the course, I have more confidence when I take steps to improve the energy efficiency at my facility[ies] that the expected level of energy savings will actually occur.	7%	6%	6%	7%	19%	30%	26%	5.2

[95] Source: Partnership Program Indirect Impacts Evaluation—General Training Participant Survey, question K5 series

There were no significant differences in the impact of the workshops on understanding by workshop topic area, as seen in Table 3-54 below.

Table 3-54. Impact on Respondent Understanding of Energy Efficiency Options by Workshop Topic[96]

Statement (1=Not at all, 7=A Great Deal)	Advanced Framing	Cx & MBCx	Overall
As a result of taking the course, I am better able to implement energy efficient solutions.	5.57	5.14	5.45
As a result of taking the course, I am more aware of utility sponsored energy efficiency programs.	4.63	4.72	4.66
As a result of taking the course, I am now more familiar with the tools and/or techniques that will enhance the service I provide to my clients.	5.86	7.00	5.89
As a result of taking the course, I have more confidence when I make recommendations for improving energy efficiency at my client's facilities that the expected level of energy savings will actually occur.	5.98	6.00	5.98
As a result of taking the course, I better understand how to improve the energy efficiency at my facility or the facilities I manage.	4.92	4.71	4.81
As a result of taking the course, I have more confidence when I take steps to improve the energy efficiency at my facility[ies] that the expected level of energy savings will actually occur.	5.15	5.18	5.17

3.6.5 Attribution

PA asked EUCC participants how much influence the workshop(s) had on their understanding of energy efficiency opportunities. Respondent answers, across all three statements, indicated the workshop(s) positively impacted their ability to identify energy efficiency opportunities (Table 3-55).

[96] Source: Partnership Program Indirect Impacts Evaluation—General Training Participant Survey, question K5 series by topic

Table 3-55. Influence of Workshop(s) on EUCC Respondents' Understanding of Energy Efficiency Opportunities (n=54)[97]

Statement (1=Not at all; 7=A Great Deal)	Not At All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree did the course cause you to think differently about how to take advantage of energy efficiency opportunities at your facility?	11%	0%	13%	13%	19%	30%	15%	4.8
To what degree did the course cause you to want to take advantage of energy efficiency opportunities at your facility?	9%	7%	6%	4%	17%	32%	26%	5.1
To what degree did the course increase your awareness of methods for taking advantage of energy efficiency opportunities at your facility?	9%	9%	6%	4%	19%	26%	28%	5.0

EUCC respondents who rated the influence of the workshop as a four or higher were asked how they view energy efficiency improvements differently as a result of attending the workshop. Attending the workshop gave five respondents a better overall understanding of how the discussed topic would help them save energy, while for the four others, the workshop(s) gave them new ideas for energy efficiency improvements they could make. Attendance also resulted in a deeper understanding of the relationship between infrastructure performance and costs (three) and what steps could be taken to reduce bills and save money (three). These results are illustrated with respondent comments, as shown below.

> *"I realize the long term fiscal impacts related to energy costs and help to focus on commissioning of energy systems to make sure the systems are operating optimally in accord with manufacturer's requirements or in accord with plans and specs and in turn relating to energy cost savings."*
>
> *"The course explained commissioning, took the mystery out of it."*
>
> *"It gave me a vehicle to be able to test my building and therefore be able to analyze the energy efficiency where I normally wouldn't have. Through the commissioning process I'm able to test different components so that when the building was occupied I had confidence in the functionality of the building."*
>
> *"You can gain some energy efficiency and some material efficiency by planning upfront on the building design."*
>
> *"I view it more in dollars lost for our company when we don't take the initiative to save the energy."*
>
> *"The course gave me a better sense of what techniques are involved and determining the effectiveness of systems for saving energy."*

[97] Source: Partnership Program Indirect Impacts Evaluation— General Training Participant Survey, question A1 series

"I think that it gave us some ideas as to things we can do on our campus that have not yet been explored. Sometimes the environment we're in is closed minded – it gives us an opportunity to open up our eyes to be able to see programs that we should take advantage of."

EUCR participants were asked, in a similar series of questions, to assess how their participation in the workshop influenced their understanding of energy efficiency opportunities. Again, the answers to these questions indicate that the workshop had a positive influence on the understanding of energy efficiency opportunities (Table 3-56). Respondents were asked to rate the degree to which their participation in the workshop influenced their awareness or behavior on a seven-point scale (one indicating no influence at all; seven indicating a great deal).

Table 3-56. Influence of Workshop on EUCR Respondents' Understanding of Energy Efficiency Opportunities (n=7)[98]

Statement (1=Not at all, 7=A Great Deal)	Not at All (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree did the course cause you to think differently about how to take advantage of energy efficiency opportunities at your home?	0 of 7	1 of 7	1 of 7	1 of 7	2 of 7	0 of 7	2 of 7	4.7
To what degree did the course cause you to want to take advantage of energy efficiency opportunities at your home?	0 of 7	0 of 7	1 of 7	1 of 7	0 of 7	2 of 7	3 of 7	5.7
To what degree did the course increase your awareness of methods for taking advantage of energy efficiency opportunities at your home?	0 of 7	0 of 7	1 of 7	2 of 7	1 of 7	1 of 7	2 of 7	5.1

EUCR participants who rated the influence of the workshop as a four or higher were asked how they view energy efficiency improvements differently as a result of attending the workshop. Overall, the residential respondents recognized an increase in their awareness.

MA respondents were also asked to assess how their participation in the workshop influenced their understanding of energy efficiency opportunities. Again, the answers to these questions indicate that the workshop had a positive influence on their understanding of energy efficiency opportunities (Table 3-57). Respondents were asked to rate the degree to which their participation in the workshop influenced their awareness or behavior on a seven-point scale, in which one indicates no influence at all and seven indicates a great deal of influence.

[98] Source: Partnership Program Indirect Impacts Evaluation— General Training Participant Survey, question A2 series

Table 3-57. Influence of Workshop on MA Respondents' Understanding of Energy Efficiency Opportunities (n=44)[99]

Statement (1=Not at all, 7=A Great Deal)	Not at all (1)	(2)	(3)	(4)	(5)	(6)	A Great Deal (7)	Mean Rating
To what degree did the course cause you to think differently about how to take advantage of opportunities to introduce energy efficient elements to the work you do for your clients?	0%	5%	2%	14%	34%	21%	25%	5.4
To what degree did the course cause you to want to take advantage of energy efficiency opportunities to introduce energy efficient elements to the work you do for your clients?	0%	2%	7%	7%	27%	14%	43%	5.7
To what degree did the course increase your awareness of methods for introducing energy efficient elements to the work you do for your clients?	0%	0%	11%	9%	34%	14%	32%	5.5

MA respondents who rated the influence of the workshop as a four or higher were asked how they view energy efficiency improvements differently as a result of attending the workshop. Many indicated that they have more ideas now on how to improve energy efficiency in the work they do (11), while others were able to receive confirmation or reinforcement that what they were doing was correct and in line with trends (seven). Some participants are now more likely to avoid the pitfalls and mistakes that associated with the implementation of energy efficiency projects (four) and a few now feel that energy efficiency improvements are something they can do (two). The comments below highlight these points:

> *"I have a better understanding of how to save energy, the steps necessary, and some of the pit falls (especially where people use the correct materials but use them incorrectly). Faulty installation would be a simpler way of saying that. I've implemented certain things in my own home and suggested them to people I know."*
>
> *"I see the mistakes that everyone's making in their ideas of what is energy efficient and how to correct it. The course definitely pointed out how to correct it. The entire course was predicated on video and pictures of mistakes in the field and the steps to be taken to correct them."*
>
> *"I believe that increases in energy efficiency are not as difficult to achieve as I previously thought."*
>
> *"If I'm remember correctly it seemed there were 2 different camps to this, there's the energy efficiency people and then there's the materials sustainability people and they don't always agree, so that was interesting to me. Probably that contractors are not as keen on changing their standard practices to make energy efficient buildings."*

[99] Source: Partnership Program Indirect Impacts Evaluation—General Training Participant Survey, question A3 series

"I think the course generally introduced new concepts and techniques to save energy in home construction that I had no previous knowledge or understanding of, just sort of the light bulb goes on. Didn't understand, didn't know those opportunities existed. Now I do, and how to take advantage of them. I think I know that we can achieve them. They are not that difficult."

"I guess you can say that I am much more aware of the importance of air sealing as opposed to adding insulation and I am better able to analyze the number to justify recommendations."

"I think the challenge for me now is working with structural engineers and contractors to achieve energy efficiency whereas before the course it was sort of a lack of knowledge on my part that was a limiting factor."

"I realize that designing it and having it constructed properly are not the same thing and there has to be real collaboration with the builders to ensure that it's built correctly."

"I realized that my framers are going to have to be a lot smarter than they are now so I'll be spending more time training my subcontractors. Probably the best class I've taken. And I used it on my own office we just finished, that's how much I believe in it."

3.6.6 End-use Commercial Customer (EUCR) Actions Taken

Fifty percent of EUCC respondents strongly agree that, because of the workshop, they recommend energy efficient technologies or practices to their management more often. Sixty-three percent of EUCC respondents think that they are more able (rating a six to seven) to evaluate energy efficient options as a result of the workshops (Table 3-58).

Table 3-58. Workshop Influence on End-Use Commercial Customers (n=54)[100]

Statement (1=Strongly Disagree; 7=Strongly Agree)	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)	Mean Rating
As a result of taking the course, I recommend energy efficient technologies or practices to my management more often.	9%	7%		6%	9%	19%	50%	5.5
As a result of taking the course, I am better prepared to evaluate energy efficient options	6%	6%	4%	7%	15%	22%	41%	5.5
As a result of taking the course, my recommendations regarding energy efficient technologies or practices are viewed by my management as more informed.	13%	4%	4%	6%	24%	19%	30%	5.1

[100] Source: Partnership Program Indirect Impacts Evaluation – General Training Participant Survey, question TC1 series

Since participating in the workshops, 67% of the EUCC participants have made an effort to save energy at the facility[ies] their business occupies or manages through the application of concepts from the workshop. Seventy percent of participants rated the workshop as influential (a rating of six or seven; a mean rating of 5.4) on their decision to make the effort to save energy. Seventeen percent thought the workshop had little to no influence on their efforts to save energy (ratings of one to three).

For the 18 participants who had not already made an effort to save energy since attending the workshop, half felt that they were not at all likely to make an effort within the next 12 months to save energy at the facility[ies] their business occupies or manages using the concepts taught in the workshops.

The main reason participants have not used the concepts taught in the workshop(s) was the feeling that the workshop(s) did not provide sufficient information to successfully apply the concepts. Respondents also indicated that the primary reason for which they had not applied discussed concepts was that had already been applying at least some of the concepts. They also mentioned that the lack of product availability contributed as well.

As seen in Table 3-59, participants were most likely to have shared the information they learned at the workshop with a colleague (93%). Therefore, the workshops have also resulted in a good deal of influence on others – both externally and internally.

Table 3-59. Actions Taken by EUCC Respondents since Workshop Participation (n=54)[101]

Action Taken	Percent
Shared information you learned in the course with a colleague	93%
Helped convince others outside of your organization that certain types of actions help save energy	83%
Helped convince others in your organization that energy saving actions are needed	80%
Sought out additional information related to the concepts taught in the course	67%

Forty-three percent of commercial participants (23/54) had an audit done of their facility and one-quarter of them had it done as a result of attending the workshop. Another 30% said the workshop did not influence their decision to have an audit done.

Eighty-three percent of the participants who had an audit (19/23) took some actions as a result of the audit. The fifty percent of participants who didn't have audits done mentioned reasons such as feeling it was too costly, not knowing how to participate or that it was available, they did not want to participate or didn't need the equipment, and other priorities higher than the audit.

[101] Source: Partnership Program Indirect Impacts Evaluation— General Training Participant Survey, question TC6 series

3.6.7 End-use Residential Customers (EUCR) Actions Taken

Since participating in the workshops, four of the seven EUCR participants have made an effort to save energy in their homes, as well as applied the concepts from the workshop. Changes included replacing hot water heaters, switching to CFLs, and weatherstripping doors.

When asked to rate the influence of the workshop on their decision to make the effort to save energy on a scale of one to ten, with ten being very influential, all participants rated the workshop a seven or higher (mean rating of nine). Half of them gave it a rating of ten for its influence.

The four residential participants who made an effort to save energy by applying the workshop concepts believe they saw measurable energy savings – two of them saw significant energy savings, one moderate, and one minimal. The one participant who tracked their savings saw a $100 savings from switching water heaters. The three participants who had not already made an effort to save energy since attending the workshop felt they were not very likely to make an effort within the next 12 months to save energy at their home using the concepts taught in the workshops.

Almost all participants have shared the information they learned at the workshop with family, friends or neighbors (Table 3-60).

Table 3-60. Actions Taken by EUCR Respondents since Workshop Participation (n=7)[102]

Action Taken	Percent
Shared information you learned in the course with family, a friend, or neighbor	6 of 7
Sought out additional information related to the concepts taught in the course	4 of 7

None of the residential participants have had an audit done at their home. Reasons for not having an audit done included not needing the services provided by the audit, not having the time to get it done, home was recently purchased or on the market.

3.6.8 Market Actor (MA) Actions Taken

Using a scale of one to seven where one is strongly disagree and seven is strongly agree, respondents were asked to indicate the degree to which they agreed with the statement: "As a result of taking the workshop, I am more likely to recommend energy efficient equipment, designs or practices to my clients." Eighty-two percent agreed with the statement, 68% of them strongly agreed. The mean rating was 6.4 across 44 respondents.

Eighty-six percent of participants (38/44) have applied concepts taught in the workshop to change or enhance the service they provide to their clients. Sixty-six percent of them (25/38) said the workshop information was influential in their decision to make the changes that they did (mean of 5.8 on a seven-

[102] Source: Partnership Program Indirect Impacts Evaluation— General Training Participant Survey, questions TR4 series

point scale where one was not at all influential and seven indicated very influential); 42% thought it was very influential.

Market actors were most likely to specify energy efficiency measures more frequently than prior to the workshop (82%), specify energy efficiency measures that they were unfamiliar with prior to the workshop (74%), and apply building designs that they were unfamiliar with prior to the workshop (71%) as a result of the workshop. It did not have much impact on their use of diagnostic tools (Table 3-61).

Table 3-61. Actions Taken by MA Respondents since Workshop Participation (n=16)[103]

Action Taken	Percent
Specify energy efficient measures more frequently than prior to course	82%
Specify energy efficient measures unfamiliar with prior to course	74%
Apply bldg or system design principals unfamiliar with prior to course	71%
Utilize building or system design tools unfamiliar with prior to course	58%
Change the methods for sizing and specifying new equipment for clients	50%
Change the installation or maintenance practices for energy consuming products	42%
Use diagnostic tools or practices unfamiliar with prior to course	18%

The six participants who had not incorporated workshop concepts in their client service since attending the workshop most often mentioned reasons related to framing techniques such as there have been no appropriate situations for applying the concepts, local building codes, and the climate.

3.6.9 Commissioning Workshop results (Cx)

Commissioning was a five-day workshop on effectively implementing the principles of the commissioning process on campuses, resulting in national certification as a Commissioning Authority – Process (CxAP) for those who completed the full workshop and passed the final test. Its goal was to provide a full understanding of the commissioning process to enable support or implementation of the commissioning process for campus projects. The first day was Introduction to Commissioning, which served as a one-day workshop for decision makers as well as an introduction to the five-day workshop. It provided an overview to support implementation of the commissioning process by those who attend the full training workshop.

Twelve of the sixteen full Cx workshop participants achieved CxAP certification through the process. Twelve of the nineteen respondents who participated in the introduction and full Cx workshops said they implemented Cx practices on buildings they were responsible for since participating in the workshop. Six of the 12 Cx projects were done in new buildings, while the other half were done in existing buildings. Those who were unable to implement Cx techniques provided reasons including the inability to get the funding approved as well as the inability to convince decision-makers that it was necessary.

[103] Source: Partnership Program Indirect Impacts Evaluation— General Training Participant Survey, question TA2 series

As shown in Table 3-62, participants realized many benefits from implementing Cx in their new buildings. Most often mentioned were reduced crisis maintenance, reduced operation and maintenance costs, and properly trained operational staff.

Table 3-62. Benefits Realized through the Addition of Cx Processes (n=12)[104]

Benefit	Number of Participants
Reduced operation and maintenance costs	7
Properly trained operational staff	7
Reduced crisis maintenance	7
Proper maintenance manuals	6
Building project was completed on budget	6
Proper equipment operation	6
Improved indoor air quality	6
Realized energy efficiency and savings as expected	5
Problems were solved earlier in the construction process	5
Building project was completed on schedule	5
Original design intent carried through to completion	5
Avoided costs to replace equipment	4
Modified design from original design	4
Other benefit	4
Fewer change orders during construction	1

Three of the participants received financial and/or technical assistance through a utility program (two through Pacific Gas and Electric (PG&E) and one other unspecified). Two of them felt the financial assistance provided was influential in their decision to implement commissioning but the other did not. For one participant, the training provided information on the utility program and was influential in his decision to work with the utility.

New Building Commissioning

Three of the six participants implemented Cx practices in one newly constructed building, two participants included commissioning in two of their buildings, and one campus implemented it in five buildings.

[104] Source: Partnership Program Indirect Impacts Evaluation — General Training Participant Survey, question C8

In the 12 buildings where participants implemented Cx practices, seven were able to do so in the pre-design phase. Two added it during the design phase, another two in the construction phase, and one did not implement until very late in the construction phase.

When participants were asked if they had adopted specific practices as a result of implementing Cx in their new buildings, many had adopted multiple new practices. Ten mentioned the production of detailed operations and maintenance manuals; nine said they improved training procedures, including taping trainings for future viewing. Eight adopted energy accounting as a method of tracking facility energy use, while only one mentioned implementing improved preventative maintenance routines.

Only two of the buildings were LEED certified, eight were built to LEED specifications without being certified, and two were not trying. The primary reason given for building to LEED specifications without getting certified was due to the fact that the building was still in process and had budget constraints. Five of the campuses, however, mentioned that they are awaiting word on LEED Silver status approval.

Using a scale of zero to ten where zero means not at all influential and ten means very influential, respondents were asked to indicate how much influence the information provided in the training had on their decision to implement commissioning for each building. The 12 ratings ranged from four to eight with an average of 6.3.

Despite several attempts with multiple contacts at the campuses, we were unable to get good savings estimates from them regarding how much they have saved by implementing Cx in their new buildings. Three of the participants were able to give us estimates for five of the twelve new buildings. One showed a savings of 120,000 kWh after for their building from Cx, one estimated a 15% savings off their 12,000,000 kWh across all three buildings (or an average of 600,000 kWh per Cx building), and the other estimated savings at 32 percent.

Existing Building Commissioning

Four of the six participants who implemented Cx in existing buildings did so in just one building, while two participants included commissioning in three of their existing buildings.

In the ten existing buildings where participants implemented commissioning, seven were able to do so very early—in the pre-design phase. Two added it during the design phase, another two in the construction phase, and one was not able to implement until very late in construction.

When participants were asked if they had adopted specific practices as a result of implementing Cx in their new buildings, most had adopted multiple new practices. All participants said they improved training procedures, including taping trainings for future viewing. Five respondents mentioned the production of detailed operations and maintenance manuals and four adopted energy accounting as a method of tracking facility energy use as well as implementing improved preventative maintenance routines.

Using a scale of zero to ten where zero means not at all influential and ten means very influential, respondents were asked to indicate how much influence the information provided in the workshop had on their decision to implement Cx for each building. The training was very influential for the ten participants. Ratings ranged from eight to ten with an average of 9.3.

Despite several attempts with multiple contacts at the campuses, we were not able to get good savings estimates from them regarding how much they have saved by implementing Cx. Three of the participants

were able to give us estimates for three of the ten existing buildings. One showed a savings of 432,171 kWh after Cx, and the other two estimated savings at 20% and 22% of pre-commissioning energy use.

Monitoring Based Commissioning Training results

This one-day workshop provided information on monitoring based commissioning (MBCx) by clearly identifying what it is, why it's important for campuses, and how to measure and monitor building energy usage to achieve savings. It covered an overview as well as the process of MBCx, sample diagnostics, measurement and verification, case studies, and reporting requirements.

Only three of the twelve participants were using MBCx practices prior to attending the workshop; however, eight indicated that they implemented MBCx techniques afterwards. Seven of the eight campuses implementing MBCx since participation in the workshop have invested in meters and sub-meters for monitoring. Other products mentioned included trending software, energy management control systems (EMCS), use of alarm points in EIS, and energy accounting software. Five were using the tools for monitoring their chilled/hot water pump systems and a few others were monitoring VFDs and district cooling systems.

Five of the eight campuses have added in-house staff or contracted with someone to manage their monitoring based commissioning system. Three added in-house staff and two more contracted out; three said no additional staff was needed.

As shown in Table 3-59, participants realized many benefits from implementing MBCx. Most often mentioned were energy savings and improved operations of existing equipment and systems.

Table 3-63. Benefits Realized through the Addition of MBCx Processes (n=12)[105]

Benefits	Number of Respondents
Energy savings	8
Improved operation of existing equipment/systems	7
Reduced energy bills	5
Identification of future retrofit projects	4
Ability to permanently monitor systems	4
Trending capability	4
Verification and persistence of savings	4
Earlier notification of problems	3
Benchmarking	2
Best practice report for future planning	2
Other benefit	1

[105] Source: Partnership Program Indirect Impacts Evaluation — General Training Participant Survey, question MB6

Two of the eight participants received financial assistance through a utility program (UC/CSU and PG&E). Both of them felt the financial assistance provided was very influential in their decision to implement MBCx. For one participant, the training provided information on the utility program and was very influential in his decision to work with the utility.

Table 3-64 below lists the number of buildings on campus where MBCx was implemented after participant attended the training.

Table 3-64. Number of MBCx Buildings (n=8)[106]

MBCx was implemented in…	Number of participants selecting
1 building	2
2 buildings	1
3 buildings	2
5 buildings	3

Using a scale of zero to ten where zero means not at all influential and 1ten means very influential, respondents were asked to indicate how much influence the information provided in the workshop had on their decision to implement MBCx for each building. Of the 25 buildings where participants implemented MBCx, participants said the training had no influence on implementing MBCx in eight. For those who felt the training influenced their decision to implement MBCx, ratings ranged from five to ten with a mean of 7.6.

As with commissioning, despite several attempts with multiple contacts at the campuses, we were not able to obtain accurate savings estimates from respondents regarding how much they have saved through the implementation of MBCx processes. Only one participant was able to provide us with estimates for five existing buildings. The savings across all five was 7,350,000 kWh and 8,014 therms after implementing MBCx; however, this participant did not feel the workshop had any influence on their decision to adopt MBCx practices. Most participants were not able to provide the usage information from before implementing MBCx to calculate savings.

3.6.10 Advanced Framing results

The Advanced Framing workshop outlined opportunities for energy and resource improvements and the magnitude of those opportunities, explored alternatives to conventional framing, and practiced conveying advanced framing information on construction documents.

Fifty-seven percent of respondents (43/76) who attended the advanced framing workshop had not built any homes a year prior to attending, 13% (10/76) had built ten or more homes in the 12 months prior to attending, and five percent refused to report the number. Only ten percent had used advanced framing techniques prior to attending. The frequency of use varied widely from five percent to 100 percent.

[106] Source: Partnership Program Indirect Impacts Evaluation — General Training Participant Survey, question MB1b

Since the workshop, 22% of participants have built between one and nine homes and seven percent have built 10 or more homes. Sixty percent of them (15/25) have implemented the techniques discussed in the workshop, mostly in homes between 1,200 to 6,000 square feet. Specific advanced framing techniques participants said they have implemented vary widely (Table 3-65).

Table 3-65. Advanced Framing Techniques Implemented (n=25)[107]

Advanced framing techniques	Percent implementing	Percent implementing in 100% of homes	Mean influence in adopting
Eliminate headers in non-load bearing walls	80.0%	16%	7.4
24-inch on center studs	73.3%	16%	6.8
24-inch on center floor joists and roof rafters	73.3%	16%	6.0
Implemented Alternative Framing Systems (SIPS, ICFs, Straw bale, etc)	66.7%	12%	6.4
2-stud corner framing with drywall clips	60.0%	4%	8.1
Single lumber headers and top plate	60.0%	8%	7.0
In-line framing	33.3%	8%	7.7
Other advanced framing techniques	6.7%	0%	8.0

Of those who have implemented advanced framing techniques in homes, participants' top two goals for using advanced framing techniques are the improvement of energy performance (mentioned by one-third) and the reduction of material consumption (mentioned by another one-third). When asked to estimate how much the average homeowner is saving annually as a result of their use of advanced framing techniques, it was difficult for most to answer. For those who offered estimates, savings ranged anywhere from five percent to 60% or were estimated to be 1,000 kWh or $10,000 in labor and materials.

Of the 15 respondents who reported implementing advance framing techniques on the homes they have built, five respondents reported having received assistance through a utility program and only one indicated having received financial assistance through a PG&E program. Three of the five participants who received either financial or technical assistance through a utility program indicated that they received information about the program through the workshop. The three participants who learned about the technical or financial assistance available to them through the workshop indicated that the workshop had an influence of five, seven, or unknown on their decision to participate in the utility program (on a scale of zero to ten where zero means not at all influential and ten means very influential). The participant who received financial assistance through another utility program indicated that the workshop had a very high influence (ten) on their decision to implement advanced framing techniques.

[107] Source: Partnership Program Indirect Impacts Evaluation — General Training Participant Survey, question AF3 and AF4

3.6.11 Environmentally Preferable Purchasing

PA received collateral and attendee lists for this training workshop. The same process was followed as with other workshops and a workshop specific module was designed as part of the process training survey. However, once we started data collection we found that none of the participants remembered the workshop and most were confident that they did not attend. After calling all listed attendees we were unable to contact anyone who had attended. We can only determine that these particular training workshops were not held although we have contacted the SCE program manager for confirmation or another explanation for the status of the workshop.

4 REFERRALS

4.1 Referrals Overview

A key element in the California Public Utilities Commission's (CPUC) local government partnerships' (LGP) programs is to refer residential households, government facilities, and small businesses to other appropriate energy-efficiency resource programs. These LGP referrals typically are the result of an audit, discussions at community events, or an inquiry from a homeowner, business owner, or local government official regarding opportunities for rebates or other incentives to install energy efficient equipment.

PA Consulting Group (PA) evaluated the effectiveness of local government partnerships (LGP) in referring customers to appropriate investor-owned utilities (IOU) and third-party resource programs outside of the partnership. Many of the program implementation plans (PIPs) highlighted the role the partnerships would play in making referrals.

The evaluation team considered an activity to be a "referral" if the LGP referring program (i.e., the program that made the referral) identified a customer who would benefit from participating in an IOU or third-party resource program ("referred to" program). The resource program typically offered rebates or incentives to the customer for installing energy-efficient equipment. For the purpose of this study, the referring program was expected to include information on the customer and the "referred to" program in a database or tracking system.

Based on program document reviews and interviews with utility program managers and LGPs, the evaluation team identified 18 partnerships that highlighted referrals as an important element of their program activities during the 2006–2008 program cycle (Table 4-1).

Table 4-1. Partnerships with Referral Programs

Program IDs	Partnership
PGE2015	Association of Bay Area Governments (ABAG)
PGE2016	Association of Monterey Bay Area Governments (AMBAG)
PGE2020	East Bay Energy Watch (EBEW)
PGE2021	Fresno Energy Watch (FEW)
PGE2025	Marin County Energy Watch
PGE2026	Merced/Atwater Energy Watch
PGE2027	Motherlode Energy Watch
PGE2028	Redwood Coast Energy Watch
PGE2029	San Francisco Energy Watch (SFEW)
PGE2030	South San Joaquin (SSJ) Energy Watch
PGE2033	Stockton Energy Watch
SCE2519, SCG3521	Ventura County Partnership
SCE2520, SCG3522	South Bay Partnership
SCE2521, PGE2017, SCG3523	Bakersfield and Kern County Partnership
SCE2522	Santa Barbara (South Coast) Partnership
SCE2567	LGEAR/Mammoth Lakes Partnership
SCE2568	LGEAR/Ridgecrest Partnership
SDGE3005	City of San Diego Partnership

4.1.1 Key Researchable Issues

PA identified key researchable questions in order to guide evaluation plans. These include:

- Are the referrals appropriate in terms of matching customers to programs in which they can participate? What are the results?
- What mechanisms are most effective in making referrals in terms of achieved additional savings?
- Is there any tracking of referrals to program participants, including results of those referrals?
- What influence did the referral have on the participating customer's decision to participate? Were they aware of the program before the referral? Did they plan to participate?

PA developed an evaluation approach designed specifically to address each of the key researchable issues. Our evaluation approach included four steps:

1) Conduct surveys with the customers that the partnerships identified/tracked as having been referred into resource programs outside the partnerships.

2) Compare lists of customers who were referred to resource programs outside of the partnerships to the utility program-tracking databases in order to identify whether the customer had taken action and attempted to discern whether that action was associated with the partnership referral.

3) Analyze relevant survey questions from the telephone surveys used to assess the audit programs.

4) Follow-up with some of the program managers to better understand how their referral process functioned.

Each of the key researchable questions was addressed in the data collection and analysis tasks; however, due to issues in obtaining sufficient referrals-tracking data sample, the findings did not fully answer the questions. Only six of these partnerships, two residential and four non-residential partnership program elements provided tracking data that contained sufficient information (i.e., the sample had enough customers with complete contact information). The referrals-tracking data for the two residential program elements was of limited use due to the fact that the data only included those who participated in the target residential programs. Additionally, the matching of referrals to IOU program participant data was often limited, as the referral-tracking customer data did not follow the same format or spelling of customer information used in the utility records.

4.1.2 Key Findings

This section provides overarching key findings and recommendations related to the audits. These key findings and recommendations are a direct result of research conducted through this indirect impacts study. We also developed metrics designed to provide qualitative indicators of program success. These metrics are presented at the beginning of this report in Section 1.7, Metrics and Indicators for Success.

The findings for the key researchable issues are limited to those few LGPs who make direct referrals and provided tracking data. Despite the small sample size that severely limit the conclusions that can be made about LGP referrals based on hard data, the results indicate that referrals by LGPs can be an effective mechanism in matching up appropriate customers with resource programs. Findings related first to the key researchable issues and then to other findings are covered in this section.

The referrals process is currently not successful in getting customers what they need to participate in appropriate resource programs (RF4). The lack of awareness even when referrals are made to specific programs indicates there is little or no follow-up effort made by the partnerships. Given that many of the nonparticipants expressed interest in the resource programs to which they were referred, the referrals process could play an important role in increasing customer participation in resource programs.

Those LGPs who directly made referrals of customers to resource programs and provided tracking data were generally effective in matching the customers to appropriate program (RF24). Although only 28 % of the referrals participated in the program, more than half of those who had not participated and were not aware of the program were interested in participating.

Personal recommendations, particularly by LGP staff, have the strongest influence on the customers' decisions to participate in the program (RF25). Again the sample was small but personal

recommendations from program staff were cited as having a major influence on the customer's decision to participate in the program. This finding indicates that proper referrals may be a very effective mechanism in achieving additional energy savings from resource programs.

Very few LGPs were able to provide tracking data on their referrals to program participants and even fewer had any results from those referrals (RF26). Many of the partnerships indicated that there were not tracking or managing a referral system or had a formalized approach for dealing with referrals. Only five of the LGPs make direct referrals to programs and provided tracking system data. Only one of those programs conduct follow-ups to obtain information on the results of those referrals.

It is not possible to draw conclusions on the effectiveness of the referrals process in customers' decisions to participate in the program (RF27). The number of programs that had data and could be included in the analysis was quite small. Customers were often not aware that they were referred to the program by the LGP because there was no follow-up. It was not possible to discern whether they knew about the program before the referral or planned to participate. Referrals from the few tracking systems that were provided could not be matched with participation data from the resource programs due to inconsistencies in formats and differences in customer names and addresses.

It is important for the partnerships to track the referrals processes and provide follow-up to ensure that the referring partnership receives appropriate credit for encouraging customers to participate in other programs (RF1). Bridging the information gap between consumers and available energy efficiency offerings by directing customers to the appropriate utility and third-party to appropriate rebate and incentive programs is a central goal of LGPs.

This review of program referral processes indicates that LGPs have a variety of definitions of and methods used for referrals (RF2). These range from referrals made to specific programs based on an audit or discussion to general advertising or references made to visit a web site.

There seems to be a high awareness of the programs to which customers are receiving referrals; however, many of them attribute that awareness to other sources, such as word-of-mouth, promotional activities, and bill stuffers (RF3). Although frequently cited as a source of information, customers consider word-of-mouth to have less influence on their actual participation in the program. Program participation is influenced more by personal contact by program staff, program information from the utilities, and participation in previous programs.

There were no examples of partnership tracking-systems that could be considered best practice; however, several partnerships, including South Bay Partnership, and the Fresno, Merced/Atwater, and Stockton Energy Watch Partnerships, stand out and are improving (RF5). In addition, many of the partnerships indicated that there were not tracking or managing a referral system or had a formalized approach for dealing with referrals. Complete and accurate tracking systems for referrals made are critical in evaluating this goal. A detailed tracking system is necessary to assess customers' needs and to evaluate whether customers are being matched with appropriate energy efficiency offerings. Furthermore, complete tracking systems assist partnerships in the documentation of their non-resource efforts and may be able to help them gain credit for recommendations that lead to resource goals outside of the partnership.

4.1.3 Recommendations

Despite severe limitations due to sample sizes, there was some valuable information gained from the analysis. This research identifies, in particular, the shortcomings of the referrals process and makes specific recommendations to significantly improve that process.

Develop a standard definition of what constitutes a "referral" (RR1). In particular, a referral should include some screening of the customer in terms of appropriateness for a program. The LGP should submit specific customer contact information to the appropriate IOU or third-party program manager. Finally, the referral should include follow-up by the LGP to determine the disposition of the referral.

Define and establish goals for referrals (RR2). If a major objective of the LGPs is to refer customers to appropriate energy efficiency programs, the partnerships should develop quantitative goals for referrals, as well as track their progress in meeting those goals.

LGPs should submit a detailed plan consistent with the program theory describing their referral management and tracking systems and processes (RR3). The program theory should identify a specific path that referred participants will take, including the expected results, so it is clear how referrals are managed, tracked, and how they fit into the program design. The program theory should include the referral-tracking system as a required input to the process.

Ensure that referrals are direct and targeted to the customer with appropriate follow-up (RR4). More than half of the customers who did not participate in the resource program expressed an interest in it. Of those who had heard about the program but did not participate, more than 60% expressed interest in the program. About half of those who had not heard about the program were interested. The referrals being made on audit and energy assessment reports should be very clearly identifiable with specific programs and contact information. All referrals that are made, including the lists gathered at community events, should include personal follow-up contact with the customer to ensure they have received the appropriate information.

Adopt a consistent state-wide tracking system for referrals (RR5). To facilitate evaluation and help meet partnership non-resource goals, PA recommends that the IOUs, third-party program managers, and LGPs work together to adopt a consistent statewide tracking system for referrals of customers to other resource programs.

The system should ensure that the referring partnerships and the IOU and third-party program managers receiving the referrals all have ready access and appropriate links from their systems to the referral tracking data (RR6). The IOU and third-party program participant tracking systems should be available to match the referrals using a consistent format for customer contact data. A process should be put in place to ensure that these referrals are accessed and acted upon by the program managers in time to take advantage of the predisposition to capture participation in the referred program. A web-based tracking system that includes security access for specific program staff would be the most effective method.

At minimum, we recommend these tracking data include the following information for each referral (RR7):

- ***Customer contact information:*** To accurately track customers that the partnership referred to resource programs, contact information should include: organization name, contact name (first and last), physical address (street number, street, city, and zip code), mailing address, area code, and phone number. If available, the customer's e-mail address may also be included. The contact information should be consistent with the format provided for the participant tracking systems used by the IOUs.
- ***Type of customer:*** The tracking system should identify whether the customer is residential, small business owner, government office, or other pertinent customer type.

- ***Specific resource program(s):*** In order to assess the impact of referrals in program participation and the effectiveness of partnerships to refer customers to programs that can meet their needs, partnerships need to track the specific resource program(s) to which customers were directed. Without tracking this information, it is impossible to evaluate if the customer participated in the program.
- ***Recommended equipment or services:*** To identify if the partnerships are funneling customers to needed products and services, partnerships should track any specific equipment or service rebates or incentives that they recommend to each customer. In some cases, these may be a component or element of a program.
- ***Referral mechanism:*** It is important for partnerships to record accurately how each customer was directed to a given resource program. This will allow for the assessment of which mechanisms are most effective in promoting awareness and participation in resource programs. Partnerships should track this data for each referral. The mechanisms may include energy assessment or energy audit report, trade show, community activity, training session, information session, or others; the name of the event and the date should also be included.
- ***Referral date:*** Partnerships should record the date they referred each customer to each resource program. The referral date provides documentation for any follow-up with the customer. Also, in the case of program participants, the length of interval between the initial referral and the customer's participation may help inform the analysis on the impact of the referral.
- ***Local partnership contact:*** The person making the referral should be listed along with a phone number and e-mail address.
- ***Reminder lists:*** The tracking system should include reminders to ensure referrals are addressed. These reminders may include lists to the referring LGPs for follow-ups with customers and/or resource program managers to ensure that appropriate actions have been taken. Lists should also be generated for resource program managers who receive the referrals.
- ***Notes on follow-up or contacts after initial referral:*** If partnerships follow-up with the resource program managers (those who received the referral) or the customer after the initial referral, PA recommends partnerships record detailed notes on dates and the nature of the contact. This tracking information can further demonstrate effort in meeting non-resource goals.
- ***Program participation:*** Ideally, the tracking system will include a final disposition for the referral. In other words, the tracking system will indicated whether the customer participated or not and the reason if they did not participate. These will require follow-ups with the customer and/or the resource program manager.
- ***Utility and third-party program contact lists***: The tracking system should include up-to-date information on who can be contacted with questions about individual programs.

Require LGP follow-ups (RR8). PA further recommends that the referring LGPs and the resource IOU or third-party programs be required to follow-up on each referral they make to promote participation. Partnerships may consider following-up with the customer after the initial referral to remind the customer of the recommendation and to see if they would be interested in participating. Partnerships may be able to further promote participation by relaying their referrals-tracking data to representatives of those programs and by following up with those program managers to see if additional information or support is required.

The referrals process should be evaluated on an ongoing basis to reach the appropriate person and ensure recall (RR9). One approach is to include a key question on all program application forms asking the customer where they heard about the program and whether the partnership (if applicable) provided

them with any program information. Otherwise, a process can be put in place to report the results of the referrals, by partnership, monthly. The report will indicate the referrals that were made, resource program information, and whether there was any follow-up with customers or program managers. The referral programs should also report the number of referrals received by partnerships, as well as the referral disposition (i.e., whether the customer was contacted, refused to participate, planned to participate, or actually participated). The transparency of these data will serve to place more emphasis on referrals, promote ongoing evaluate efforts, as well as improve the process overall.

4.1.4 Section Organization

This document presents our approach, findings, and analysis of the LGP referrals evaluation, and is organized by the following topics:

This document presents our approach, findings, and analysis of the LGP referrals evaluation, and is organized by the following topics:

- Description of the referrals processes (Section 4.2)
- Methodology and approach (Section 4.3)
- Results for business/local government customer surveys and database analysis (Sections 4.4 and 4.5)
- Results for residential customer surveys and database analysis (Sections 4.6 and 4.7)
- Analysis of referrals questions from the audits surveys (Section 4.8)

4.2 Summary of Program Referrals Processes

Many of the Local Government Partnerships (LGP) programs include referrals as a key element. According to the non-resource assessment completed by PA, 18 LGP programs reported having significant referrals processes. These referrals were made to the LGP's direct-install components, other energy efficiency programs offered by the utilities, third-party energy efficiency programs, or other local community initiatives to improve energy efficiency of local businesses and households. After reviewing the data provided by the utilities, in which they were asked to explain their referrals-tracking process, as well as provide lists of customers that were referred to other programs, 13 programs were selected for further analysis (Table 4-2). More detailed descriptions of these referrals processes and tracking systems can be found in Appendix C.

Table 4-2. Programs Initially Selected for Analysis of Referrals

IDs	Program	Referrals to	Participants
PGE2016	AMBAG	Pacific Gas and Electric Company (PG&E) Rebates and Incentives Programs	Local governments
PGE2020	East Bay Energy Watch	3rd Party Programs/PG&E Programs	Small businesses
PGE2021	Fresno Energy Watch	3rd Party Programs/PG&E Programs	Small businesses
PGE2026	Merced/Atwater	3 rd Party Programs/PG&E Programs	Small businesses
PGE2028	Redwood	PG&E Rebates & Incentives	Small businesses
PGE2030	South San Joaquin	PG&E Programs	Small business, public buildings
PGE2033	Stockton	3 rd Party Programs/PG&E Programs	Small businesses
SCE2520, SCG3522	South Bay	SCE Programs	Local government/small businesses
SCE2521, SCG3523, PGE2017	Bakersfield-Kern	SCE Residential Programs	Households
SCE2521, SCG3523, PGE2017	Bakersfield-Kern	SCE Municipal Programs	Local governments
SCE2567	LGEAR/Mammoth Lakes	Refrigerator Rebate/Refrigerator Roundup	Households
SCE2568	LGEAR/Ridgecrest	Ducted Evaporative Cooler Rebate Program	Households
SDGE3005	City of San Diego	SDG&E Municipal Programs	Local governments

Our review of the program referrals processes and the results from utility program and partnership staff discussions indicated there are a variety of referral processes used by the LGPs. These methods range from targeted referrals to general referrals. Targeted referrals are those where customers are specifically referred to investor-owned utilities (IOU) or third-party programs based on audit participation or discussions with the customer. In the best-case scenario, targeted referrals are also considered as direct-personal referrals. Direct-personal referrals include customer contact information that is provided by the LGP to the specific IOU or third-party programs, as well as a process in which the partnership follows-up on the referral with the customer, the IOU, or third-party program manager. In many cases, these direct-personal-targeted-referrals were very limited, as only a few large industrial projects met that definition.

Indirect-personal referrals may provide lists of referrals to specific programs, though there is no documented follow-up by the partnership and the customer may have little to no recollection of the

referral discussion with the partnership. The partnerships often discussed referrals with the customers at local events and then submitted the participant's contact information to the appropriate program managers. Again, this process included no documentation of follow-up contacts with the customer or program managers.

General referrals include those made to a widespread audience. In general, these include advertisements, such as print and media. These general references are given to customers to visit an IOU web site for rebates and incentives. In some cases, these referrals are recommendations included in an audit report directing the customer to the available IOU rebate and incentive programs on the IOUs web site. In two cases, the partnership provided a list of referrals that were simply customers in the area that had participated in another program after general advertising campaigns.

The types of referrals for various LGPs are summarized in the following table.

Table 4-3. Overview of the Various Referrals Approaches

	***Targeted*—Referrals to specific programs, rebates, or services that address a customer's need**	***General*—Funneling to IOU web sites or general rebates and incentives or informal referrals**
***Direct Personal*—LGP refers individual customers directly to IOU or third-party program(s) and LGP conducts follow-up with IOU/third-party program manager and/or customer**	AMBAG (large commercial/industrial) South Bay City of San Diego (Museums)	Bakersfield-Kern
***Indirect Personal*—LGP provides indirect referrals to individual customers (e.g., written audit reports/assessments) OR LGP provides lists of customers to IOU/third-party resource program staff with no follow-up**	Fresno Merced/Atwater Redwood Coast Residential South San Joaquin (limited) Stockton	Redwood Coast Business East Bay (CYES) Marin County (CYES) AMBAG Home Energy Audit
***Impersonal*—Mass marketing in service territory (e.g., radio or newspaper ads, meetings)—not typically considered a Referral**		Mammoth Lakes Residential Ridgecrest Residential

4.3 Analytic Approach

PA used two different approaches to evaluate the impacts of partnership referrals. Where possible, PA conducted telephone surveys of customers included in the partnership's referral-tracking system. We also performed a database analysis, comparing the partnership referral lists against participation lists of the IOU programs to see if the referred customers participated in the programs to which they were referred.

PA performed a database analysis for the referrals from all of the partnerships that provided referral-tracking data. For the customer surveys, PA sampled all referred customers from six partnerships—four of for the small businesses and local government surveys and two for the residential households surveys. We did not include referrals from Bakersfield-Kern in the residential survey sample, as the evaluation team was concerned that multiple surveys had already been completed with Bakersfield-Kern customers

for other process evaluations and element reviews of the non-resource evaluation. In addition, the audit surveys administered for Bakersfield-Kern participants included questions regarding the referral processes, which we used for this analysis.

The original 18 partnership programs selected for referral component reviews were reduced, based on data availability, to 12 programs for this analysis. In some cases, the partnerships either did not provide tracking data or had very little information (less than five referrals listed). In other cases, the partnership participants were already included in the surveys for training or audit process analyses being conducted by PA.

Table 4-4 shows the final list of partnerships and the analysis approach used for each of the targeted partnerships for the residential, small business and government customer referrals. PA performed the database analysis for all of the partnerships from which we received tracking data. For the customer survey, PA sampled all referred customers from each partnership, with the exception of San Joaquin, due to the small number of referrals. Additional details for each program, including the sample sizes, are presented with the detailed findings for each data collection task in the forthcoming sections.

Table 4-4. Referrals Analysis Approaches for the Partnerships Included in This Study

Partnership	Tracking System Provided	Analysis Approach
AMBAG	Does not track referrals	Discussions with Partnership representatives; Audit phone survey questions on referrals analyzed
East Bay Energy Watch	Provided 2 referrals	Audit phone survey questions on referrals for CYES component analyzed
Fresno Energy Watch	Yes—Small Business	Phone survey and database analysis
Marin County Energy Watch	Does not track referrals	Audit phone survey questions on referrals for CYES component analyzed
Merced/Atwater Energy Watch	Yes—Small Business	Phone survey and database analysis
Redwood Coast	Does not track referrals	Discussions with Partnership representatives
South San Joaquin	Yes—only 3 listed	Database analysis
Stockton Energy Watch	Yes—Small Business	Phone survey and database analysis
South Bay Partnership	Yes—Small Business	Phone survey and database analysis
Bakersfield-Kern	Yes—Residential Only	Database analysis
LGEAR/Mammoth Lakes	Yes—Residential	Phone survey and database analysis
LGEAR/Ridgecrest	Yes—Residential	Phone survey and database analysis

4.4 Small Business and Local Government Survey Results

The non-residential survey of referred small business and local government referral participants consisted of a starting sample of 487 customers from three different PG&E partnership programs (Fresno, Merced/Atwater, and Stockton) and one SCE partnership (South Bay). These customers were tracked by the programs as participants who were referred to up to three different third-party or general utility rebate and incentive programs. For this reason, we analyze the customer survey at the program referral-level instead of the customer-level. In other words, some customers were referred to multiple programs and their responses were considered for each of the programs to which they were referred. However, the vast majority of the survey respondents (93%) said they were referred to only one program.

Because programs did not track referrals at a level of detail needed to support the evaluation effort, PA performed a census survey for which the entire population was contacted. In an effort to maximize response, the PA team performed online look-ups for records without phone numbers as well as records with bad phone numbers (e.g., disconnected numbers, fax/data lines). From March 23 through April 7, PA conducted a total of 204 surveys with government or small business customers, representing 222 of the 487 program referrals. As seen in the table below (Table 4-5), we calculated the overall response rate, as well as response rates by referring program (the partnership that provided the referrals lists).

Table 4-5. Small Business/Local Government Referrals Surveys Response Rates

Sample	Fresno	Merced/ Atwater	Stockton	South Bay	Overall
Starting Sample	**224**	**73**	**144**	**46**	**487**
No/bad phone number	26	8	18	4	56
Adjusted Sample	**198**	**65**	**126**	**42**	**431**
Refused	41	7	25	4	77
Unavailable for duration	7	2	4	0	13
Called out (at least 6 attempts)	45	14	38	6	103
Complete	**89**	**39**	**46**	**30**	**204**
Response Rate	**44.9%**	**60.0%**	**36.5%**	**71.4%**	**47.3%**

4.4.1 Key Findings

The key findings from the non-residential customers who were surveyed from the lists of customers referred to the programs are as follows:

A significant issue with the referrals process is that, for the majority of customers who receive referrals from the partnerships to IOU or third-party programs, the partnerships did not follow-up on the referred customer for 85% of the respondents (RF6). This is likely one of the primary reasons for why 45% of respondents did not recall hearing from the resource IOU and third-party programs (i.e., programs to which respondents were referred).

Participants who indicated that they were aware of the program to which they were referred were most likely to cite word-of-mouth or promotional activities as the source of their awareness (RF7).

Overall, 28% of respondents reported participating in at least one of the IOU or third party programs to which they were referred (RF8). More than half (55%) were aware of the programs and about half of them participated in a program indicating that a large number were likely not contacted or did not recall being contacted when the referrals were made.

The majority of respondents did not recall being personally contacted regarding the resource programs (RF9). Only 16% of respondents indicated that they were contacted by a utility, partnership, or resource program representative before they became aware of any of the resource programs to which they were referred. Seventeen percent of respondents reported that, at some point in the referral process, they were contacted by one of these representatives. Respondents mentioned the LGP as the source from which they first heard about the program for only two percent of the referred programs.

Personal contacts appear effective in the encouragement of customers to participate in programs (RF10). Respondents reported that they received a personal contact from the utility, partnership, or resource program staff before they became aware of the program. For 35 of the 123 programs, respondents indicated that they had heard of the program before the survey (28%); respondents participated in 22 of those 35 programs (63%).

Personal recommendations have a significant influence on the respondent's decision to participate in the program (RF11). Among the programs from which respondents reported receiving a personal recommendation, the average influence rating was 7.9, on a scale from zero (no influence) to ten (great deal of influence). Recommendations made by the referring program staff had the most influence on a respondent's decision to participate (8.9 out of 10).

For those who indicated that they were aware of the program, but were not contacted personally, utility mailings and bill inserts had the most influence on a respondent's decision to participate with ratings of 9.7 and 7.8 out of 10, respectively (RF12).

Respondents who participated in one resource program appear more likely to participate in additional resource programs (RF13). Customers who participated in other energy efficiency programs were four times more likely to have participated in the resource IOU or third-party program—20% of those who participated in the resource program participated in other programs as well. This survey did not discern whether the respondents participated in other programs before or after they participated in the resource IOU or third party program.

The majority of customers indicated that they are interested in the resource IOU or third-party programs to which they were referred (RF14). Of the non-participants who recalled hearing about the IOU or third-party program, respondents still expressed interest in participating in more than half (62%) of the programs to which they were referred by the LGP. About half of those (49 of 99) who had not heard of the programs were also interested. Overall, respondents either participated in or expressed interest in participating in 148 out of 222 referred programs.

While non-residential customers expressed interest in the majority of resource programs, the equipment or services of the program did not always meet the customer's needs (RF15.)

4.4.2 Detailed Results

Sample Characterization

The survey instrument included questions regarding business type and electricity supplier. Our findings regarding this information are presented in this section. It is important to note that the sample is not representative of any larger population of customers, as only a few LGPs were able to provide sufficient tracking system data for the surveys.

The most common business type among non-residential respondents was retail (27%). The next most-common primary business type was offices (20%), followed by restaurants (11%). The most prevalent title of surveyed respondents was owner or operator (38%), followed by manager (24%). The majority of non-residential respondents were customers of PG&E. Seventy-nine percent of respondents reported that they receive their electricity from PG&E, and 68% said they received their gas from PG&E.

Overall, our records showed that of the 204 local government facilities and small business respondents, 189 customers were referred to one program, 12 customers were referred to two different programs, and the remaining three customers were referred to three programs. Thus, 189 customers were referred to 222 programs. Table 4-6 shows the frequency of LGP referrals to IOU and third-party programs.

Table 4-6. Number of Small Business Survey Respondents by Partnership and Program

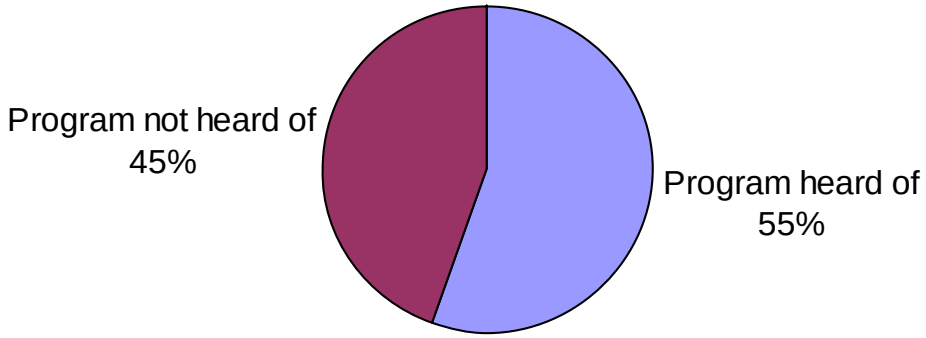
Resource Programs	Referring Partnerships			
	Fresno	Merced/Atwater	Stockton	South Bay
CA Dairy Energy Efficiency	1	0	0	0
California Preschool Energy Efficiency (CPEEP)	0	0	1	9
Commercial Laundry	0	0	1	0
Cool Control Plus	0	5	1	0
Duct Test and Seal	0	8	18	0
Energy Smart Grocer	0	2	1	0
HeatWise	0	1	0	0
Light exChange (LCP)	3	0	0	0
Lodging Savers	0	4	0	0
General PG&E Rebates and Incentives	86	29	22	0
SCE Audit	0	0	0	4
SCE Lighting Retrofit	0	0	0	4
General SCE Programs	0	0	0	13
School Energy Efficiency	0	3	1	0
Small Commercial Comprehensive Refrigeration (CoolBiz)	0	0	5	0
Total Program Referrals for Survey Respondents	**90**	**52**	**50**	**30**

4.4.3 Awareness of the Programs and Participation

The small business and local government customers referred to resource IOU or third-party programs were asked to discern how they found out about the program. As shown in Figure 4-1, survey respondents acknowledged that they had heard of approximately 55%of the IOU or third-party programs to which they were recorded as having been referred. In other words, the customers who were referred to programs by

the partnership said that they had heard of the program in 123 out of 222 cases where referrals were made to specific programs. About 28% (57 of 204) of customers referred to IOU or third-party programs indicated that they participated in at least one of the resource programs referenced by the partnership. There is no way to attribute that participation to the referral because most customers were not aware of the referral and there was no follow-up or good tracking data to determine whether the referral was acted upon by the program that received the referral.

Figure 4-1. Referred Programs Recognized by Respondents[108]



Since PA was able to survey the contact person listed for the referral in 94% of the cases, it was expected that this proportion would be significantly higher. There are a number of possible explanations for this reduced awareness. A portion of the referrals may have been provided through energy assessments and energy audit reports, although these were not mentioned as a source of program information by the respondents. This indicates that the customer may not have taken notice of the referral information included in the report or was not interested. In other cases, lists of referrals were provided by the referring partnership to third-party programs that may or may not have followed-up with the customer. The length of time since the date the referral was made may also have served as a contributing factor. The referrals in the lists that PA received date back to approximately two years before PA conducted this survey (spring of 2007), which may have affected participant recollection.

[108] Source: Partnership Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, question R1

Table 4-7. Participation and Awareness of Respondents

Participation of Respondent	Number
Respondents who were referred to one or more programs	204
Respondents who participated in at least one program to which they were referred	57
Programs to which the 204 respondents were referred	222
Programs to which the 204 respondents participated in after being referred	60
Programs to which they were referred that the 204 respondents had heard of	123

For those who had heard of the program, the most common source from which these respondents reported first hearing of the resource IOU or third-party programs was through word-of-mouth (18% of referred programs), followed closely by newspaper articles (17%). The next most common sources were electric-bill stuffers, community sweeps, and advertisements (13% each). Table 4-8 shows the percentage of sources from which respondents first heard of the resource programs.

Table 4-8. Sources from Which Respondents First Heard of Resource Programs (n=123)[109]

Source of Program Awareness	Percentage
Word of mouth	18%
Newspaper article	17%
Electric/gas utility-bill stuffers	13%
Community sweeps	13%
Advertisements	13%
Electric/gas utility mailing	6%
Local government partnership activities	2%
Community displays	2%
Energy fairs	2%
Another program	1%
Web site	1%
Other	8%
Don't know	6%

[109] Source: Partnership Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, question R2

It is worth noting that the referring partnership could be credited for a number of the activities cited as the source of awareness of the resource program. The partnerships promoted programs through many of these sources although there is no way to clearly identify which sources were activities sponsored by the partnership based on the survey questions. The partnerships marketing strategies included media and community events and other promotions coordinated with the investor-owned utilities to provide information on their programs.

PA also asked respondents if someone from their utility, the referring partnership, or the resource program contacted them and recommended the program before they were aware of it. For 35 of the 123 referrals on record (28%), respondents mentioned that a person from their utility, the LGP, or the resource program contacted them. Table 4-9 shows the frequency of these types of personal recommendations made by LGPs. SCE respondents (South Bay Partnership) reported the highest proportion of personal referrals with 42%, followed by the PG&E Merced/Atwater Partnership with 40%. South Bay was the one partnership that conducted follow-ups with the customers after making the referrals.

Table 4-9. Personal Recommendation Source by Partnership[110]

Recommendation Source	Fresno	Merced/Atwater	Stockton	South Bay	Overall
Member of utility	2	6	3	5	16
Member of Partnership	4	0	2	2	8
Member of referred program	5	4	1	1	11
Total personal recommendations	**11**	**10**	**6**	**8**	**35**
Total referred programs heard of	**59**	**25**	**20**	**19**	**123**
Personal recommendations as percentage of referred programs	**19%**	**40%**	**30%**	**42%**	**28%**

PA added a follow-up question for respondents who indicated that they had not received a personal recommendation before they were aware of the resource program. Respondents were asked if a representative from one of these sources *ever* contacted them regarding the resource program. The PA survey team also called back respondents who had already completed the survey to ask this follow-up question. Only two respondents reported in the follow-up question that they were ever contacted by a representative about the referred program.

4.4.4 Impact of Referral on Program Participation

For every program that the referral respondents were aware of, PA asked if the respondent had participated in the program. Nearly half of respondents from the referrals data base who had heard of the program (60 of 123) reported participating in at least one of the resource programs that they had heard of before. Three of the respondents from the Merced/Atwater Partnership reported participating in two resource programs.

Table 4-10 presents participation rates by each LGP sampled. Across partnerships, respondents participated in 20 to 33 percent of resource programs that they were referred to by the partnership. Fresno

[110] Source: Partnership Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, questions P1 and P1a

customers participated in the most programs (27), while South Bay customers participated in the highest percentage of resource programs (33%). These results indicate that targeted referrals result in a significant number of customers participating in the program.

Table 4-10. Participation Referred Programs[111]

Partnership	Number of Program Referrals	Number of Referred Programs Heard Of	Number of Programs Participated In (% of Program Referrals)
Fresno	90	59 (66%)	27 (30%)
Merced/Atwater	52	25 (48%)	13 (25%)
Stockton	50	20 (40%)	10 (20%)
South Bay	30	19 (63%)	10 (33%)
Overall	**222**	**123 (55%)**	**60 (27%)**

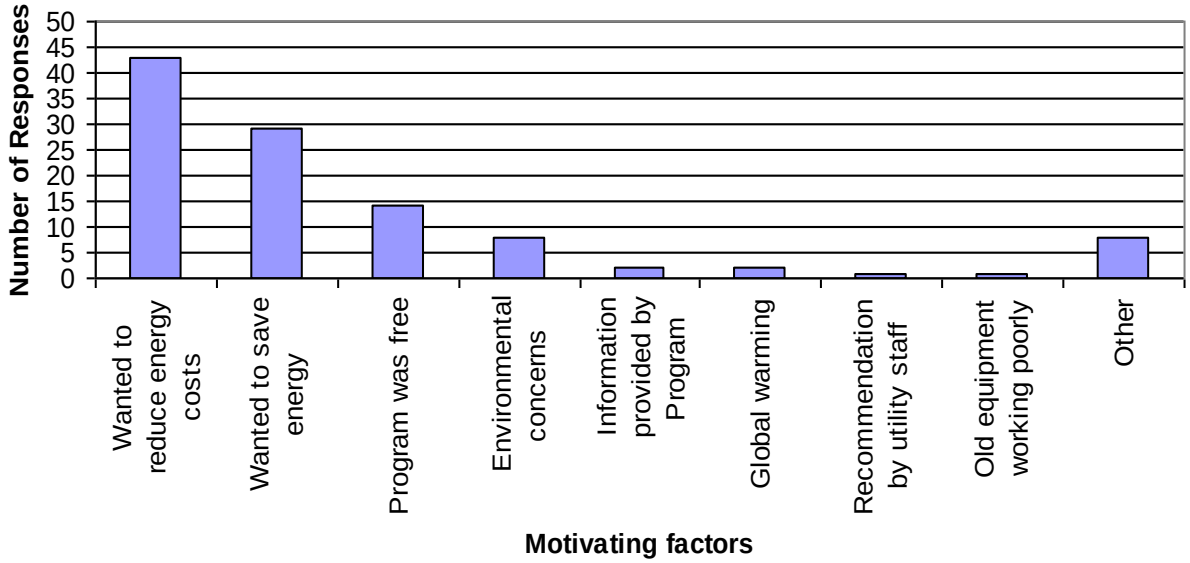
Respondents reported various types of participation through these programs. The most common action done through resource programs was the installation of lighting equipment and controls (73 % of the 60 program participants). Another 25%, or 15 program participants, said they installed heating, ventilation, or air conditioning (HVAC) equipment. Respondents who participated in the resource programs may also have installed motors/compressors, refrigeration equipment, appliances, EMS and controls, water saving measures, a white roof, insulation, and a pool pump as part of their participation.

4.4.5 Motivating Factors for Participation

Respondents reported multiple motivations for participating in the resource program. The most common motivation for participation was to reduce energy costs (72% of responses). The next most frequently cited motivator was saving energy (48%), followed by the program being free (23%), and environmental concerns (13%). Figure 4-2 shows the frequency of motivating factors mentioned by respondents who participated in at least one resource program. "Other" responses included motivations such as other businesses were participating, to help with sales, and to increase lighting in the facility.

[111] Source: Partnership Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, questions P1 and P2

Figure 4-2. Motivating Factors for Participation in Resource Programs (n=60)[112]



4.4.6 Effectiveness of Referral Mechanisms

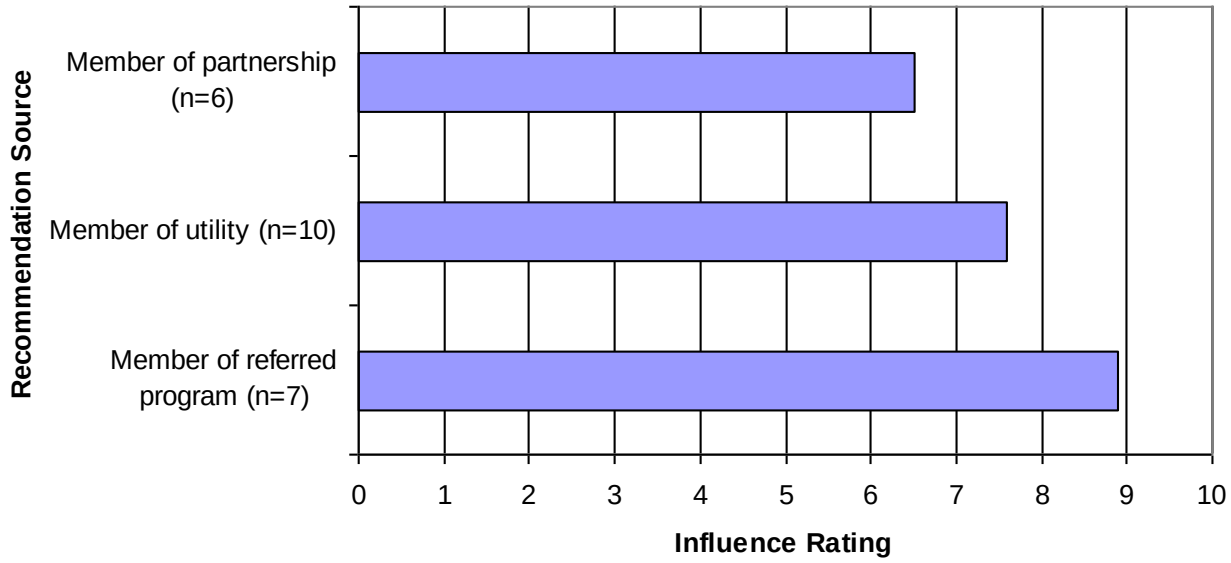
To assess the impact of program referrals from LGPs, PA also asked the 60 participating respondents what impact the information they received about the resource program had on their decision to participate in that program. PA asked the respondents who reported receiving a personal recommendation whether or not they think they would have participated in the referred program without the recommendation.

On four occasions, respondents did not know if they would have participated in the program without the recommendation they received. At the same time, however, the personal recommendation did receive high ratings in terms of the level of influence on participation. Participating respondents were asked to rate how influential the personal recommendation or the information they received from other sources (for respondents who said they did not receive a personal recommendation) was on their decision to participate in the resource program.

Among the programs where respondents reported receiving a personal recommendation, the average rating was 7.9 on a scale from zero (no influence) to ten (great deal of influence) in their decision to participate in the program. Within this group, recommendations made by members of the resource partnership program had the highest influence, with an average rating of 8.9. Figure 4-3 shows the reported ratings for different sources of personal recommendations.

[112] Source: Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, question P3a

Figure 4-3. Average Level of Influence of Personal Recommendation Sources[113]



Those who participated in the resource program and indicated that they had not received a personal contact indicated that the information they received from other sources had an average influence of a 5.9 on their decision to participate. This is lower than the average influence rating for personal referrals (between six and nine percent for personal referrals). Among sources cited by more than one respondent, gas/electric utility mailings and gas/electric utility bill inserts averaged the highest level of influence with ratings of 9.7 and 7.8, respectively. Conversely, word-of-mouth rated as having the least influence on program participation (average rating of 2.8).

4.4.7 Participation in Other Energy Efficiency Programs

While the direct effect cannot be determined by the survey results, the responses suggest that those who participate in one energy efficiency program may be more likely to participate in additional opportunities. These results speak to the importance of referrals from one program to another.

In addition to the programs to which the respondents were referred by the LGP, 15% of all respondents reported participating in other energy efficiency programs offered by their utility in the past three years. Respondents reported participating in a wide variety of programs, including the Cool and Light Program, Cool Control Plus Program, Light Exchange Program (LCP), PG&E Rebates and Incentives Program, as well as the SCE Lighting Retrofit Program.

Respondents were not asked about the timing of program participation relative to the referral process. It is also unclear whether customers who participate in multiple programs are more interested in energy efficiency opportunities or whether the information barrier has been overcome once they have gone through the program participation process once.

[113] Source: Partnership Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, questions P1 and P5

A higher portion of those who participated in the resource program also participated in other rebate and incentive programs. Table 4-11 shows that respondents who participated in programs as a result of a referral were nearly four times as likely to have participated in other energy efficiency programs.

Table 4-11. Participation between Resource Programs and Other Programs (n=112)[114]

Participated in other rebate and incentive programs	Participated in at least one of the referred-programs	
	No	Yes
Yes	3 (5%)	11 (19%)
No	53 (91%)	45 (79%)
Don't know	2 (3 %)	1 (2%)
Total	58 (100%)	57 (100%)

4.4.8 Nonparticipants

Respondents who were included in the tracking system as referrals to resource IOU or third-party programs reported not participating in 73% of the programs to which they were referred. Given there were multiple referrals for a respondent, these represented 72% of the respondents who did not participate. Those who said they had heard of the resource program, but had not participated, noted several reasons why they did not participate. The most frequent reason for not participating was that the respondent felt they did not need the equipment or services offered by the program (mentioned by 10 respondents). These responses suggest that some non-participating customers who recalled the program may not have been appropriate candidates for these referrals. Several other respondents indicated that they were not responsible for equipment purchases or maintenance. These results suggest that in these cases, the evaluation team either spoke to the wrong person, or the referral itself was directed to an inappropriately targeted customer. Other anecdotal responses included not knowing how to participate, not being able to afford energy saving equipment, lack of follow-up after initial contact with the program, just had not gotten around to participating, and general disinterest in the program.

Overall, respondents expressed interest in over half (56%) of the resource programs for which they did not participate. Additionally, 62% of respondents expressed interest in at least one of these resource programs. Nonparticipants who were not interested in participating listed a variety of reasons why. Below are quotes from nonparticipants regarding their disinterest in participating in the resource program.

> *What they proposed as cost saving for switching the energy efficient lighting does not match the cost of replacing the fixtures and other costs that come with it.*
>
> *None of it applied to what I'm doing. The rebates are so minor there's no use in [participating].*
>
> *I don't think we would qualify for [the program] or it would work for us.*
>
> *I cannot find anyone that can give me information in regards to how to participate in the program.*

[114] Source: Partnership Program Indirect Impacts Evaluation—Government/Small Business Referrals Survey, questions P2 and OP1

Notably, a few respondents said that they tried to participate in the program, but either did not qualify or have not heard back from the program. This points to a major weakness in the partnerships' referrals in that there is no follow-up process conducted by the referring partnership for 85% of respondents.

Of the respondents who recalled hearing about the resource program, though they did not participate, 62% expressed some interest in participating (39 out of 63 programs). This is higher than for programs respondents do not recall having heard of the program, where respondents expressed interest 49% of the time (49 out of 99 programs).

Those who have not and were not interested in participating in the program cited the following reasons for their lack of interest: un-needed equipment, too costly, already participated in programs to make their building more efficient, and not owning the building. This indicates that a number of the non-participant group should not have been referred to the program.

Finally, 90% of respondents reported that they were not aware of any other organizations where they could receive the same type of services as the resource programs. However, it was unclear whether this perception was regarding organizations other than utilities, partnerships, and third-party contractors. If so, this finding is not surprising, as these are the majority of organizations that offer programs.

4.5 Small Business and Local Government Database Review and Analysis

PA compared the referred customers' information in the partnership referral-tracking data to utility program participation lists to see if the customers participated in utility programs after the referral. PA conducted this analysis at the customer level. Notably, this database comparison is limited to utility programs and does not assess participation in third-party programs to which customers were referred (resource programs). In addition to developing a consistent tracking system for referrals, it will be important to include both IOU and third-party program staff in the process for the purpose of impact assessment.

PA did not receive any referral-tracking data from four of the nine partnerships that were targeted for the non-residential evaluation. In most cases, the partnerships said they did not track referrals. Of the data we received, the Richard Heath Associates (RHA) partnerships' (Merced/Atwater, Stockton, and Fresno Energy Watch programs) tracking data of initial referrals was the most complete. In addition to supplying detailed and generally complete customer contact information, these data also clearly tracked specific programs (including third-party programs) to which each customer was referred by the partnership, including the date of each referral.

Like the RHA partnerships, the South Bay Partnership also provided complete and detailed customer contact information. The high survey response-rate is indicative of the quality of this contact information in the tracking data. For many customers, South Bay also tracked follow-up attempts after the initial referral. However, the specific programs or equipment to which customers were funneled through a referral was not as clearly tracked.

Finally, the San Joaquin partnership provided fairly detailed tracking information for two of its three referrals, but no information beyond company name for the third referral. None of these referral customers were matched in the utility participation data.

4.5.1 Database Matching Method

PA received program participant data from PG&E, SCE, SCG, and SDGE utilities which were used to compare against the referral-tracking data received from the Fresno, Merced/Atwater, San Joaquin, South Bay, and Stockton LGPs. The Fresno, Merced/Atwater, and Stockton tracking data also included information for customers referred only to third-party programs. Since the utility program participant lists do not include third-party programs, we excluded these customers from the database analysis.

The datasets required phone numbers and addresses to be cleaned and made consistent in format before the matching process could commence. All symbols were removed from the phone numbers to provide a 10-digit number for matching. Addresses were parsed into street number, street type, and street name so they could be more easily matched.

After the dataset formats were cleaned, cases were matched using three key search parameters – phone number, name, and address. Match methods were implemented in the order in which the team had the most confidence. First, the cases were matched by phone number. Any cases that did not match on phone number were then matched on Street Name, Street Type, and Street Number. The remaining cases that did not match on the previous criteria were then matched on Street Name, Last Name, and City. Because this was a much less precise method of matching cases, the team manually compared about 80 records to determine their validity as a match.

Finally, the date recorded in the referral-tracking data was compared to the utility date paid for each matched customer. This last check was intended to verify that the referral was made prior to the respondent's participation in the program.

4.5.2 Key Findings

The matching of referrals to program participation tracking system data was difficult due to variance in customer names and addresses (RF16). The percentage of matching information was very low; we were able to match approximately four percent of referral customers to the tracking system data (17 matches). Of those matches, six of the 17 were inconclusive because the referral date was missing or the referral date was after the utility rebate payment date.

Without a better tracking system in place that includes follow-up with customers and the other program managers who received the referrals, there is no way to attribute participation to other programs from the referrals process. In particular, a significant number of referrals were made to third-party programs that could not be analyzed using the database provided because only IOU programs were included in the participant tracking data.

In development of a new referral tracking system, the systems used by several of the partnerships included in this analysis could be used as a starting point; however, there are a number of improvements that are needed to develop a best practice referrals-tracking system that would serve all of the partnerships as described (see Chapter 9). Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations.

4.5.3 Detailed Results

Table 4-12 shows the frequency in which customers in each partnership's tracking data were matched to utility records as participants in the appropriate utility program. The analysis identified some matches where the participation date in the utility database was before the referral date or where dates were

missing. For the purpose of investigating the impact the referrals had on program participation, these matches are less reliable than matches where the referral date precedes the utility date.

Table 4-12. Comparison of Referrals-tracking Data to Utility Participant Data

Partnership	Total Matches with Utility Participant Lists	Matches with Referral Date Before Utility Paid Date	Matches with Referral Date Occurring After IOU Rebate Paid Date	Matches with Date Missing
South Bay (N=46)	3 (7%)	2 (4%)	1 (2%)	0 (0%)
Merced/Atwater (N=58)	4 (7%)	2 (3%)	0 (0%)	2 (3%)
Stockton (N=64)	9 (14%)	6 (9%)	2 (3%)	1 (2%)
Fresno (N=220)	1 (0%)	1 (0%)	0 (0%)	0 (0%)
San Joaquin (N=3)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Overall (N=391)	17 (4%)	11 (3%)	3 (1%)	3 (1%)

These results indicate that some customers participate in utility programs after receiving a referral from an LGP. Customers from the Stockton referrals-tracking data were matched in the utility database the most with nine customer matches (14%); the referral date preceded the participation date for six of these.

4.5.4 Limitations

There are major limitations to keep in mind when reviewing these database analysis results. First, the matching approach likely misses some matches between customers in the referrals-tracking data and the utility participation records due to differences in customer information between data sets. While PA used a multi-tiered matching method to try to capture as many matches as possible, differences in data, such as the spelling of a customer's name or address, may result in a number of missed matches. The sensitivity of this type of analysis underlines the importance of complete and accurate referral-tracking data.

Second, this database analysis only matches the referral-tracking data against utility rebate and incentive programs, and not third-party programs. Therefore, the actual number of participants in resource programs may be higher, especially for the Merced/Atwater, Fresno, and Stockton partnerships, as they reported a number of referrals to third-party programs.

In addition, it is important to note that this database analysis cannot alone infer any of the effects referrals may have on program participation. Knowing that a customer participated in a utility program after they were referred does not necessarily mean that the referral itself significantly influenced the customer's decision to participate in a given program. Thus, the results of this analysis can only be used to identify opportunities for improvement in the referral-tracking processes.

4.6 Residential Household Survey Results

The referral-tracking system provided by Mammoth Lakes and Ridgecrest was initially thought to include specific referrals that were made to other programs. Subsequent discussions with the partnership confirmed that these were not typical referrals, as they included a list of participants in specific programs that were supported and promoted by the partnerships through general advertising. For these cases, we use the term promoting partnership, as these LGPs did not technically make a program-specific referral.

One partnership, Mammoth Lakes, promotes the ENERGY STAR Refrigerator Rebate Program (a component of HEER) and the Refrigerator Round-Up Program (part of the Appliance Recycling Program (ARP)) through newspaper and radio advertisements. The partnership also provides rebates to assist customers with the delivery costs associated these activities. The customer lists provided included individuals who had participated in the programs and *probably* did so because of the partnership activities.

The Ridgecrest partnership promotes the Ducted Evaporative Cooler Rebate Program through newspaper and radio advertisements. The Partnership offers an additional incentive to Ridgecrest residents to broaden participation in the program. Again, the lists provided referrals customers who had participated in the programs.

Despite these issues, the survey data was analyzed and reported because there are useful findings on the influence of a partnership's promotional activities on customer decisions to participate in specific residential programs.

PA attempted to contact the entire population from the Mammoth Lakes and Ridgecrest lists to complete the survey. We exceeded a 50% response rate with this sample. In an effort to maximize response rates and minimize sample bias, the PA team performed online look-ups for records without phone numbers, as well as records with bad phone numbers (e.g. disconnected numbers, fax/data lines, etc.). From March 23 through April 7, PA conducted 152 surveys with residential customers. Table 4-13 shows an overall response rate, as well as response rates by the referring partnerships.

Table 4-13. Residential Referrals Survey Response Rates

Sample	Mammoth Lakes	Ridgecrest	Overall
Starting Sample	**47**	**269**	**316**
No/bad phone number	14	57	71
Adjusted Sample	**33**	**212**	**245**
Refused	5	24	29
Unavailable for duration	1	0	1
Called out (at least 6 attempts)	9	47	56
Complete	**17**	**135**	**152**
Response Rate	**51.5%**	**63.7%**	**62.0%**

PA was only able to survey three of the 17 customers included from the Mammoth Lakes list for the Refrigerator Round-Up Program element. The low response is largely due to not having phone numbers for these customers; pointing to a weaknesses in tracking-system data.

4.6.1 Key Findings

The key findings from the residential surveys of the two partnerships are summarized here and followed by more detailed results.

Stores, followed by word-of-mouth, and contractor/vendor were listed most frequently by residential respondents as the first source of awareness of the residential programs (RF17). Over 40% from the ENERGY STAR Refrigerator Rebate Program mentioned stores, although they are a small sample of 17 respondents. Over 40% of respondents from the Ducted Evaporative Cooling Program mentioned stores or contractors as the first source of program awareness. Very few respondents reported being contacted by a person from the partnership, the program, or the utility. These findings are consistent with the respondents being participants in the programs and not direct referrals.

The residential program participants most often mentioned the rebate or saving money as their primary motivator for participation in the program; over one-third mentioned this factor (RF18).

The newspaper advertising by the partnerships was successful in that it was rated the highest in terms of level of influence on the respondent's decision to participate (8.7 out of 10) (RF19.)

Those few survey respondents who said they were contacted personally by a partnership or utility staff person highly rated the partnership's recommendation as having influenced them in their decision to participate in the program (RF20).Representatives from their partnership received the highest rating of 8.5 in influencing respondents to participate. Although there were only two participants who talked to the local partnership, this finding is consistent with the results of the non-residential programs in that these personal contacts are very effective.

Similar to non-residential customers, households who participated in one program were likely to participate in additional programs—17% said they participated in other programs (RF21). The customers were not asked about timeframe in the survey, so there is no data on which program they participated in first.

4.6.2 Detailed Results

Sample Characteristics

The vast majority of survey respondents were homeowners (95%). Eighty-one percent of surveyed homes were single-family detached homes, 16% were mobile homes, one percent were single family attached homes, and one percent were multi-family dwellings. In addition, 95% of respondents reported receiving their electricity from SCE and 66% received their gas from PG&E.

The lists showed that respondents from the Mammoth Lakes High Sierra Initiative participated in either SCE's ENERGY STAR Refrigerator Rebate Program (part of the Home Energy Efficiency Rebate Program) or SCE's ENERGY STAR Refrigerator Round Up (part of the Appliance Recycling Program). All customers of the Ridgecrest Partnership were on record as participating in SCE's Ducted Evaporative Cooler Program (part of the Home Energy Efficiency Rebate Program). Table 4-14 shows the number of respondents in the sample by resource program and by promoting partnership.

Table 4-14. Number of Respondents by Resource Program and Promoting Partnership

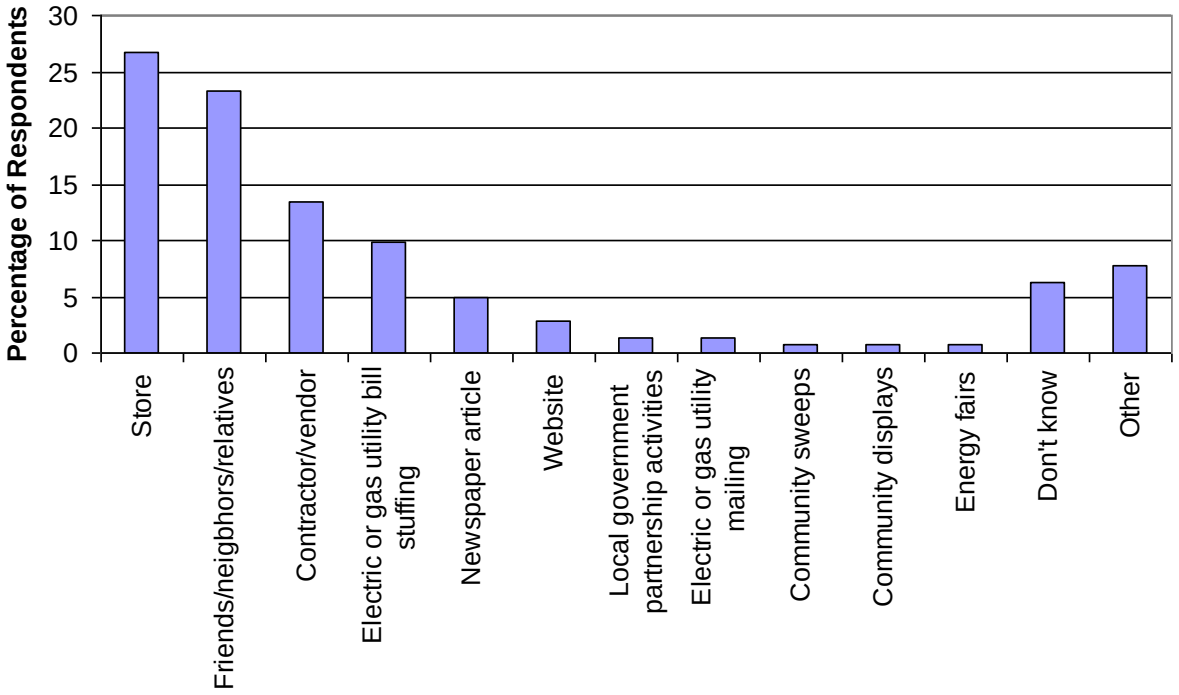
Resource Program	Promoting Partnership	
	Mammoth Lakes	Ridgecrest
Ducted Evaporative Cooler	0	135
ENERGY STAR Refrigerator	14	0
Refrigerator and Freezer Recycling	3	0
Total	17	135

4.6.3 Awareness and Transmission

Ninety-three percent of residential respondents confirmed that they were aware of the resource program for which the partnership had them listed. We expect this, since these respondents were drawn from the program participant lists and not a list of all referrals. Although the partnerships played a role in providing support and promotion to the program, which subsequently may have influenced participation in the programs, these should not be considered as referrals.

Figure 6-1 shows the percentages of how respondents initially heard of the program. The most common source reported was a retail store (27%). The second most prevalent initial-source of information was by word-of-mouth from friends, neighbors, or relatives (23%); followed by contractors/venders (13%) and electric/gas utility bill inserts (10%). Respondents reported "Other" sources, such as the local Swap Sheet, their landlord, utility, other advertising, and other word-of-mouth. Additional research is required in order to identify which were partnership activities.

Figure 4-4. Initial Source of First Awareness of Residential Program (n=145)[115]



These results are interesting considering that Mammoth Lakes and Ridgecrest promotional efforts were listed as newspaper and radio advertisements. Newspaper articles were the fifth most referenced sources for initially hearing of the referred program. These results suggest that most respondents first became aware of these programs through some other source that may have been sponsored by the partnership. The research did not provide enough information to determine which of these sources of information were directly attributable to the partnership.

On an individual program basis, the rankings of how the customer first heard of the program vary; however, it is important to consider the small sample sizes for the refrigerator programs. Forty-two percent of respondents for the ENERGY STAR Refrigerator Rebate Program and 27% of respondents for the Ducted Evaporative Cooler Program reported first hearing of the program from a retail store (Table 4-15). Considering that only three of the Refrigerator Round Up program customers responded to the survey, the next most frequent response was word-of-mouth for the Ducted Evaporative Cooler Program (25%) followed by newspaper articles for the Refrigerator Rebate Program (17%). Word-of-mouth was also an important source of information for the non-residential resource IOU and third-party programs.

[115] Source: Partnership Program Indirect Impacts Evaluation—Residential Referrals Survey, question R2

Table 4-15. First Heard of the Program for Resource Program[116]

	Ducted Evaporative Cooler (n=130)	ENERGY STAR Refrigerator Rebate Program (n=12)	Refrigerator Round-Up (n=3)
Store	27%	42%	0%
Newspaper article	3%	17%	33%
Electric/gas utility bill stuffers	9%	8%	33%
Word of mouth	25%	0%	0%
Contractor/vendor	15%	0%	0%
Web site	2%	8%	0%
Local government partnership activities	1%	8%	0%
Electric or gas utility mailing	2%	0%	0%
Community sweeps	1%	0%	0%
Community displays	1%	0%	0%
Energy fairs	1%	0%	0%
Other	8%	8%	33%
Don't know	6%	8%	0%

PA also asked respondents if a staff member or contractor from their utility, the partnership they participated in, or the program staff contacted them and recommended the resource program *before* they were aware of the program. Only six of the 142 respondents (four percent) reported that someone had contacted them before they were aware of the program. Two respondents said that someone from their utility contacted them and two others said that someone from the LGP they participated in recommended the program. These results further indicate that there was no formal referral process implemented by the partnership for these programs. At the same time, the partnership may have been very effective in achieving participation in the program through their advertising and use of additional incentives. In addition, customers may find it difficult to identify whether a contact came from the promoting partnership, resource IOU program manager, resource third-party contractor, or other group.

Notably, the two respondents who reported that someone from the LGP contacted them were both participants of the Mammoth Lakes High Sierra Energy Initiative. One of these respondents participated in the ENERGY STAR Refrigerator Program and the other participated in the Refrigerator and Freezer Recycling Program.

The majority of respondents (91%) reported that no representative from their partnership recommended the program before they were aware of the program, indicating that personal referrals from partnership representatives are not recognized by the respondents as a primary mechanism for generating awareness

[116] Source: Partnership Program Indirect Impacts Evaluation—Residential Referrals Survey, question R2

of the programs. More information is needed to examine the role that the partnership played in increasing awareness.

Due to the low frequency of respondents reporting that they received no personal contact from a partnership or utility representative, PA added a follow-up question mid-field asking if a representative from one of these sources *ever* contacted the respondent regarding the program. The PA survey team also called back respondents who had already completed the survey to ask this follow-up question. Out of 116 respondents who said no one contacted them before they were aware of the program, only one indicated that someone from their utility had *ever* contacted them.

4.6.4 Impact of Referral on Program Participation

According to our discussions with the partnership utility sponsor, the respondent lists supplied by the referring program included only those who participated in the resource program. Ninety-three percent of respondents who recall having heard of the residential program from any source (89% overall) confirmed that they had participated in that program. Table 4-16 presents participation rates by promoting partnership and resource program.

Table 4-16. Participation in Residential Programs Promoted by the Partnerships[117]

Partnership	Program	Number of Respondents	Number of Respondents Who Had Heard of the Program	Respondents Who Said They Participated in the Program
Ridgecrest	Energy Efficient Ducted Evaporative Cooler Program	135	127 (94%)	122 (90%)
Mammoth Lakes	ENERGY STAR Qualified Refrigerator Rebate Program	14	12 (86%)	10 (71%)
Mammoth Lakes	Refrigerator and Freezer Recycling Program	3	3 (100%)	3 (100%)
Overall		152	142 (93%)	135 (89%)

4.6.5 Motivating Factors to Participation

Respondents reported multiple motivating factors for participating in the program; primarily centering on saving money or improving the operating efficiency of their equipment. One-third of these respondents pointed to the rebate or opportunity to save money on the energy efficient equipment as motivation for participating in the program. The next most frequent motivations cited include: the old equipment was operating poorly (30%), want to reduce energy costs (28%), the old equipment did not work (22%), and

[117] Source: Partnership Program Indirect Impacts Evaluation—Residential Referrals Survey, question R2

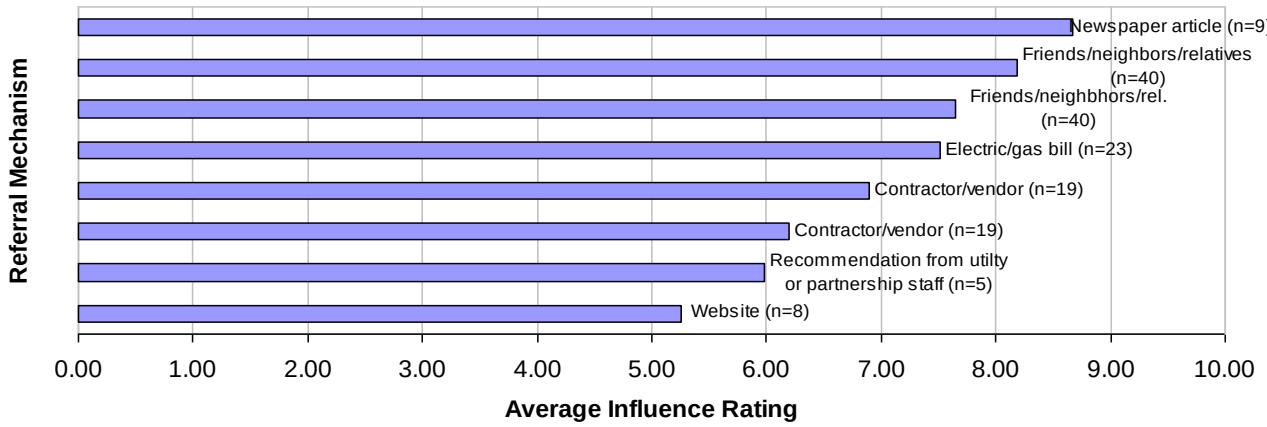
the desire to save energy (19%). Only four respondents noted information provided by program staff or a recommendation from another person as a motivating factor.

4.6.6 Factors Influencing Participation

The small number of personal contacts limits the ability to draw comparisons to other factors on influencing participation. The data suggest that for these residential programs newspaper articles, bill inserts, or word-of-mouth communiqués were very effective in promoting participation for these survey respondents. Newspaper articles had the highest level of influence on participation at 8.9 out of 10 (Figure 6-2). At the same time, LGP representatives were also rated very high (8.7), which suggests that this type of recommendation may be very effective in prompting customers to participate in a given program. The research cannot determine what role partnership outreach efforts played for each of the factors in influencing participation. Perhaps even word-of-mouth was due to partnership performance on other projects and, thus, is a major influence on participation in the residential programs.

To assess the impact of program promotion by the partnerships on participation in these programs, PA asked participating respondents about the impact of the information they received about the residential program on their decision to participate in that program. The results show some evidence of the activities of the LGPs and other sources motivating customers to participate in other energy efficiency programs.

Figure 4-5. Average Influence Rating by Source from which Heard of Program[118]



Since this was not truly a direct-targeted referral program, only a few respondents reported receiving personal recommendations. PA asked the seven respondents who reported receiving these recommendations whether or not they thought they would have participated in the program without the personal recommendation they received. Both respondents who said they talked to a member of their partnership reported that they did not think they would have participated without the recommendation. Of the respondents who received a recommendation from a utility member, one said they would have participated, one said they would not have participated, and the other did not know.

Participating respondents were also asked to rate the influence of various personal recommendations on their decision to participate in the referred program. The large majority of respondents who said they did not receive a personal recommendation were asked about the influence of the information they received

[118] Source: Program Indirect Impacts Evaluation—Residential Referrals Survey, questions P5, P6, R2, and R3

from other sources. Among the respondents who received a personal recommendation, the average rating was 6.3, on a scale from 0 (no influence) to 10 (great deal of influence). Within this group, the two recommendations from LGPs had the highest average rating of 8.5. Recommendations from utility representatives averaged the lowest influence rating of 4.3. The two respondents who said they were recommended by someone other than their partnership or utility gave an average influence rating of 7.0.

Participating respondents were also asked specifically to rate how influential the program information they received was on their decision to participate in the program. Overall, respondents rated the influence of the information a 7.4. Figure 6-2 presents the average influence ratings among sources from which at least five respondents reported hearing of the program. Information from newspaper articles was rated the highest in its influence in promoting participation, with an average rating of 8.7. This would indicate that the promoting partnership was an important influence since they indicated responsibility for the advertising. Information by word-of-mouth from friends, relatives, or neighbors was rated second most influential at 8.2, followed by electric/gas bill inserts at 7.7. Additional research is needed to identify the relative influence of specific partnership activities on program participation,

4.6.7 Participation in Other Energy Efficiency Programs

The survey results also found that those who participated in one resource program were more likely to participate in the refrigerator and ducted evaporator cooling programs promoted by the partnership. Seventeen percent of all respondents reported participating in other energy efficiency programs in addition to these two programs in the past three years. Respondents reported participating in a wide variety of programs, including the SCE's Summer Discount Plan, Home Energy Efficiency Rebate Program, Refrigerator and Freezer Recycling Program, ENERGY STAR Refrigerator Rebate Program, Ducted Evaporative Cooler Program, SCE Home Energy Survey, Heating and Cooling Rebate Program, Pool Pumps and Motors Rebate Program, Lighting Rebate Program, Appliances Rebate Program, and the California Photovoltaic Solar Systems Program.

All but two of these respondents also reported participating in the refrigerator and ducted evaporator programs. Interestingly, none of the respondents who had heard of these two programs and said they did not participate actually participated in other energy efficiency programs. These findings suggest a relationship between participating in one program and participating in additional programs, highlighting the potential importance of program referrals.

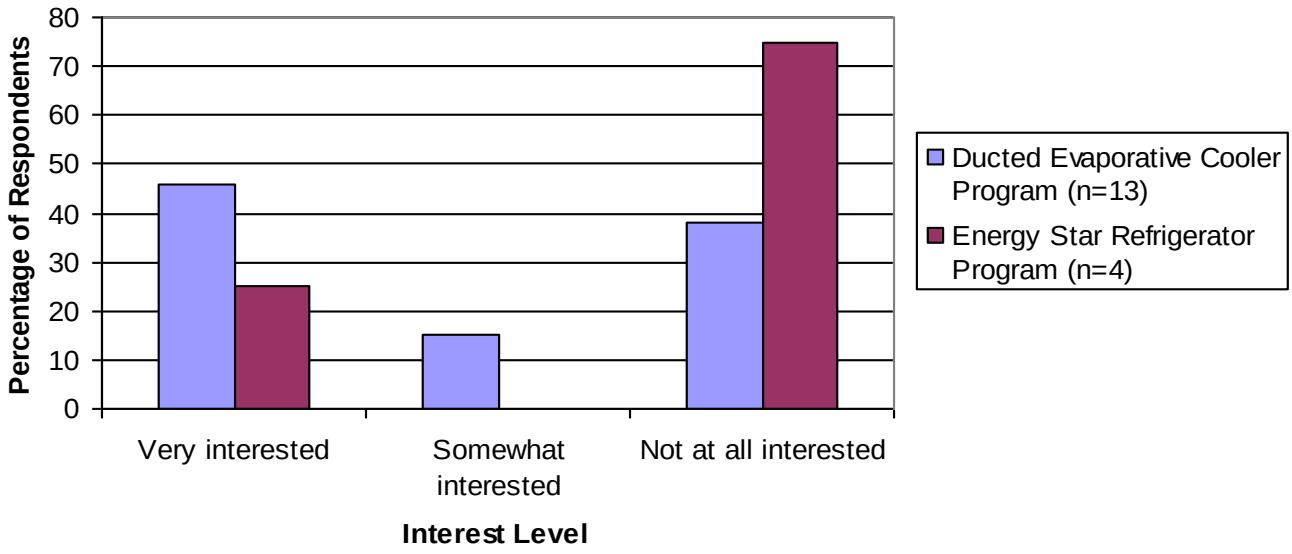
4.6.8 Nonparticipants

Given the source of the lists, it is surprising that there were any customers who said they did not participate in the program. Seven respondents said that they had heard of the program, but did not participate, while another ten who claimed to be non-participants indicated that they were not aware of the program. Since PA was able to talk with 148 of the 152 respondents provided by the partnerships, it is surprising that even these few did not recall hearing about the program.

None of these non-participants reported receiving a personal recommendation, which was true of the majority of participants as well. Rather, these respondents said that they first heard of the referred program from electric/gas utility bill inserts, friends, neighbors, relatives, a web site, or from a contractor/vendor. When asked why they did not participate, the majority of respondents who knew about the program explained that they either had recently installed new equipment or did not need the equipment or services offered by the resource program.

Among respondents who either did not recall hearing of the resource program or did not participate, interest in the referred program was polarized, with most respondents reporting either being very interested or not at all interested. Figure 4-6 shows the distribution of interest levels among nonparticipants by resource program.

Figure 4-6. Interest in Services Offered by Two Programs[119]



Over half of the self-reported nonparticipants of the Ducted Evaporative Cooler Program expressed some interest in the services offered by the program. In contrast, three out of the four nonparticipants of the ENERGY STAR Refrigerator Program said that they were not at all interested in that program's services. The primary reason given for participants' disinterest was that the respondent did not need the equipment offered by the program.

4.7 Residential Household Database Review and Analysis

PA compared the customers' information in the partnership referral-tracking data to utility program participation lists. This analysis was done to serve two purposes: to verify that the customers in the Ridgecrest and Mammoth Lakes referral-tracking lists participated in the program and to see if there was any evidence of the customers who were referred by the Bakersfield-Kern Partnership to IOU programs participating in any of these programs after the referral. After determining that the lists provided by Ridgecrest and Mammoth Lakes were participants that may have been influenced by program promotion, the data matching was not useful in assessing referrals for those programs. At the same time, the analysis was helpful in identifying areas for improvement in tracking this data.

4.7.1 Database Matching Method

PA received program participant data from PG&E, SCE, SCG, and SDGE; utilities that were used to compare against the referral-tracking data received from Bakersfield-Kern, Ridgecrest, and Mammoth

[119] Source: Partnership Program Indirect Impacts Evaluation—Residential Referrals Survey, question NP2

Lakes LGPs. The datasets required phone numbers and addresses to be cleaned and made consistent in format before the matching process could begin. All symbols were removed from phone numbers to provide a ten-digit number for matching. Addresses had to be parsed into street number, street type, and street name so they could be matched uniquely.

After the dataset formats were cleaned, cases were matched using three key search-parameters —phone number, name, and address. Matching methods were implemented in the order in which we had the most confidence. First, we matched by phone number. Any cases that did not match on phone number were then matched on street name, street type, and street number. The remaining cases that did not match on the previous criteria were then matched on street name, last name, and city. Because this was a much less precise method of matching cases, we manually compared approximately 80 records to determine their validity as a match.

Finally, the date recorded in the referral-tracking data was compared to the utility date paid for each matched customer. This last check was intended to verify that the referral was made prior to participation in the program.

4.7.2 Key Findings

The customer survey and database analysis revealed areas for improvement in the referral-tracking data that the partnerships provided for residential households. First, missing or incomplete customer contact information limited our ability to collect accurate data.

The absence of phone numbers in the Mammoth Lakes tracking data for the Refrigerator Round-Up Program contributed to a low survey response-rate for this group and lower-than-expected matching rate in the database analysis (RF22). Full names, addresses, and phone numbers were also incomplete or missing for several of the customers in the Bakersfield-Kern tracking data. Our database analysis revealed a low percentage of matches between the Bakersfield-Kern data and the utility participant databases. It is possible that our database analysis did not appropriately match referrals to participants due to inaccurate contact information in the referral-tracking data.

In addition, the tracking data provided by all three partnerships did not include sufficient data to evaluate different referral mechanisms. The Bakersfield-Kern tracking data provided no information on the referral mechanism, or the method in which the respondents were referred (i.e., personal recommendations, radio ads, etc.). In both the Mammoth Lakes and Ridgecrest tracking data, the referral mechanism was broadly listed as "Newspaper/Radio Ads, Flyers, Radio Ads" for all records, which is the promotion that they attribute to the program participants. This description does not provide enough detail to compare the influence of the different partnership activities on program participation.

Finally, our database analysis for Bakersfield-Kern referrals was also limited by partnership implementers that did not track the specific programs that they recommended to their customers (RF23). Because of this, PA staff could only match up their referral-tracking data to participation in any of the utility programs. This limitation makes it difficult to assess if customers are being funneled to programs that can best serve their needs. Recommended database inputs are presented, in detail, in Appendix M, Program Database Tracking System Recommendations.

4.7.3 Results

Table 4-17 shows the frequency of which customers in each partnership's tracking-data were matched to utility program participant records. Each partnership either had some matches where the participation date

in the utility database was before the referral date or where dates were missing. For the purpose of investigating the impact the referrals had on program participation, these matches are less reliable than matches where the referral date precedes the utility program participation date. The sum of the matches based on date-criteria exceeds the total unique matches for Ridgecrest because of multiple entries in the utility tracking-data for some customers.

Table 4-17. Comparison of Referral-tracking Systems to Utility Participant Databases

Partnership	Total unique matches with utility participant lists	Matches with referral date before utility paid date	Matches with referral date after utility paid date	Matches with date missing
Ridgecrest (N=269)	262 (97%)	258 (96%)	29 (11%)	0 (0%)
Mammoth Lakes (N=47)	23 (49%)	10 (21%)	1 (2%)	13 (28%)
Bakersfield-Kern (N=782)	34 (4%)	18 (2%)	22 (3%)	0 (0%)

Overall, almost all (97 percent) of the referred households claimed by Ridgecrest were matched in the utility data. This high rate was expected, as these customers were all participants. In contrast, the utility participant lists verified participation among only 49 percent of referred customers claimed by Mammoth Lakes; this may be due to the lack of telephone numbers in the Mammoth Lakes database.

The Bakersfield-Kern referrals-tracking data yielded 21 matches (3%) with the utility participant lists; in 18 of these matches the referral date preceded the participation date. While only comprising a small percentage of the population, these matches imply that some customers participated in core utility programs after they were referred to the utility program.

4.7.4 Limitations

There are a several factors keep in mind when interpreting the database analysis results. First, our matching approach likely misses some matches between customers in the referrals-tracking data and the utility participation-records due to differences in customer information between data sets. While PA used a multi-tiered matching method to try to capture as many matches as possible, differences in data, such as the spelling of a customer's name or address, may result in a missed match. The sensitivity of this type of analysis underlines the importance of complete and accurate referral-tracking data.

In addition, it is important to note that this database analysis alone cannot infer any of the effects referrals may have on program participation. The Mammoth Lakes and Ridgecrest partnerships provided a list of program participants, though not a complete list of referrals. Furthermore, knowing that a customer participated in a utility program after they were referred does not necessarily mean that the referral had any influence on the customer's decision to participate. Thus, the results of this analysis should only be interpreted as one indicator of the possible effect of these referrals.

4.8 Audit Survey Results Related to Referrals

The final stage of the referral analysis included a review of survey responses to questions included in the audit surveys for PGE2016 Association of Monterey Bay Area Governments Home Energy Audit (AMBAG), Community Energy Partnership Home Audit (CEP), and California Youth Energy Services Tune-Up Audit (Home and Small Business (CYES). CYES is a component of the PGE2020 East Bay Energy Watch and PGE2025 Marin County Energy Watch partnerships. These were partnerships that were not included in the referrals surveys described in this report.

The results of the audit survey questions confirm other findings in the report that when the partnerships provide specific information on appropriate energy efficiency programs, there are a number of customers (10 to 22 percent) who participate in these programs after they receive the resource program information.

The audit participants were asked the following questions:

- As part of your participation in this program, did you receive information about other utility programs?
- What information did the program give you?
- Did you participate in any of these programs? Which programs?

The findings indicate that about 40 percent of the audit-analysis survey respondents (61 out of 177) reported receiving information on other programs as a result of the audit process. The information primarily consisted of brochures, although four respondents from AMBAG and two respondents from CEP Residential mentioned having received application forms or some form of assistance. The percentage who indicated that they participated in a program after receiving the information ranged from slightly less than ten percent to slightly more than 20 percent (Table 4-18).

Table 4-18. Summary of Audit Survey Funneling Module Results

	Partnership	Respondents	Received Information on other programs	Received brochures on other programs	Participated in other programs	Percentage who participated after receiving information
Residential	AMBAG	176	24	12	5	20.8%
	CYES	73	23	14	5	21.7%
	CEP	150	67	60	7	10.4%
Small Business	CEP	177	61	33	6	9.8%