2002 STATEWIDE NONRESIDENTIAL AUDIT PROGRAM EVALUATION

Study ID# SW066

March 1, 2004

Prepared for California's Investor-Owned Utilities:

Pacific Gas and Electric Company
San Diego Gas and Electric Company
Southern California Edison Company
Southern California Gas Company

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

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FINAL

Prepared for

Rafael Friedmann
Pacific Gas & Electric
245 Market Street
San Francisco, CA 94105

Prepared by

QUANTUM CONSULTING INC.
2001 Addison Street, Suite 300
Berkeley, CA 94704

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1. EXECUTIVE SUMMARY

This section provides a synopsis of the background, objectives, key findings and resulting recommendations associated with the evaluation of the 2002 Statewide Nonresidential Audit Program.

1.1 PROGRAM DESCRIPTION

The Statewide Nonresidential Audit (Audit) Program provides energy efficiency information and energy conservation recommendations that are tailored (to the degree possible) to each participating customer. Five distinct audits are offered to customers: Mail, CD-Rom, Online, Phone and On-site. Customer-specific information is gathered to make individual energy conservation recommendations for each customer, culminating in the preparation of a tailored report (or list of recommendations) for each participant.

The Audit program is designed to overcome informational and affordability market barriers for a diverse set of nonresidential customers. The program achieves these goals by providing energy efficiency recommendations and referrals to rebate programs. The portfolio of Audit survey types (also referred to as delivery mechanisms) is designed to meet the needs and preferences of different sized customers. The Audit survey types most suited to each customer size category are summarized in Exhibit 1-1.

Exhibit 1-1
A Portfolio of Audit Delivery Mechanisms Meet the Needs of Different Sized Customers

	Mail	CD ROM	Online	Phone	On Site
Very Small	●	●	●	●	●
Small	●	●	●	●	●
Medium		●	●		●
Large					●

In 2002, the program was offered in a nearly uniform format by each of four California Investor Owned Utilities (IOUs), Pacific Gas and Electric (PG&E), Southern California Edison (SCE), the Southern California Gas Company (SoCalGas) and San Diego Gas and Electric (SDG&E). This was the first year that all the five audit types were offered by the four IOUs, leading to some differences as learning-curve issues were dealt with. This program also addresses the California Public Utilities Commissions' (CPUC) targets regarding equitable program access to the hard-to-reach (HTR) business sector. The CPUC defines hard-to-reach customers as small (less than 20 kW or less than 10 employees), located in rural areas, renters, and those for whom English is a second language.

1.2 PROGRAM ACCOMPLISHMENTS

The accomplishments for the Audit program are tracked in various IOU and Audit vendor databases. They are reported in the quarterly status reports that are submitted to the CPUC.

Based on the 2002 fourth quarter report, PG&E, SCE and SoCalGas each substantially exceeded survey complete goals, and SDG&E met goals. Exhibit 1-2 below shows the goals and accomplishments of each IOU for total participation and HTR participation. Statewide the utilities completed 26,359 audits in 2002, and exceeded goals by 82%.

Exhibit 1-2
2002 Nonresidential Audit Participation Versus Goals

Utility	Total Participation		Hard-to-Reach Participation	
	Q4 Report	Goals	Q4 Report	Hard-to-Reach
PG&E	6,487	3,000	5,493	1,600
SCE	8,844	4,500	5,314	1,800
SDGE	3,977	3,950	845	750
SoCalGas	7,051	3,024	741	300
Total	26,359	14,474	12,393	4,450

1.3   2002 PROGRAM DEVELOPMENTS

The Audit program transformed into a statewide program during late 2001 and early 2002. The early goals for this statewide transformation included each IOU offering all five audit delivery mechanisms. For most IOU's this meant adding up to three new audit delivery mechanisms to their existing Nonresidential Audit Programs. There was also an attempt to standardize all audit types while placing a special emphasis on reaching the HTR population. Overall, the development of all audit types was a coordinated effort producing a great deal of statewide consistency across all audit types by the end of 2002, with the important exception of the on-site audit where some differences remain. 2002 was a year of development of statewide consistency; therefore not all types of audits were fully implemented by all IOUs during the entire year.

The differences in on-site audit implementation provide opportunities to identify program implementation techniques best suited to different customer types and different end-uses, as discussed further in this Executive Summary and throughout this Study. For example, in 2002 PG&E continued it's pilot follow-up program consisting of telephone calls to participants at least one month after participation. The objective of this effort is to spur downstream implementation of the measures recommended. Also, in 2002 SCE piloted a new approach to reach HTR customers where auditors went 'door-to-door' to HTR businesses offering free energy audit services.

1.4   EVALUATION OBJECTIVES

The 2002 Statewide Nonresidential Audit Program Evaluation presented in this report offers a retrospective examination of program accomplishments, measures downstream program effects and effectiveness, and provides prospective guidance for maximizing the value of the "Audits." This evaluation has many more specific objectives, all in support of this over-arching objective. Specific objectives include:

- Measuring participant response to the Audit program in terms of energy and demand savings.

- Characterizing the portfolio of recommendations included in the Audit reports, and carrying out a "gap analysis" to determine what percent of the recommendations are eventually implemented.

- Measuring the program's effects on participant energy efficiency uptake using a variety of indicators.

- Assessing the success of marketing efforts, including IOU outreach efforts to HTR customers.

- Reviewing the success of recent process improvements, including program design changes resulting from statewide coordination efforts.

- Investigating key drivers for customer participation in the Audit Program.

- Investigating key drivers for customer adoption of audit recommendations.

- Exploring customer perceptions of the participation experience and usefulness of the audit.

- Characterizing the longer-term benefits of the Audit program, including an investigation into the persistence of audit-recommended practices.

- Examining the interactive effects of the Audit program and the energy crisis.

- Assessing the longevity of the audit, including the timing of customer response to Audit participation, utilization of the Audit report, participant recall of Audit recommendations, and the turnover of key contact personnel.

- Measuring customer response to "follow-up" program elements designed to encourage Audit participants to implement recommendations.

- Comparing and contrasting the techniques and relative successes of the Audit, SPC and Express Efficiency programs, and examining their compatibility and synergies. (This effort is reported in a separate deliverable: the "2002 Nonresidential Cross Program Assessment")

Efforts to meet evaluation objectives are supported by a variety of primary data collection. In all there are four customer surveys, as well as professional interviews with Program Managers and Implementation Staff. There are three participant surveys totaling 1,500 completes and including both program year 2000 and program year 2002 participants. The fourth customer survey is with the general population, and totals 800 completes. Twenty Program Manager and Implementation Staff Interviews were also conducted. Given the move to a Statewide program in 2002, the Study results should be seen as indicative of a program in transition; results for the

2003 to 2005 period can be expected to be more indicative of the long-term impacts and cost-effectiveness of the various audit offerings.

1.5   EVALUATION FINDINGS

Marketing

To ensure that program goals are met, marketing of Audit services is an important program activity, and one that is notably emphasized by each of the IOUs. A wide array of marketing methods are used, spanning direct mail campaigns, e-mail blasts, flyer distribution (and other marketing strategies) at outreach events, press releases, newsletters, cold calls and advertising. Exhibit 1-3 presents IOU marketing accomplishments and goals that were obtained from the fourth quarter program status reports submitted to the CPUC.

Exhibit 1-3
Nonresidential Audit Program
Marketing Accomplishments

Utility and Marketing Efforts	Q4 Accomplishments	Goals**
PG&E		
Press release	1	
Newsletter	4	
Brochures	1,445,856	
Fact sheets	3,700	
Advertisements	3	
Flyers and handouts	470	
Direct-mail audit packages	48,000	
Inviation to Audit training	292	
SCE		
Bill inserts	1,290,000	
Dirct mail outreach	291,800	
Press release	9	
Outreach events	73	
e-mail blast mailings	4,487	
Fact sheets	10,000	
Advertisements	1	
Flyers and handouts	24,000	
Direct-mail audit packages	19,000	
Audit training	2	
SDG&E		
CD-ROM	297	333
Bill inserts	240,000	270,000
Dirct mail outreach	52,000	54,000
SCG		
CD-ROM	321	333
Bill inserts	250,000	250,000
Flyers and handouts	15,500	5,000

Based on IOU Fourth Quarter Status Reports submitted to the CPUC.

**No goals were reported for PG&E and SCE

The rate of awareness of the Audit program in the general population is very high, at 42 percent. As shown in Exhibit 1-4, rates of awareness are consistent across IOU service territories, and as expected, tend to be higher in non-HTR segments than HTR segments. The difference is relatively small, a tribute to successful and substantial efforts made by the IOUs to recruit these customers into the Audit program. However, the differences in awareness by customer size are quite large with 65 percent of the large customers being aware compared with only 32 percent of the very small customers. This positive relationship of size and awareness is nearly linear across the very small, small, medium, and large customer segment.

Exhibit 1-4
Rates of Audit Program Awareness in the General Population
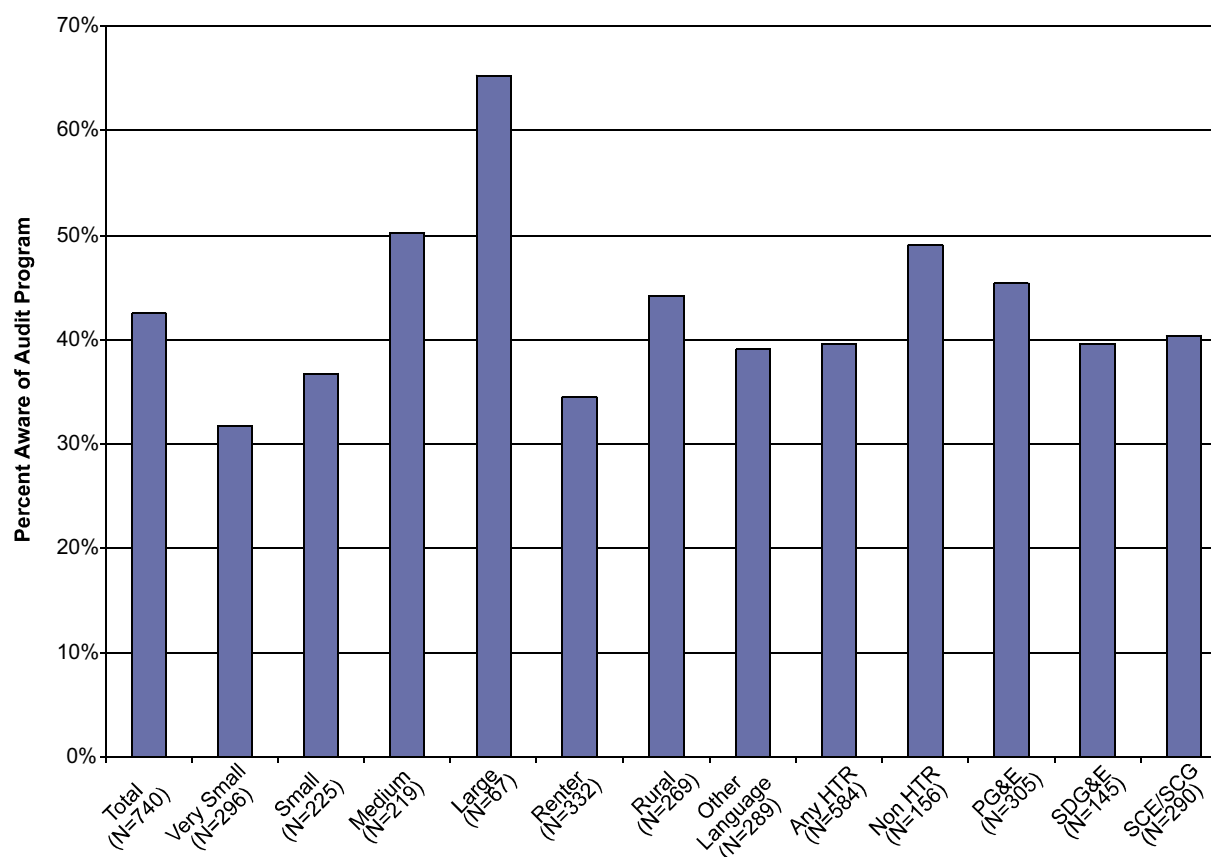
Awareness of the Audit Program in the general population is driven by the IOUs, who account for two-thirds of overall awareness through bill inserts, brochure mailings and utility representatives, shown in Exhibit 1-5.

Exhibit 1-5
Utility Marketing Channels as Sources of Program Awareness
In the General Population
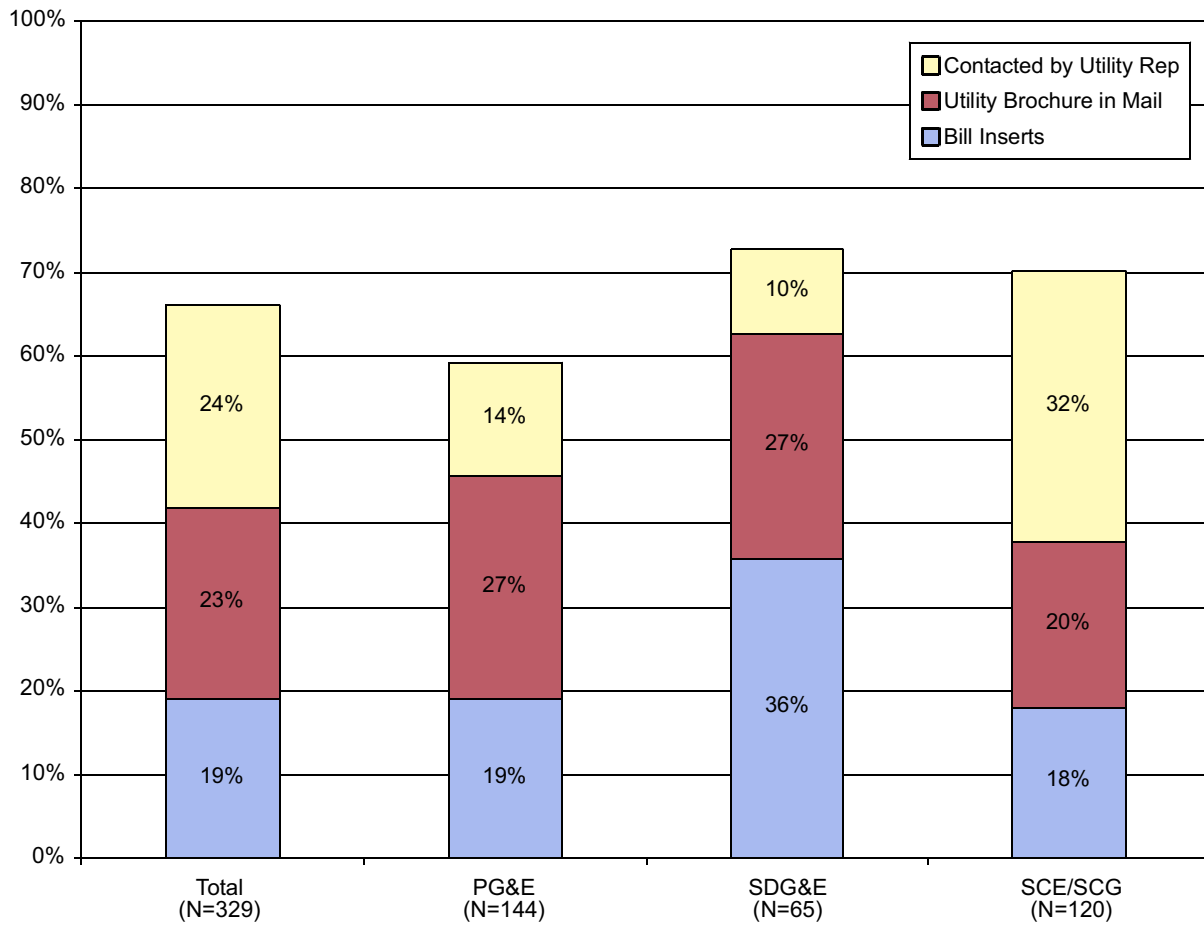
In general, customers are nearly twice as likely to learn of the Audit Program through the mail (42 percent brochure/bill inserts) than from a utility representative (24%) whose role in making customers aware varies by IOU. SCE and SCG customers are far more likely to become aware of the Audit Program through utility representatives than PG&E and SDG&E customers. SCG's service technicians (as well as account executives), who inform customers of utility programs during service calls may account for the large marketing role of SCG representatives.

Customer Feedback

Participants satisfaction with a variety of elements of the 2002 Audit Program are shown in Exhibit 1-6. Customers were asked to rank their satisfaction on a scale of 1 to 10. Satisfaction is presented in terms of percentage of satisfied customers. "Satisfied" customers ranked their satisfaction 8 to 10 on a 10-point satisfaction scale, "somewhat" refers to those customers who rated their satisfaction between 4 and 7, while "not at all satisfied" customers' ratings fell between 1 and 3.

Exhibit 1-6
Satisfaction with Audit Program Elements
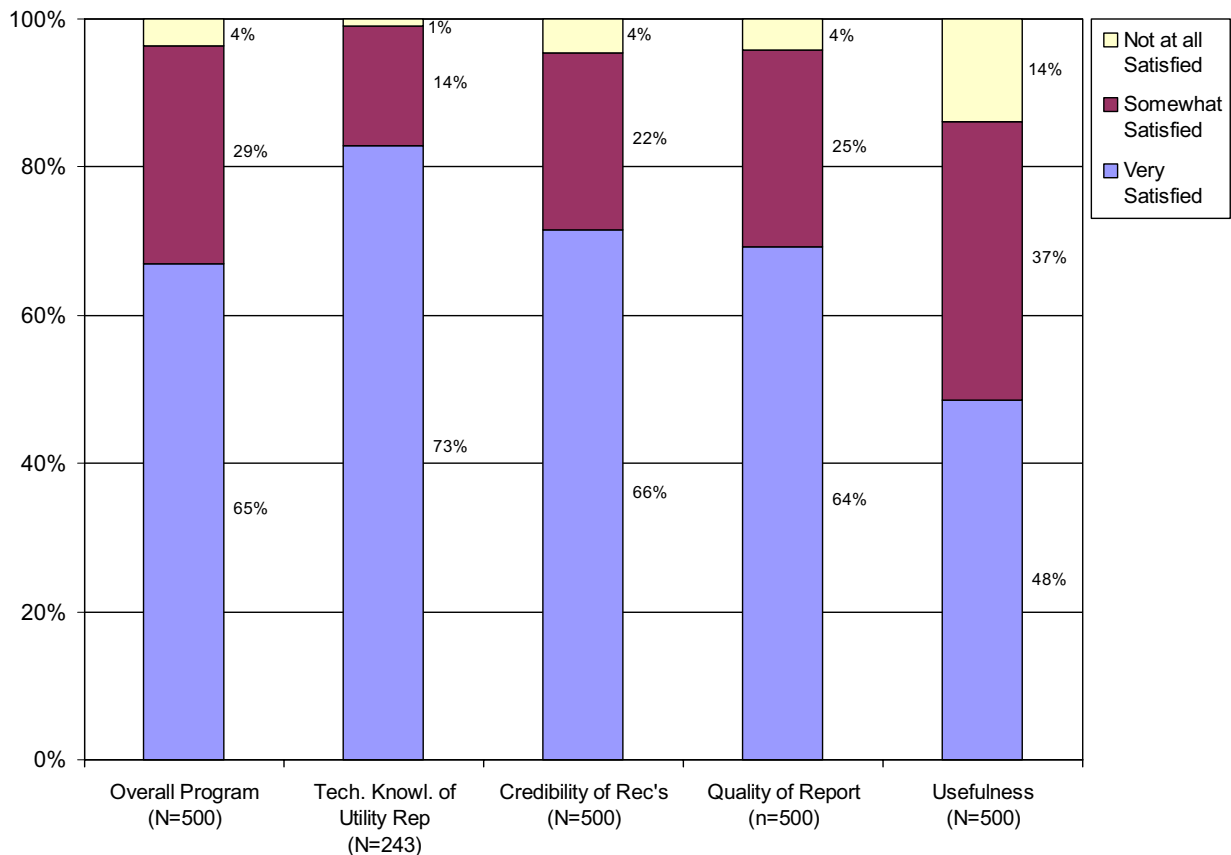
Satisfaction levels are generally very high. Participants tended to be most satisfied with the technical knowledge of their utility representative. Two-thirds felt that audit recommendations were very credible. Likewise, the quality of the audit report was praised. However, participants were less impressed with the usefulness of the audit. While more participants found the report very useful than somewhat useful, 14 percent did not find it useful at all.

There is a clear relationship between customer size and the type of information desired from the audit. About half of participants prefer simple energy saving tips (53 percent) to equipment retrofit projects (23 percent), while 20 percent desire both. Very small customers, tenants and retailers were particularly interested in simple tips instead of equipment retrofits. Exhibit 1–7 below shows the percentage of respondents in each size category that prefer simple tips, retrofit projects, or both. The exhibit clearly shows that the smaller the customer, the greater their preference for simple energy saving tips.

Exhibit 1-7
Customer Size versus Recommendation Preferences
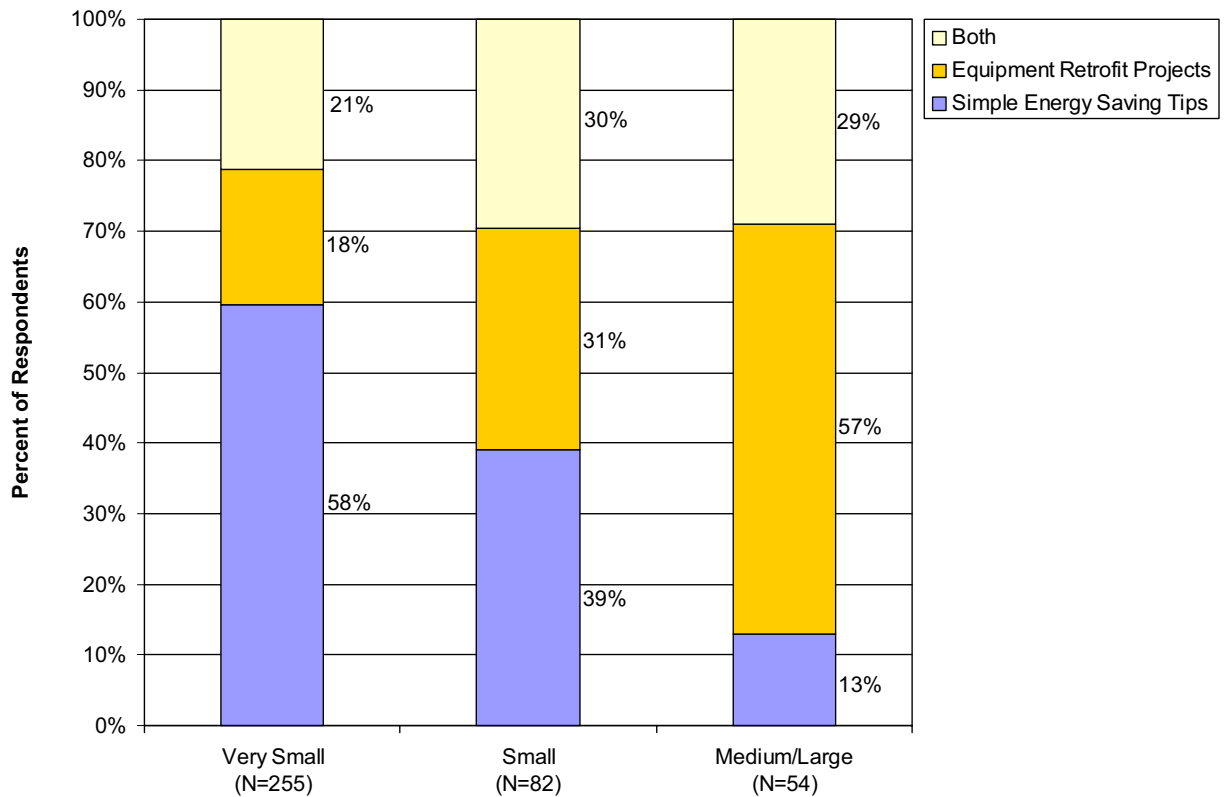
Both customers and vendors want the IOUs to perform more personalized follow-up with customers after the audit. Prompted for program improvement suggestions, nearly 71 percent of customers express the desire for more follow-up activity. Vendors also suggest more program follow-up as a way of improving participant implementation of recommendations. Other common suggestions from customers for program improvement include more customized recommendations (11 percent), and more cost saving recommendations or rebates (5 percent).

Exhibit 1-8 below summarizes the suggestions made by customers for program improvement by Audit delivery mechanism.

Exhibit 1-8
Suggestions for Program Improvement by Audit Delivery Mechanism
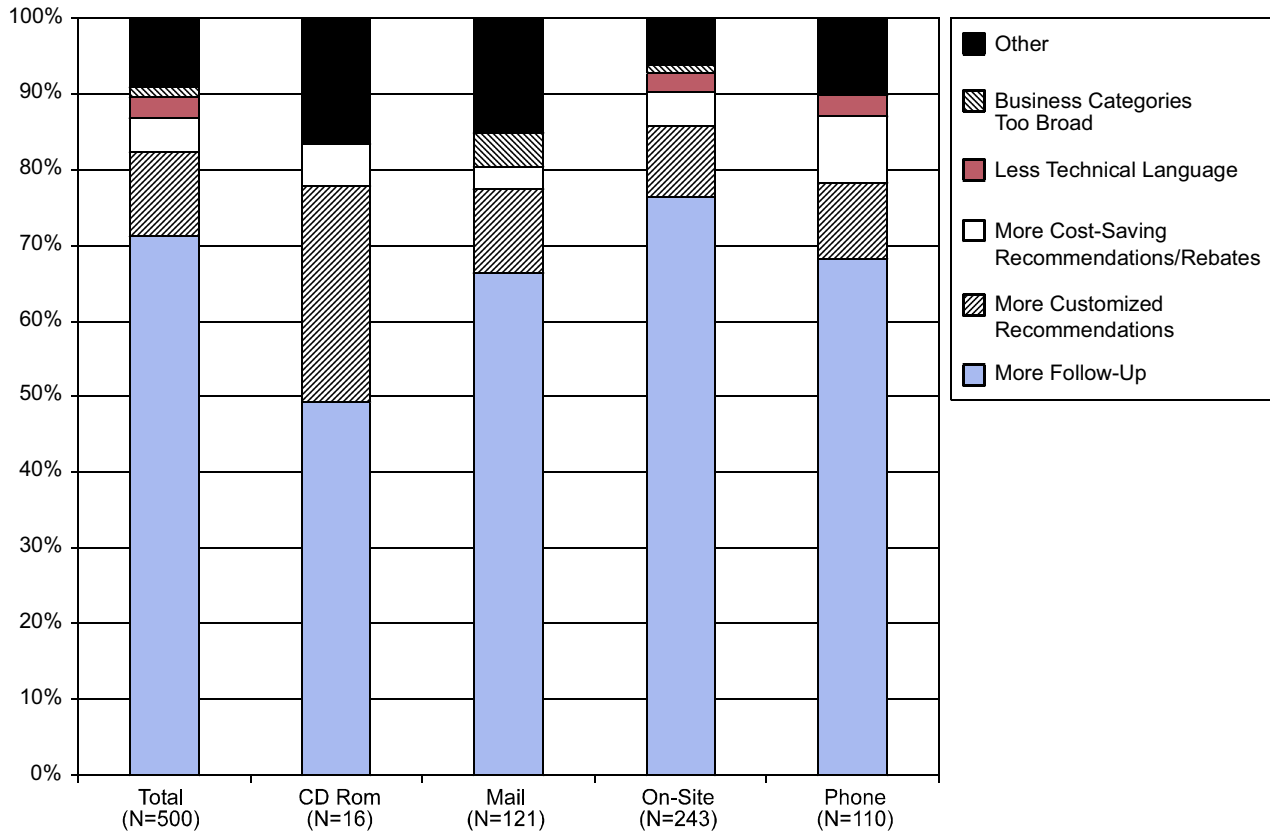
The response "business categories too broad" refers to PG&E's mail audit where peer-group data is presented by business category to serve as an energy use benchmark for the customer.

Barriers to Recommendation Follow Through. Customers who received an audit but did not implement its recommendations mentioned lack of money as the main reason they did not take action, particularly for those who received recommendations about changes to gas appliances and cooling equipment. This finding again underscores the need for clear links from the audit program to incentive programs. For those customers who received lighting recommendations, lack of money was less of a deterrent. These customers also mentioned that the estimated savings associated with lighting retrofits did not justify the investment, particularly in light of other spending priorities.

Exhibit 1-9 below provides self-reported reasons for not implementing recommended measures by end-use. Note that for all end use categories except lighting, the sample size (N) is small.

Exhibit 1-9
Reasons for Not Implementing Recommended Measures

	Lighting	Cooling	Gas Appliances	Other Technologies
Do not have enough money	39%	46%	66%	45%
Product was not available	1%	0%	0%	0%
Could not find a service provider	1%	0%	0%	4%
Savings did not justify added investment cost	15%	6%	7%	4%
Other priorities for capital spending	15%	11%	14%	6%
No approval (corporate or landlord)	12%			10%
Owner responsible for changes		12%	7%	
No current perceived need	8%		40%	17%
Product unsatisfactory	2%			2%
No Time	3%	7%		0%
Other	3%	9%	0%	13%
No Answer	3%	14%	0%	4%
N	108	37	14	21

Audit Longevity

The study of Audit longevity covers issues related to the "useful life" of the audit. Exhibit 1-9 below presents the frequency with which customers' report reviewing their audit report over a 3.5-year period. The height of each bar represents the portion of the total participant population that went back to their audit report to review it more than once. The chart indicates that 50 percent of on-site participants reviewed their audit report more than once. The portions of mail and phone audit participants that revisited their report are lower, at 32 and 29 percent respectively.

Use of Audit Reports Over Time. Audits with greater customization and credibility also have a longer useful life and a more interested audience. *In the Process Assessment (Chapter 5),* on-site audits are shown to score higher than other audits for credibility and customization.

Results shown in Exhibit 1-10 underscore the additional value added to the on-site audit through these superior attributes. The impact chapter (*Chapter 4*) also demonstrated that greater impacts are achieved through the on-site based delivery channel.

Exhibit 1-10
Percent of Participants that Re-Review Their Audit Reports by Delivery Mechanism
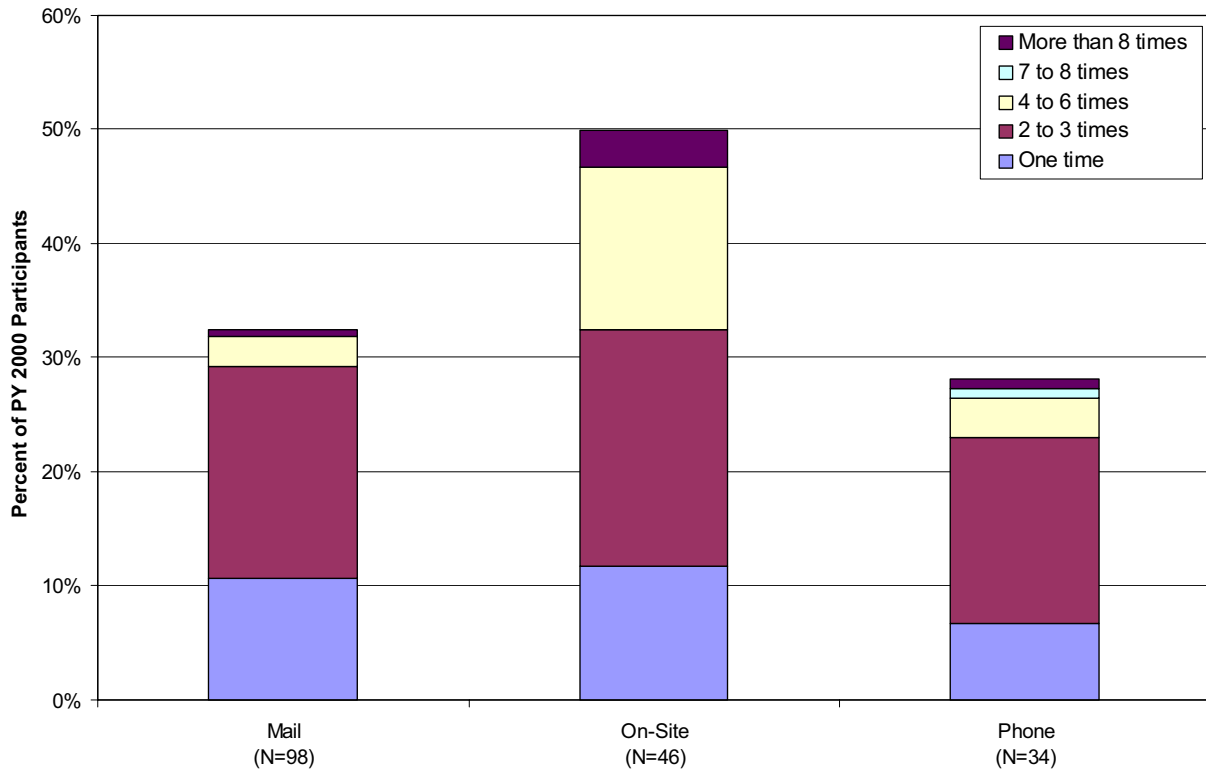
Complexity of Audit Recommendations and Time-to-Adoption. Examining participant adoptions over the time period following the audit reveals interesting considerations for program design. Relatively simple recommendations are implemented first. Conservation measures and lighting equipment recommendations tend to occur in the first 6 months to one year following the audit. Participant uptake of measures for more complex end uses requires years of consideration (such as capital funding, integration with production schedules, other higher priority needs, etc.) before spikes of activity occur. These patterns show that the time lag between the resolution of the information barrier and the resolution of other adoption barriers is related to equipment complexity.

Personnel Turnover and Related Findings from Participant Survey Solicitation. Participant personnel turnover is important because it is directly related to the longevity of the Audit and the appropriateness of eligibility requirements surrounding Audit participation frequency.

Similarly, the ability of key contact personnel to recall Audit participation directly affects audit longevity. Currently, participants are eligible once every three years.

For each phone call made to a participant where a key contact name was provided, we collected data regarding the status of the contact's employment. Our method estimated participant staff turnover for the key contact stored in the utility tracking systems to be 5.3 percent annually. The rate of key contact staff reassigned within the company is estimated at 0.8 percent annually. The rate at which customers are able to recall their participation is more dramatic. Overall, only 52 percent of 2002 participants we contacted in the process of completing the 2002 participant surveys recalled their audit participation well enough to complete the detailed participant surveys associated with this evaluation[1].

CD ROM Installation Rate. Nearly 60 percent of customers who were able to verify receipt of the CD ROM tool claimed not to have installed the program on their computer[2]. Clearly the effectiveness and longevity of these audits is hampered by the disconnect between distribution and installation. On the other hand, similar to online participation, participants with a CD ROM tool may repeat their survey as many times as they like, increasing its power over other types of audit deliveries.

Persistence of Energy Conservation Practices. Ninety percent of PY 2000 participants report currently taking some energy conservation actions. The self-reported average life of currently practiced conservation measures is 3.6 years. Only eleven percent of Audit participants reported terminating a conservation measure. The reasons conservation practices were terminated were primarily interference with business operations, perceptions that the energy crisis was over, or that the effort was not worthwhile. Terminated conservation practices have an average reported life of 1.4 years.

The quality or magnitude of conservation efforts is highly variable and is also, of course, directly linked to energy savings. Quality and magnitude of conservation are difficult to collect accurately using a self-report method, especially when considering a host of different practices. We recommend that persistence of Audit recommended practices be measured using billing analysis techniques in the future.

Program Tracking System

The quality of 2002 tracking system data is inconsistent across the IOUs, and in some cases, incomplete. A severe shortcoming in the tracking systems affecting all four utilities (for at least one program delivery channel) is lack of account numbers or other unique premise identifiers. This limits the ability to properly characterize participants by business type or size, eliminates the possible use of billing analysis, and eliminates the ability to merge to other program

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[1] Bear in mind that while this suggests an extremely high rate of audit recall degradation, we are unable to determine to what extent these respondents were simply reluctant to complete the survey.

[2] "Installation" may have been seen as installing the program to the hard drive, and may have not captured those users who ran the CD-ROM audit without "installing" it in a computer.

databases to accurately estimate for example, post audit participation in other energy efficiency programs.

None of the IOUs could provide account numbers or adequate contact information for online audits, severely restricting evaluation of this important program component. For certain delivery channels (and utilities) the tracking systems did not store key contact data including business name, address, contact name and phone number. These data are crucial for many program evaluation objectives including representative sample design and successful outreach to the participant population.

Moreover, as discussed in the recommendations section below, a complete tracking system is a powerful tool for program management, providing for real-time program feedback and more effective enhancements.

Market Effects

The 2002 Audit program was successful in moving participants towards greater energy efficiency knowledge, awareness of opportunities and intentions to invest. Exhibit 1-11 compares participants and the general population in terms of their knowledge of energy efficient products and their stated intentions to purchase energy efficient equipment in the future.

Exhibit 1-11
Comparison of Purchase Intentions and Knowledge
of Participants and the General Population
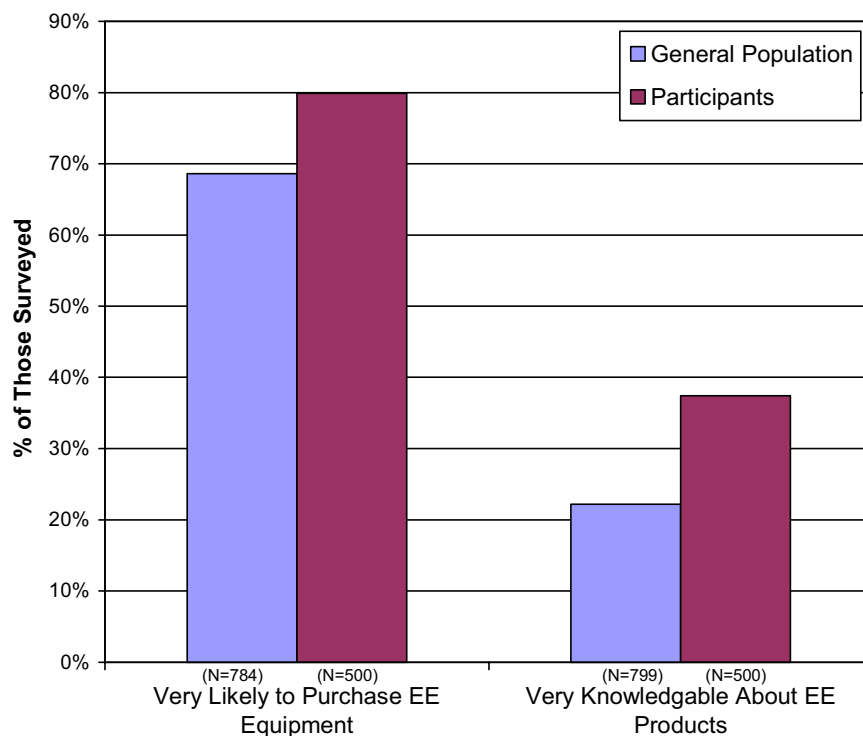
The exhibit shows that participants consider themselves more likely to purchase energy efficient products and more knowledgeable about such products than the general population.

Exhibit 1-12 below shows the percent of participants and general population respondents claiming that their knowledge of energy efficiency is very high (8 to 10 on a 10- point scale.) Effects seem particularly pronounced for large, industrial, very small and restaurant/grocery segments.

Exhibit 1-12
Self-Reported Knowledge of Energy Efficiency in the General Population versus Participants
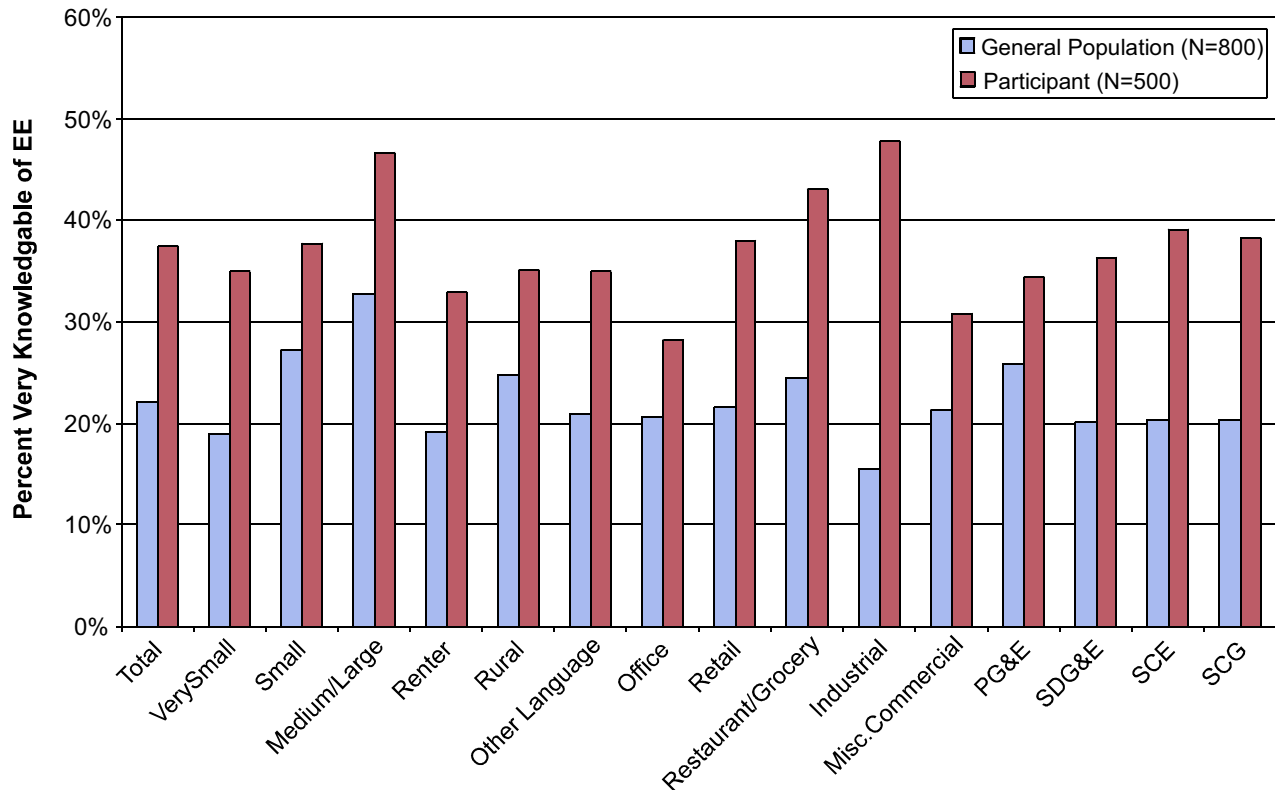
Furthermore, participants report that they are considerably more knowledgeable after participating in the program. Participants were asked to rate their current knowledge of energy efficiency (on a 10-point scale) and then to rate their knowledge before the Audit program.

Exhibit 1-13 below presents the percent of respondents who claimed their knowledge was very high (8 to 10 on a 10-point scale.), both before and after the audit. The difference between self-reported knowledge before and after the program is quite pronounced nearly across the board.

It is important to note that the percent of participants claiming thorough knowledge of energy efficiency remains less than 50 percent for all segments. While the program is moving things in the right direction, by a sizable margin, there still remains a sizable gap in customers' perceived knowledge.

Exhibit 1-13
Self-Reported Change in Energy Efficiency Knowledge Due to Audit Program
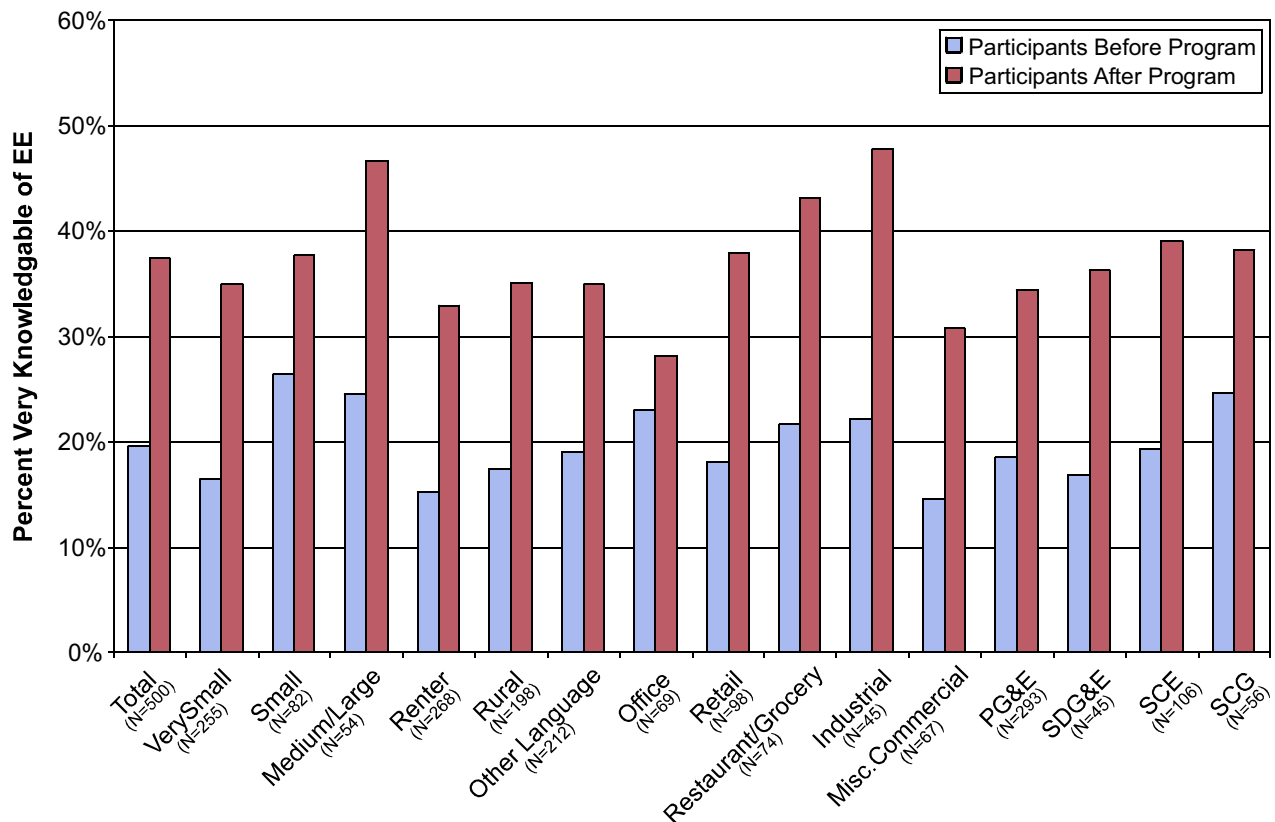
Influence of the Audit During the California Energy Crisis

Next we investigate the interactive effects of the audit and the 2000-2001 California energy crisis using survey data from 2000 participants. Not only were there a substantial number of recommendations implemented during the energy crisis, but participants report a high level of influence from the audit program and/or report on their conservation actions taken during the

crisis period. Exhibit 1-14 shows that about 85 percent of participants were at least somewhat influenced by the Audit report, and between one-third and one-half were very influenced by the Audit. Participants report a higher level of influence from the on-site report than the mail or phone audit report.

Exhibit 1-14
Influence of the Audit on Adoptions During the Energy Crisis by Delivery Mechanism
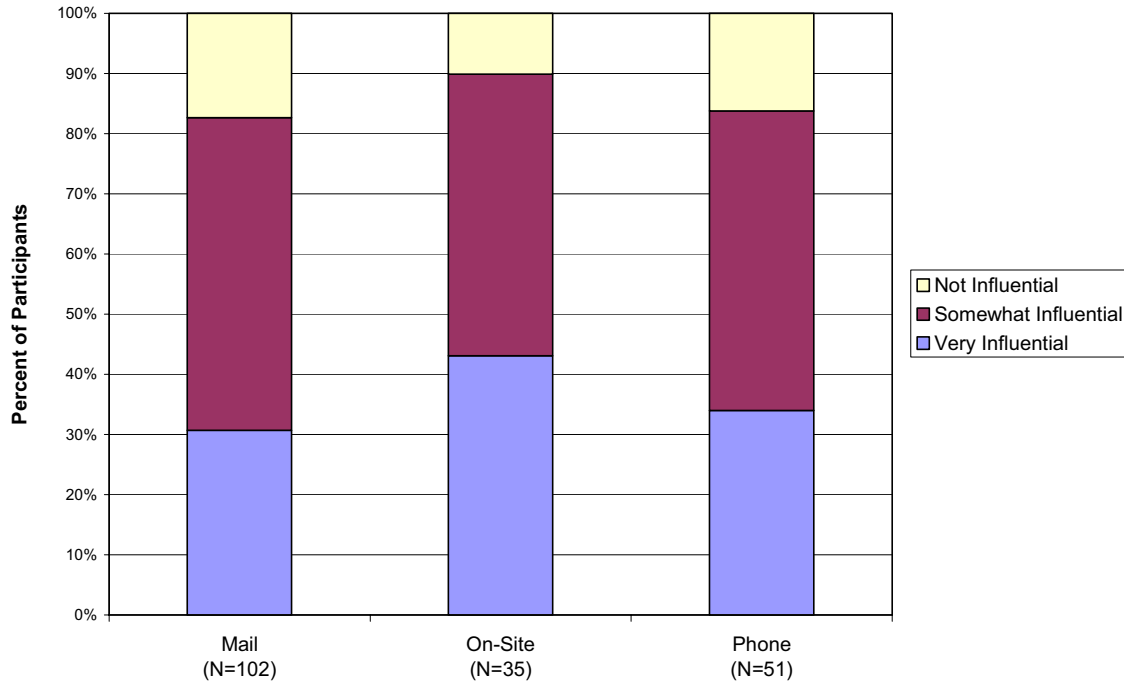
Participant Adoption of Energy Efficiency Measures and Practices

Energy efficiency measures and practices adoption data are presented to characterize the impact of the Audit Program. Gross measure adoption rates in the participant population are compared with nonparticipants by end use category.

Lighting is the only end use with clear evidence of overall program effects. However, a detailed examination of adoption rates across all end uses, with consideration to the efficiency of the equipment, provides strong evidence of segment-specific program effects.

Participant adoption rates within HTR are substantially higher than nonparticipant rates for the lighting and cooling end uses, and even for gas appliances (although these results stem from the SCG service territory only). There is particularly strong evidence the program is moving smaller and HTR facilities to adopt HVAC controls at high rates (mostly programmable thermostats).

Exhibit 1-15 compares participant and nonparticipant lighting adoption rates, including all types of adoptions. In nearly every segment, participant adoption rates notably exceed nonparticipant adoption rates. The pattern of results highlights success in the program-emphasized HTR segments. Small, rural and renter segments outperform their nonparticipant counterparts. The HTR success is in large part due to stellar performance of the PG&E audit in these markets. The PG&E lighting adoption rate among HTR facilities is 31 percent. Among only very small facilities it is 30 percent. These rates are significantly in excess of comparable nonparticipants. Other segments that stand out as having a particularly strong lighting impact include: small facilities, offices, retail stores, and restaurant/grocery stores.

Exhibit 1-15
Lighting Equipment Adoption Rates – Participant versus Nonparticipant
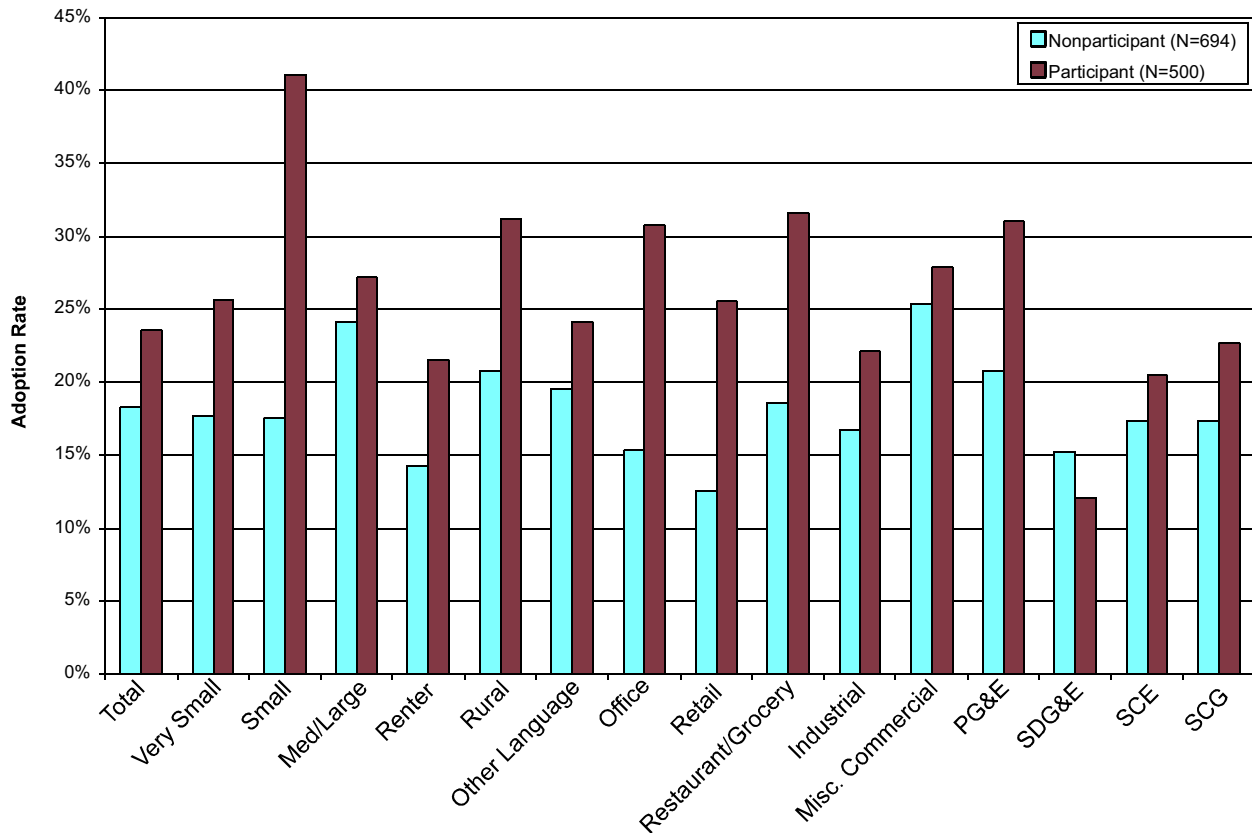
As shown in Exhibit 1-16 participants have a marginally higher overall adoption rate of cooling equipment than nonparticipants. Some segments show accelerated adoption rates, while others show little or no improvement.

Similar to lighting, the pattern of cooling results highlights success in the program-emphasized HTR segments. Very small, rural and renter segment outperform their nonparticipant counterparts. The HTR success is again in large part due to the performance of the PG&E Phone, Mail and On-Site audits in these markets. HTR facilities in PG&E service territory have an energy-efficient cooling equipment adoption rate of 19 percent – well in excess of comparable nonparticipants (13 percent). The rate for PG&E's very small facilities is still greater than nonparticipants, but not by as much, 15.5 percent, contributing to the lower overall rate for very small customers shown in the previous exhibit. The HTR rates measurably surpass comparable rates among nonparticipants. As with lighting, audits also had a strong cooling impact in small facilities, offices, retail stores, and restaurant/grocery stores.

Exhibit 1-16
Cooling Equipment Adoptions – Participant versus Nonparticipant
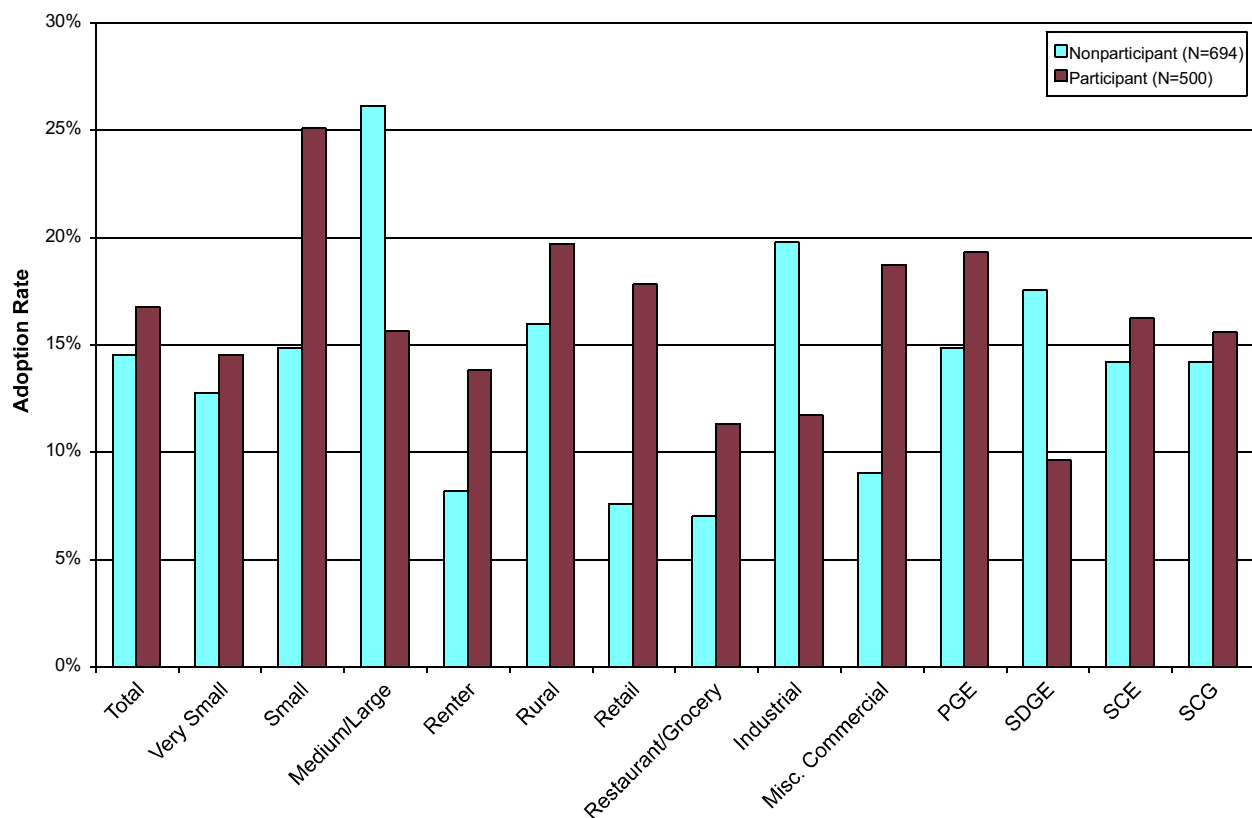
The gas end use is very successfully emphasized in the SCG on-site audit tool. The rate of high efficiency gas appliance adoption among these customers is substantially higher than nonparticipant rates. There is less compelling evidence of gas appliance program effects from

other IOU/delivery mechanism combinations. SCG's success with gas can provide lessons to enhance the other IOUs results.

There is evidence of prominent segment-specific program effects in the "other" equipment end-use category. The medium/ large and industrial segments are adopting these technologies at significantly higher rates than nonparticipants. These effects are especially pronounced among SCE MCD[3] audit customers.   Adoption rates are so high that they may displace investment dollars that might otherwise have gone to energy efficient cooling investments. These larger customer segments had lower adoption rates for energy-efficient cooling equipment relative to nonparticipants. Clearly this segment is responding to audit program recommendations that appear to emphasize motors and insulation recommendations.

For each participant equipment adoption reported, respondents were asked whether the equipment installed was one of the recommendations made in the audit report (written or electronic.) The results give some indication of the influence of audit recommendations on purchases beyond self-reported influence ratings.

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[3] Major Customer Division—can you provide a bit more info—are these the 500 kW and above? Served by Major Customer Account Representatives?

Exhibit 1-17 presents the percent of equipment purchases that were specifically recommended in the audit report. The results are shown for the total participant population by end use and for some important hard-to-reach segments.

Exhibit 1-17
Percent of Adoptions Specifically Recommended in Audit Report
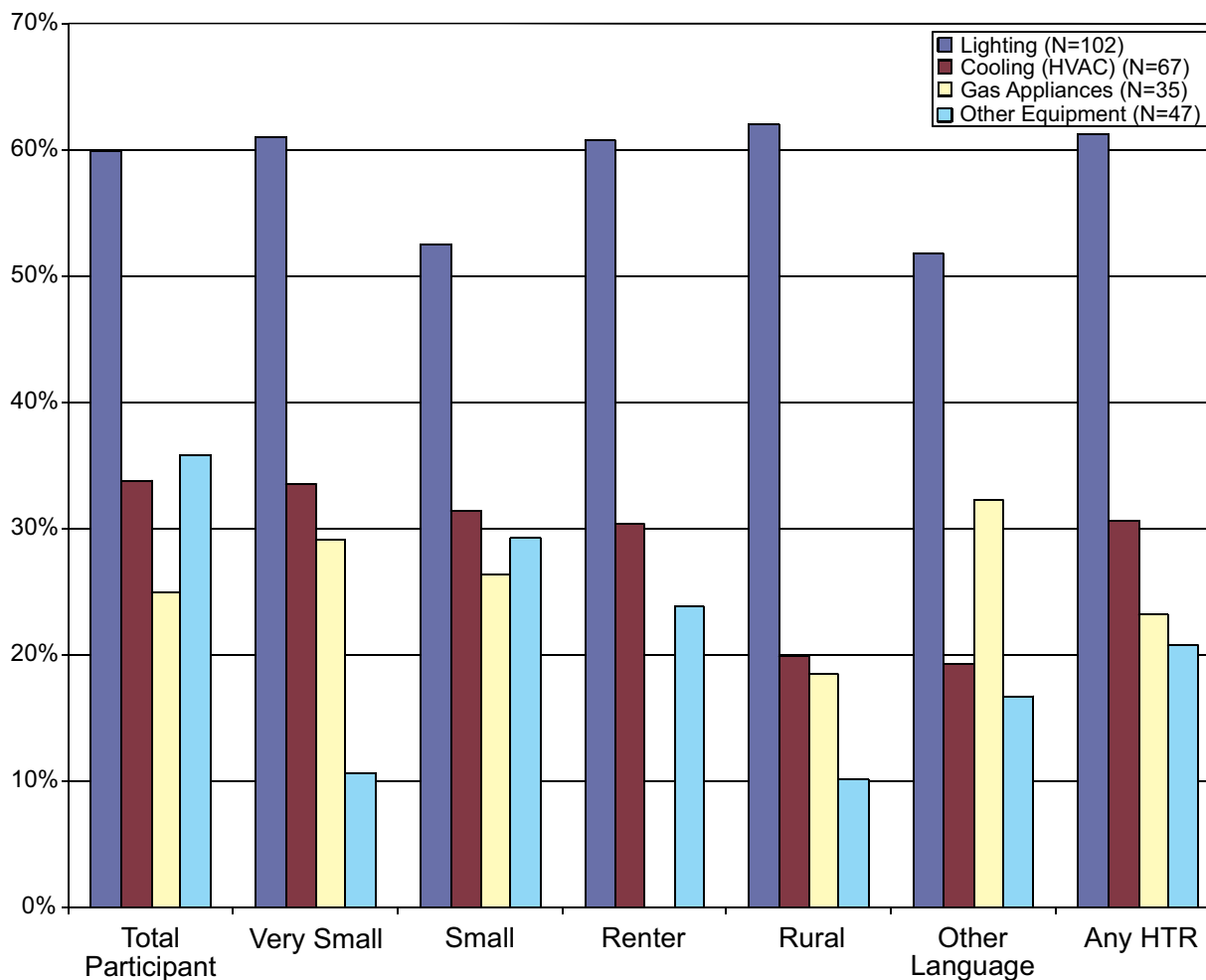
Exhibit 1-16 again confirms lighting as the end use with the greatest rate of customer follow-through (between 50% and 60%). About 20% to 30% of HVAC and Gas recommendations are adopted. Only between about 10% to 20% of "Other" audit recommendations are adopted. Differences between the segments shown in the exhibit are fairly minimal, although it does appear that rural customers are implementing fewer cooling, gas and other recommendations than other hard-to-reach segments.

2002 PG&E Follow-Up Program Evaluation Results

The PG&E follow-up program, which consists of a telephone call placed at least one month following the audit is shown to be generally successful. The most important indicator of

success is whether the follow-up phone call produced an increase in the rate at which participants adopted energy efficient measures. Here, regardless of the type of audit they received, the follow-up call had a positive impact on the likelihood of high efficiency adoption.

Exhibit 1-18 below summarizes participant self-report data regarding the installation of *energy efficient* measures installed *after* the audit. Respondents were asked whether they had installed any energy efficient technologies since the audit, and the exhibit below presents the overall results, across all end uses. The effects of the follow-up calls confirm the initial hypothesis for both audit types. The difference for the On-Site audit is 6.6 percentage points while for the Phone audit the difference is larger at 10.4 percentage points. These results show the value of the call-back, a program enhancement that the other IOUs should consider implementing.

Exhibit 1-18
Percent of Participants Adopting at Least One Recommended Measure
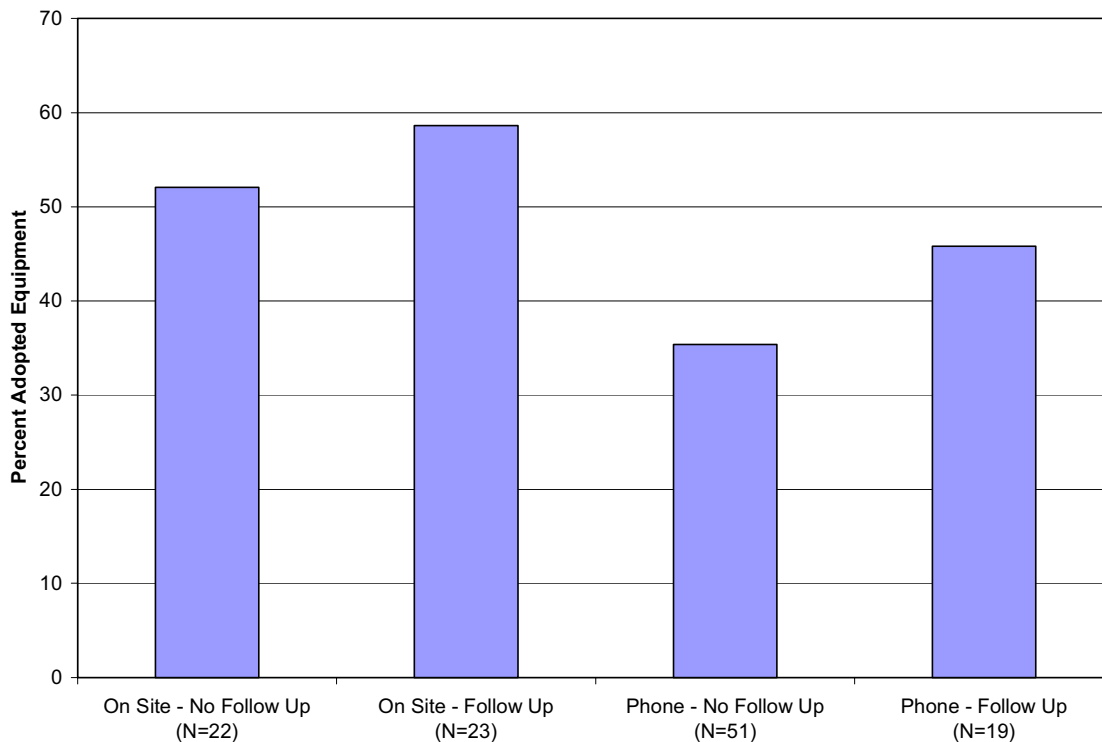
1.6   PROGRAM IMPLEMENTATION RECOMMENDATIONS

The recommendations presented here are meant to serve as guidance for program managers and planners, and require their direct input prior to any downstream action.

- Program managers, customers and evaluation results all indicate that the on-site audit is the most successful delivery mechanism offered through the Audit program, in terms of both customer satisfaction and post-audit measure adoption. However, this evaluation

did not investigate the cost effectiveness of each delivery mechanism. Cost effectiveness will be investigated in future evaluations, as the program settles and matures out of its transition period. The following are some of the elements of the 2002 Audit program that were found to be most effective.

– The SoCalGas on-site audit is very successful at encouraging gas appliance adoptions, and also at referring a large portion of their audit customers to the incentive programs.

– PG&E had great success in 2002 with hard-to-reach customers, not only recruiting many into the program, but in successfully gaining customer implementation of recommendations.

– The SCE MCD[4] on-site audits, which are directed at large customers, have very solid impact results and present a broad portfolio of recommendations appropriately customized for larger customers.

– SCE marketing efforts with Community Based Organizations (CBOs) appear to be very effective.

• Although a solid case has been made for the allowance of differences in program delivery across the state, the program may benefit from more integrated use of best statewide practices. An optimal tool can possibly be developed drawing on the best characteristics from each IOUs' audit instruments, particularly with regard to the on-site audit where more differences remain. This is an issue that should be re-examined in the 2003 EM&V effort.

• It is recommended that the link between the incentive programs continue to be promoted through the Audit program, and that new strategies to further strengthen that link be considered.

– As stated above, customers who received an audit but did not implement its recommendations mentioned lack of money as the main reason they did not take action, particularly for those who received recommendations about changes to gas appliances and cooling equipment.

• Many program success stories are presented in Chapter 4. Nevertheless, the utilities should spend more time extracting societal value in energy savings from participants once they are drawn into the program. The program design needs to emphasize downstream participant assistance to obtain that goal, especially among the hard-to-reach. If the utilities continue to emphasize HTR, it is recommended that more sophisticated follow-up mechanisms be used to enhance downstream energy savings. More assistance is needed to help time-deprived HTR customers adopt energy-efficient measures and practices. For example, the SCE cold call (door-to-door) audit is a prime candidate for a follow-up program. These audits have proven successful as a low-

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[4] Major Customer Division

hurdle approach to reaching HTR goals, but do not show substantial posterior energy savings.

- *Chapter 7's* evaluation of the current PG&E follow-up program demonstrates positive impacts on customer satisfaction and likelihood of high efficiency equipment adoption. Assuming sufficient budgets, there are several improvements to follow-up efforts that could be considered:

  – Increase the goals for the number of follow-up calls for the Phone and On-Site audits.

  – Expand the use of follow-up calls to the other audit types.

  – Obtain more information from participants during the follow-up call so that a more thorough analysis could be conducted regarding the barriers to installation.

- The cost effectiveness of the CD-ROM audit should be evaluated to optimize its use.

  – Little is known about the impacts and cost effectiveness of the CD-ROM Audit tool. The year 2002 was the first year that the CD-Rom was implemented—and most IOUs released the CD-ROM late in the year, so results in this evaluation are preliminary. The CD-ROM is considered by some program managers and staff to be somewhat outdated given the considerable growth in online access in recent years. In addition, this is the only delivery channel where accomplishments are measured with respect to delivery of the tool to the customer, rather than tracking based on audit completion and therefore recognition that a customer has obtained a list of recommendations.

- Another important area for program improvement surrounds participant-reported usefulness of the audit report, which scored much lower than other "program element" categories.

  – Smaller customers prefer simple tips and more cost-effective recommendations that are less expensive. Medium and large customers, on the other hand, favor more customized recommendations, and more technically sophisticated reports with equipment retrofit information. The program design must address these strong differences in customer wants and needs.

- The remote audits (CD-Rom, online, mail, phone) should be continued, particularly with follow up components and referrals to rebate programs. In this fashion, the remote audits produce effects nearly comparable to those of the on-site audits.

- The On-Site instrument should continue to be directed at larger facilities to emphasize recommendations that are customized and sophisticated. Small customers express little need for specialized recommendations, thus on-site audit are less appropriate for them.

  – The SCE MCD audit, directed at larger customers is shown to be an effective delivery channel in Chapter 4. It has a broad scope of recommendations, and evidence of appropriate customization across size and business type. This type of audit together with the larger target customer group is an effective and appropriate use of on-site resources.

- End use distribution of audit recommendations presented in *Section 4.4* reveal little distinction between the PG&E[5] phone and on-site audit reports. The on-site audit recommendations should be distinct in character from the Phone audit, revealing the additional customization available to the on-site professional auditor.

- It is recommended that consideration be given to dropping the CPUC's mandated three-year eligibility rule, that does not allow customers to participate again in the Audit program within 3 years. This recommendation is based on the relatively high personnel turnover rates and poor participant recall of the Audit (discussed in *Chapter 6*) together with the availability of multiple Audit delivery mechanisms. A much shorter interval of one year is more appropriate. Also, allowing customers to obtain energy efficiency information from more than one delivery channel within a given program year should be allowed.

- Consideration should be given to the strategy of incorporating other measures of accomplishment in addition to the number of completed audits. For example, set goals and track accomplishments using measured downstream implementation of energy efficiency practices and measures will likely enhance post-audit follow-through activities and participant adoptions. Goals based on the implementation of Audit recommendations could be tracked (to the extent practically feasible) along with the current practice of measuring goals with respect to audits completed.

- To ensure that program goals are met, marketing of Audit services is an important program activity, and one that is commendably emphasized by each of the IOUs. There is a need for the utilities to consider, test and verify the audit marketing channels that are most effective. As discussed below, enhanced marketing tracking systems would support more valuable evaluation of marketing strategy success and ensure the best use of PGC funds for this important activity.

1.7   PROGRAM TRACKING SYSTEM IMPROVEMENTS

Tracking data is both inconsistent across the utilities and, in some cases, incomplete. A well-planned program tracking system will serve as a powerful tool for more effective program management and real-time evaluation, as well as meeting a variety of important downstream measurement and verification needs.

Going forward it is recommended that the utilities maintain more consistent and complete tracking system records, especially with regard to account numbers, business names, contact names and contact phone numbers. Additionally, this should include data supporting the extent of each recommendation (i.e., equipment capacity) and the expected savings from a full implementation of each recommendation. All data collected during follow-up program efforts should be recorded carefully for future evaluation. Furthermore,

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[5] Recommendation data was available for PG&E phone and on-site audits, and SCE MCD audits only. PG&E recommendation data reflects *only* the small/medium company on-site and phone audit. PG&E offers a very sophisticated large company on-site audit with highly customized recommendations, but the data regarding these audits was not available for this evaluation.

- The online survey faces a relatively difficult situation with regard to accurate program tracking. Currently users are only required to enter their e-mail address, providing no solid link back to the customer that uses the tool. A large portion of the audit program is delivered through the online mechanism, thus there is a significant need to establish a solid link back to the customer using an account number or other premise tracking code. The use of such a code, with software upgrades, would further allow the use of customer billing records to calibrate Audit model savings expectations and other relevant online results, as well as supporting a multitude of both real-time and downstream evaluation needs.

    - It may be untenable to require online participants to provide an account number because of the potentially severe reduction in participation. Another evaluation approach would be to analyze website data. This could improve understanding of how the site is used, where users are spending the most time, where they are logging off, etc. Further, email surveys or follow-up efforts could be used to gather measure uptake data.

- CD-ROM survey tracking faces unique challenges. The CD-ROM is either sent to customers by mail, or handed out during an outreach event where a business card is collected from the recipient. A database of all available tracking data, including this business card information, should be maintained carefully. However, there still remains the challenge of associating account numbers with CD-ROM participants. No easy solution has yet been identified.

1.8   EVALUATION SUGGESTIONS

The recommendations for Audit program evaluation activities revolve around the belief that Audit program success can be greatly influenced by real-time evaluation of the program, while seeking prospective improvements, including recommendations for program adaptation during implementation. Real-time refers to the Northwest Energy Efficiency Alliance (NEAA) model sometimes referred to as Adaptive Management. Also, there is a need within the program to characterize best practices Statewide (and beyond) in program implementation and tracking, providing more consistency and higher quality in Audit delivery, Audit reports and program tracking. This would emphasize the use of program components that work best.

Under Adaptive Management, the evaluators are an integral member of the program team, seeking to objectively observe inner-program workings, while testing innovative hypotheses on a real-time basis. NEEA has used this approach successfully over the years. While real-time evaluation should not replace retrospective evaluation needs, the Audit program would best be served at this time by such a model. Specific evaluation objectives that should be addressed using this model are described in more detail below.

On-site audit delivery across the state is based on a wide variety of approaches and the resulting audit reports vary substantially in content and format. It would likely pay great dividends for an evaluator, in conjunction with the utility program managers, to compare and contrast delivery procedures and the current reports (now being used across the state), to assess their strengths and weaknesses, and develop the best blended product, with further consideration of innovation.

Evaluation research is also needed to systematically examine the effectiveness of Audit program marketing. The first step, if not already in place, would be for the utilities to actively track marketing campaigns, as discussed at greater length above.

Lastly, research is needed to assess and accept and/or reject various follow-up methods, approaches and hypotheses prior to implementation of additional pilot efforts. The evaluation of PG&E's 2002 follow-up program presented in *Chapter 7* suggests the approach is effective, but the sample size upon which conclusions are drawn is limited. A similar evaluation effort on a larger scale would add more clarity and substance to these findings. This and other follow-up evaluation efforts would serve to inform the societal value and cost-effectiveness of intervention downstream of the audit, for use in program design updates.

As for retrospective evaluation needs, substantial additional work is needed to measure full Audit program impacts.

- First, the data available in the program tracking systems, hard copy audit reports and telephone survey data did not adequately support a complete assessment of impacts. The impact estimates provided in this report are therefore very conservative and preliminary.

- Second, this evaluation was not able to measure impacts for the CD-ROM and Online audit delivery channels. Future evaluations of the Audit program should endeavor to do accomplish this.

- Third, consideration should be give to examining program impacts, particularly conservation measure impacts, using billing regression analyses.

- Fourth, some measure of net impacts for the program is needed, through the derivation of a net-to-gross (NTG) ratio, therefore accounting for free-ridership and spillover. Past NTG findings are unlikely to be applicable today, given the programs emphasis on HTR participation.

  – To measure the relative influence of competing forces on a customers decision to adopt a measure or practice, a logit model could be developed that allocates portions of energy efficiency adoptions to each influencing force, such as rebates, the audit program, Flex-your-Power and other media or incentive programs. This is an objective way of separating program from other effects and allows self-report data analysis to serve as a secondary and complimentary information source.

2. INTRODUCTION

The 2002 Statewide Nonresidential Audit Program Evaluation presented in this report offers a retrospective examination of program accomplishments, measures downstream program effects and effectiveness, and provides prospective guidance for maximizing the value of the "Audits." The program itself provides free energy management services and information to nonresidential customers using a survey of a given customers' energy using equipment, resulting in a downstream report that provides recommendations for energy conservation practices and energy efficiency equipment or measure upgrades. This program is being offered in a nearly uniform format by each of four California Investor Owned Utilities (IOUs), Pacific Gas and Electric (PG&E), Southern California Edison (SCE), the Southern California Gas Company (SoCalGas) and San Diego Gas and Electric (SDG&E).

This section provides an overview of the audit programs, an introduction to the evaluation objectives and scope of work, and a brief outline of the remainder of the report. An overview of the Audit Program is presented next.

2.1   OVERVIEW OF THE AUDIT PROGRAM

The Statewide Nonresidential Audit (Audit) program is a key component in an integrated energy efficiency infrastructure in California providing essential analysis of customer end-use systems, conservation and energy efficiency opportunities, and economic information for customers to make investment decisions. The program provides direct support for and coordination with the IOUs' incentive programs.

The Audit program provides comprehensive, unbiased information to guide customers' energy decisions. The energy audits and information services provide no-cost and low-cost recommendations leading customers to invest further in energy efficiency. The audits help customers assess energy efficiency opportunities and link them to IOUs Express Efficiency and Standard performance Contract programs. In this way, the program successfully addresses the market barriers of both awareness and affordability.

Customer-specific building information including equipment and their operation is first gathered using online, CD-ROM, telephone, mail or on-site surveys. This data is in turn used to make energy conservation recommendations for each customer, culminating in the preparation of a tailored report (or list of recommendations) for each participant. The written reports outline or refer to potential energy and dollar savings, and provide information about utility incentive programs.

This program also addresses the California Public Utilities Commissions' targets regarding equitable program access to the hard-to-reach (HTR) business sector. The CPUC defines hard-to-reach customers as small (less than 20 kW or less than 10 employees) located in rural areas, renters, and those for whom English is a second language. The practical, working definition for most IOUs is small size (which they measure using usage data or rate code) and rural (captured in the service zip code.) The remaining HTR criteria must be self-reported and so is not known prior to customer contact and is more difficult to verify.

Energy efficiency recommendations can be classified into two distinct groups: low cost/no cost behavioral measures ("Practices") and equipment ("Measures") that require a substantial capital investment. In some instances the Measure recommendations are later installed using further assistance from a rebate program, such as the Express Efficiency or Standard Performance Contract programs. For this reason, the Audit program is considered a "feeder" program, providing an important marketing service for other incentive programs.

It is best to regard the entire portfolio of energy efficiency programs as an integrated set of energy efficiency services, with each program seeking to serve the diverse needs of the nonresidential population. A corollary is found within the Audit program where an array of delivery mechanisms or channels are offered in an effort to ensure that Audit services are available to a wide audience of nonresidential participants. Exhibit 2-1 below shows which type of Energy Audit customers may benefit from the most:

Exhibit 2-1
A Portfolio of Delivery Mechanisms to Meet the Needs of Different Sized Customers

Customer Size	Mail	CD ROM	Online	Phone	On Site
Very Small	●	●	●	●	●
Small	●	●	●	●	●
Medium		●	●		●
Large					●

Although several of the programs delivery channels are geared to meeting the needs of a given customer segment (especially size), customers are allowed to participate in any of the delivery channels they choose. Each of the five surveys available within the Statewide portfolio of Nonresidential Audits are described below in Exhibit 2-2.

Exhibit 2-2
Nonresidential Audit Delivery Channel Descriptions

DELIVERY	DESCRIPTION
On-Site Survey	On-site surveys are traditionally targeted to medium and large commercial customers, particularly in segments offering substantial energy savings. Though medium and large commercial customers are targeted due to the relatively high cost of on-site services, small customers who request an on-site survey are accommodated. Furthermore, SCE is providing a pilot door-to-door survey service aimed directly at small customers, in response to CPUC goals surrounding outreach with hard-to-reach (HTR) customer classes.
Mail Survey	Direct-mail surveys are designed for small business customers who do not necessarily want or need an on-site survey. These surveys take about 15 minutes to complete. Once the utility vendor receives the completed survey in the mail, a software program compiles and analyzes the customers' responses to the energy survey. The customer then receives a detailed report filled with suggestions on how to lower costs related to energy, solid waste, and water.
Telephone Survey	The utility or their vendor offers commercial customers telephone energy surveys as an alternative to mail surveys or on-site surveys. Trained energy specialists guide customers to answer questions pertaining to energy-consuming equipment and usage patterns. The collected information is then used to generate a report, which is then mailed to the customer and includes suggestions on how to lower energy costs.
Online Survey	To readily reach customers with internet access and provide a survey approach that each customer can access according to their own schedule, a (new) online tool has been established. Information regarding energy use and energy using equipment is entered by the customer during a visit to a utility web site, and a list of recommendations is generated and provided on-the-spot.
CD-ROM Survey	Similar to the online survey, but for those customers without internet access, an interactive CD-ROM tool has recently been added to the program portfolio.

The mail, phone, online and CD-ROM delivery channels are largely uniform, while the on-site surveys being offered across the state vary markedly with regard to the expertise of the auditors fielded, the emphasis on customization, the emphasis on measure recommendations (especially gas for SoCalGas vs. electric for the other IOUs), and the highly unique cold call approach being used by SCE to reach small and otherwise HTR customers. Some delivery channels and IOUs provide customer benchmarking results (for example, vs. a typical customer falling under the same business type) or an estimate of energy use breakdown by equipment type and/or end-use.

2.1.1 The 2002 Nonresidential Audit Program

The Nonresidential Audit program transformed into a statewide program during late 2001 and early 2002. The early goals for this statewide transformation included each IOU offering all five delivery mechanisms. For most IOU's this meant adding up to three new delivery mechanisms to the existing nonresidential audit programs. There was also an attempt to standardize all audit types while placing a special emphasis on reaching the hard-to-reach (HTR) population. All IOUs used the same third party contractor (Nexus) for the CD and on line audits, with three of the four utilities also using this contractor for the phone audits as well. Despite the significant focus on consistency, the IOUs also agreed to perform pilot projects within a single utility in order to explore new approaches. If a given pilot works, then other IOUs may consider it.   In addition, the IOUs recognize that because they have different customer populations with somewhat unique needs and wants, different levels of annual funding, and different organizational structures (e.g. in the form of account representatives), their programs cannot, and should not, be entirely consistent. In 2002 PG&E continued it's pilot follow up program consisting of telephone calls placed with participants at least one month after participation.   The objective of this effort is to spur downstream implementation of the measures recommended.   This program element is examined in the *Chapter 7 Follow-up Assessment*.

Overall, the development of all audit types was a coordinated effort producing a great deal of statewide consistency across each audit type in 2002, except for the on site audit where some differences remain. When examined more closely, behind the scenes, more differences in approach and implementation emerge across the IOUs. This is especially true with regard to program tracking, both across utilities and across program delivery channels and with regard to utility marketing efforts. These two areas are discussed in more detail below.

In 2002 the IOUs developed one audit tool for all small/medium customers, called "Business Analyzer". With this new tool, if customer audit information is entered (using the online or phone audit), in real time, the customer (or auditor) can create a dynamic survey that asks questions related to a customers' specific business. The current mail-survey has also been greatly simplified. The goal is to make the questions easier to answer and make the tools easier to use, while returning solid information to the customer. Customers have the option of doing a detailed survey versus a short analysis or even doing benchmarking.

At the end of 2002 and beginning of 2003, the customer could do multiple-facility benchmarking to make comparisons between their different facilities. These choices were not all available in 2001.   The Fast Track version of the audit, which provides audit recommendations in less time and with less work on the part of the customer, was introduced at the end of 2001. The FastTrack audit tool is now available as an online option, and is the mail-in audit tool used by all four IOUs. Now all of the tools are integrated. A current upgrade to the Fast Track audit tool will allow customers to create a plan for implementing recommendations. For example, they can query the set of recommendations by various criteria and get information on quick payback measures, or heating and cooling measures, or measures that have rebates offered for them.

2.1.2 Program Tracking

As discussed above, the on-site, mail and phone surveys all require a two-step process involving the collection of relevant customer information and the subsequent processing of those data to produce a set of energy efficiency recommendations and a customized energy management report. The utilities and their vendors use a variety of tools spanning highly automated report generation to manual calculations and hand-written reports. Hard copy reports are stored by the relevant IOU or their implementation vendor. Each of these delivery channels has the capability of supporting downstream tracking of accomplishments.

The online survey faces a relatively difficult situation with regard to accurate program tracking. Currently users are only required to enter their e-mail address, providing no solid link back to the customer that uses the tool.

CD-ROM survey tracking is the least developed. First, very little is known about the customer that receives the disk, unless it is sent via mail, but, in some instances, the disks are handed out during outreach events when it is difficult to collect relevant tracking data. Second, this is the only delivery channel where accomplishments are measured with respect to delivery of the tool to the customer, rather than tracking based on audit completion and therefore recognition that a customer has obtained a list of recommendations.

The utilities and their vendors use a variety of tracking system tools to establish program accomplishments and, in some cases, track data on the recommendations made as part of each energy survey. As the upcoming sections of this chapter, the *Chapter 3 Methods* and *Chapter 5 Process Assessment* will demonstrate, data tracking is both inconsistent across the utilities and, in some cases, incomplete.

2.1.3 Program Accomplishments

The accomplishments for the Nonresidential Audit program are tracked in various IOU and vendor systems and reported in the quarterly status reports that are submitted to the California Public Utilities Commission (CPUC). Exhibit 2-3 presents a comparison between reported accomplishments and IOU goals.

Exhibit 2-3
Nonresidential Audit Program
Survey Accomplishments

Utility and Delivery	Q4 Accomplishments	Goals
PG&E		
On-Site	1,038	
Phone	2,055	
Mail	1,888	
Web	1,028	
CD	478	
Total	6,487	3,000
SCE		
On-Site	6,934	
Phone	42	
Mail	584	
Web	1,177	
CD	107	
Total	8,844	4,500
SDGE*		
Total	3,977	3,950
SCG*		
Total	7,051	3,024

Based on IOU Fourth Quarter Status Reports submitted to the CPUC.

* Audit type detail is not available

With regard to the fourth quarter report-based statistics, PG&E, SCE and SoCalGas each substantially exceeded survey complete goals, and SDG&E met goals. Furthermore, each of the utilities far exceeded their HTR goals, with PG&E completing 5,492 (with a goal of 1,600), SCE completing 5,314 (with a goal of 1,800), SoCalGas completing 741 (with a goals of 300), and SDG&E completing 845 (with a goal of 750).

2.1.4 Program Marketing

To ensure that program goals are met, marketing of Audit services is an important program activity, and one that is notably emphasized by each of the IOUs. A wide array of marketing methods are used, spanning direct mail campaigns, e-mail blasts, flyer distribution (and other

marketing strategies) at outreach events, press releases, newsletters, cold calls and advertising. Exhibit 2-4 presents IOU marketing accomplishments and goals that were obtained from the fourth quarter program status reports submitted to the CPUC.

Exhibit 2-4
Nonresidential Audit Program
Marketing Accomplishments

Utility and Marketing Efforts	Q4 Accomplishments	Goals**
PG&E		
Press release	1	
Newsletter	4	
Brochures	1,445,856	
Fact sheets	3,700	
Advertisements	3	
Flyers and handouts	470	
Direct-mail audit packages	48,000	
Inviation to Audit training	292	
SCE		
Bill inserts	1,290,000	
Dirct mail outreach	291,800	
Press release	9	
Outreach events	73	
e-mail blast mailings	4,487	
Fact sheets	10,000	
Advertisements	1	
Flyers and handouts	24,000	
Direct-mail audit packages	19,000	
Audit training	2	
SDG&E		
CD-ROM	297	333
Bill inserts	240,000	270,000
Dirct mail outreach	52,000	54,000
SCG		
CD-ROM	321	333
Bill inserts	250,000	250,000
Flyers and handouts	15,500	5,000

Based on IOU Fourth Quarter Status Reports submitted to the CPUC.

**No goals were reported for PG&E and SCE

For the most part marketing activities revolve around mailing or handing out promotional materials, often in concert with marketing activities for other programs, such as Express. There is, however, some differentiation in emphasis across the IOU's in an effort to identify the most effective marketing strategies for the program. For example, PG&E has taken the lead in audit

training, which the other utilities are now incorporating within their audit program portfolios. Also, SCE is most active in conducting marketing during various outreach events (and through press releases), often involving partner community-based organizations (or CBOs).

2.2   STUDY OBJECTIVES

The objective of this study is to offer both retrospective examination and prospective guidance in maximizing the value of the current Nonresidential Audit Program for all stakeholders. There are five main components of this evaluation that provide comprehensive support for this overall objective. These components and their individual objectives are shown below.

Impact Assessment. The *Chapter 4* Impact Assessment measures participant response to the audit in terms of energy and demand savings using a number of indicators. This assessment also includes a "gap" analysis that characterizes the portfolio of recommendations included in the Audit reports, and compares those recommendations with the measures being implemented, as well as those that are not.

Process Assessment. The *Chapter 5* Process Assessment measures the program's effects using several other indicators. This includes an assessment of the success of marketing efforts and improvements, including IOU outreach efforts to hard-to-reach customers. There is a review of the success of recent process improvements, including program design changes resulting from the statewide coordination efforts. Furthermore the Process Assessment investigates key drivers for customer follow-through, and the key drivers for participation. Finally, it explores customer perceptions of the participation experience and usefulness of the audit.

Long Term Assessment. The *Chapter 6* Long Term Assessment characterizes the longer-term benefits of the Audit program, including an investigation into the persistence of audit-recommended practices. This assessment also examines the interactive effects of the audit program and the energy crisis. Finally, the Long Term Assessment thoroughly assesses the longevity of the audit, including the timing of customer response to audit participation, utilization of the audit report, participant recall of audit recommendations, and the turnover of key contact personnel.

Follow-Up Evaluation. The *Chapter 7* Follow Up Evaluation measures customer response to program elements designed to encourage audit participants to implement recommendations.

Cross Program Evaluation. The Cross Program Evaluation is a stand-alone report. This evaluation component compares and contrasts the techniques and relative successes of the Audit, SPC and Express Efficiency programs, and examines their compatibility and synergies.

2.3   REPORT CONTENTS

This section provides the structure of the evaluation report, as describe below.

- The report includes a *Chapter 1 Executive Summary* providing a condensed version of the evaluation approach and key findings.

- The *Chapter 2 Introduction* lays the groundwork for the chapters that follow.

- The *Chapter 3 Study Methodology* focuses on the analytical approach employed to meet study objectives, including a section that describes the data collection plan, sample design and survey dispositions, as well as segmentation and weighting schemes utilized for data analysis and presentation.

- The *Chapter 4 Impact Assessment*, *Chapter 5 Process Assessment*, *Chapter 6 Long Term Assessment* and *Chapter 7 Follow-up Evaluation* then follow, in accordance with the objectives listed above.

- The eighth and final chapter combines key findings into prospective recommendations for program improvement.

Chapters 3 through 7 end with a key findings summary. Supporting study material is found in the appendices.

- Appendices A, B and C present survey results for the Participant Impact, Process and Long Term surveys, including comparisons with applicable general population (or nonparticipant) survey results.

- Appendices D through J provide the survey instruments and interview guides that were used in the Study to collect data from participants, the General Population and program managers and implementers.

- Appendix K presents previous studies and publications referenced in this Study.

3. STUDY METHODOLOGY

This section presents an overview of the Study approach, data collection activities and analysis methods. It also presents characteristics of the participant population that should be considered when reviewing detailed segment specific results in the chapters that follow.

- The section begins with an explanation of the Study approach and data collection strategy designed to support the evaluation objectives.

- Survey sample designs are then presented, followed by a discussion of survey dispositions, analysis weights and segmentation schemes.

- The next section discusses the structure of participation patterns in terms of IOU, delivery mechanism and customer size, and a discussion surrounding the relevance of these findings when interpreting evaluation results.

- The next section presents the impact approach that was applied in developing *Chapter 4, Section 4.2* estimates of program gross impacts.

- The final section presents key findings that arose during the design and application of the study methodology.

3.1 OVERVIEW OF STUDY APPROACH AND DATA COLLECTION STRATEGY

The evaluation team employed the following multi-step process to address the Study objectives. 1) Develop research objectives and program theories. 2) Refine objectives and plans based on interviews with program managers and implementation staff. 3) Build an experimental approach to address each study objective and test program theories. 4) Construct data collection instruments and field surveys with participants and nonparticipants. 5) Assess data/results and draw Study conclusions and recommendations.

As discussed in the *Section 2 Introduction*, the primary components of the study include impact, process and long-term assessments, an analysis of the utilities' audit follow-up efforts, and a stand-alone cross program analysis that compares and evaluates the Audit, Express Efficiency and Standard Performance Contracting programs. Each component has its own set of objectives and all components support the primary objective of providing a retrospective examination and prospective guidance to maximize the value of the current Nonresidential Audit Program.

Each of the five evaluation components is supported by a variety of primary data collection. In all there are 4 customer surveys as well as professional interviews with Program Managers and Implementation Staff.

- The PY2000 Participant Long Term Effects survey examines longer-term impacts, impacts during the California energy crisis, and persistence of energy efficiency practices;

- The PY2002 Participant Impact survey is used to collect indicators of participant impacts;

- The PY2002 Participant Process survey examines program procedures, market effects and participant satisfaction.

- General Population data are used primarily to examine "baseline" energy efficiency conditions, providing a platform from which program effects are isolated.

- Program Manager and Implementation Staff Interviews are used to refine evaluation objectives and assess recent implementation and marketing strategies.

Exhibit 3-1 below outlines the "taxonomy" of the Study, and the basis for the data collection strategy. The exhibit summarizes the relationship between the data sources outlined above and the evaluation objectives.

Exhibit 3-1
Data Collection and Analysis Design
for the Statewide Nonresidential Retrofit Energy Audits Program Evaluation

Study Objectives	DATA COLLECTION					
	500 Participant Long-Term Effects Surveys		800 General Population Surveys*	500 Participant Process Surveys	500 Participant Impact Surveys	20 Utility Staff Interviews
Program Year	**2000**	**2001**	**-**	**2002**	**2002**	**2002**
Impact Assessment						
Participant EE actions/intentions	●				●	
Comparison with NP and GP**			●		●	
Gap Analysis					●	
Process Assessment						
Program market effects				●		
Comparison with GP**			●	●		
Marketing efforts/improvements						●
Process improvements				●		●
Participant satisfaction				●		
Long Term Assessment						
Document long-term benefits	●					
Persistence of practices	●					
Customer Audit Recall	●			●	●	
Interaction with Energy Crisis	●					
Audit Follow-Up Evaluation						
Influence of the follow-up call					●	
Follow-up transaction assessment				●		
Customer satisfaction				●		
Cross Program Evaluation						
Cross-program participation	●			●	●	●
Relative effectiveness				●	●	
Success of program delivery				●		●
Key drivers for participation				●		●
Participant process experiences		●		●		●

(Between the 2001 column and the 800 General Population Surveys column, a double-headed arrow labeled **ENERGY CRISIS** appears spanning the Process Assessment section.)

* The General Population Survey is shared with the 2002 Statewide Express Efficiency Evaluation.

** GP=General Population, NP=Nonparticipant.

3.2   SAMPLE DESIGN

As discussed above, to support the study objectives five distinct surveys have been conducted. Three of these are participant telephone surveys, one is a general population telephone survey, and one is interviews of program managers and implementation staff.

The number of completed surveys is shown in Exhibit 3-2.

Exhibit 3-2
Data Collection Overview

Study Data Collection	Sample Frame	Survey Completes
PY 2000 Participant Long Term Effects Survey	Utiliity Program Tracking Data	497
PY 2002 Participant Impact Survey	Utility Program Tracking Data	500
PY 2002 Participant Process Survey	Utility Program Tracking Data	500
General Population Survey	CIS* & 2001 Sm/Med Wants and Needs Survey**	800
PM/Implementation Staff Interviews	Lists Provided by IOUs	16

*Customer Information Systems
**See Appendix K for a full Study reference.

The remaining discussions in this section address the available sample frame for each of the surveys, the related sample designs and the planned distribution across key customer segments. This discussion begins with the participant surveys, followed by the General Population survey and finally, the program manager and implementation staff interviews.

3.2.1 Participant Surveys

Exhibit 3-3 summarizes the utility tracking data records obtained for this evaluation for the program years 2000 and 2002.

Exhibit 3-3
Summary of Utility Audit Tracking Data for PY 2000 and PY 2002

Utility	Online Audits	Mail Audits	Phone Audits	CD Audits	On Site Audits	Total
Year 2000						
PG&E	-	1,979	1,833	-	1,127	4,939
SCE	-	1,543	-	-	-	1,543
SDG&E	-	-	-	-	345	345
SCG	-	-	-	-	-	-
Year 2002						
PG&E	1028*	1,500	2,126	561	1,097	5,284
SCE	1337*	588*	42	202*	7,660	7,702
SDG&E	-	120*	-	-	736	736
SCG	-	743	78	294	1,512	2,627

*Incomplete contact information

Some of the tracking database records are missing critical contact information. More detail is presented on the content of the tracking system databases in the *Section 5 Process Assessment*. There is insufficient contact information for the online audits, the 2002 SCE and SDG&E mail audits, and 92 out of 202 SCE CD ROM audits. The contact information for Online records includes only email address, and the mail audit participants for SDG&E in 2002 includes only mailing address. Attempts were made to contact participants through the mail and email, with very little customer response. As discussed in section 5.2, even asking online participants to volunteer contact information would not solve the sampling problem due to inherent selection bias. Still, requiring that participating customers enter their account number, name and telephone number would be a good step to take in improving current customer contact tracking.

For most customers a 10 percent completion rate was expected for the purposes of sample design. That is, for every 10 pieces of sample one survey complete is accomplished. However, for customers that were contacted through e-mail or conventional mail, the expected success rate is much lower—around 1 or 2 percent. Mass mailing- and (especially) e-mail-based market research generally have much lower returns that telephone-based research.

The participant sample design is in large part dictated by sample availability. Many of the cells in the sample are at their capacity. That is, they are supporting the maximum number of completes that should be expected. Of the 13 populated year 2002 participant survey cells, all but two are at capacity, and 2 out of the 5 year 2000 participant survey cells are at capacity.

Exhibit 3-4 below shows the participant survey sample design for the program year 2000 and program year 2002 surveys. Particularly for some of the smaller cells, and the Online audits, an attempt was made to complete more surveys than the sample design supports, given a 1 in 10 completion rate, and then adjust other cells accordingly. Survey completes are presented in section 3.3 below, Analysis Weights and Segmentation Scheme.

Exhibit 3-4
Participant Survey Sample Design

Utility	On line Audits	Mail Audits	Phone Audits	CD Audits	On Site Audits	Total
Year 2000						
PG&E	0	115	115	0	115	345
SCE	0	115	0	0	0	115
SDG&E	0	0	0	0	40	40
SCG	0	0	0	0	0	0
Year 2002 Impact						
PG&E	20	71	71	28	51	241
SCE	20	0	2	6	71	99
SDG&E	0	2	0	0	37	39
SCG	0	37	0	15	71	123
Year 2002 Process						
PG&E	20	71	71	28	51	241
SCE	20	0	2	6	71	99
SDG&E	0	2	0	0	37	39
SCG	0	37	0	15	71	123

3.2.2 General Population Survey

The general population survey is shared with the 2002 Statewide Express Efficiency Evaluation. Therefore the sample design must meet the needs of both studies. The general population sample design is constructed to span the entire market defined by, IOU service territory, business type and customer size.

Business types were developed to group similar facilities and also to be roughly equal in electricity consumption for the less than 500 kW market. The greater than 500 kW market are not eligible for Express participation, and so were treated separately. Size is defined using a combination of tariff rate class and demand data. Very small facilities (less than 20 kW) are identified using rate class or estimated demand based on kWh consumption. The small (20 – 100 kW) and medium (100 – 500 kW) facilities are identified using demand, or estimated demand based on kWh consumption. The largest facilities (over 500 kW) are identified using rate class or demand data.

Exhibit 3-5 shows the sample design for the General Population Survey. Among small and medium facilities (between 20 kW and 500 kW) the sample allocation across business types is equal. Among the smallest facilities (less than 20 kW), office, retail, restaurant/grocery and miscellaneous commercial are allocated extra points because these business types are a larger portion of both sites and usage within this cell. Among the largest customers, the consumption distribution is skewed towards industrial, and has very small representation in retail and

restaurant/grocery and agriculture. The sample was allocated across business types accordingly, with a much larger portion in industrial, and smaller portions in retail and restaurant/grocery. Agriculture was eliminated in the very large customer segment because of very small relative consumption.

The allocation across the customer size categories emphasizes the very small, and de-emphasizes the extra large. The very small customers are of particular importance because they are hard to reach (HTR) and it is an important goal of the IOU's to encourage them to participate in energy efficiency programs. The very large customers are smaller in number than other size segments, and also are ineligible for the Express program, so they are allocated a smaller portion of the sample. PG&E and SCE have twice the sample of SDG&E because their customer populations are larger.

Exhibit 3-5 below shows the designed number of completes in each cell. The advantages of this approach are a very flexible survey sample that will support a variety of analytical approaches and techniques. For example, comparisons can be made between participants and the general population at the business type or size level, or both. This approach also ensures all business type and size cells will be included in the final survey sample. Of course, appropriate weights are used when analyzing data or grouping for presentation. Weights are discussed in more detail in *Section 3.3*.

Exhibit 3-5
General Population Survey Sample Design

Customer Size	Business Category	Pacific Gas & Electric	Southern California Edison	San Diego Gas & Electric	Total
Very Small	Institutional	14	14	7	35
	Office	20	20	10	50
	Retail	20	20	10	50
	Restaurant/Grocery	20	20	10	50
	Other Commercial	20	20	10	50
	Industrial	14	14	7	35
	Agriculture	12	12	6	30
	TOTAL	120	120	60	300
Small	Institutional	12	12	6	30
	Office	12	12	6	30
	Retail	12	12	6	30
	Restaurant/Grocery	12	12	6	30
	Other Commercial	12	12	6	30
	Industrial	12	12	6	30
	Agriculture	12	12	6	30
	TOTAL	84	84	42	210
Medium	Institutional	12	12	6	30
	Office	12	12	6	30
	Retail	12	12	6	30
	Restaurant/Grocery	12	12	6	30
	Other Commercial	12	12	6	30
	Industrial	12	12	6	30
	Agriculture	12	12	6	30
	TOTAL	84	84	42	210
Large	Institutional	6	6	2	15
	Office	6	6	2	15
	Retail	6	6	2	8
	Restaurant/Grocery	6	6	2	8
	Other Commercial	6	6	2	15
	Industrial	6	6	2	25
	Agriculture	0	0	0	0
	TOTAL	36	36	12	84
TOTAL	Institutional	44	44	21	109
	Office	50	50	24	124
	Retail	50	50	24	124
	Restaurant/Grocery	50	50	24	124
	Other Commercial	50	50	24	124
	Industrial	44	44	21	109
	Agriculture	36	36	18	90
	TOTAL	324	324	156	804

3.2.3 Program Managers and Utility Staff Interviews

A total of 10 Program Manager and 4 implementation staff interviews were completed. In addition, 2 interviews were conducted with staff directly involved in follow-up program efforts.

Utility Program Manager Interviews. Interviews were completed with program managers from each of the utilities, covering nine topic areas that are presented in *Section 5.1*. All interviews were tape recorded while the interviewer took notes and required about 1.25 hours each to complete. Two in-depth interviews were completed with PG&E staff, two with SCE staff, three with SDG&E staff, and three with SoCal Gas.

Vendor Interviews. Standardized open-ended interviews were also completed with vendors associated with the PY2002 Statewide Nonresidential Audit Program covering five topic areas that are presented in *Section 5.6*. All interviews were tape recorded while the interviewer took notes and required about 30 to 45 minutes to complete. Interviews were completed with representatives from Base Energy, Inc., PG&E Account Services, Nexus Energy, and FCI Management Consultants.

Follow-up Interviews. As noted above, 2 additional interviews were completed with the PG&E program manager and the PG&E Business Call Center (BCC) manager, to obtain further details regarding the pilot follow-up (call) program element.

3.3 ANALYSIS WEIGHTS AND SEGMENTATION SCHEME

This section presents the segmentation scheme used for analyzing and presenting results, including an examination of telephone survey dispositions by those segments, and the development of analysis weights to ensure that the results presented reflect observed participation patterns.

3.3.1 Data Segmentation and Presentation

Detailed tables were developed for each participant survey question and are presented in appendices A, B and C, for the Participant Impact, Process and Long Term surveys, respectively. General Population survey results are presented for comparisons where appropriate. These tables also serve as the basis for many of the report exhibits. Survey responses for each question are tabulated at least two ways, shown in exhibits 3-6.a and 3-6.b below. In one scheme (Exhibit 3-6.a) results are presented in categories directly comparable to the general population, including customer size, renter/owner, rural, other language, hard-to-reach and business types. In addition, IOU service territories are shown for comparison. It is important to bear in mind the IOU comparisons are complicated by different distributions of delivery mechanism and customer size, as well as quite different sample sizes.

Exhibit 3-6.b shows the second segmentation and presentation template. This format was developed primarily to compare results across delivery mechanisms and IOU service territories, where available. There were not enough survey completes to support each populated segment. Segments with fewer than 15 responses are excluded from the tables.

Exhibit 3-6.a
Results Table Template 1
for Comparison with the General Population and Nonparticipant Groups

C1. Since January 2002, did you make any changes related to cooling <address>, including air conditioning units, programmable thermostats, or HVAC controls?	Total	Very Small	Small	Medium	Large	Renter	Owner	Rural	Urban	English	Other Language	Any HTR	Non HTR	Office	Retail	Restaurant/Grocery	Institutional	Industrial	Misc. Commercial	Agriculture	PGE	SDGE	SCE	SCG
Yes	17%	15%	25%	16%	15%	14%	22%	20%	16%	19%	14%	16%	20%	26%	18%	11%	19%	12%	19%	0%	19%	10%	16%	16%
No	81%	85%	67%	84%	85%	85%	76%	80%	82%	79%	85%	84%	75%	72%	82%	89%	81%	88%	80%	100%	80%	90%	81%	84%
Don't Know	2%	1%	8%	0%	0%	1%	2%	1%	2%	2%	1%	1%	5%	2%	0%	0%	0%	0%	1%	0%	1%	0%	3%	0%
N	500	230	84	44	10	275	219	169	331	284	216	396	104	50	96	74	13	43	72	6	246	40	133	81

Exhibit 3-6.b
Results Table Template 2
for Comparison Across Delivery Mechanism and Utility

C1. Since January 2002, did you make any changes related to cooling at <address>, including air conditioning units, programmable thermostats, or HVAC controls?	Total	PG&E CD ROM	TOTAL CD ROM	PG&E Mail	TOTAL MAIL	PG&E On-Site	SCE Vendor On-Site	SCE MCD On-Site	SDG&E On-Site	SCG On-Site	TOTAL On-Site	PG&E Phone	TOTAL Phone
Yes	17%	8%	15%	20%	18%	20%	13%	15%	10%	18%	15%	21%	21%
No	81%	92%	85%	79%	81%	80%	85%	75%	90%	82%	83%	77%	78%
Don't Know	2%	0%	0%	1%	1%	0%	2%	11%	0%	0%	3%	1%	1%
N	500	28	32	78	88	53	94	20	37	70	274	87	95

3.3.2 Analysis Weights and Survey Dispositions

The 2002 participant population distribution across IOU service territory, delivery mechanism and customer size is shown in Exhibit 3-7 below. The table shows that most participants have 'unknown' size, which means that the tracking system data did not support a merge to customer information system databases, and so the participants energy use could not be determined. Going forward the utilities could identify "required" tracking system fields that must be filled-out, thus ensuring, for example, the inclusion important analysis merge keys.

Exhibit 3-7
Program Year 2002 Participant Population

Delivery Channel	Customer Size	PG&E	SCE	SCE-MCD	SDG&E	SCG	TOTAL
CD Rom	Unknown Size	23	106			294	423
	Large	2					2
	Medium	48					48
	Small	67	9				76
	Very Small (HTR)	421	87				508
	All	561	202	0	0	294	1,057
Mail	Unknown Size	15	588		54	106	763
	Large	3					3
	Medium	43				3	46
	Small	385			9	54	448
	Very Small (HTR)	1,054			57	580	1,691
	All	1,500	588	0	120	743	2,951
On Site	Unknown Size	104	4,814	442	458	42	5,860
	Large	24		454	1	9	488
	Medium	167	41	357	18	407	990
	Small	357	196	148	58	352	1,111
	Very Small (HTR)	445	1,126	82	201	702	2,556
	All	1,097	6,177	1,483	736	1,512	11,005
Phone	Unknown Size	107	15			3	125
	Large	7					7
	Medium	33					33
	Small	240	5			6	251
	Very Small (HTR)	1,739	22			69	1,830
	All	2,126	42	0	0	78	2,246
On Line	Unknown Size	1,028	1,337	0	0	0	2,365
All	Unknown Size	1,277	6,860	442	512	445	9,536
	Large	36	0	454	1	9	500
	Medium	291	41	357	18	410	1,117
	Small	1,049	210	148	67	412	1,886
	Very Small (HTR)	3,659	1,235	82	258	1,351	6,585
TOTAL		**6,312**	**8,346**	**1,483**	**856**	**2,627**	**19,624**

SCE has the largest participation levels, followed fairly closely by PG&E. All four IOUs provided significant on-site audits in 2002, but the participation distribution by audit type was mixed across the four IOU's. Of course, these are the records provided to the evaluation team

by the IOUs and probably do not accurately reflect true program accomplishments in all cases. These issues are discussed in more detail in the *Section 5.2 Tracking System Assessment*.

Exhibits 3-8 and 3-9 provide the distribution of survey completes for the Participant Impact and Process surveys, respectively. For certain delivery channels, especially the Online and CD-ROM audits, the availability of sufficiently good participant contact data (from the utility tracking systems) greatly affected the resulting survey completes.

Exhibit 3-8
Program Year 2002 Impact Survey Completes

Delivery Channel	Customer Size	PG&E	SCE	SCE-MCD	SDG&E	SCG	All
CD Rom	Unknown Size	2	3		0	1	6
	Large	0	0		0	0	0
	Medium	0	0		0	0	0
	Small	5	0		0	0	5
	Very Small (HTR)	21	0		0	0	21
	All	28	3	0	0	1	32
Mail	Unknown Size	1	0		0	0	1
	Large	1	0		0	0	1
	Medium	1	0		0	0	1
	Small	23	0		0	1	24
	Very Small (HTR)	52	0		3	6	61
	All	78	0	0	3	7	88
On Site	Unknown Size	4	72	10	22	0	108
	Large	2		6	0	1	9
	Medium	8		3	0	31	42
	Small	21	2	1	4	16	44
	Very Small (HTR)	18	20		11	22	71
	All	53	94	20	37	70	274
Phone	Unknown Size	2	4		0	0	6
	Large	0	0		0	0	0
	Medium	1	0		0	0	1
	Small	10	1		0	0	11
	Very Small (HTR)	74	0		0	3	77
	All	87	5	0	0	3	95
On Line	Unknown Size	0	11	0	0	0	11
All	Unknown Size	9	79	10	22	1	121
	Large	3	0	6	0	1	10
	Medium	10	0	3	0	31	44
	Small	59	3	1	4	17	84
	Very Small (HTR)	165	20	0	14	31	230
TOTAL		**246**	**113**	**20**	**40**	**81**	**500**

Clearly there is a less than equitable distribution across IOU service territories. This was an unavoidable result of available usable sample across the five delivery mechanisms. The Participant Process survey disposition is similar, shown in Exhibit 3-9.

Exhibit 3-9
Program Year 2002 Process Survey Completes

Delivery Channel	Customer Size	PG&E	SCE	SCE-MCD	SDG&E	SCG	All
CD Rom	Unknown Size		1				1
	Large						0
	Medium	1					1
	Small	1	1				2
	Very Small (HTR)	12					12
	All	14	2	0	0	0	16
Mail	Unknown Size				3		3
	Large						0
	Medium	2					2
	Small	34					34
	Very Small (HTR)	68			5	9	82
	All	104	0	0	8	9	121
On Site	Unknown Size	6	57	4	19	1	87
	Large			4			4
	Medium	15	2	5		24	46
	Small	25	2		3	9	39
	Very Small (HTR)	28	13	1	15	10	67
	All	74	74	14	37	44	243
Phone	Unknown Size	5	3				8
	Large						0
	Medium	1					1
	Small	4	2			1	7
	Very Small (HTR)	91	1			2	94
	All	101	6	0	0	3	110
On Line	Unknown Size		10				10
All	Unknown Size	11	71	4	22	1	109
	Large	0	0	4	0	0	4
	Medium	19	2	5	0	24	50
	Small	64	5	0	3	10	82
	Very Small (HTR)	199	14	1	20	21	255
TOTAL		293	92	14	45	56	500

The distribution of survey completes does not accurately represent the distribution of the participant population in 2002. For this reason, weights were developed to adjust the results to more accurately represent the distribution of participants across IOU service territory, delivery mechanism and customer size. Out of necessity, "unknown size" was treated as its own category and assigned weights in a similar manner to other customer sizes.

Weights were calculated as the ratio of the number of customers in the population to the number of customers in the survey sample, for a given strata. The resulting weights applied to the Impact Survey data and the Process Survey data are shown in Exhibits 3-10 and 3-11, respectively.

Exhibit 3-10
Weights Applied to Impact Survey Data

Delivery Channel	Csutomer Size	PG&E	SCE	SCE-MCD	SDG&E	SCG
CD Rom	Unknown Size	12	35	-	-	100
	Large	-	-	-	-	-
	Medium	-	-	-	-	-
	Small	13	-	-	-	-
	Very Small (HTR)	20	-	-	-	-
Mail	Unknown Size	15	-	-	-	-
	Large	3	-	-	-	-
	Medium	43	-	-	-	-
	Small	17	-	-	-	54
	Very Small (HTR)	20	-	-	19	97
On Site	Unknown Size	26	67	44	21	-
	Large	12	-	76	-	9
	Medium	21	-	119	-	13
	Small	17	98	148	15	22
	Very Small (HTR)	25	56	-	18	32
Phone	Unknown Size	54	4	-	-	-
	Large	-	-	-	-	-
	Medium	33	-	-	-	-
	Small	24	5	-	-	-
	Very Small (HTR)	24	-	-	-	23
On Line	Unknown Size	-	122	-	-	-

Weights applied to the Participant Process survey data are shown in Exhibit 3-11.

Exhibit 3-11
Weights Applied to Process Survey Data

Delivery Channel	Csutomer Size	PG&E	SCE	SCE-MCD	SDG&E	SCG
CD Rom	Unknown Size	-	106	-	-	-
	Large	-	-	-	-	-
	Medium	48	-	-	-	-
	Small	67	9	-	-	-
	Very Small (HTR)	35	-	-	-	-
Mail	Unknown Size	-	-	-	18	-
	Large	-	-	-	-	-
	Medium	22	-	-	-	-
	Small	11	-	-	-	-
	Very Small (HTR)	16	-	-	11	64
On Site	Unknown Size	17	84	111	24	42
	Large	-	-	114	-	-
	Medium	11	21	71	-	17
	Small	14	98	-	19	39
	Very Small (HTR)	16	87	82	13	70
Phone	Unknown Size	21	5	-	-	-
	Large	-	-	-	-	-
	Medium	33	-	-	-	-
	Small	60	3	-	-	6
	Very Small (HTR)	19	22	-	-	35
On Line	Unknown Size	-	134	-	-	-

A similar approach was used to develop weights for analysis of the Long Term survey data. Exhibits 3-12, 3-13 and 3-14 show the program year 2000 participant population, the distribution of Long Term survey data completes and the weights applied to long term survey data results.

Exhibit 3-12 shows that the program year 2000 population is heavily concentrated in the PG&E service territory. It also has less emphasis in on-site audits than more recent participation patterns.

Exhibit 3-12
Program Year 2000 Participant Population

Customer Size	PGE Mail	PGE On Site	PGE Phone	SCE Mail	SDG&E On Site	All
Large	9	52	5	1	0	67
Medium	59	150	12	17	11	249
Small	345	450	97	210	20	1122
Very Small	1543	462	1705	878	80	4668
Unknown	23	13	14	437	234	721
TOTAL	1979	1127	1833	1543	345	6827

The Participant Long Term survey disposition is presented in Exhibit 3-13.

Exhibit 3-13
Long Term Survey Completes

Delivery Channel	Customer Size	PG&E	SCE	SDG&E	All
Mail	Unknown Size	1	13		14
	Large	0	0		0
	Medium	4	0		4
	Small	28	21		49
	Very Small (HTR)	134	89		223
	All	167	123	0	290
On Site	Unknown Size	0		14	14
	Large	1		0	1
	Medium	11		0	11
	Small	34		1	35
	Very Small (HTR)	29		0	29
	All	75	0	15	90
Phone	Unknown Size	1			1
	Large	0			0
	Medium	1			1
	Small	7			7
	Very Small (HTR)	108			108
	All	117	0	0	117
All	Unknown Size	2	13	14	29
	Large	1	0	0	1
	Medium	16	0	0	16
	Small	69	21	1	91
	Very Small (HTR)	271	89	0	360
TOTAL		**359**	**123**	**15**	**497**

Weights were developed analogously to the Program Year 2002 Impact and Process survey weights. The weights were calculated as the ratio of the number of customers in the population to the number of customers with survey completes in each cell. The resulting weights applied to the Long Term survey data are presented in Exhibit 3-14.

Exhibit 3-14
Long Term Survey Weights

Customer Size	PG&E Mail	PG&E On Site	PG&E Phone	SCE Mail	SDG&E On Site
Large	-	52	-	-	-
Medium	15	14	12	-	-
Small	12	13	14	10	20
Very Small	12	16	16	10	-
Unknown	23	-	14	34	17

Weight development for the general population survey was slightly more complicated. The goal was to develop weights that would allow a comparison between the general population and the participant populations to control for differences in customer size and IOU service territory. Although business type was considered seriously, sample sizes could not support that level of detail. Thus, cells created for general population weights were defined by

customer size and IOU service territory. Unknown size cells in the participant populations were assigned sizes based on the distribution of the known sizes within each IOU service territory. Weights were developed as the ratio of the total number of participants within each cell to the number of general population survey completes. Separate general population weights were calculated for developing comparisons with program year 2002 and program year 2000 results.

3.4   PARTICIPATION PATTERNS

As described above segmentation and reporting schemes were developed to assist in controlled comparisons across surveyed populations. When examining survey results and many of the exhibits throughout the body of this report it is useful to do so in conjunction with the information presented in this section. This section highlights participation patterns that will help the reader interpret segment-specific results. For example, when viewing IOU service territory results, it is important to keep in mind differences in the composition of delivery mechanism and customer size.

Exhibit 3-15 below presents the 2002 participant population size distribution by delivery mechanism. As would be expected, the remote audits (phone, mail and CD-ROM) have larger relative proportions of very small customers, and the on-site has the largest number of medium and large customers.

Exhibit 3-15
Program Year 2002 Distribution of Customer Size by Delivery Mechanism
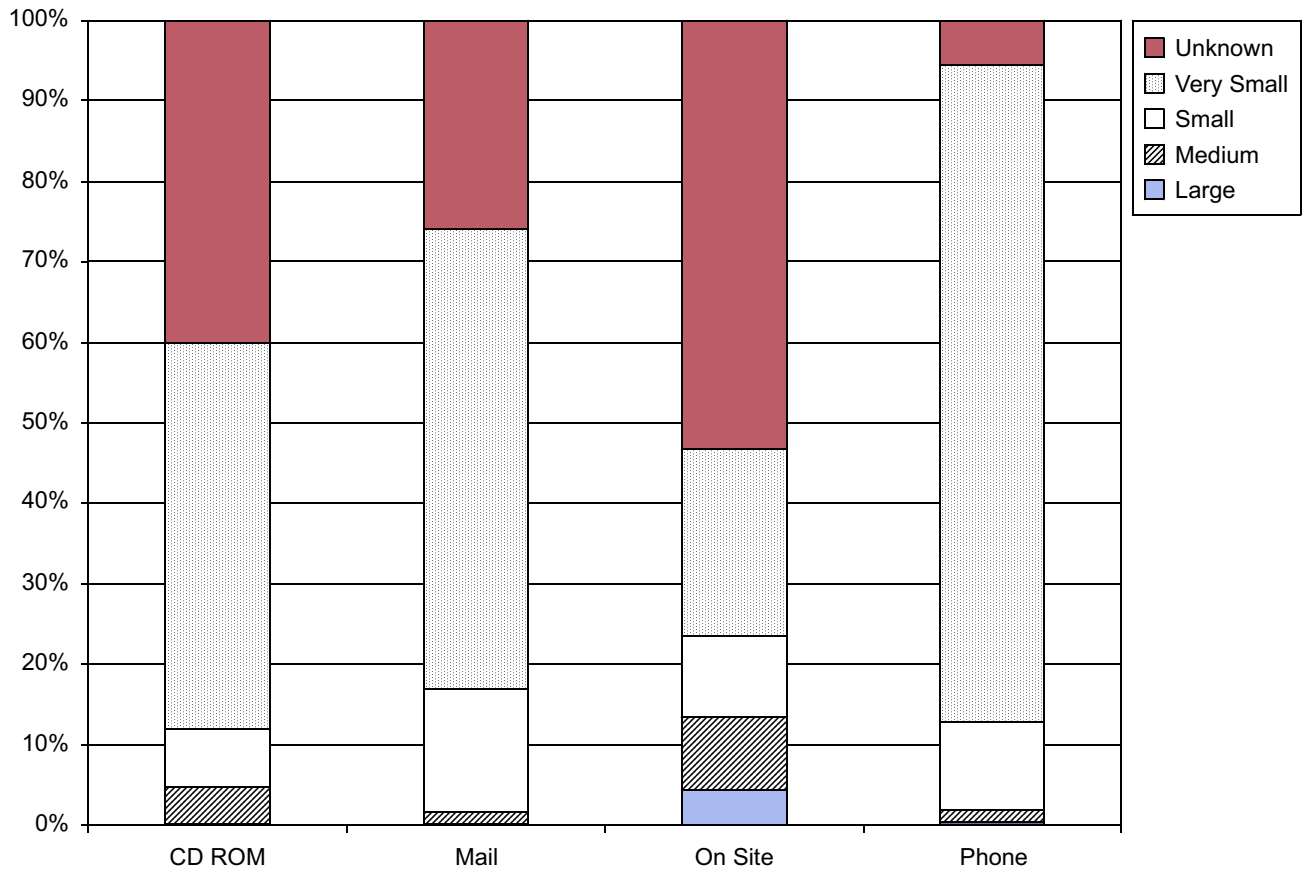
Exhibit 3-16 below underscores the results shown in Exhibit 3-15 above, by displaying the distribution of delivery mechanism for each customer size category. The exhibit shows that medium and large customers almost exclusively participate in the on-site audit, although all customer size categories show a significant on-site component.

Exhibit 3-16
Program Year 2002 Distribution of Delivery Mechanism by Customer Size
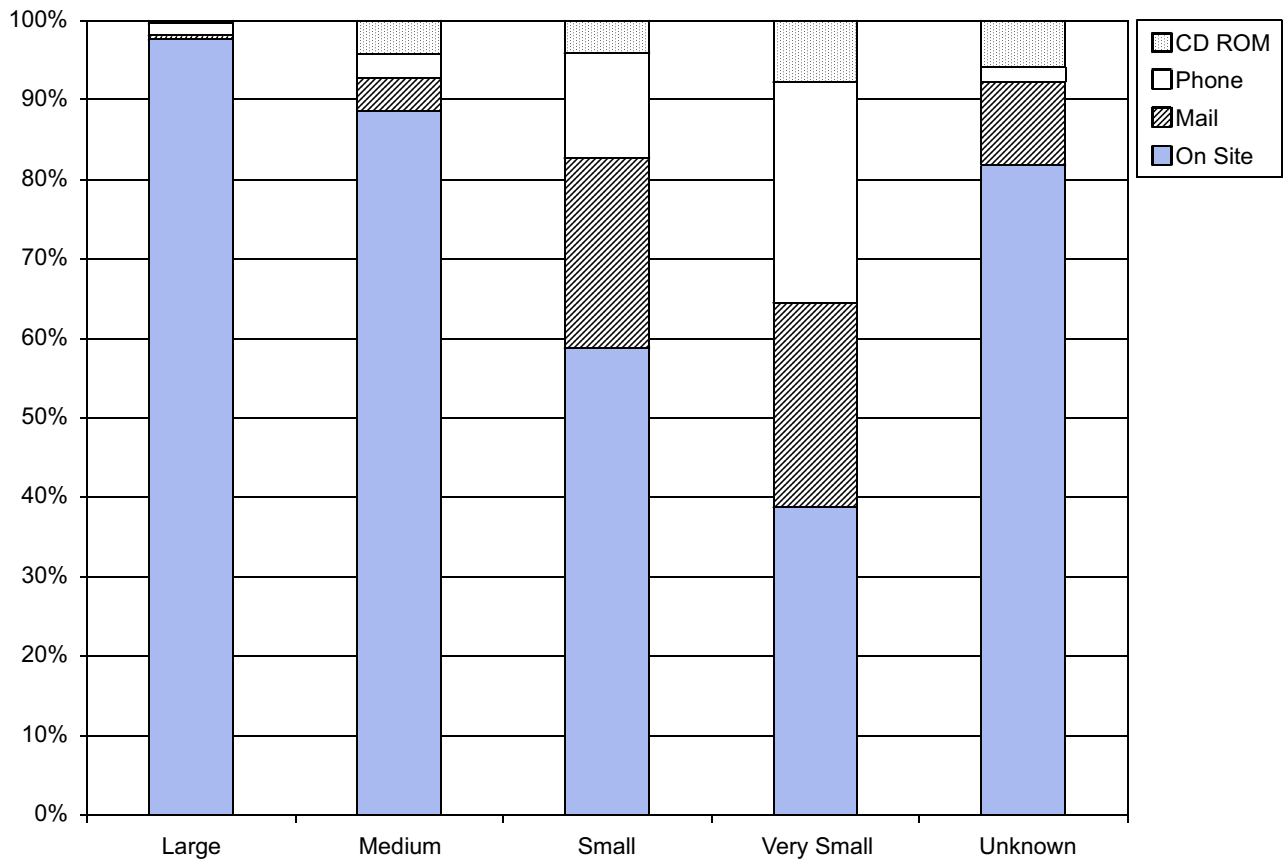
The previous two exhibits have shown results that are fairly intuitive. Program theory and resulting IOU marketing efforts couple larger customers to the on site audit, and smaller customers to CD ROM, online, mail and phone. However, Exhibit 3-17 findings are more interesting and less intuitive. This exhibit shows the distribution of delivery mechanism by IOU service territory. PG&E service territory has a more even distribution across the delivery mechanisms than the other service territories. Thus, when viewing a PG&E result and comparing it with other service territories, it is important to bear in mind that PG&E is has a greater portion of remote audit participation than other IOUs. PG&E did not necessarily complete more remote audits in 2002, but was able to provide these records to the evaluation team, while some other IOUs could not.

Exhibit 3-17
Program Year 2002 Distribution of Delivery Mechanisms by IOU
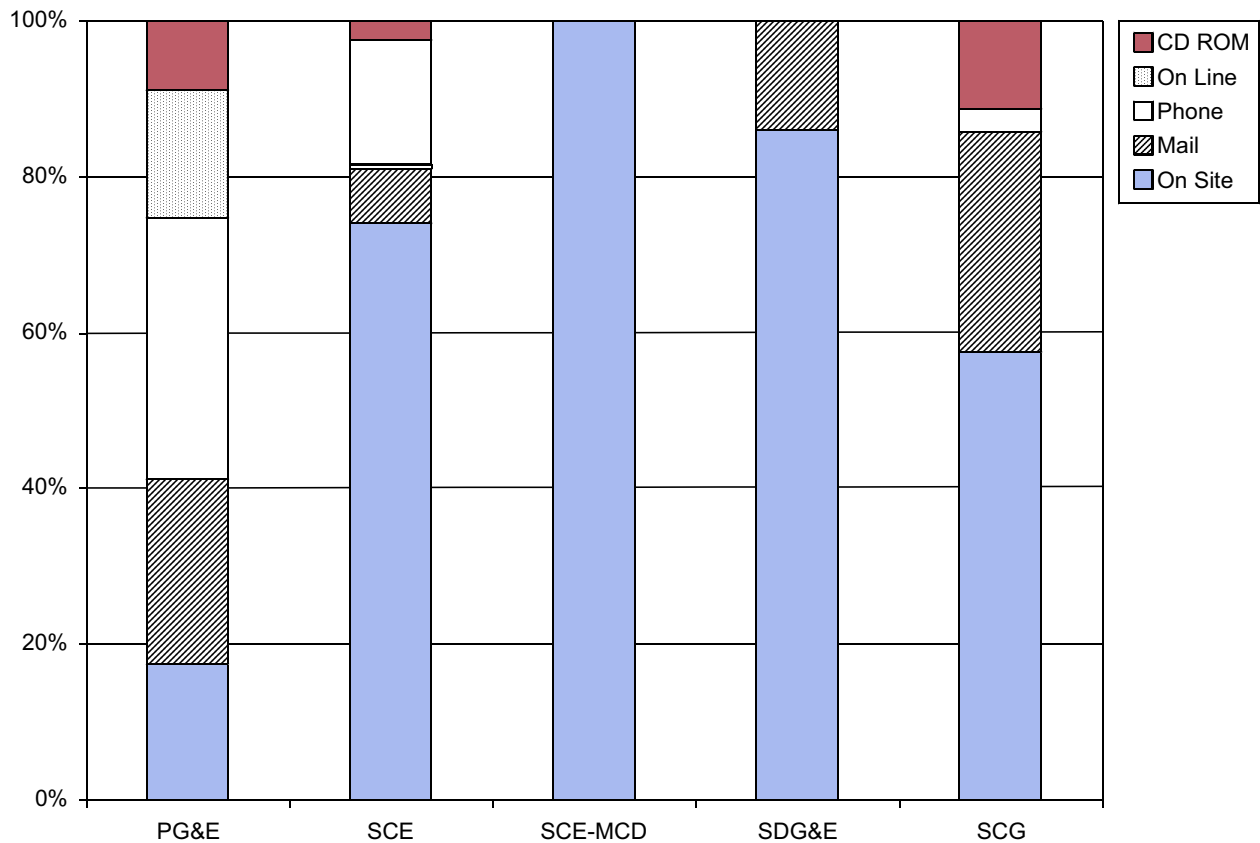
The last exhibit relating to the Program Year 2002 participant population shows the distribution of customer size by IOU. Exhibit 3-18 below shows that PG&E and SCG have the greatest numbers of very small customers. SCE service territory has a very large number of unknown size participants, and while it may be reasonable to assume that the majority of them are very small, this fact remains unknown.

Exhibit 3-18
Program Year 2002 Distribution of Customer Size by IOU
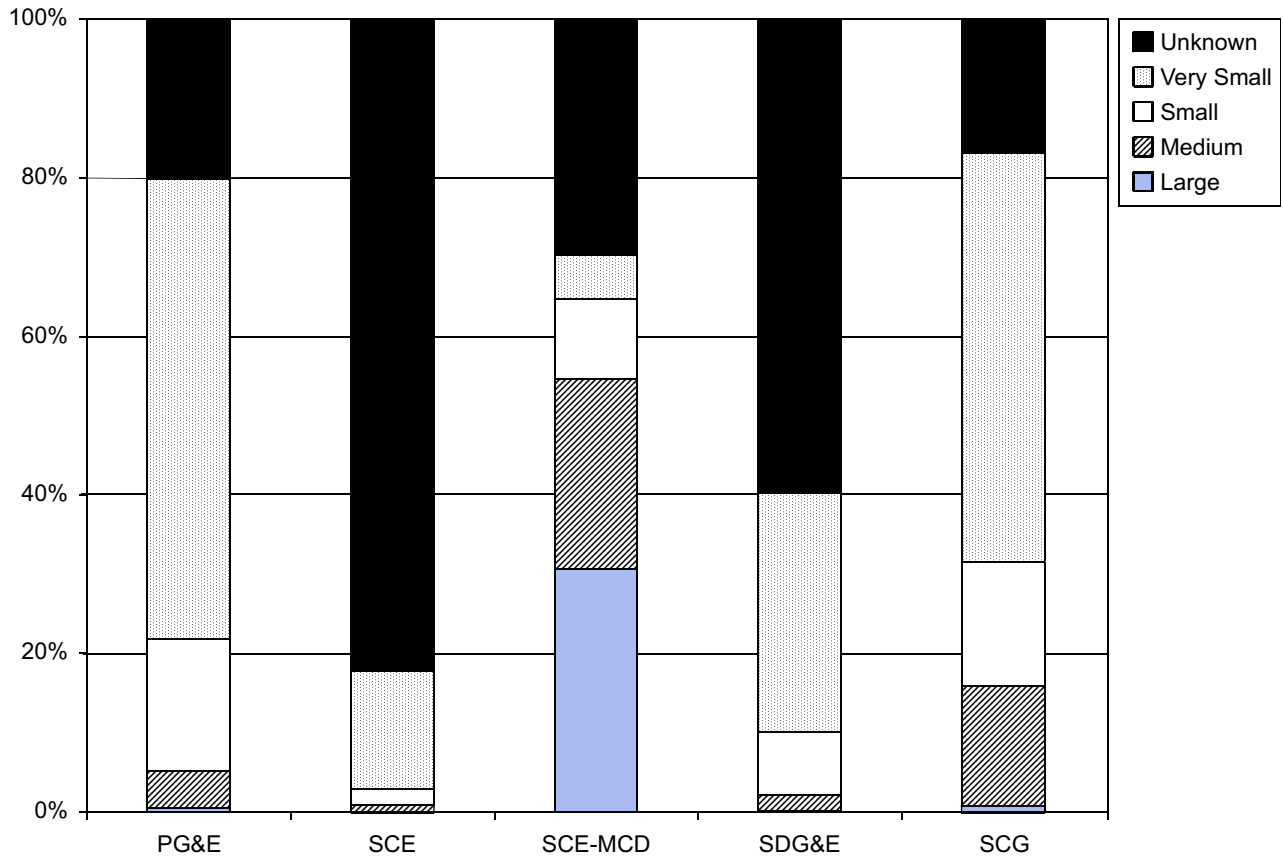
Interestingly, Year 2000 participation is also dominated by very small customers. Exhibit 3-19 below shows the Program Year 2000 distribution of customer size by IOU and delivery mechanism. As expected on-site audits have greater numbers of medium and large customers. The PG&E phone survey is almost exclusively composed of very small customers. The resulting distribution of audits by customer size and type is a function of implementation approach, which is a function of budget and IOU resources.

Exhibit 3-19
Program Year 2000 Distribution of Customer Size by IOU and Delivery Mechanism
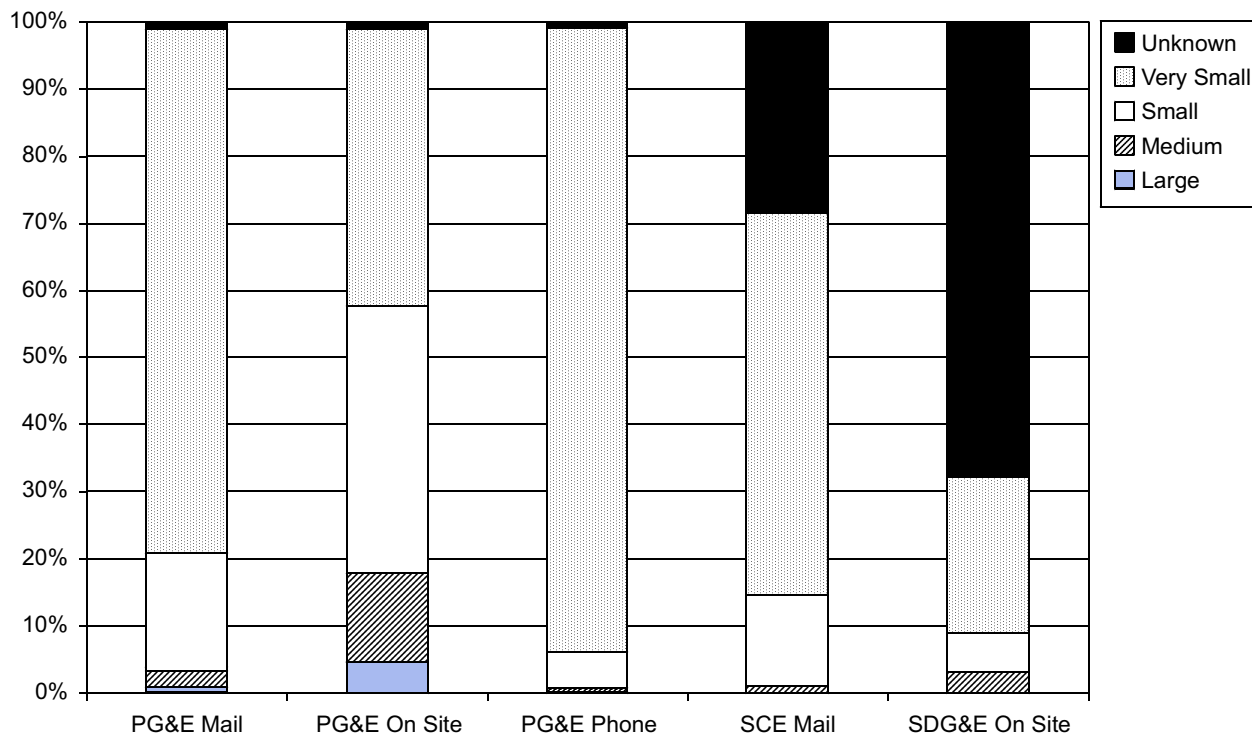
3.5   IMPACT APPROACH

This section presents the comprehensive impact approach applied in estimating impacts for lighting and cooling measures adopted by participants since their participation in the program in 2002. The approach presented in this section was applied to derive the gross impact results for the 2002 Nonresidential Audit Program, presented in *Section 4.2*. The gross impacts presented reflect (self-reported) customer energy efficiency actions taken after the audit. Because the survey was completed during summer 2003, the actions taken are, on average, for about a one-year period following the audit.

Impacts were calculated for the lighting and cooling end uses alone. Attempts to estimate impacts for gas and other measures were unsuccessful, due to inadequate information describing the specifics of the measures installed, for example equipment capacity. Also, no attempt was made to quantify impacts for energy efficiency conservation practices due to insufficient information describing the specific actions taken.

The impact approach applied is a calibrated engineering model for the majority of the lighting measures installed, or a deemed savings model for the remaining measures. The calibrated engineering (CE) lighting end-use models are based on past Commercial Energy Efficiency (CEEI) Evaluation results that made use of end-use metering and other model calibration techniques. On the other hand, the cooling impact model is a simplified engineering model or deemed savings estimate. No billing regression model was applied, a method sometimes used to statistically adjust engineering estimates of savings.

The general approach implemented was to first establish whether or not each self-reported measure was a high efficiency or standard efficiency action, and then reclassify each high efficiency action into a predefined category that is offered under the Express Efficiency program. The advantage to mapping measures is that it allows for the use of accepted impact forecasting methods, based on past evaluations and as documented in Advice Filing documents, program Workpapers and proposals submitted to the CPUC.

3.5.1 Impact Analysis Overview

The impact analyses were carried out in a series of discrete steps, beginning with an analysis of survey self-reports regarding energy efficiency actions taken since the time of the audit and program-related data that are available (tracking systems and hard copy surveys). Program data were then used in conjunction with existing forecasting impact methods, where available, to determine participant-specific estimates of indoor lighting and cooling measures. Hard copy surveys obtained for identified adopters were also examined as a potential impact source and used in conjunction with telephone survey records to determine impacts on a case-by-case basis.

Where available, savings estimates were also compared against customer billing records to ensure reasonableness. Unreasonably high impact results, as a function of customer usage, were re-examined for adjustment using alternate data sources (i.e., audit report-based measure counts vs. self-reported survey measure counts).

Unlike program impact calculation procedures use for retrofit programs, the Audit program impact calculations require additional information regarding the scope of measures adopted, where tracking systems for Express Efficiency, for example, have ample data to support an independent calculation of impacts. In the case of this Audit evaluation, additional information comes from the telephone survey, based on probes of customer measure and practice actions following the program audit. As mentioned above, 500 PY2002 Participant Impact surveys were completed to inform the evaluation regarding post-audit measure implementation.

Demand and Energy Impacts. Gross impacts—kW, kWh and therms—were calculated for the commercial indoor lighting and cooling end uses. Using the impact calculation methods described above, a gross energy, demand, and therm value was calculated for every adopter identified in the telephone survey sample. Refer to *Sections 3.5.2* and *3.5.3* for additional details surrounding the derivation of impacts for the lighting and cooling end uses, respectively.

Sample-based impact results for the 500 survey completes (i.e., average impacts per Audit) were then applied by delivery channel (total number of Audits completed) to extrapolate results to the general Audit participant population.

3.5.2 Lighting End-Use Models

Lighting impact calculation procedures applied in this evaluation are based largely upon intermediate results from the PG&E 1994 and 1995 Commercial Energy Efficiency Incentive (CEEI) studies, with these methods subsequently adopted in PG&E Workpapers filed with the CPUC. The data collection and analysis approach employed in these PG&E evaluations incorporated three key data sources in a nested sample design: lighting logger data, on-site audit data, and telephone survey data. The application of this thorough approach in assessing lighting impacts, and the consistent results achieved in 1994 and 1995, has allowed the continued use of these calibrated engineering results for a number of evaluations and other uses.

The general lighting model specification applied is described next.

General Lighting Model Specification

The general lighting model used to estimate impacts for the Audit program is founded on the decomposition of lighting impacts into manageable impact calculation parameters (referred to as the "impact decomposition approach"). The intermediate lighting model results presented in this section are based on the application of this approach to develop hourly impacts for each of three daytypes, Weekday, Saturday, and Sunday. Those results, applied to CEEI participants in the 1994 and 1995 evaluations cited above, were used to derive mean lighting hours of operation and other segment specific lighting model results, as described below. The impact decomposition equation that was used to estimate unadjusted engineering impacts (UEIs) in 1994 and 1995 is displayed below.

$$UEI_t = [(\Delta UOL * U * OF_t) * T] * [1 + HVAC]$$

Where,

ΔUOL = the technology level change in connected kW associated with a particular measure.

U = the number of measure units installed for a particular application.

OF_t = the operating factor which describes the percentage of full load used by a group of fixtures during a prescribed period of time, t.

T = the time interval for which an impact is estimated; for most measures, the OF term is the engineering parameter that changes significantly over time. Time intervals for lighting estimates were single hours, segmented by hours "on" (open operating factor) and hours "off" (closed operating factor) schedules.[1]

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[1]Although there are periods of time when lights are generally considered off, many lights are either accidentally or purposely left on during these periods. The effective hours of lighting operation captured during these off periods were applied using the operating factor term (the probability that lights operate during a particular time interval).

$HVAC$ = the component of impact associated with both the net savings due to cooling (demand or energy) and the net increase due to heating (energy or therm).

Next, impact model parameters taken from previous PG&E CEEI Program evaluation results, are presented for use in deriving Audit program impacts.

Summary of Existing Results

Past evaluation results were used to derive full load hours of operation, coincident diversity factors (CDFs) and HVAC interactive effects. Unit change in connected load is based on recently filed Workpapers, describing baseline technology assumptions for each measure and the change in operating load, given a program qualifying Express Efficiency measure. While the application of lighting impact methods presented in this next section are taken from PG&E Workpaper filings submitted to the CPUC, the methods and assumptions are generally accepted by the other IOUs.

Annual Hours of Operation - Annual hours of operation for lighting systems are presented in Exhibit 3-20; an excerpt from 2003 PG&E Workpaper filings submitted to the CPUC.

Exhibit 3-20
Annual Hours of Lighting System Operation by Business Type

Market Sector	Annual Operating Hours
Office	4,000
Retail	4,450
College	3,900
School	2,150
Grocery	5,800
Restaurant	4,600
Health Care/Hospital	4,400
Hotel/Motel	5,500
Warehouse	3,550
Process Industrial	6,650
Assembly Industrial	4,400
All Other	4,500

Coincident Diversity Factors (CDFs) - Exhibit 3-21 presents coincident diversity factor results for the indoor lighting end-use, representing the probability of fixture operation coincident with the system peak hour.

Exhibit 3-21
Peak Hour Lighting Coincident Diversity Factors by Business Type

Market Sector	Coincident Diversity Factors
Office	0.81
Retail	0.88
College	0.68
School	0.42
Grocery	0.81
Restaurant	0.68
Health Care/Hospital	0.74
Hotel/Motel	0.67
Warehouse	0.84
Process Industrial	0.99
Assembly Industrial	0.92
All Other	0.76

HVAC Interactive Effects - Exhibit 3-22 presents mean electric HVAC energy adjustment factors by business type, that describe the ratio of total fixture and HVAC impacts to fixture-only impacts. These adjustments are applied by business type to estimates of technology-only lighting impacts, yielding total impact estimates that include an HVAC interactive component.

Exhibit 3-22
HVAC Electric Energy Impact Adjustments by Business Type

Market Sector	Energy Interactive Effects
Office	1.17
Retail	1.11
College	1.15
School	1.15
Grocery	1.13
Restaurant	1.15
Health Care/Hospital	1.18
Hotel/Motel	1.14
Warehouse	1.06
Process Industrial	1.01
Assembly Industrial	1.04
All Other	1.08

Exhibit 3-23 presents mean HVAC summer on-peak demand adjustment factors by business type, representing the peak hour HVAC interactive adjustment to lighting impacts.

Exhibit 3-23
HVAC Electric Demand Impact Adjustments by Business Type

Market Sector	Demand Interactive Effects
Office	1.25
Retail	1.19
College	1.22
School	1.23
Grocery	1.25
Restaurant	1.26
Health Care/Hospital	1.26
Hotel/Motel	1.14
Warehouse	1.09
Process Industrial	1.02
Assembly Industrial	1.08
All Other	1.13

Lastly, Exhibit 3-24 presents mean natural gas HVAC energy impact calculation factors by business type, representing expected natural gas heating interactive impacts as a function of electric energy impacts. While this adjustment was never formally incorporated within PG&E Workpaper filings, these evaluation results, stemming from the 1995 PG&E CEEI evaluation were incorporated within the *Chapter 4* impacts calculations, but represent a relatively small effect of lighting equipment change from standard to high efficiency.

Exhibit 3-24
HVAC Natural Gas Energy Impact Calculation Factors by Business Type

Market Sector	Gas Heating Interactive Effects (Therm/GWh)
Office	-0.39
Retail	-0.26
College	-0.11
School	-0.43
Grocery	-0.09
Restaurant	-0.46
Health Care/Hospital	-0.19
Hotel/Motel	-0.05
Warehouse	-0.06
Process Industrial	0.00
Assembly Industrial	0.00
All Other	-0.08

Per-Unit Lighting Change in Connected Load

A summary of per-unit change in connected load results are presented in Exhibit 3-25 for high efficiency measures that were adopted by Audit participants. Per-unit change in connected load estimates, including those depicted here, were used in conjunction with the existing CEEI models just presented, to determine individual customer kW, kWh and therm impacts for participants that reported adopting those measures. These impact model inputs are based on PG&E Workpaper filings.

Exhibit 3-25
Per-Unit Change in Connected Load and Deemed Savings for the Lighting Measures

Lighting Technology Description	Units	Per-Unit Change in Connected Load (Watts)	Per-Unit Annual Energy Savings (kWh)	Estimate Source
CFL exit sign	lamp	20	*	PG&E Workpapers, Study 404A
LED exit sign	lamp	36	*	PG&E Workpapers, Study 404A
Install reflectors/fluorescent lamp removed	lamp	43	*	PG&E Workpapers, Study 404A
13 W CFL	lamp	45	*	Tracking system, PG&E Workpapers, Study 404A
18 W CFL	lamp	57	*	PG&E Workpapers, Study 404A
2-lamp 4' T8	lamp	10	*	PG&E Workpapers, Study 404A
2.5-lamp T8/T5	lamp	9	*	PG&E Workpapers, Study 404A
3 lamp 4' T8	fixture	31	*	Hard copy audit, PG&E Workpapers, Study 404A
Electronic ballast	lamp	7	*	PG&E Workpapers, Study 404A
250 W metal halide	lamp	159	*	PG&E Workpapers, Study 404A
Bypass timers	timers		412	1996 PG&E CEMS Evaluation
Occupancy sensors	sensors		827	1996 PG&E CEMS Evaluation
Photocells	photocells		99	1996 PG&E CEMS Evaluation
Time clock	time clocks		439	1996 PG&E CEMS Evaluation

* Energy impacts vary by business type segment.

3.5.3 Cooling End-Use Deemed Savings Estimates

The cooling impact analysis is based largely upon deemed savings estimates obtained from 2004/2005 IOU Express Efficiency Program proposals that were submitted to the CPUC in 2003. However, estimates also reflect customer self-reported adoptions and other data obtained from individual hard copy audit reports, on a customer-by-customer basis.

Selected Per-Unit Cooling End-Use Results

A summary of per-unit cooling impacts is presented in Exhibit 3-26 for measures that were adopted by Audit participants, according self-reports from the PY2002 Impact Survey. These impacts reflect a typical installation, without differentiation by business type. Furthermore, these impacts are diversified estimates, reflecting typical customer behavior.

Exhibit 3-26
Per-Unit Impacts for the Cooling End-Use

Cooling Technology Description	Units	Per-Unit Summer Demand Impact (Watts)	Per-Unit Annual Energy Impact (kWh)	Per-Unit Annual Natural Gas Impact (therm)	Estimate Source
Direct evaporative cooler	tons	714	1,075	0	PG&E 2004/5 Express Program Proposal
Evaporative cooled condenser	tons	480	2,828	0	SCE 2004/5 Express Program Proposal
Evaporator fan controller	controller	0	2,216	0	Hard copy audit
Setback programmable thermostat	thermostat	0	1,181	274	(Adjusted) Utility 2004/5 Express Program Proposals
Split system air conditioner <65,000 Btuh	ton	165	224	0	PG&E 2004/5 Express Program Proposal
Packaged air conditioner <65,000 Btuh	ton	193	263	0	PG&E 2004/5 Express Program Proposal
Packaged air conditioner <65,000 Btuh	ton	254	620	0	SCE 2004/5 Express Program Proposal
Split system air conditioner <65,000 Btuh	ton	217	529	0	SCE 2004/5 Express Program Proposal
Packaged air conditioner 65,000 to 135,000 Btuh	ton	106	259	0	SCE 2004/5 Express Program Proposal
Split system air conditioner 135,000 to 240,000 Btuh	ton	115	281	0	SCE 2004/5 Express Program Proposal
Packaged air conditioner 240,000 to 756,000 Btuh	ton	126	307	0	SCE 2004/5 Express Program Proposal
Condenser coil cleaning	NA	0	2,628	0	Tracking system
Refrigeration replacement	NA	0	1,254	0	Tracking system
0.50 kW/ton water-source chiller	tons	150	600	0	ASHRAE 90.1
Variable speed drive	horsepower	0	753	0	PG&E 2004/5 Express Program Proposal

3.6 KEY FINDINGS

The composition of survey samples are in large part dictated by available sample. The resultant survey completes are not evenly distributed by IOU or delivery mechanism, but do represent a best effort given sample constraints. The 2002 participant population is concentrated in on-site survey customers, and in PG&E customers. PG&E program tracking records are more diversified by survey type than other IOU records.

Tracking system records provided for this evaluation were incomplete. This has an impact on the types of weights and stratification available for the analyses presented in the chapters that follow. Some of the more pertinent fallout from these data shortfalls includes analysis weights created for "missing data" size segments and a participant sample population not fully reflective of the true population. In addition, there are low survey response rates where contact information was poor. Results for the CD ROM and online surveys should be interpreted with caution given the small resultant sample sizes for these strata. Going forward the utilities could identify "required" tracking system fields that must be filled-out, thus ensuring, for example, improved contact data and the inclusion important analysis merge keys.

4. IMPACT ASSESSMENT

This section presents the results of the 2002 Audit Program impact assessment. It presents energy and demand savings attributable to the program, and examines savings across a variety of significant program segments. An over-arching objective is to reveal any patterns in audit program impacts that might emerge by delivery mechanism, customer size and IOU service territory. More specifically, this section seeks to:

- Assess participant measure and practice adoptions and compare those adoptions with a nonparticipant baseline group.

- Quantify program impacts by combining participant measure adoption data with deemed savings.

- Explore the influence of audits on customers' likelihood to adopt energy efficiency measures and undertake conservation actions.

- Complete a 'gap' analysis that contrasts the portfolio of recommendations with self-reported participant adoptions.

4.1   PARTICIPANT MEASURE AND PRACTICE ADOPTION

The impact survey of 2002 participants was fielded to collect detailed information regarding the adoptions of equipment and energy saving practices. In this section measure and practice adoption data are presented to characterize the impact of the program on energy efficiency actions.

The section is organized by end-use, with separate discussions for each of four major end uses: lighting, cooling, gas appliances and other equipment. This is followed by a discussion of conservation practices in the participant and nonresidential general populations.

Gross measure adoption rates in the participant population are compared with nonparticipants. For a cleaner, simpler characterization of program effects, nonparticipants are selected for the comparison group rather than the general population. Participants in the Express Efficiency, SPC and Audit programs were removed from the general population to create this nonparticipant group. Nonparticipants are also used as a comparison group to examine technologies adopted, and the average adoption size per customer. General population results are shown in the appendix, and indicate the level of energy efficiency activity occurring in the population at large that is comparable to the participant population distribution by size and IOU service territory.

The data are displayed using two primary segmentation schemes. The first is geared towards comparisons with the nonparticipant group, and includes facility size, business type and IOU service territory. It also includes hard-to-reach categories including rural, renter, and facilities whose primary language is not English. For a given exhibit business type and size segments

are excluded due to small sample sizes in the participant survey; for example, large facilities are combined with medium-sized facilities for this reason.

Note, when examining IOU service territory results, the reader should bear in mind that each utility has a unique distribution of program accomplishments by audit delivery mechanism. Thus a utility-specific result may, for example, reflect differences in delivery mechanism success. The distribution (among survey respondents) of delivery mechanism within each IOU service territory is shown in chapter 3 and the implications are discussed here to assist the reader with these distinctions.

The second segmentation scheme shows results by IOU and audit delivery mechanism. These are reported wherever a significant number of participant survey responses were obtained. Note that some delivery mechanisms target certain customer size categories. For example, on-site audits are geared to serve larger customers, while mail surveys are thought to be a more appropriate or cost-effective delivery mechanism for smaller customers. These sample differences should be kept in mind when drawing comparisons.

4.1.1   Lighting Measure Adoptions

This section discusses the adoption of lighting measures by audit participants, and compares these adoptions to nonparticipants to reveal program effects over a baseline. The lighting end use provides the strongest evidence of program impacts of the four end-use categories (and conservation measures) examined in this section. As demonstrated below, energy efficient lighting activity in the participant population is consistently greater than is found among nonparticipants.

Exhibit 4-1 compares participant and nonparticipant lighting adoption rates. In nearly every segment, participant adoption rates notably exceed nonparticipant adoption rates. The pattern of results highlights success in the program-emphasized HTR segments. Small, rural and renter segments outperform their nonparticipant counterparts. The HTR success is in large part due to stellar performance of the PG&E audit in these markets. The PG&E lighting adoption rate among HTR facilities is 31 percent. Among only very small facilities it is 30 percent. These rates are significantly in excess of comparable nonparticipants. Other segments that stand out as having a particularly strong lighting impact include: small facilities, offices, retail stores, and restaurant/grocery stores.

Exhibit 4-1
Lighting Equipment Adoption Rates – Participant versus Nonparticipant
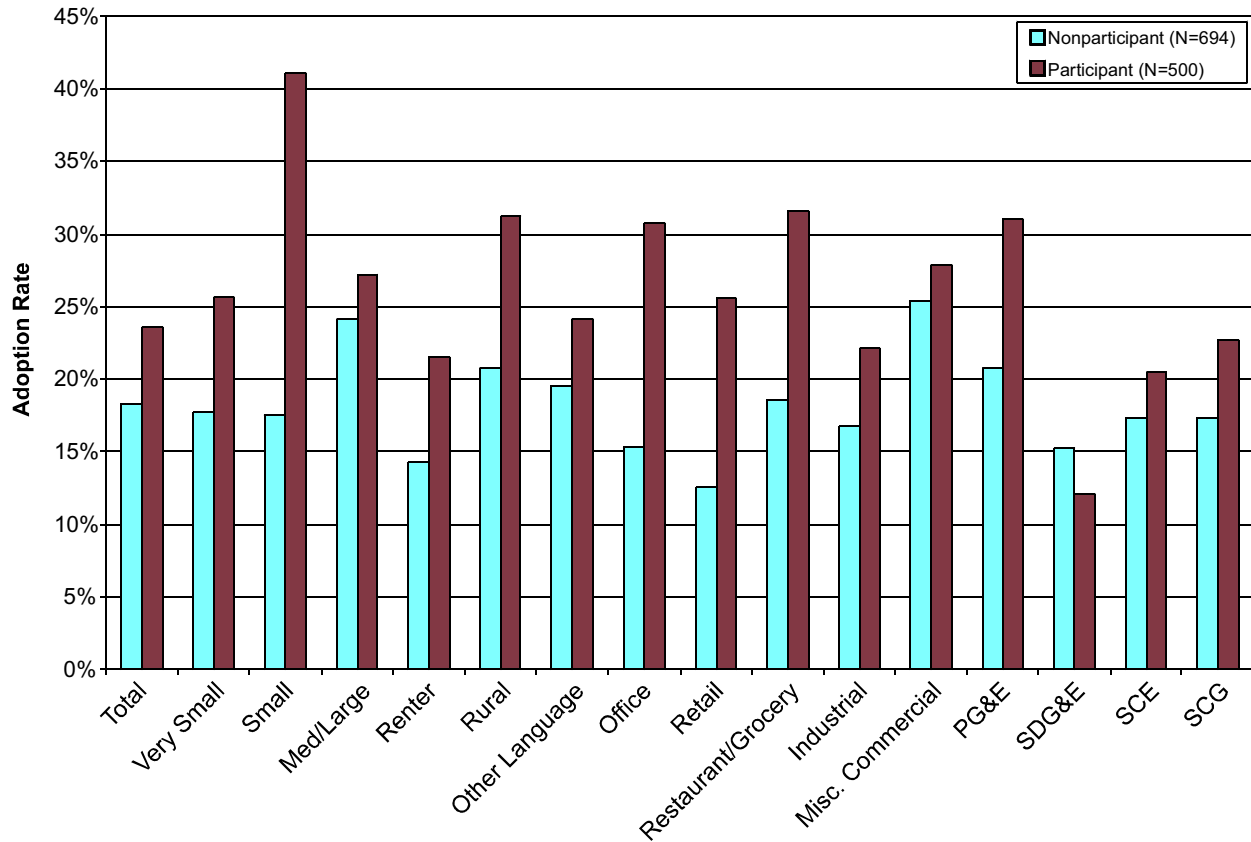
Exhibit 4-2 presents lighting adoption rates by IOU and delivery mechanism[1]. Phone and mail audits show strong results; both category respondents are primarily PG&E customers. The greatest lighting success lies in PG&E's on-site audit and the SCE MCD on-site audit. The SCG on-site result is solid as well, although the adoption rate yield is lower. The remaining types of on-site audits, the SCE Vendor and SDG&E are considerably less successful, resulting in an overall on-site result that lies below both phone and mail overall results. Note that both the SDG&E and the SCE vendor on-site audits concentrate on very small facilities. This shows that on-sites for very small facilities are less cost-effective.

Exhibit 4-2
Lighting Adoption Rates by Utility and Delivery Mechanism

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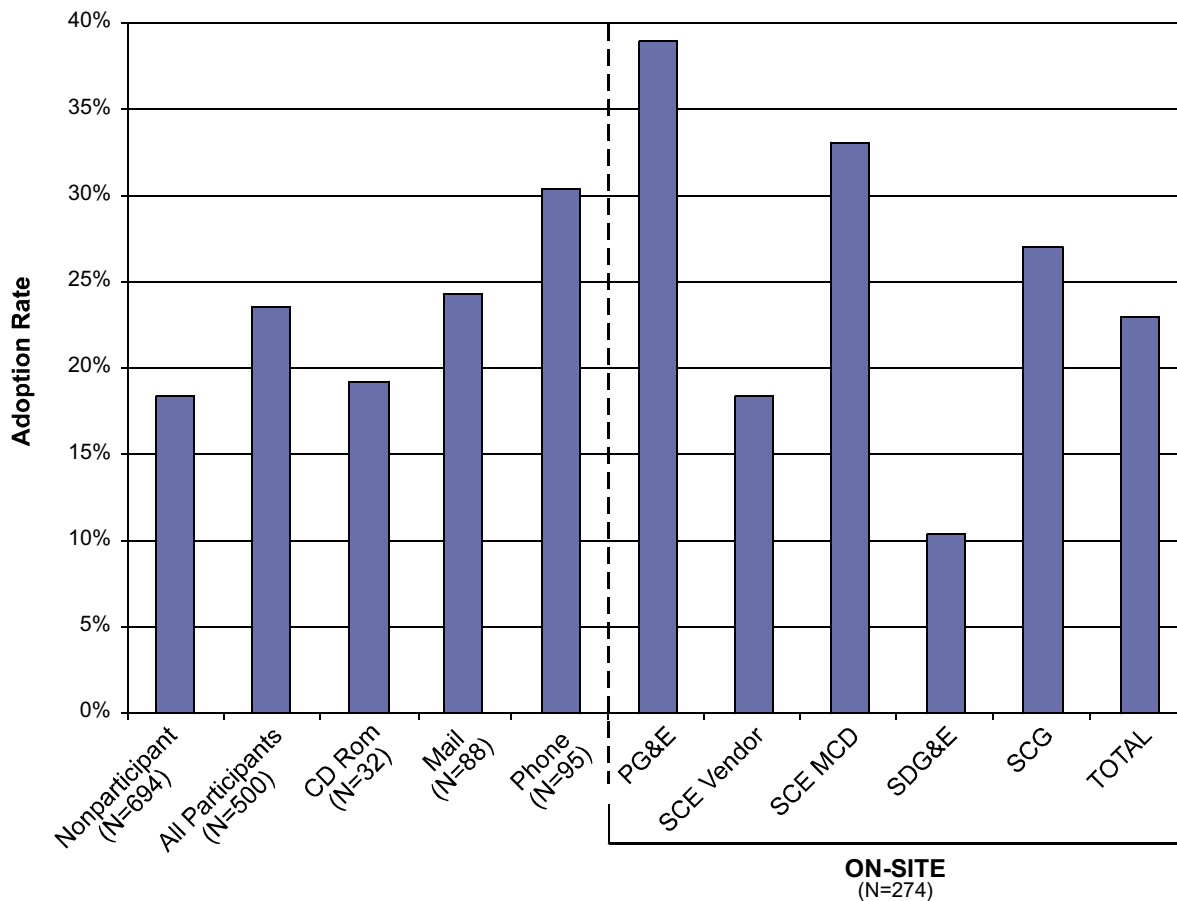
[1] To see the breakdown of adoption rates by measure type, refer to Appendix A, ExhibitsA-3 and A-4.

Next, we examine the pattern of lighting technologies adopted by participants and nonparticipants. Exhibit 4-3.a participant distribution and Exhibit 4-3.b nonparticipant distribution show that not only are participants adopting lighting technologies more frequently, they are adopting more high efficiency technologies than nonparticipants. The standard efficiency T10 and T12 fluorescent tubes, incandescent and magnetic ballast adoptions comprise 10 percent of participant adoptions, while they are 17 percent of nonparticipant adoptions. Participants are installing CFLs at a significantly higher rate than nonparticipants, 34 versus 19 percent.

Exhibit 4-3.a
Participant Lighting Adoptions by Technology

Participants
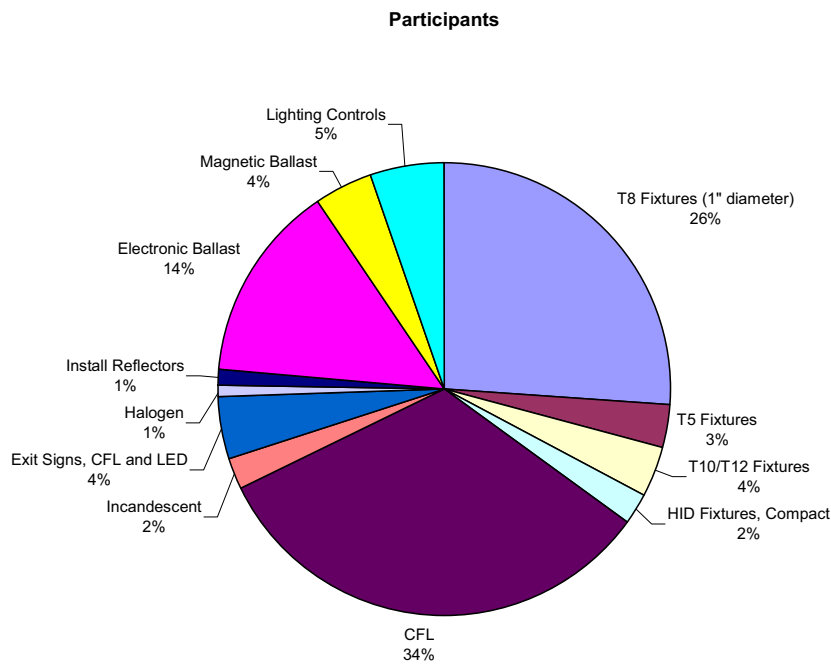
Nonparticipant Lighting Adoptions by Technology
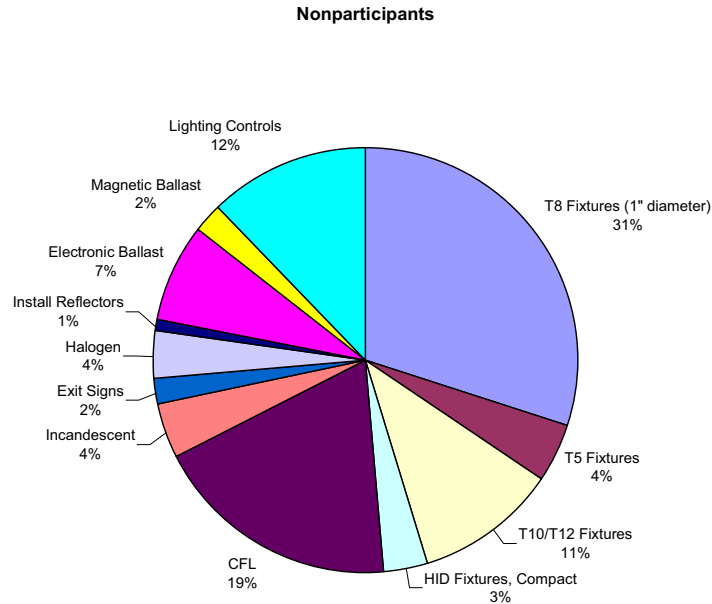
Nonparticipants

Another essential characteristic of participant lighting impacts is the average size of lighting installations. Exhibit 4-4 below shows the average size of installations made in the participant and nonparticipant populations for the most often installed technologies. Overall, Participants are making somewhat smaller installations of T8, CFL and electronic ballasts, but somewhat larger installations of lighting controls. However, the activity in the two populations is occurring in very different size segments. The average square feet[2] of the facilities contributing to the calculation of installation size is also shown in the table below. Participants are significantly smaller in size than nonparticipants, showing clearly that the program is successfully moving the HTR market. The number of items installed per square foot is higher for the participants than nonparticipants for all technologies except electronic ballasts.

Exhibit 4-4
Average Size of Lighting Installations
Reported by Participants and Nonparticipants

Technology	Participant				Nonparticipant			
	Avg Install Size	N	Avg Sq Feet	Items Per 1,000 Sq Feet	Avg Install Size	N	Avg Square Feet	Items Per 1,000 Sq Feet
T8 Fixtures (1" diameter)	46.5	16	18,222	2.6	57.0	25	42,489	1.341
CFL	52.7	48	9,687	5.4	53.7	29	18,557	2.892
Electronic Ballast	33.5	13	19,104	1.8	78.4	8	28,752	2.726
Lighting Controls	23.5	10	39,635	0.6	17.9	14	51,614	0.347

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[2] The calculation of square feet is based upon self reported survey data.

When the rate of adoption is combined with the average size, the result is a proxy for net program impacts. The data shown in Exhibit 4-5 provides a normalized comparison of activity in the two populations: participant and nonparticipant. The difference between lighting adoption activity in the two populations overall is moderate, with an average number of items installed per respondent of 13 versus 11. However, when focused on high efficiency activity, participants exceed nonparticipants by a more substantial margin, with an average number of items installed per respondent of 11 versus 7. The technology-specific results reveal that the program impact is generated primarily in CFL installations. Activity within the T8 and electronic ballast technologies is greater in the participant than nonparticipant populations, but not by a significant margin.

Exhibit 4-5
Average Number of Items Installed per Respondent
As Reported by Participants and Nonparticipants
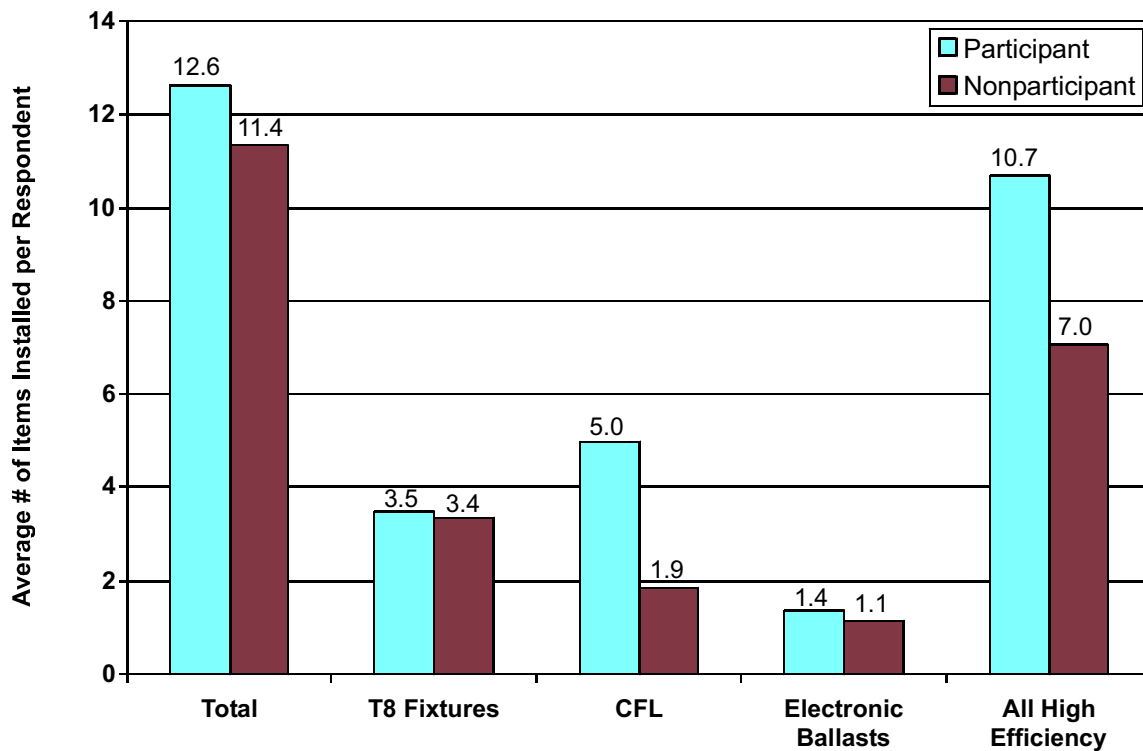
*Fixtures, lamps, ballasts, etc. calculated as percent of population that adopted lighting x percent of lighting adopters who adopted each technology x average installation size = average install per customer.
**Efficient equipment includes T8's, T5's, CFL's, electronic ballasts, and exit signs.

4.1.2 Cooling Equipment Adoptions

As shown in Exhibit 4-6 participants have a higher overall rate of cooling equipment adoption than nonparticipants by just a modest margin. Some segments show enhanced adoption rates, while others show little or no improvement.

Exhibit 4-6
Cooling Equipment Adoptions – Participant versus Nonparticipant
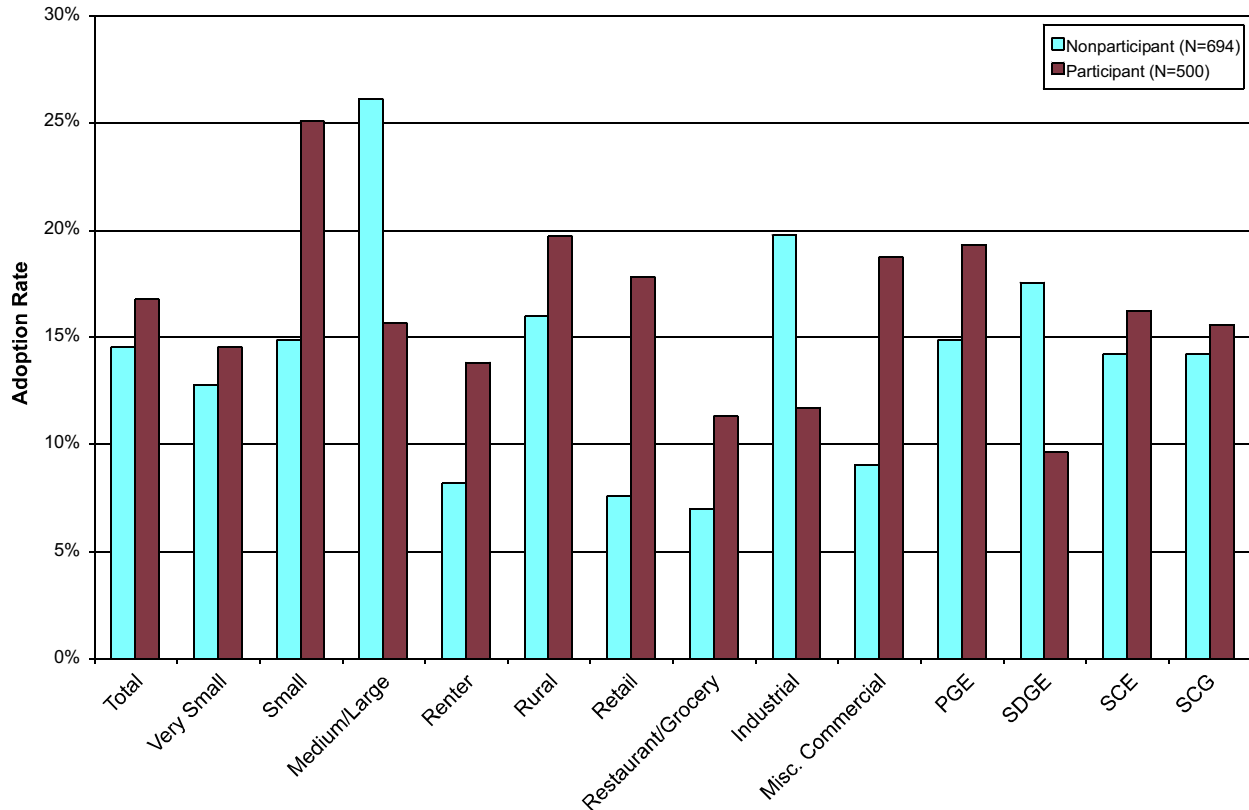
There is a lot of activity among nonparticipants in the medium/large and industrial categories. We will see later on that the participants in these categories are overwhelmingly favoring motors and insulation retrofits. The low rate of participant adoption of cooling technologies suggests that these motors and insulation adoptions to some extent were done in lieu of cooling adoptions.

Similar to lighting, the pattern of results highlights success in the program-emphasized HTR segments. Very small, rural and renter segment outperform their nonparticipant counterparts. The HTR success is again in large part due to the performance of the PG&E Phone, Mail and On-Site audits in these markets. HTR facilities in PG&E service territory have a cooling equipment adoption rate of 19 percent – well in excess of comparable nonparticipants (13 percent). The rate for PG&E very small facilities is still greater than nonparticipants, but not by as much, 15.5 percent, contributing to the lower overall rate for very small shown in the previous exhibit. The HTR rates measurably surpass comparable rates among nonparticipants.

Other segments that stand out as having a particularly strong cooling impact include: small facilities, offices, retail stores, and restaurant/grocery stores. These are the same segments that stood out for their lighting adoption rates.

Exhibit 4-7, below, shows cooling adoption rates by IOU and audit type. Not surprisingly, there continue to be many similarities between cooling and lighting. Again the remote audits perform very well, challenging the on-site audit in overall effectiveness. Phone and mail audits show uniformly strong results that exceed nonparticipant adoption rates by a notable margin. The on-site audits show mixed results. The PG&E on-site audit is very strong, and the SCG result is again solid. Unlike cooling the SCE MCD audit rate is relatively low. As mentioned previously, these customers have very high rates of motors and insulation adoptions. It appears that these adoptions were favored over cooling in the MCD audit recommendations. The SCE vendor on-site cooling adoption rate, 13 percent, is comparable to the nonparticipant rate among very small facilities. Overall results for CD Rom are better than expected, although this result is based on a relatively small number of survey completes.

Exhibit 4-7
Cooling Adoption Rates by Utility and Delivery Mechanism
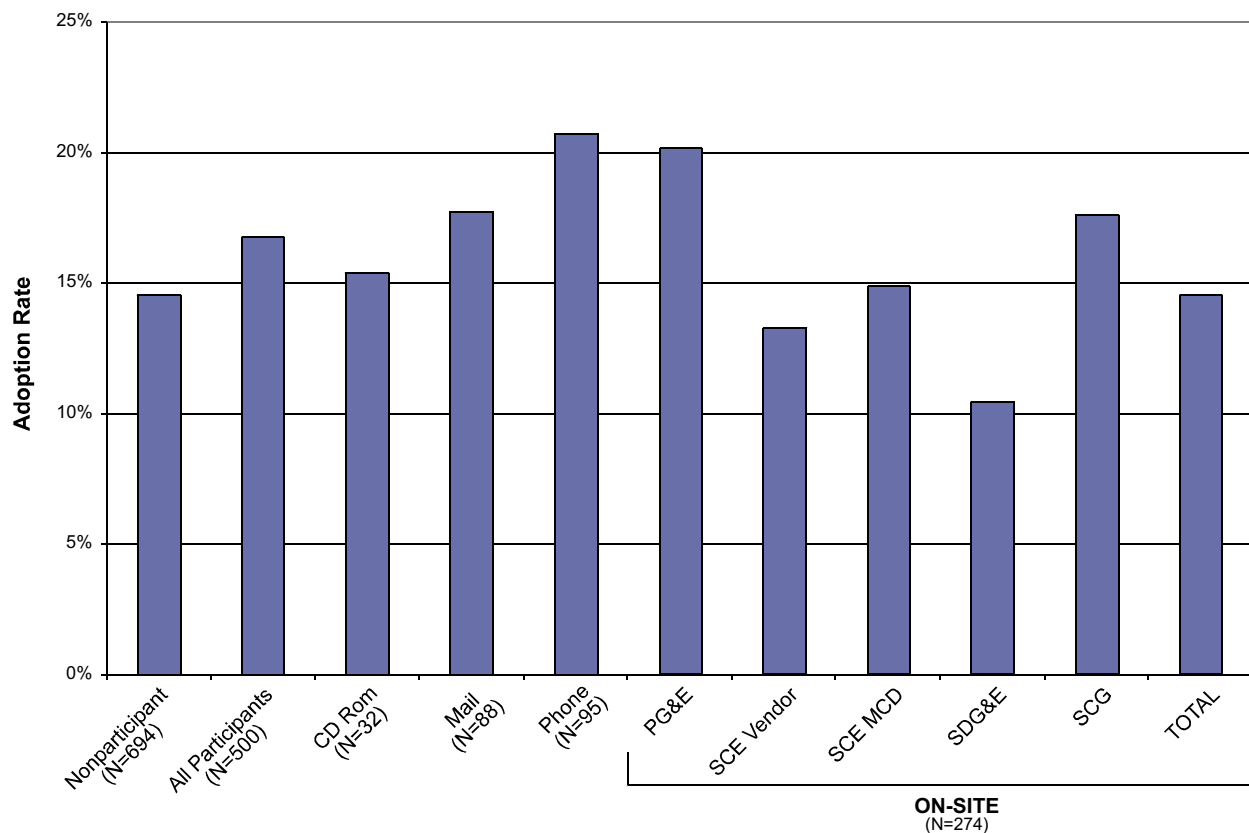
It is very important to note follow up activities by PG&E explain a large part of the cooling equipment performance of the on-site and phone audits. Among PG&E on-site customers, the cooling adoption rate for those that received a follow up call is 28 percent, while PG&E on-site customers that did not received a call have an adoption rate of 15 percent. For PG&E phone

audits, those that received a follow up call had a cooling adoption rate of 41 percent[3], versus 15 percent for those who did not. Interestingly, the difference is not nearly as apparent for lighting adoptions where barriers are lower than those that exist for more complex and higher cost cooling measures. Furthermore, lighting measures are more strongly emphasized in the written audit reports, requiring less prodding to encourage lighting adoptions.

Next we examine the types of cooling equipment technologies adopted in the participant and nonparticipant populations. Exhibit 4-8.a and 4-8.b below shows the distribution of cooling technologies within each population. Both participants and nonparticipants are primarily adopting air conditioners and controls, with AC adoptions more common among nonparticipants and controls more common among participants. Overall, the nonparticipant technology mix looks broader and somewhat more customized and advanced (such as EMS and TES), while participant adoptions are somewhat more conservative. This is likely a result of a less than proportional representation of HVAC measures in the Audit recommendations. The sample of PG&E on-site and phone audits show the portion of recommendations made in HVAC technologies to be lower than the percent of adoptions. Thus, the fact that Participants did less HVAC could be due to audits not pushing for such enhancements, which could either be due to auditors not finding good opportunities in HVAC and/or audits not focusing on more complex process changes. Refer to the *Section 4.4 Gap Analysis* for a full discussion of these issues.

Exhibit 4-8.a
Participant Cooling Adoptions by Technology

Participant Cooling Equipment Purchases

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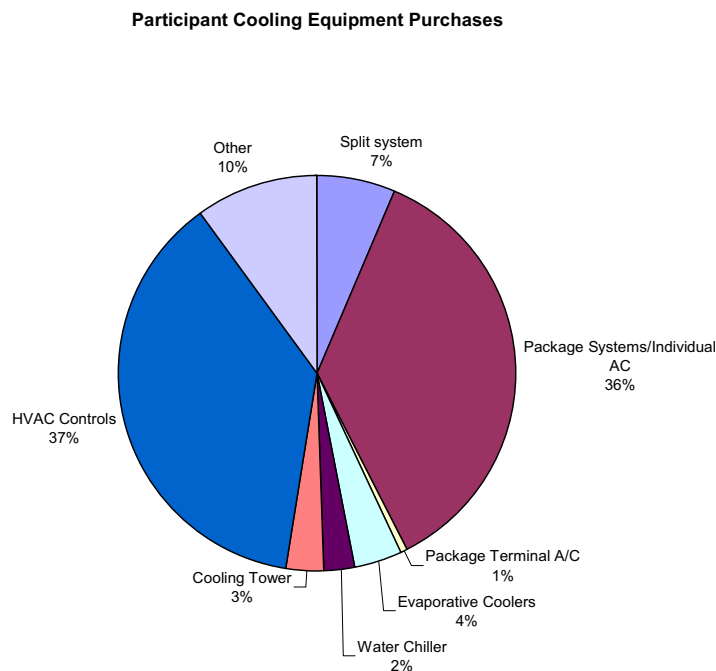
[3] The number of respondents contributing to this calculation is 19.

Exhibit 4-8.b
Nonparticipant Cooling Adoptions by Technology

Nonparticipant Cooling Equipment Purchases
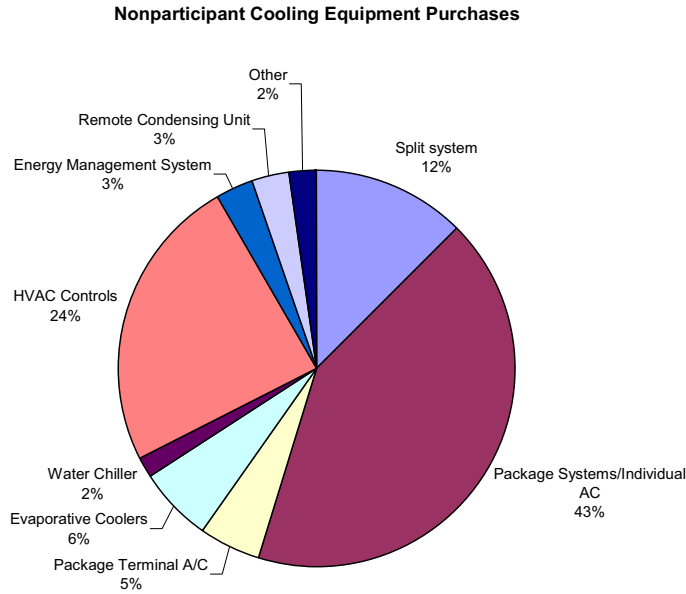
The exhibits shown above characterize cooling equipment adoption activity by segment, but they don't adequately examine the efficiency of adopted equipment and the volume of those installations. Exhibit 4-9 presents adoption rates for high efficiency equipment. The exhibit shows that participants are adopting high efficiency equipment at a higher rate than nonparticipants, 11.5 versus 9.6 percent, respectively.

Most segments show strong results in Exhibit 4-9 below. Adoption rates are highest among Phone and CD Rom customers. While the phone result can be explained by PG&E's follow up efforts, the same cannot be said for CD Rom, but the sample size for the latter is considerably smaller (32 versus 95.)

Another item not to miss in this exhibit is the SCE MCD result. The rate of energy efficient cooling adoptions (14.9 percent) is nearly as high as the total cooling adoption rate (15 percent) showing nearly a complete selection of energy efficient technologies over standard.

The SCE MCD, PG&E and SCG on-site audits are comparable to the best performers, while the two on-sites directed towards the smallest facilities, the SCE vendor and SDG&E, under-perform. These two audit types are focused on the smallest customers, with 85 and 77 percent very small facilities, respectively. In contrast, PG&E, SCG and SCE MCD are 45, 47 and 0 percent very small, respectively. On-sites clearly have more cost-effective results among larger customers, confirming program manager expectations and program theory.

Exhibit 4-9
High Efficiency Cooling Equipment Adoption Rates by Utility and Delivery Mechanism
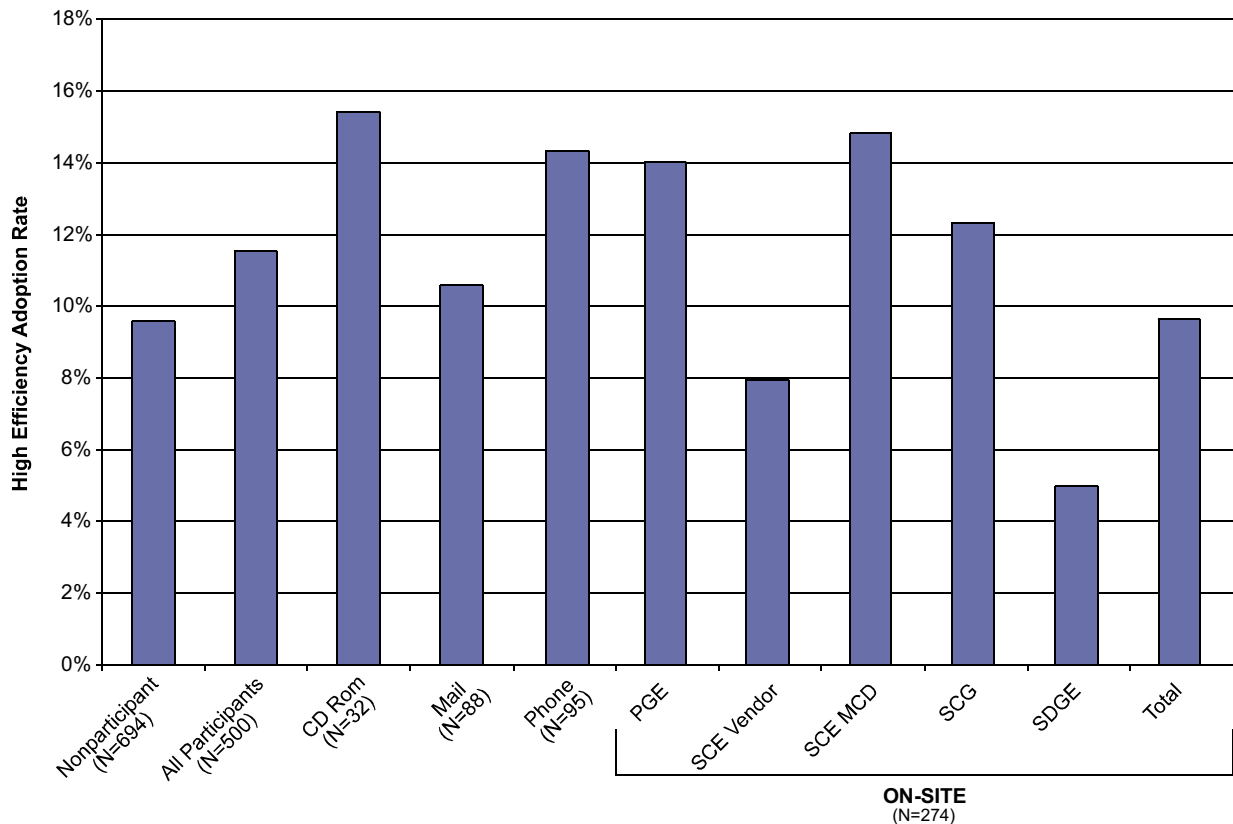
Exhibit 4-10.a and 4-10.b presents the technology distribution for high efficiency cooling equipment adoptions among participants and nonparticipants. Adoptions of high efficiency split and packaged systems are close in the two populations, even though total AC adoptions are greater among nonparticipants, because a greater percentage of participants purchased high efficiency units. Participants are doing more HVAC controls and nonparticipants are doing more package terminal AC's and evaporative coolers. Nonparticipants installed TES and EMS systems, but participants did not. TES and EMS were not emphasized in the PG&E audit recommendations, but did appear in the list of SCE MCD recommendations. These were the only lists of recommended measures available for this evaluation, but their scant appearance on these lists does provide a possible explanation for their absence from the list of participant adopted measures.

Exhibit 4-10.a
Participant High Efficiency Cooling Adoptions by Technology

Participant EE Cooling Adoptions

Nonparticipant EE Cooling Adoptions
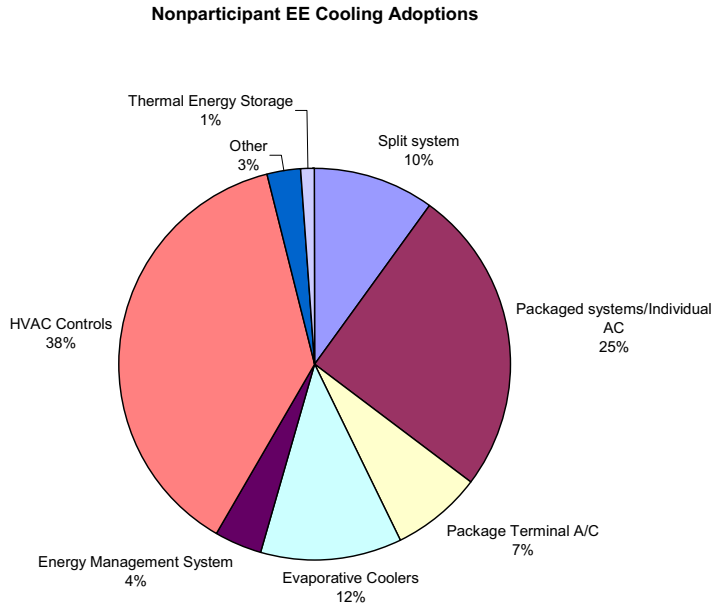
Exhibit 4-11 shows the average size of installations for some key technologies.   The average installation size for the two most commonly adopted technologies, packaged systems and HVAC controls, are larger among nonparticipants.   The difference in HVAC controls is particularly large, 5.3 versus 3.1. Also shown in the table below is average square feet of facilities contributing to the calculation of average installation size. This normalizing factor has little effect for packaged systems, but is quite marked for HVAC Controls. The difference in the average size of facilities installing controls among the two population is large, 7,100 versus 28,300 square feet. Controls installed per square foot among the participants are twice the nonparticipant rate. This is further evidence that the program is moving the HTR segments to adopt cooling technologies, particularly HVAC controls.

Exhibit 4-11
Average Size of High Efficiency Cooling Equipment Installations

Technology	Participant				Nonparticipant			
	Avg Install Size	N	Avg Sq Feet	Install per Sq Foot	Avg Install Size	N	Avg Sq Feet	Install per Sq Foot
Split system	2.1	3	62,472	0.0000	1.5	10	11,095	0.0001
Packaged systems/Individual AC	2.2	15	29,741	0.0001	2.6	30	19,178	0.0001
Pacaged Terminal AC	7.3	3	4,659	0.0016	2.2	4	22,890	0.0001
Evaporative Coolers	2.5	4	7,265	0.0003	1.3	4	2,815	0.0005
HVAC Controls	3.1	29	7,117	0.0004	5.3	40	28,383	0.0002

Combining the average size of high efficiency installations with adoption rates results in a measure of average adoptions per respondent within the two populations. Exhibit 4-12 presents these results for key cooling technologies and the for high efficiency equipment overall. Although the adoption rates are higher among participants, the average size of the installations are larger among nonparticipants, resulting in pretty much equivalent activity levels within the two populations.

Please note, however, we have also demonstrated that for the primary participant adopted technology, HVAC Controls, adoption activity is coming from distinctly different size segments in the two populations. Participant adopters are notably smaller than nonparticipant adopters, exhibiting the programs success in its HTR emphasis.

Considering the size-based comparisons of participant and nonparticipant actions and the adoption rates presented earlier, it is our contention that adoption rate is a more relevant measure of program effect for the cooling end-use. We make this case as there are a relatively low number of valid data points for adoption size, and a large variance.

Exhibit 4-12
Average Number of High Efficiency Items Installed per Respondent[1]
As Reported by Participants and Nonparticipants
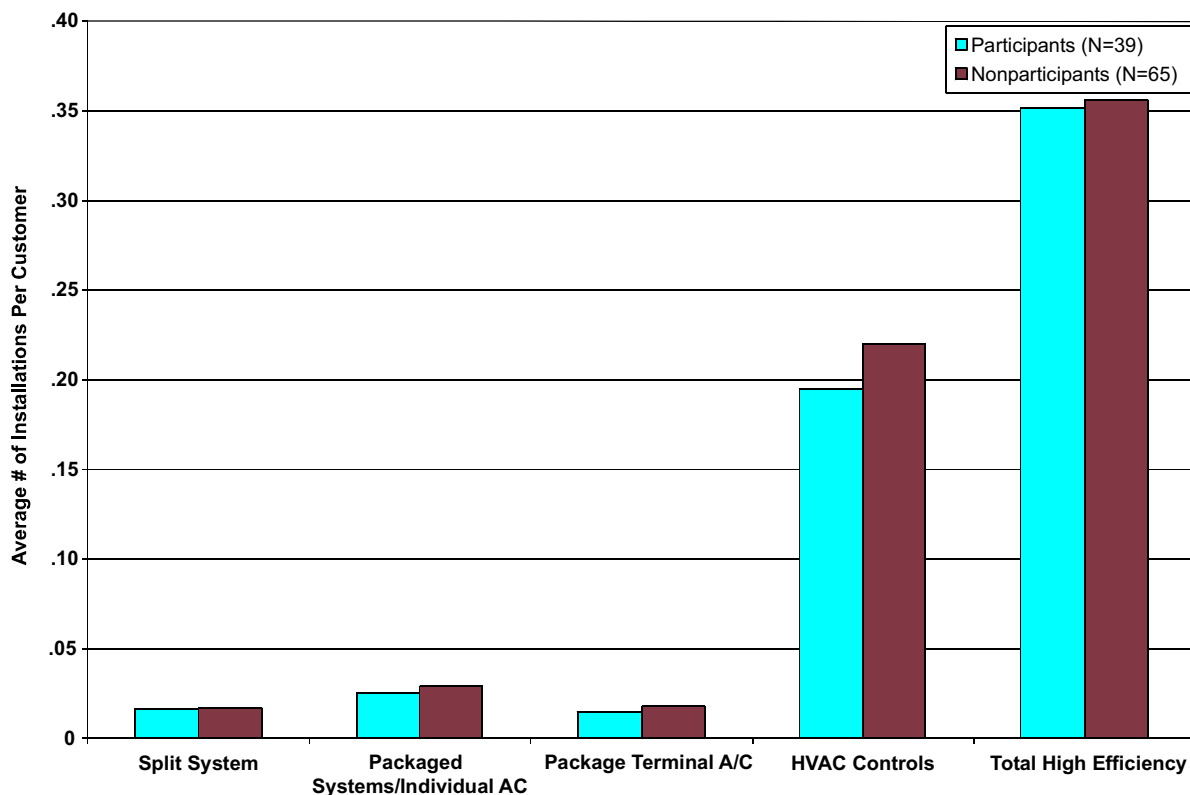
[1]. Calculated as the total number of high efficiency installations divided by the number of survey respondents.

4.1.3 Gas Equipment Adoptions

This section examines the third major end-use, gas equipment. Exhibit 4-13 below shows participant and nonparticipant adoption rates by key segment. There is a substantial difference in participant and nonparticipant adoption rates among the SCG customers. Hard-to-reach segments such as very small facilities, renter and rural again display higher participant adoption rates. In this case, the positive smaller company results are driven by the SCG on-site audit made up of 70 percent small and very small companies.

Exhibit 4-13
Gas Equipment Adoption Rates—Participant versus Nonparticipant
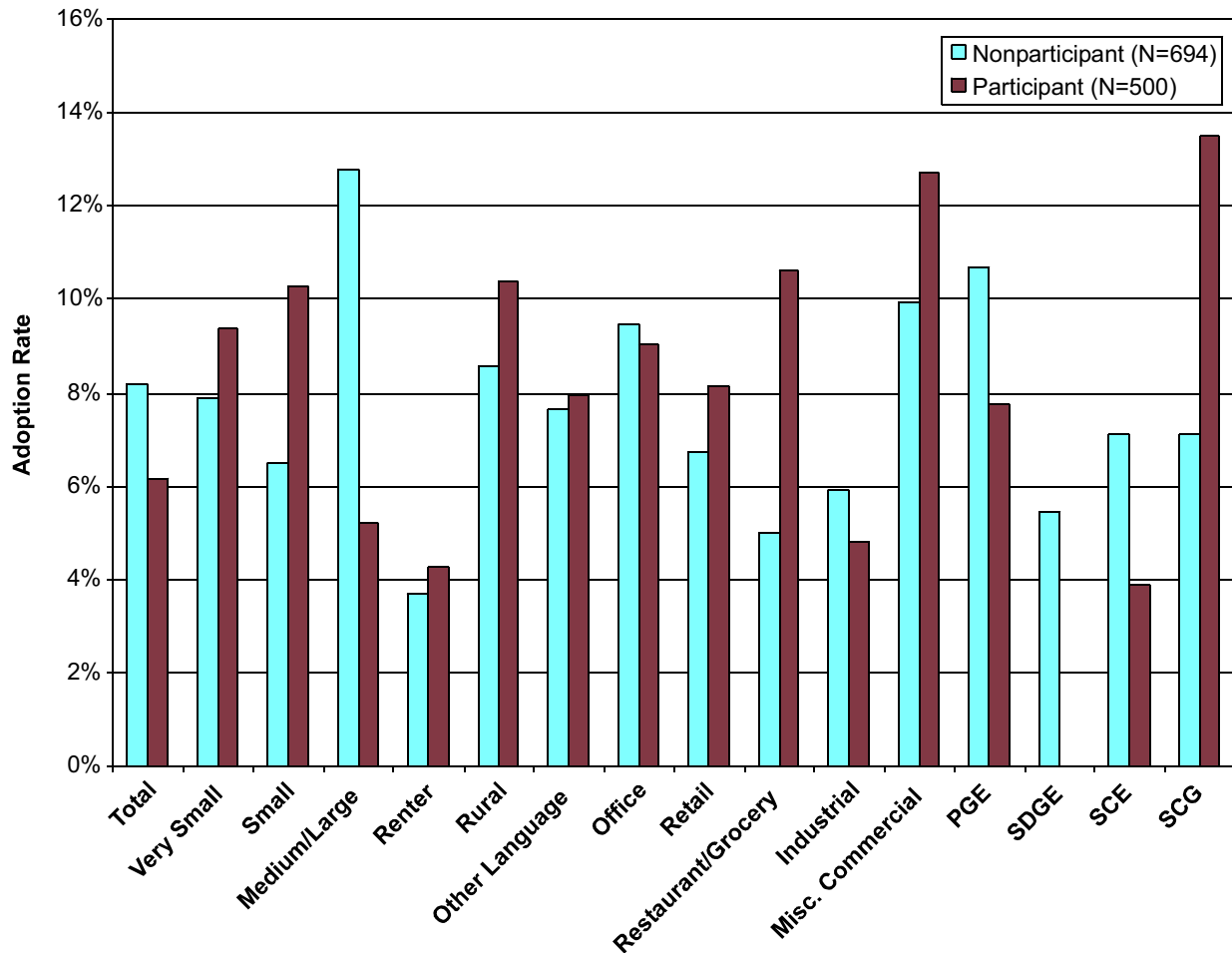
It appears that SCG is successful in encouraging audit participants to purchase gas equipment. As is discussed later in Section 4-3, SCG 's high rate of rebates among audit participants that purchased gas equipment indicates a strong link within the audit program between customer follow-through and participation in rebate programs. SCG is the only utility that bundled audit and Express rebates in 2002; all customers that received a rebate first received an audit.

On the other hand, medium and large participants and industrial participants are less likely to adopt gas measures than nonparticipants. It may be that the influence of the audit has a tendency to direct customers away gas measures they might ordinarily adopt (like nonparticipants) and towards lighting and cooling end uses which, as will be shown in the *Section 4.4 Gap Assessment*, account for most of the audit recommendations.

Exhibit 4-14 presents gas equipment adoption rates by utility and delivery mechanism. Again SCG results tower over the others, with on-site audit participants reporting an adoption rate of 19 percent versus 9 percent among nonparticipants. The strong link between the SCG Audit and the Express rebate program surely contributes to these successes. No other utility and delivery mechanism combination presents convincing evidence of participant impacts within the gas appliance end use.

Exhibit 4-14
Gas Equipment Adoption Rates by Utility and Delivery Mechanism
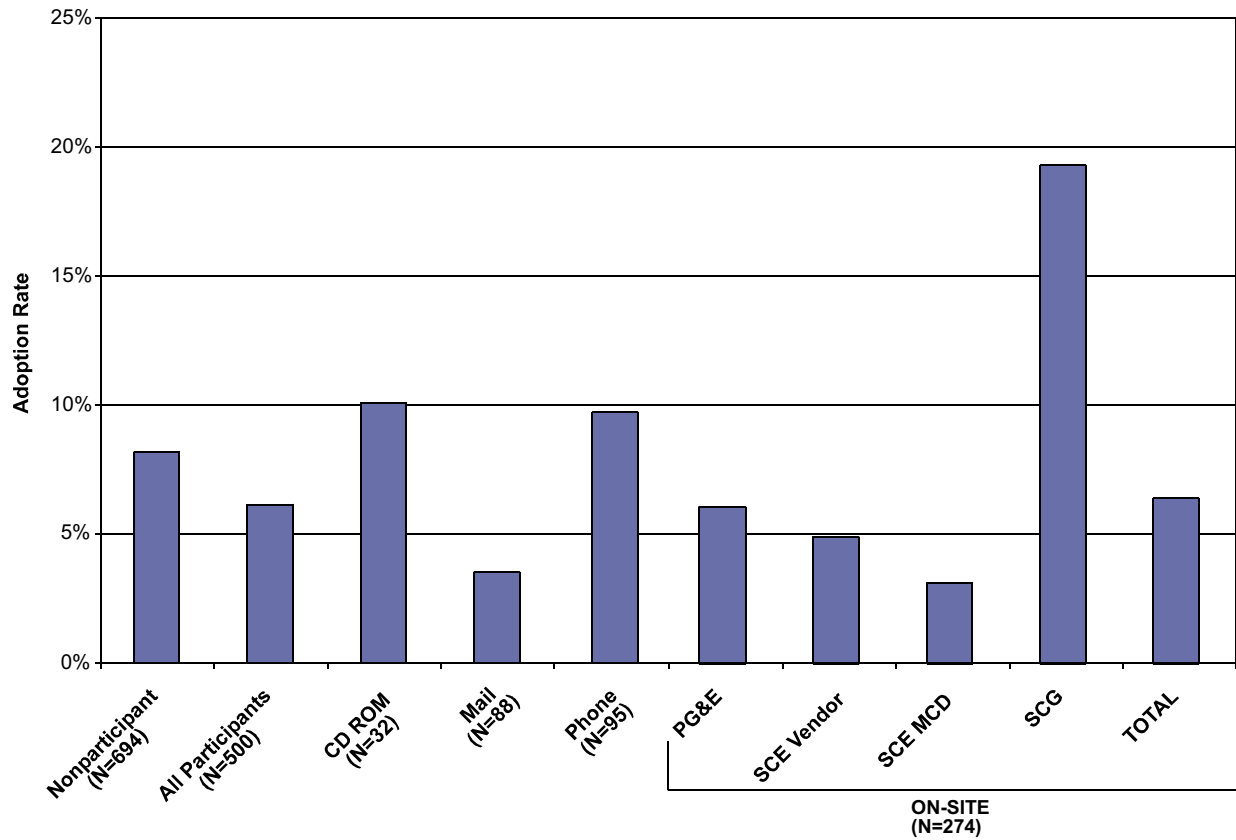
The types of gas equipment adopted by participants and nonparticipants are presented in Exhibit 4-15.a and 4-15.b. The most common installations for both groups are water heaters and boilers. Participants are installing more boilers and more stoves than nonparticipants. Nonparticipants installed more water heaters.

Exhibit 4-15.a
Participant Gas Equipment Adoptions by Technology

Gas Appliance Adoptions - Participant

- Other 3%
- Fireplace 4%
- Stove/Oven 15%
- Gas booster for dishwasher 1%
- Furnaces 7%
- Boilers 25%
- Water Heaters 45%
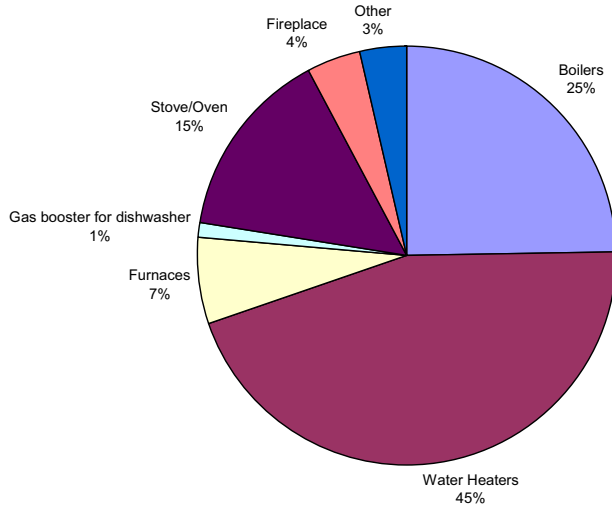
Exhibit 4-15.b
Nonparticipant Gas Equipment Adoptions by Technology

Gas Appliance Adoptions - Nonparticipant

- Gas clothes dryer/dishwasher 11%
- Gas oven/heater/grill/range 7%
- Gas booster for dishwasher 4%
- Stove 6%
- Furnaces 11%
- Boilers 13%
- Water Heaters 48%
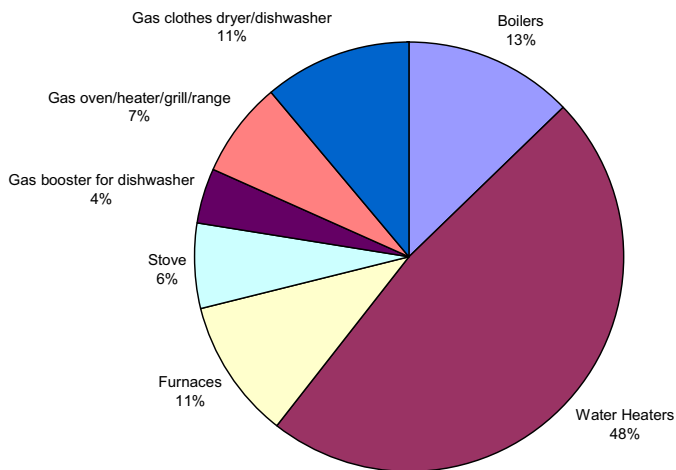
Participants and nonparticipants were asked if their new gas equipment was energy efficient. Exhibit 4-16 below shows the rate of self-reported high efficiency gas equipment adoptions by utility and delivery mechanism. Overall, participants report a lower frequency of installing high efficiency gas equipment than nonparticipants; further evidence that these measures are under-emphasized in most audit reports. The lower adoption rate may be explained by participants' higher rate of lighting and cooling adoptions together with budget constraints. That is, participants may be substituting out of gas and into electric measures per their audit recommendations. The SCG result stands out above the others, exhibiting this utilities measurable success in promoting high efficiency gas equipment through a strong link with its rebate program and emphasis on gas measures in the audit report.

Exhibit 4-16
High Efficiency Gas Equipment Adoption Rates by Utility and Delivery Mechanism
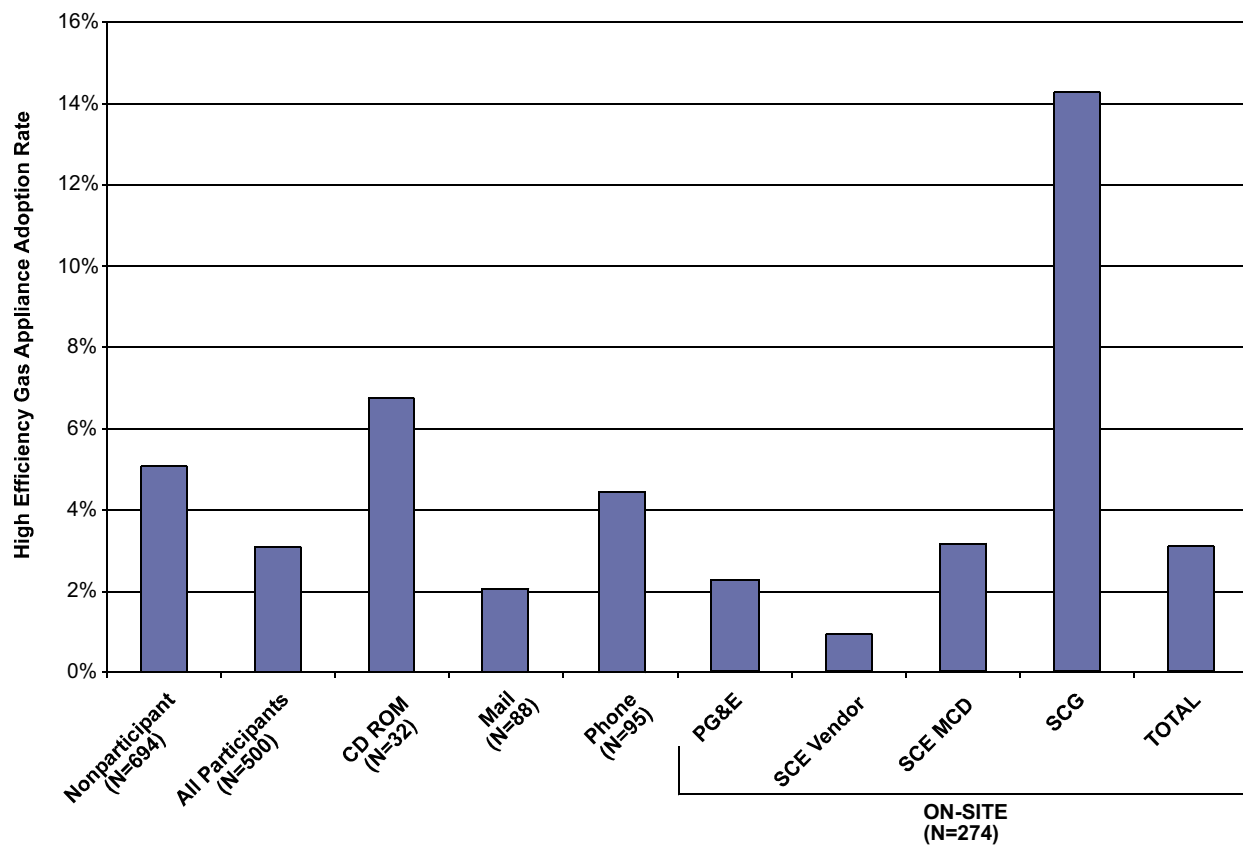
4.1.4 Other Equipment Adoptions

The final category of equipment adoptions is a "catch-all" that includes any other installations that respondents believe significantly effect their overall energy consumption. This category captures customized equipment, which might be recommended during an on-site audit of a large or complex facility.

Exhibit 4-17 shows the rate of 'other' equipment adoptions for participants and nonparticipants by segment. The exhibit shows that the impact for these technologies is concentrated among larger-size and industrial customers. The medium/large size segment, and industrial facilities both display a notably higher adoption rate than their nonparticipant counterparts. This results is driven by very high adoption rates among the SCE MCD audit customers, as will be demonstrated in the following exhibits. These achievements are not apparent in the SCE overall adoption rates because the overall result is pulled down by very moderate adoption rates among the SCE Vendor audit customers.

Exhibit 4-17
Other Equipment Adoption Rates – Participants versus Nonparticipant
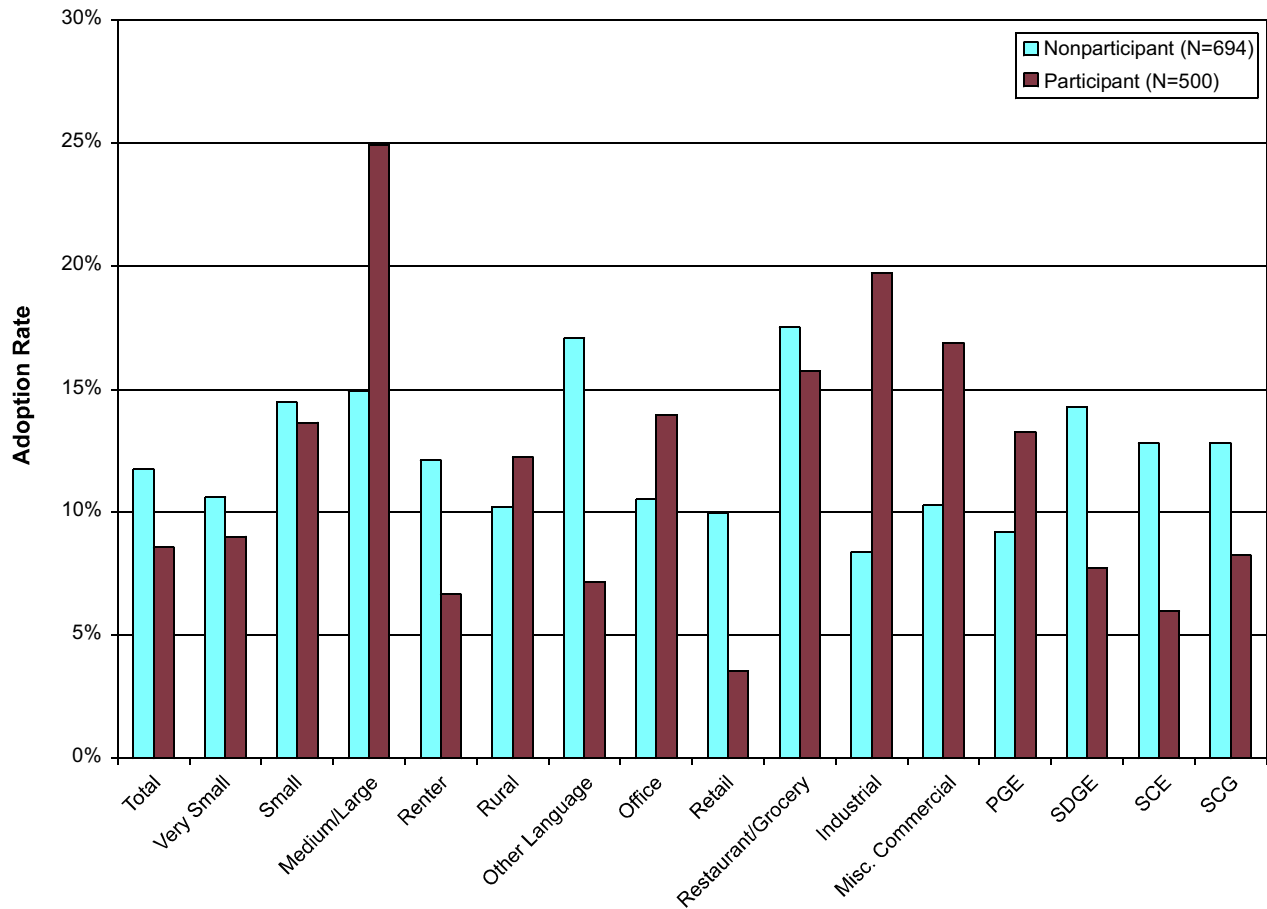
PG&E has also done a good job with specialized ('other') recommendations, exceeding the nonparticipant rate by a notable margin. PG&E is achieving this result with smaller customers. PG&E participants are only 5.15 percent medium and large sized customers. The 'other' technology adoption rate for PG&E's very small and small customers is 14.2 percent, well in excess of the 8.9 percent adoption rate of similar sized facilities within PG&E's service territory. In contrast, the rate of 'other technology' adoption among PG&E's medium and large customers is 7.75 percent – well below the comparable PG&E nonparticipant rate (11.6 percent).

Examining this size effect within PG&E further shows that PG&E is having some success with larger customers in the on-site audit, where they have an adoption rate of 10.9 percent, but large customers are not responding to the remote audit. The larger facility results for these audits are nonexistent, at zero percent for mail and phone (no CD Rom data available.) This is not too surprising. A large facility is unlikely to install specialized equipment on the recommendation of a remote audit tool.

Exhibit 4-18 presents 'other' equipment adoption rates by utility and delivery mechanism. Medium and large nonparticipant results are also shown for more appropriate comparison with the SCE MCD result. The pattern of results highlights the success of the SCE MCD audit. Combining this result with information gained from the previous exhibit, led to the examination of the industrial segment results by audit type.

Exhibit 4-18
Other Equipment Adoption Rates by Utility and Delivery Mechanism
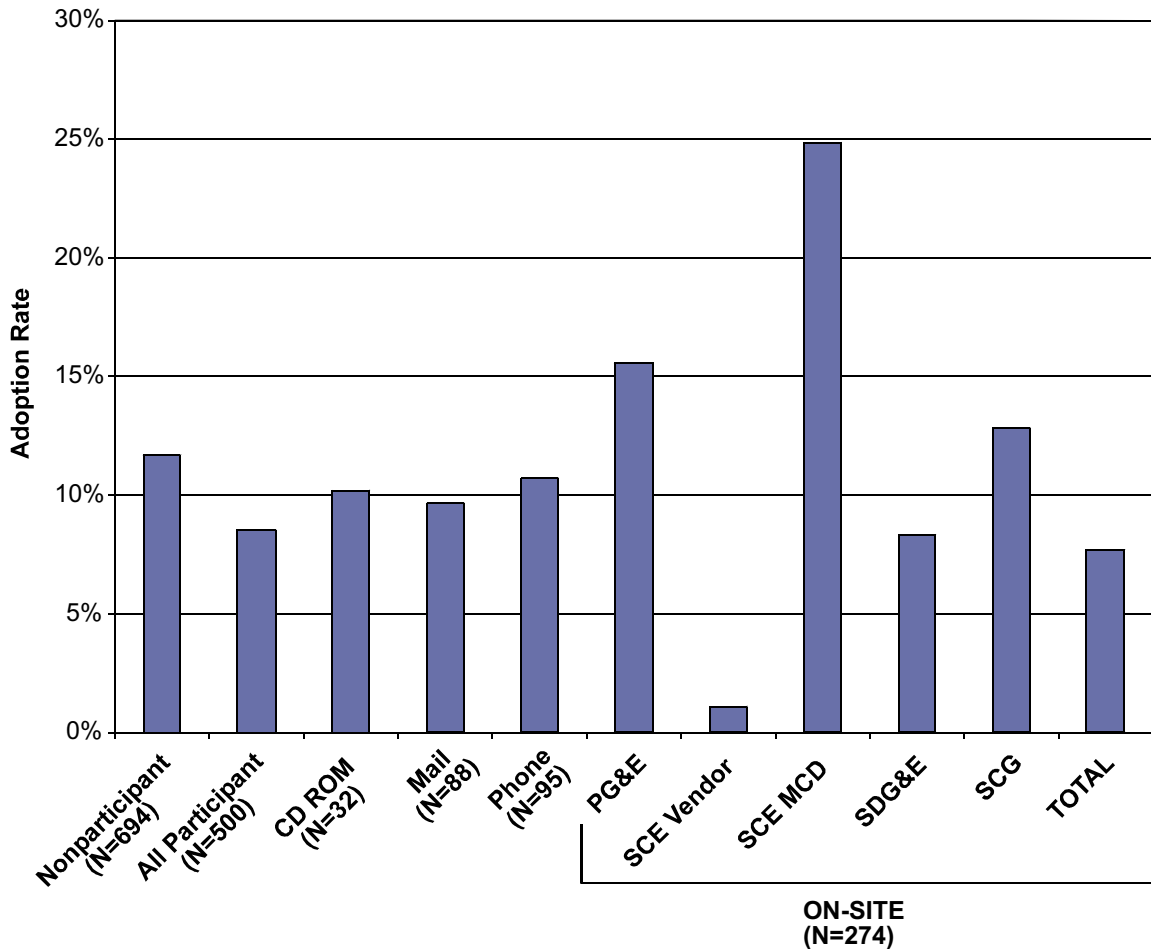
The industrial participant segment is over 40 percent SCE MCD customers. The industrial "other equipment" adoption rate for just the SCE MCD audit customers is 28.0 percent. The adoption rate among medium/large SCE MCD customers is 37 percent. Industrial adoption

rates for non-SCE MCD customers is also solid at 13.5 percent, while non-MCD adoptions among medium and large are a bit lower, at 10.1 percent.

The success of the audit in influencing 'other' equipment adoptions among medium/large and industrial customers illustrates the effectiveness of audit in that segment and the "hunger" or need for energy efficiency information. Furthermore, this demonstrates a strong willingness to implement energy efficiency recommendations in those segments, as these customers have greater access to capital to finance projects that make economic sense.

The MCD audit result is very strong and provides a possible explanation for the low cooling and gas adoption rates among medium/large and industrial customers. The results suggest that the MCD audit emphasizes 'other equipment' (in particular, motors and insulation as discussed below) over cooling equipment adoptions. While these customers are continuing to do lighting, the 'other' equipment adoptions displace the higher capital cost cooling retrofits with custom equipment replacements. We explore in greater detail the MCD audit recommendations in the gap analysis, section 4.4. The gap analysis shows the MCD provides a great deal of customization in recommendations leading to a number of cross-cutting motor measures.

Exhibit 4-19.a and 4-19.b shows the categories of other equipment adoptions made by participants and nonparticipants. The two distributions are similar, although participants are doing more motors and outdoor lighting than nonparticipants. The SCE MCD audit participants' are installing just two types of equipment, motors (82 percent) and insulation (18 percent.)

Exhibit 4-19.a
Participant Other Equipment Adoptions by Technology

Other Equipment Adoptions - Participants
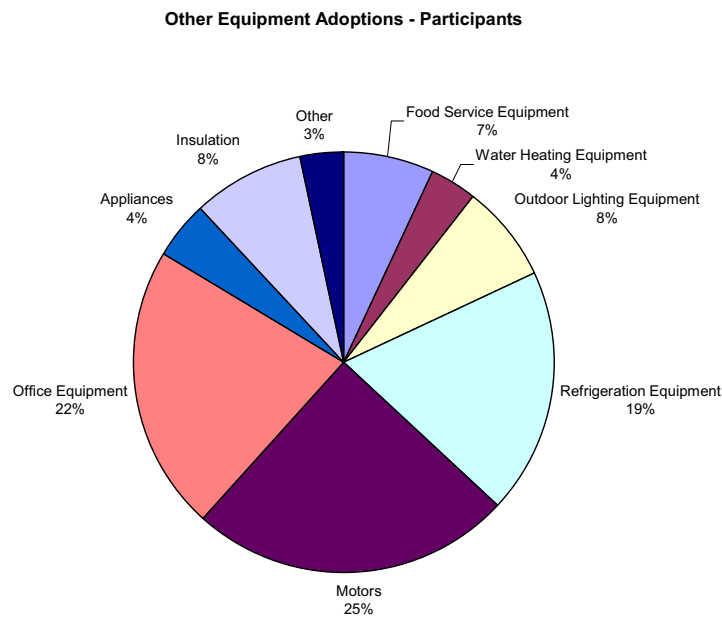
Exhibit 4-19.b
Participant Other Equipment Adoptions by Technology

Other Equipment Adoptions - Nonparticipant
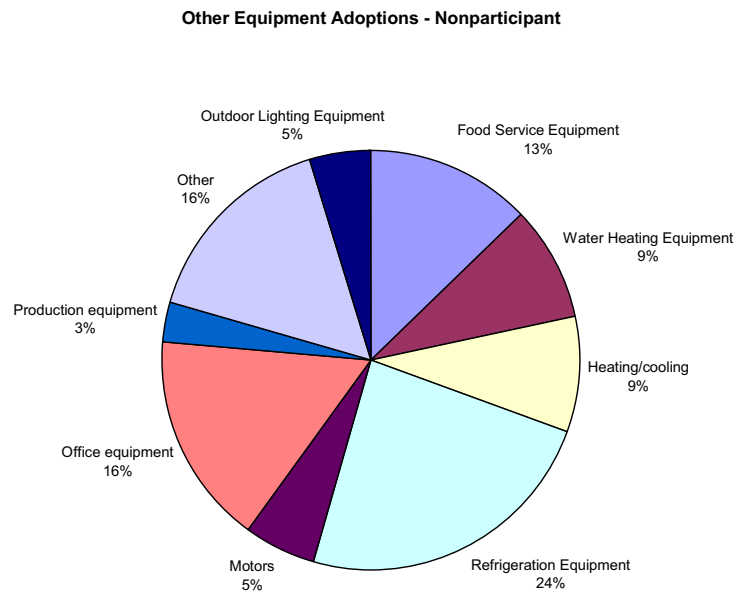
Nonparticipants were not asked to report the efficiency of the other equipment that was installed. However, participants were asked this question, and 84 percent of those who could provide a response claimed their newly installed equipment is high efficiency.

4.1.5   Energy Conservation Rates

The general population is chosen as a baseline comparison group for the conservation measure analysis because of the widespread offering of so many different types of conservation measure programs, such as Flex Your Power and the 20/20 rebate program.

Exhibit 4-20 below shows the rate at which participants and the general population incorporate energy conservation into their daily routine. The exhibit shows that the majority of both groups are engaging in conservation practices. The rate of conservation practice is remarkably stable across segments for both participants and the general population, revealing a universal interest and willingness to incorporate energy saving practices into routine business practices.

Exhibit 4-20
Conservation Rates- Participants versus General Population
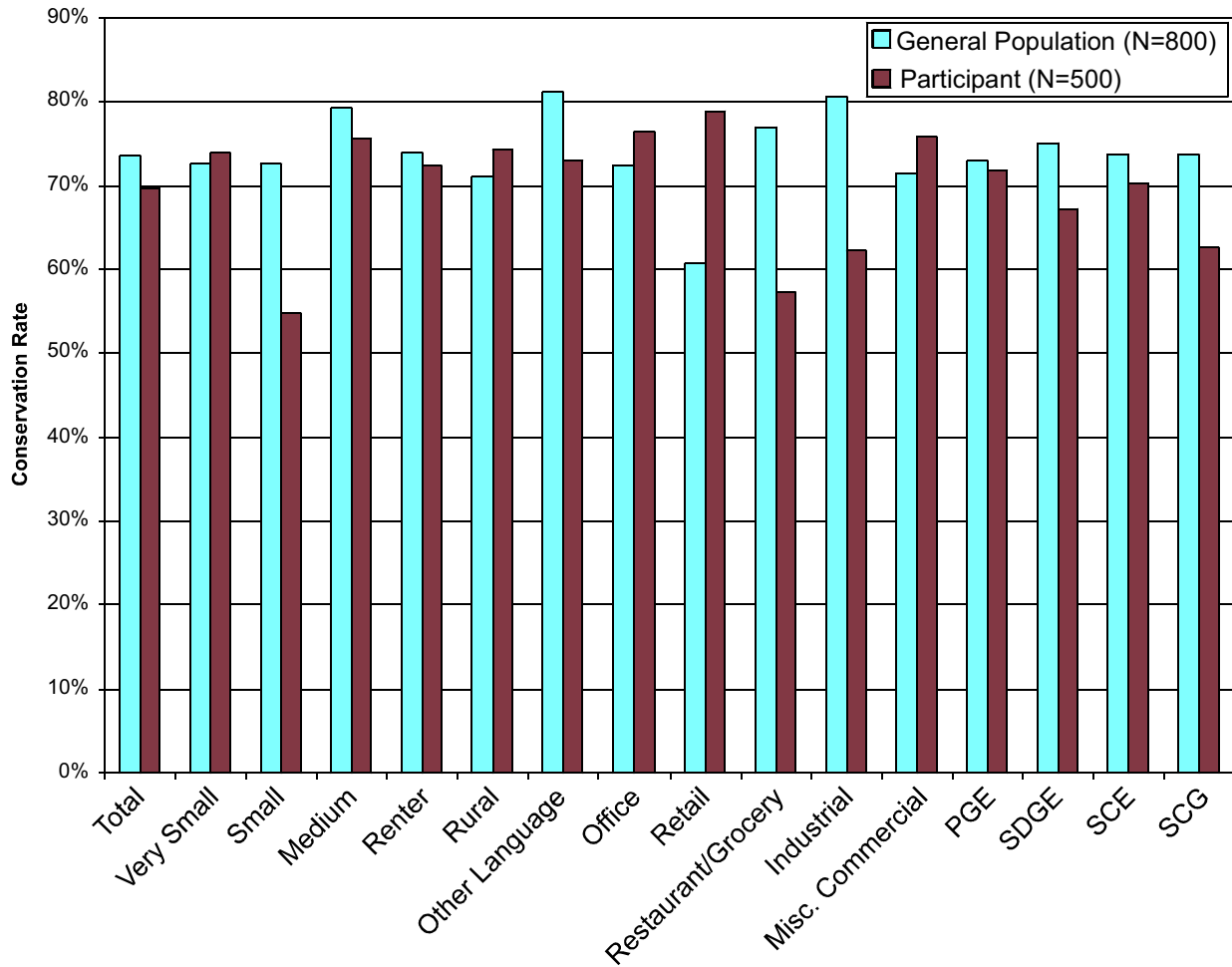
Exhibit 4-21 shows the rates of energy conservation practices by IOU and audit type. Similar to the segments shown in exhibit 4-20, these results are very stable over the various audit types and utilities. The PG&E CD Rom result stands out as significantly higher than others, but the total CD Rom result is in line with others and in line with the general population results.

Exhibit 4-21
Conservation Practice Adoption Rates by Delivery Mechanism and Utility
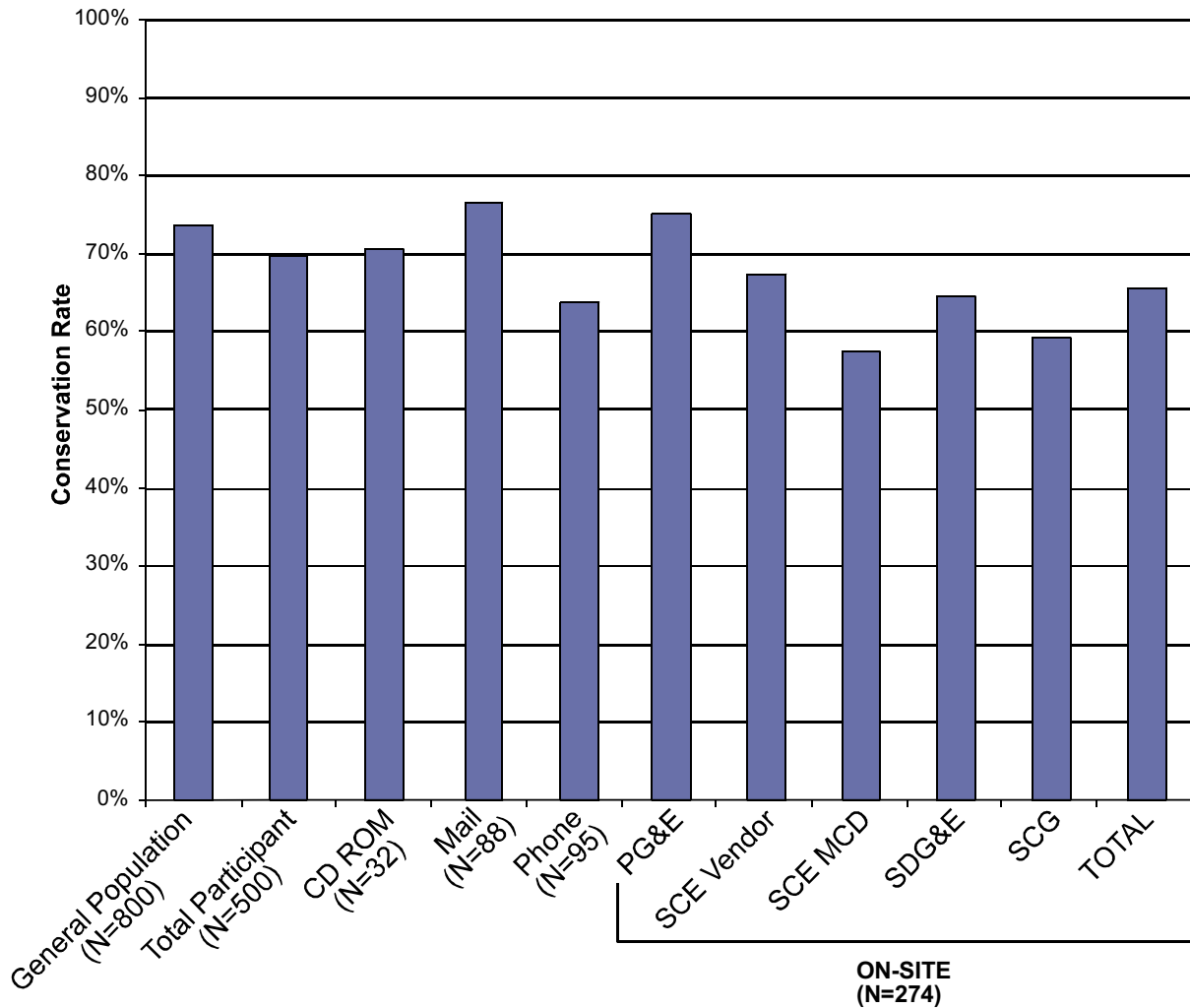
As discussed earlier, program impacts may not always translate into higher conservation rates. Sometimes the impact may be reflected in the types or magnitude of the energy saving practices. For example participants may conserve to a greater degree or with more effective practices than the general population.

Exhibit 4-22 displays the specific types of conservation practices the general population and participants are doing. The practices shown below are grouped for presentation. (To see these more detailed distributions, please refer to Appendix A.) The resulting distributions for participants and nonparticipants are very similar. Participants and general population respondents are nearly identical with regard to the types of conservation practices they engage in. The most common practice is to turn lights off, at about 50 percent of both participants and general population respondents.

The evidence provided by Exhibits 4-20 through 4-22 indicates that the audit program is not galvanizing participants to conserve more, or differently, than the general population. Before drawing final conclusions, there are other data to consider.

Exhibit 4-22
Types of Conservation Practices – Participants versus General Population
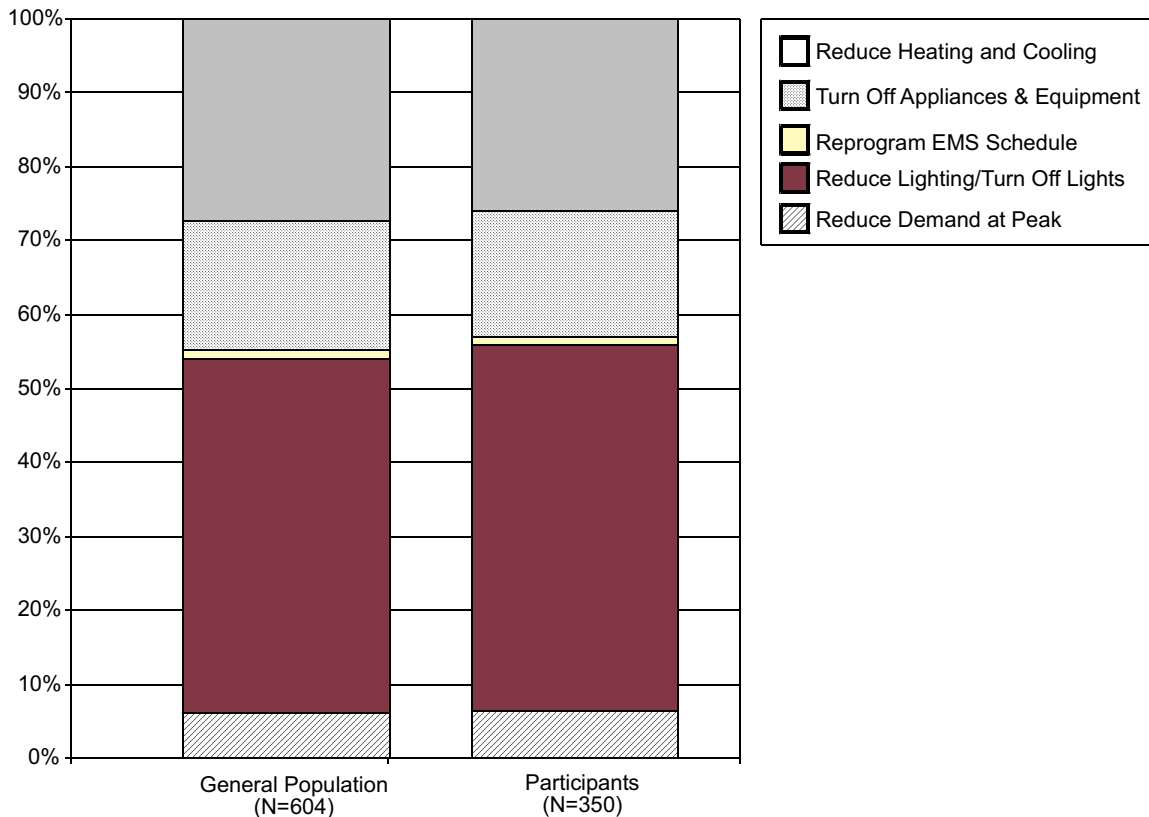
Survey results suggest little difference in conservation rates between participants and the general population. However, a closer look at lighting conservation – the most common conservation action – suggests that participants are more vigilant in keeping lights off than the general population. While participants and the general population both turn off lights, Exhibits 4-23 and 4-24 suggest that participants are far more vigilant in keeping lights off than non-participants.

Follow-up questions were posed to respondents who were conserving by turning off lights. The questions are intended to approximate the degree to which lighting was reduced. The question reads, "What percent of your lights that would normally be on during the day are you keeping off now?" This question was asked separately for both day and evening. Exhibit 4-23 shows the participant and general population responses to this question, and illustrates that participants were much more likely to reduce their lighting levels significantly, at least during the day. Twenty-four percent of participants reported reducing their lighting by 50 percent or more, versus 16 percent of the general population.

Exhibit 4-23
Percent of Lighting Reduced – Participants versus the General Population
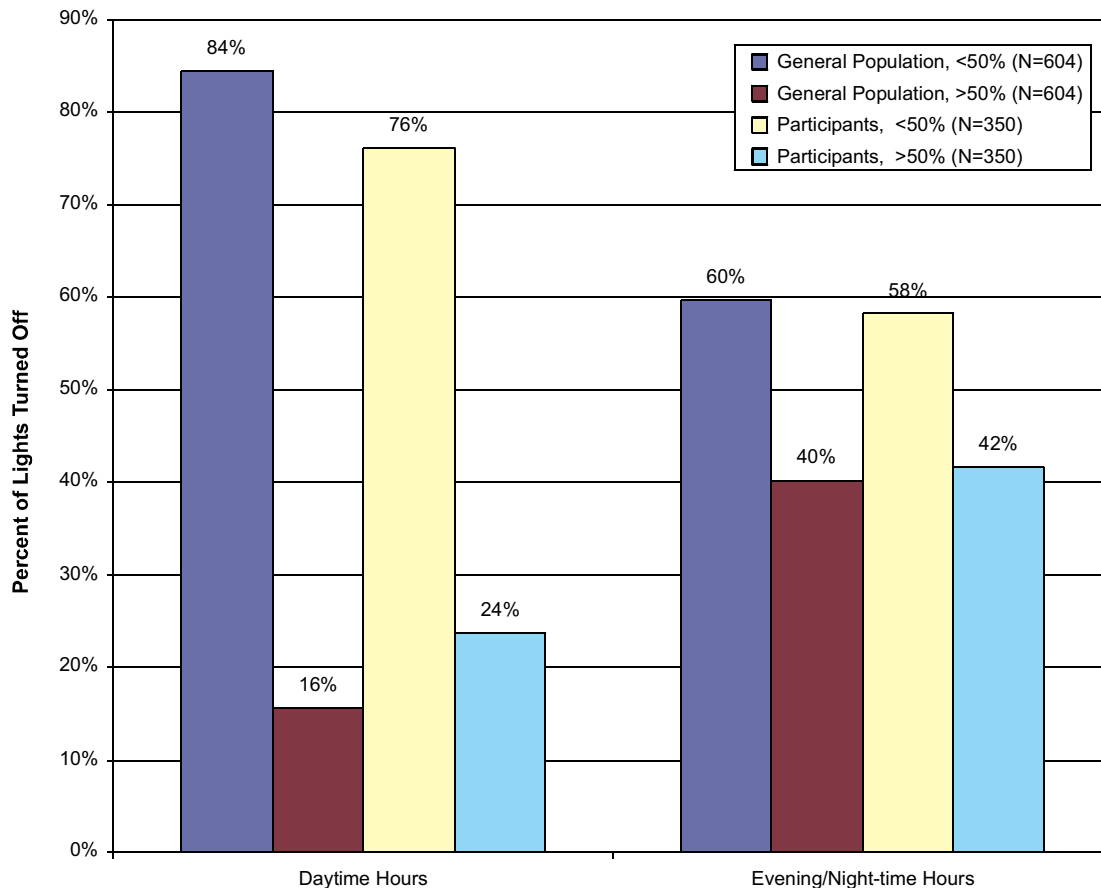
Participants were asked, "Of the things that you mentioned that you are doing to conserve energy since January 2002, do you think you are conserving more/less/or about the same as you did the year before (in 2001)?" This question speaks to the degree to which participants and the general population are conserving relative to the 2001 energy crisis. If the program effects conservation activity we expect to see more participants stating that they are conserving at higher rates relative to 2001, while nonparticipants are more likely to conserve a similar or lesser amount than in 2001.

As shown in Exhibit 4-24 below, participants are more likely to claim increased levels of conservation measure activity relative to 2001, but are also more likely to state they are conserving less, providing no compelling evidence for conservation effects.   Perhaps the market is somewhat saturated with conservation measure activity, with little marginal benefit for additional conservation actions.   Thus, participant activity is focused in the more visible equipment adoption categories.

Exhibit 4-24
Conservation Efforts Relative to 2001 Energy Crisis Period
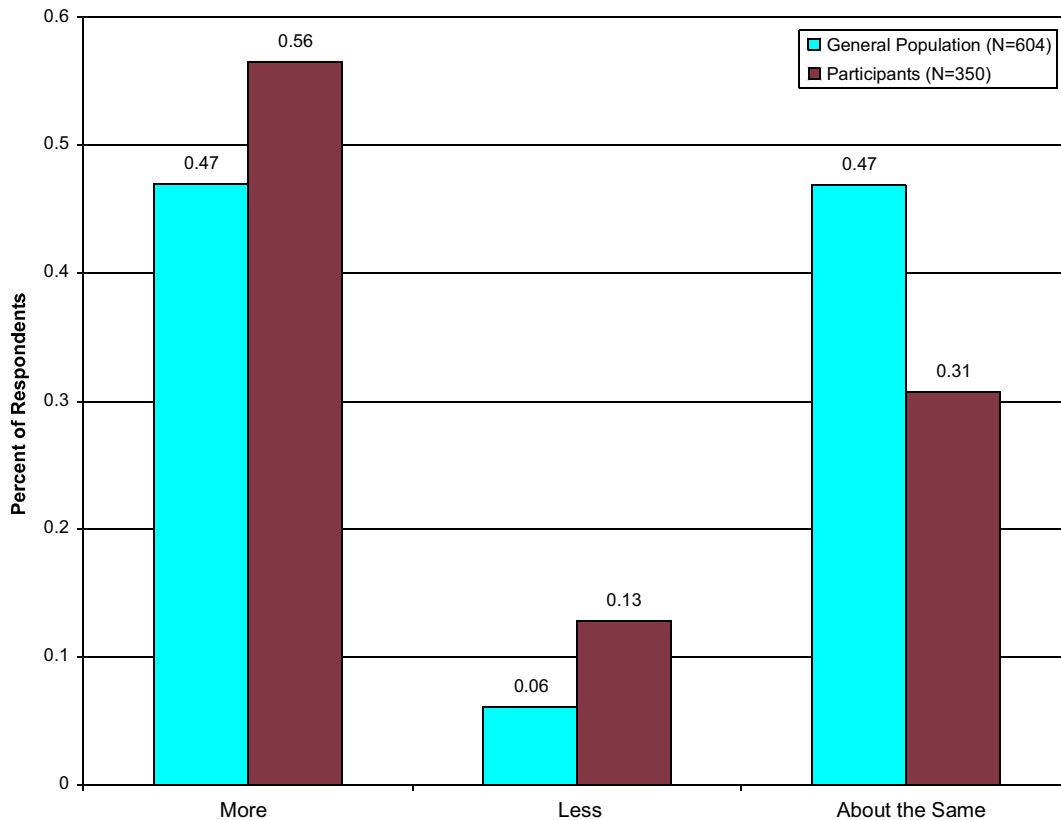
While the magnitude of conservation indicates that the audit program has some impact on the diligence of conservation applied, analysis of conservation practice rates shows little if any program effect.   Furthermore, the types of conservation practices applied by participants and nonparticipants are remarkably similar, again suggesting little if any program effect.

4.2   AUDIT PROGRAM GROSS IMPACTS

In this section gross impact results for the 2002 Nonresidential Audit Program are presented using the methods described in *Section 3.4*.   The gross impacts presented reflect (self-reported) customer energy efficiency actions taken after the audit.   Because the survey was completed during summer 2003, the actions taken are, on average, for about a one-year period following the audit.

Impacts were calculated for the lighting and cooling end uses alone. Attempts to estimate impacts for gas and other measures were unsuccessful, due to inadequate information describing the specifics of the measures installed, for example equipment capacity. Also, no attempt was made to quantify impacts for energy efficiency conservation practices due to a lack of information describing the specific actions taken. In a future evaluation, billing analysis would be a more reliable method for measuring audit program impacts in conservation measure activity. This is discussed in more details in *Section 4.6 Key Findings*.

4.2.1 Lighting and Cooling Gross Impacts

Based on the 2002 Impact Survey, which consisted of 500 completed interviews with program participants, there were 170 lighting and 98 cooling equipment installations reported. The first step in impact analysis was to identify those actions involving high efficiency technologies, resulting in an impact that could potentially be attributable to the Nonresidential Audit Program.

Of the 170 lighting measures reported by respondents 11 had insufficient information describing the technology installed, 25 measures were said to be installed before the audit and 19 technologies were classified as standard rather than high efficiency. This left a total of 115 lighting measures for which impacts were calculated.

Similarly, of the 98 cooling measures reported by respondents 8 had insufficient information describing the technology installed, 20 measures were said to be installed before the audit and 15 technologies were classified as standard rather than high efficiency. This left a total of 55 cooling measures for which impacts were calculated.

Exhibit 4-25 presents the distribution of the 115 lighting and 55 cooling measures installed by technology and audit delivery mechanism. The resulting gross annual electric energy impacts for the survey population are also presented. The lighting impacts are the most concentrated in the compact fluorescent technology and the on-site audit delivery channel, and the cooling impacts are most concentrated in the unitary equipment category and also the on-site audit delivery channel.

Exhibit 4-25
2002 Impact Survey-Reported Gross Annual Electric Energy Impacts
by End-Use, Technology Group and Delivery Mechanism

End-Use and Technology Group	Gross Number of Installations					Gross Annual Electric Energy Impacts (kWh)				
	On-Line	CD-ROM	Mail	Phone	On-Site	On-Line	CD-ROM	Mail	Phone	On-Site
Lighting										
Compact Fluorescent Lamps	-	1	8	6	23	-	7,103	89,143	70,814	781,138
Controls	-	1	1	-	7	-	4,120	2,481	-	96,866
Delamp Fluorescent Fixtures	-	1	1	1	-	-	10,712	1,487	974	-
Efficient Ballast Changeouts	2	-	6	5	5	15,767	-	17,511	9,387	16,501
Efficient High Intensity Discharge Fixtures	-	1	-	-	1	-	3,126	-	-	5,047
Exit Signs	-	-	2	-	5	-	-	573	-	2,859
T-5 and T-8 Lamps and Electronic Ballasts	2	1	7	10	18	11,381	1,133	11,641	18,707	87,567
TOTAL LIGHTING	4	5	25	22	59	27,147	26,194	122,835	99,881	989,977
Cooling										
Central Built-up Cooling System Measures	-	-	1	2	6	-	-	28,280	3,882	80,729
Direct Evaporative Coolers	-	-	-	2	1	-	-	-	16,124	10,750
High Efficiency Packaged Units, PTAC's and Window/Wall AC's	-	2	3	7	8	-	8,818	9,737	18,899	106,421
Miscellaneous Other Measures	-	-	-	-	3	-	-	-	-	10,824
Set-Back Programmable Thermostats	2	-	6	2	10	14,168	-	15,349	2,361	33,060
TOTAL COOLING	2	2	10	13	28	14,168	8,818	53,366	41,266	241,782

Exhibit 4-26 presents the gross summer demand and annual natural gas energy impacts for the survey population. Similar to electric energy impacts, lighting summer demand impacts are the most concentrated in the compact fluorescent technology and the on-site audit delivery channel, and the cooling impacts are most concentrated in the unitary equipment category and the on-site audit delivery channel. Natural gas impacts, however, follow a much different pattern. High efficiency lighting equipment retrofits require a greater use of natural gas (for space heating), with a reduction in internal gains. The segments with the largest negative gas impacts are those with the largest positive electric impacts. For cooling measures, the majority of natural gas impacts are associated with set-back thermostat installations, with, again, much activity in the on-site audit delivery channel.

Exhibit 4-26
2002 Impact Survey-Reported Gross Summer Demand and Annual Natural Gas Impacts
by End-Use, Technology Group and Delivery Mechanism

End-Use and Technology Group	Gross Summer Demand Impacts (kW)					Gross Natural Gas Impacts (therms)				
	On-Line	CD-ROM	Mail	Phone	On-Site	On-Line	CD-ROM	Mail	Phone	On-Site
Lighting										
Compact Fluorescent Lamps	-	1.28	16.21	11.91	115.21	-	-1	-23	-9	-83
Controls	-	0.00	0.00	-	0.00	-	0	-1	-	-13
Delamp Fluorescent Fixtures	-	1.56	0.32	0.17	-	-	-3	0	0	-
Efficient Ballast Changeouts	3.34	-	3.64	1.67	3.16	-4	-	-4	0	-1
Efficient High Intensity Discharge Fixtures	-	0.48	-	-	0.82	-	0	-	-	-2
Exit Signs	-	-	0.12	-	0.54	-	-	0	-	-1
T-5 and T-8 Lamps and Electronic Ballasts	2.41	0.20	2.21	3.36	15.86	-3	0	-3	-5	-24
TOTAL LIGHTING	5.76	3.52	22.49	17.11	135.58	-7	-5	-32	-15	-124
Cooling										
Central Built-up Cooling System Measures	-	-	4.80	0.00	22.89	-	-	0	0	1,396
Direct Evaporative Coolers	-	-	-	10.71	7.14	-	-	-	0	0
High Efficiency Packaged Units, PTAC's and Window/Wall AC's	-	3.61	5.93	12.67	43.62	-	0	0	0	0
Miscellaneous Other Measures	-	-	-	-	1.81	-	-	-	-	389
Set-Back Programmable Thermostats	0.00	-	0.00	0.00	0.00	3,285	-	2,464	274	7,665
TOTAL COOLING	0.00	3.61	10.73	23.37	75.45	3,285	0	2,464	274	9,450

The resulting impacts shown in Exhibits 4-25 and 4-26 reflect not only the success of a given delivery channel in developing measure installations and impacts, but the distribution of survey completes by channel. To allow direct comparison across delivery channel, Exhibit 4-27 presents impacts on a per-audit basis. The number of survey completes for the mail, phone and on-site audit delivery channels were deemed large enough to support an assessment of per-audit impacts. Due to the lack of contributing survey data used to estimate impacts for the On-Line and CD-ROM audit delivery channels, estimates are not provided for those channels alone, though the "average" is provided, which incorporates impact results for each delivery channel.

Exhibit 4-27
Per-Audit Gross Impacts
by End-Use and Delivery Channel

End-Use	Delivery Mechanism			
	AVERAGE	Mail	Phone	On-Site
Number of 2002 Impact Survey Completes				
-	500	88	95	274
Gross Per-Audit Annual Electric Energy Impacts (kWh)				
Lighting	2,532	1,396	1,051	3,613
Cooling	719	606	434	882
TOTAL	3,251	2,002	1,486	4,495
Gross Per-Audit Summer Demand Impacts (kW)				
Lighting	0.37	0.26	0.18	0.49
Cooling	0.23	0.12	0.25	0.28
TOTAL	0.60	0.38	0.43	0.77
Gross Per-Audit Annual Natural Gas Energy Impacts (therms)				
Cooling	31	28	3	34
TOTAL	31	28	3	34

The on-site audit channel generates the largest per-audit impacts, followed by the mail and phone surveys, which each capture impacts that are roughly half the size of on-site impacts. The relatively close per-audit natural gas impacts generated by the mail delivery channel is driven by the presence of set-back thermostat actions.

Exhibit 4-28 presents gross impacts for the 2002 Nonresidential Audit Program overall, obtained by multiplying the per-audit impacts in Exhibit 4-27 with the total number of audits provided in the 2002 utility tracking systems, as shown in the top of Exhibit 4-28.

Exhibit 4-28
Nonresidential Audit Program Gross Impacts
by End-Use and Delivery Channel

End-Use	Delivery Mechanism			
	PROGRAM	Mail	Phone	On-Site
Number of 2002 Audits				
-	19,624	2,951	2,246	11,005
Gross Program Annual Electric Energy Impacts (kWh)				
Lighting	49,689,349	4,119,176	2,361,408	39,761,678
Cooling	14,105,792	1,789,595	975,620	9,711,003
TOTAL	63,795,141	5,908,770	3,337,029	49,472,680
Gross Program Summer Demand Impacts (kW)				
Lighting	7,239.66	754.28	404.57	5,445.60
Cooling	4,441.69	359.85	552.61	3,030.44
TOTAL	11,681.35	1,114.13	957.18	8,476.04
Gross Program Annual Natural Gas Energy Impacts (therms)				
Lighting	-7,155	-1,061	-346	-4,989
Cooling	607,272	82,620	6,472	379,560
TOTAL	600,118	81,558	6,126	374,571

Next consideration is given to the extent to which the gross impacts presented above are attributable to the program.

Section 4.1 above shows that nonparticipants also install lighting and cooling equipment, providing an indicator that high efficiency actions would take place in the market with or without the program, but to what extent? To attribute impacts to the Nonresidential Audit Program, respondents were asked to score the influence of the program on each equipment installation on a scale of 1 to 10, where 1 is not at all influential and 10 is very influential.

Exhibit 4-29 demonstrates the reduction in gross impacts if high efficiency equipment installations with an influence score of 3 or lower are removed from the impact calculation database. It is important to point out that this is merely a demonstration of impact adjustment and is not intended to reflect a more robust net impact assessment, which was not an objective of this study.

Exhibit 4-29
Nonresidential Audit Program Influence-Adjusted* Impacts
by End-Use and Delivery Channel

End-Use	Delivery Mechanism			
	PROGRAM	Mail	Phone	On-Site
Influence-Adjusted* Program Annual Electric Energy Impacts (kWh)				
Lighting	45,434,288	3,532,282	1,787,354	37,250,919
Cooling	10,713,237	1,463,881	277,575	8,169,405
TOTAL	56,147,524	4,996,164	2,064,928	45,420,324
Influence-Adjusted* Program Summer Demand Impacts (kW)				
Lighting	6,555.93	667.78	300.35	5,026.57
Cooling	2,892.34	295.02	107.56	2,423.78
TOTAL	9,448.27	962.80	407.91	7,450.35
Influence-Adjusted* Program Annual Natural Gas Energy Impacts (therms)				
Lighting	-5,985	-811	-300	-4,182
Cooling	483,176	45,900	0	307,542
TOTAL	477,192	45,088	-300	303,360
Influence-Adjusted* Annual Electric Energy Impacts as a Percent of Gross				
Lighting	91%	86%	76%	94%
Cooling	76%	82%	28%	84%
TOTAL	88%	85%	62%	92%
Influence-Adjusted* Summer Demand Impacts as a Percent of Gross				
Lighting	91%	89%	74%	92%
Cooling	65%	82%	19%	80%
TOTAL	81%	86%	43%	88%
Influence-Adjusted* Annual Natural Gas Energy Impacts as a Percent of Gross				
Lighting	84%	76%	87%	84%
Cooling	80%	56%	0%	81%
TOTAL	80%	55%	-5%	81%

* Influence-adjusted impacts are based on the subtraction of gross impacts (by measure) that have a self-reported influence score of less than 4 on a 1 to 10 scale.

This influence-adjusted result suggests that all of the delivery channels are influential for lighting end-use equipment installations, and all but the phone audits are successfully influential for cooling measure installations. As mentioned above, the attribution of impacts is actually a much more complicated issue than the demonstration presented here. A full

consideration of audit program net impacts would need to account for current market conditions (with indicators drawn from the nonparticipant population), and a more careful examination of participant cause and effect, leading to a given equipment installation and technology choice. Considerations would include the timing of the audit and installation, other influences like the rebate programs/rebates/education/marketing, participant knowledge of a particular technology and energy saving opportunity before vs. after the audit. Indicators of audit influences of equipment installations are explored in greater detail in the section that follows.

In future evaluations it would be beneficial to perform a more rigorous net to gross analysis. A logit model could help tease out the relative importance of competing influence and quantify the portion of activity attributable to the Audit program. To complement this approach, survey questions can be designed that help determine what the customer's behavior would have been in the absence of the program.

4.3   INFLUENCE OF THE AUDIT ON EQUIPMENT AND PRACTICE ADOPTIONS

The previous sections examined audit gross impacts and equipment and practice adoptions among participants, including comparisons with nonparticipant adoptions. This section investigates how influential the audit was in the decision to purchase new equipment.

It is reasonable to assume most adoptions occurring within a year or so of the audit are influenced to some degree by the Audit program[4]. After all, when making a purchase, all information pertaining to the equipment is weighed and incorporated into the decision-making process. Indeed, as shown in Chapter 6, Long Term Assessment, audit related conservation activity is greatest within the first year of the audit. In the impact survey, participants were asked whether their equipment purchases were specific recommendations in the audit report. Participants were also asked to rate the influence of the audit on their purchase decisions on a scale of 1 to 10, where 1 is not influential at all and 10 is very influential. Conservation measures are treated somewhat differently in the survey. Participants were not asked to rank the influence of the audit on a scale from 1 to 10, but instead were asked to state which conservation measures they had begun as a result of the audit. (Responses to these survey questions are summarized in the following sections, 4.3.1 and 4.3.2.)

An important function of the audit program is to connect participants with rebate programs to encourage the adoption of recommendations. For this reason there is interest in the relationship between audit participation, Express Efficiency participation and how they might work together to encourage more high efficiency actions. There is a separate report dedicated to these and related issues—The Cross Program Assessment report. We present some of these results here because they relate directly to questions of influence on customer adoption behavior. The exhibits in this section do not present results for every segment. Results based on fewer than 10 responses are withheld.

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[4] A full discussion of the timing of adoptions relative to the audit is presented in Chapter 6, Long Term Assessment.

4.3.1 Self-Reported Influence of Audit on Equipment Adoptions

As stated above, customers were asked to rate the influence of the audit program on their equipment purchase decision on a scale from 1 to 10, where 1 is not influential at all and 10 is very influential. The mean influence reported by respondents is shown in Exhibit 4-30 below for each end-use. Total population results are shown as well as results for key hard-to-reach segments.

Exhibit 4-30 below shows that lighting recommendations have greater influence than other end The exhibit shows that lighting recommendations have greater influence than other end uses. This confirms the success of the audit program in encouraging lighting, found by examining adoption rates in *Section 1.1*. Cooling has the next highest result. In general the HTR segments are having a greater response to lighting and cooling recommendations than non-HTR segments, evidenced by the larger than average mean influence in most segments.

Exhibit 4-30
Audit Influence on Equipment Adoptions by End-Use
Mean Influence Score
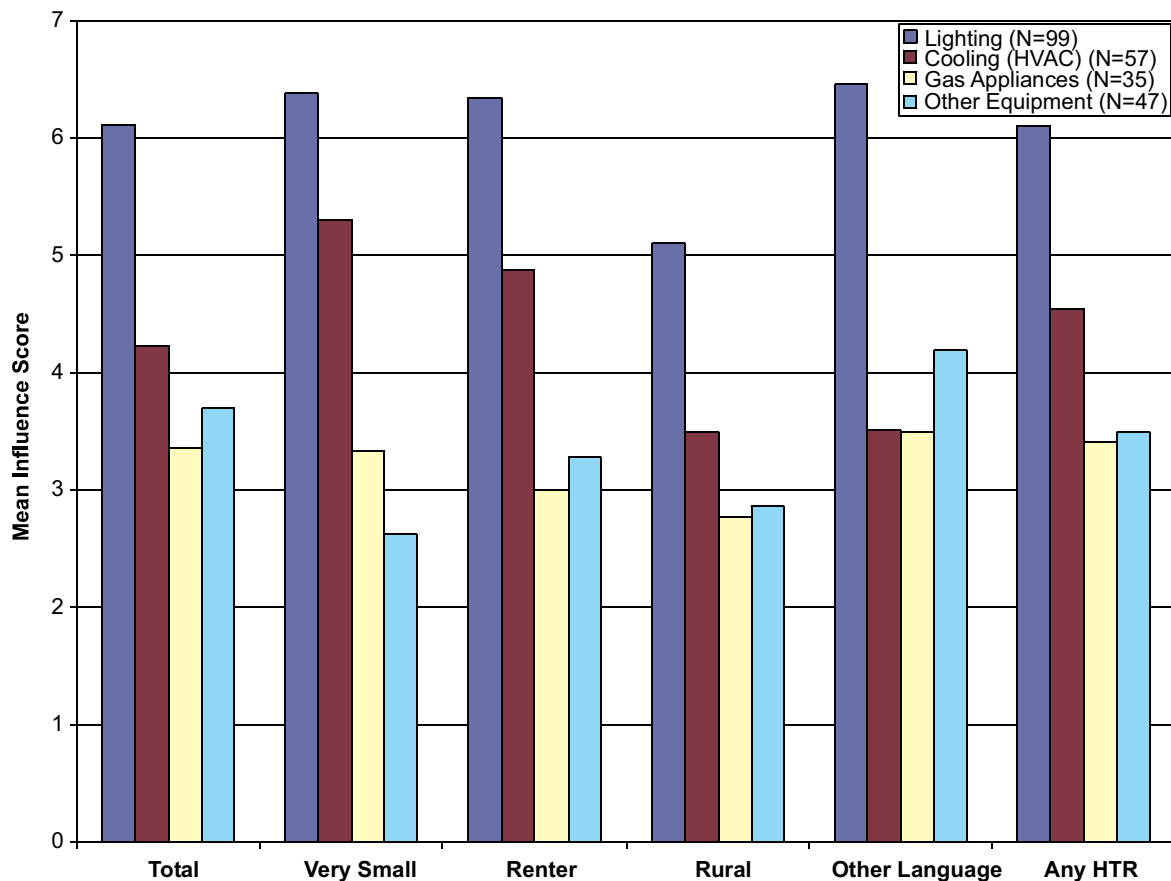
Although the result is not shown in the exhibit, the SCG result for gas equipment was strong with a mean of 6.3 (N = 12). It appears that the SCG on-site instrument and delivery strongly

impacted gas equipment adoptions. SCG techniques might be shared with other utilities for a higher statewide result in this end use.

For purposes of presentation, we grouped numeric influence ratings. Ratings from 1 to 3 were not at all influenced, ratings from 4 to 7 were somewhat influenced and ratings from 8 to 10 are very influenced. The percent of respondents falling into each of these groups by end use is shown in Exhibit 4-31.

Exhibit 4-31
Influence of Audit on Equipment Adoptions
Categorical Presentation
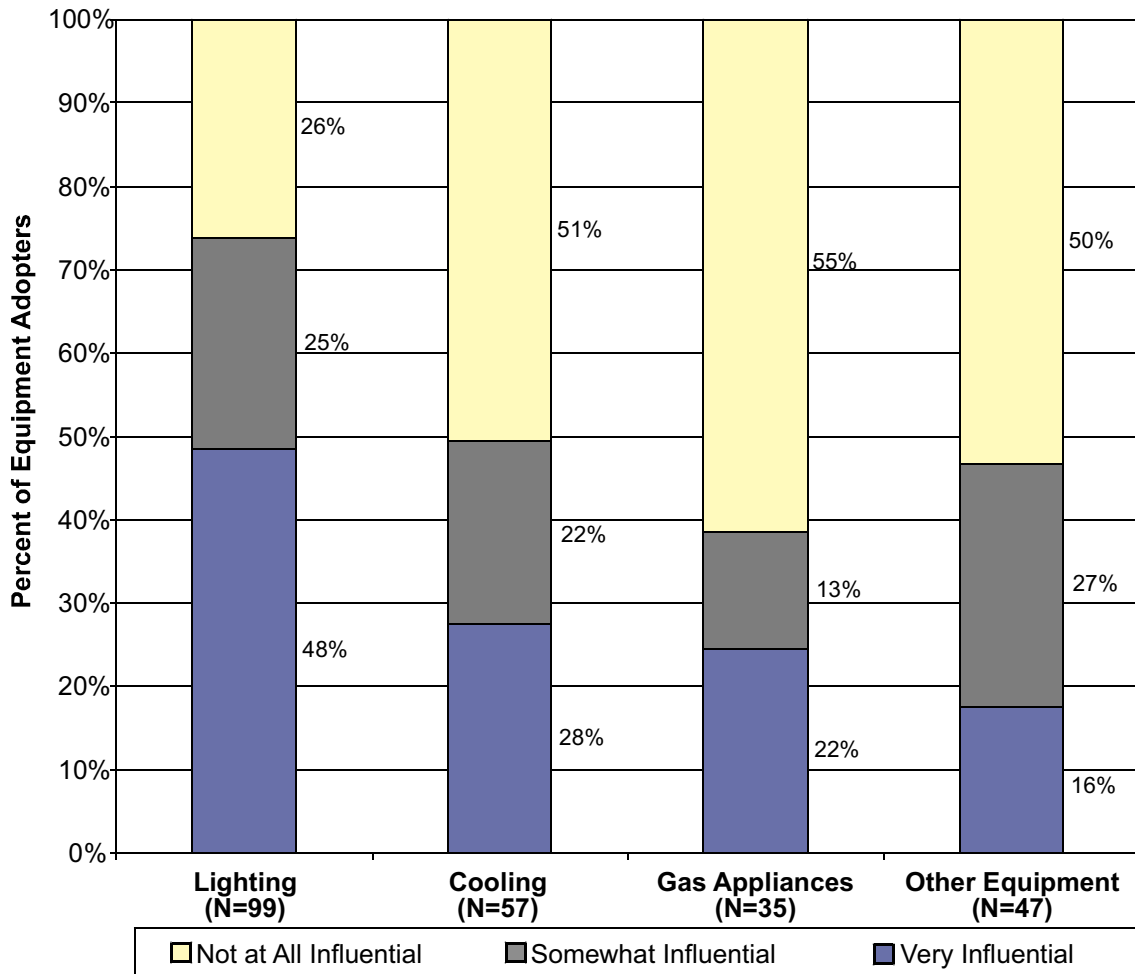
Exhibit 4-31 shows, again, that lighting recommendations have the highest follow through rate, followed by cooling. Gas appliances and other equipment adoptions trail behind.

Exhibit 4-32 presents the mean participant self-reported influence for each end use by delivery mechanism.[5]

Exhibit 4-32
Influence of Audit on Equipment Adoption by Delivery Mechanism
Mean Influence Score
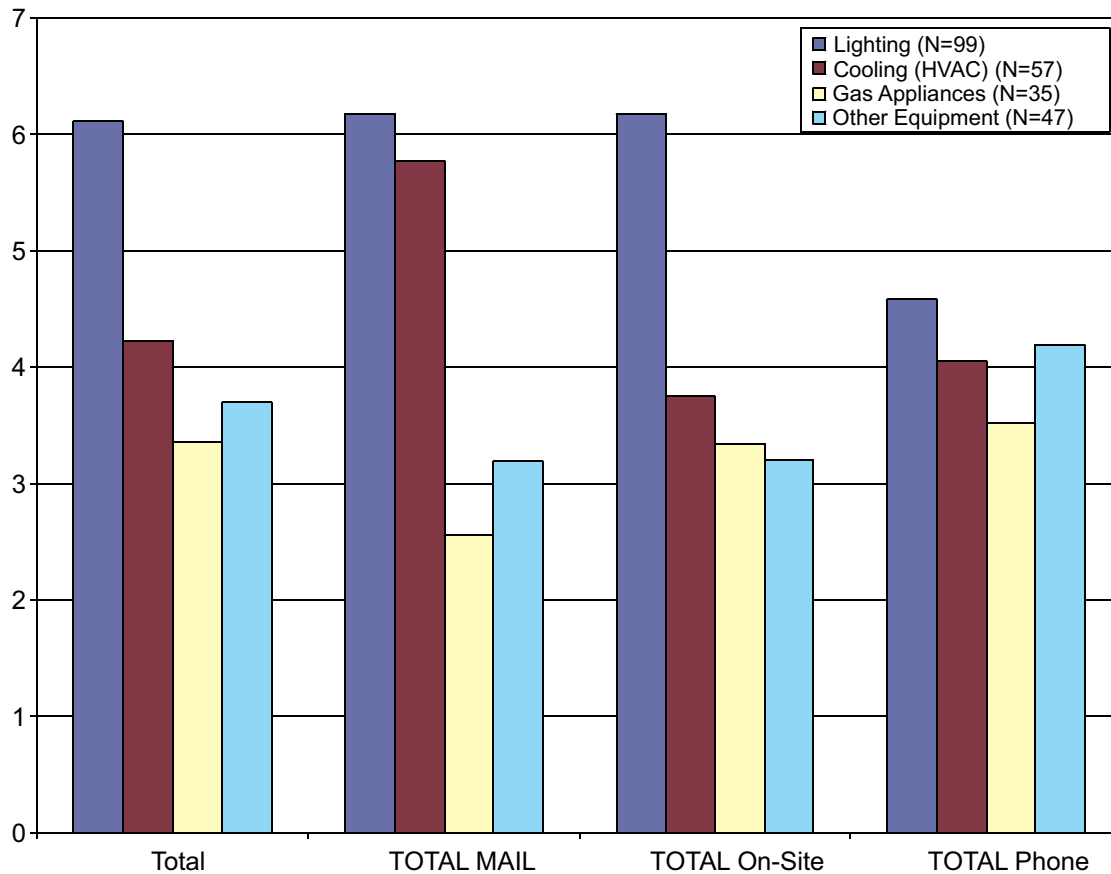
Results are strong for the mail audit, with high influence scores for both lighting and cooling, and scores comparable to other delivery mechanisms for gas appliances and other equipment. The difference between phone and on-site are not substantial, with on-site showing significantly better lighting result, but comparable results for other end uses.

Although the SCE MCD customers have substantially higher adoption rates for 'other' equipment, they claim that the audit had little to do with their decision, with an average influence score less than 3. However, there is a problem of small sample size for this question, with only 4 responses, so the score should be interpreted with much caution. The SCG On-Site audit performed very well for the gas appliance measures with half of the adopters claiming to have been very influenced by the audit.

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[5] There were not enough CD Rom respondents to report these results for that delivery mechanism.

4.3.2 Percent of Adoptions Specifically Recommended in Audit Report

For each participant equipment adoption reported, respondents were asked whether the equipment installed was one of the recommendations made in the audit report (written or electronic.) The results give some indication of the influence of audit recommendations on purchases beyond self-reported influence ratings. The first exhibit in this section —Exhibit 4-33— presents the percent of equipment purchases that were specifically recommended in the audit report. The results are shown for the total participant population by end use and for some important hard-to-reach segments.

Exhibit 4-33
Percent of Adoptions Specifically Recommended in Audit Report
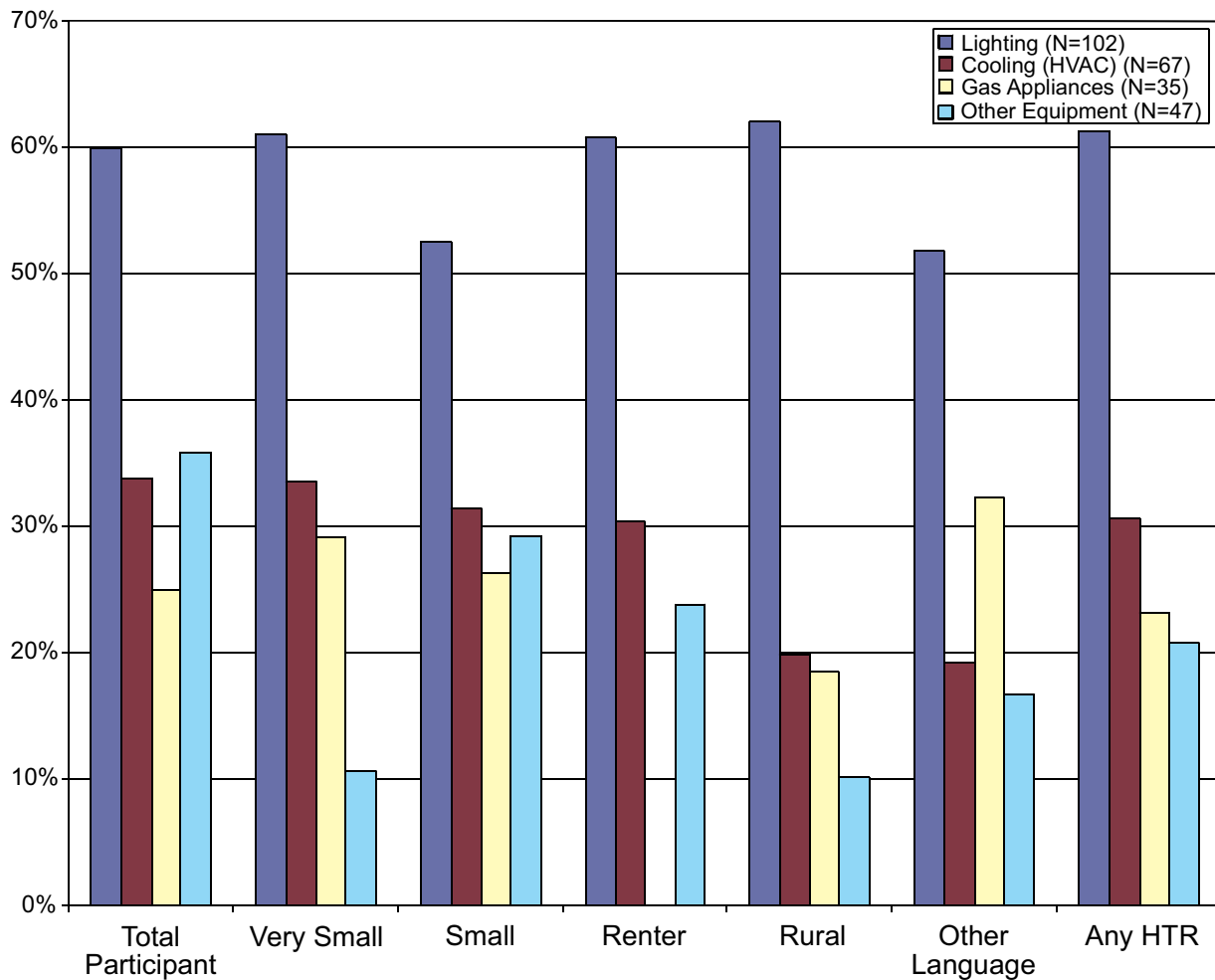
Exhibit 4-33 again confirms lighting as the end use with the greatest rate of customer follow-through. Differences between the segments shown in the exhibit are fairly minimal, although it does appear that rural customers are implementing fewer cooling, gas and other recommendations than other hard-to-reach segments. The 'other' equipment result is volatile and notably smaller in the hard to reach segments than the participant total. It is not shown in the exhibit due to a small sample size (9) but the result for non-HTR facilities is 66 percent of

'other' equipment installed was recommended by the audit report. The SCE MCD rate is 44 percent. Thus, although customers claim little to no audit program influence, there is some evidence to the contrary.

Exhibit 4-34 shows the percent of equipment adoptions recommended in the audit report by end use. The segments of the stacked bars represent the percent that said, "yes, the equipment was a recommendation," those that said "no" and also includes those that could not remember. Only 16 percent of lighting adoptions were said to have not been included in the audit report, versus between 44 and 52 percent of the other end use adoptions.

Exhibit 4-34
Percent of Equipment Adoptions Specifically Recommended in the Audit Report
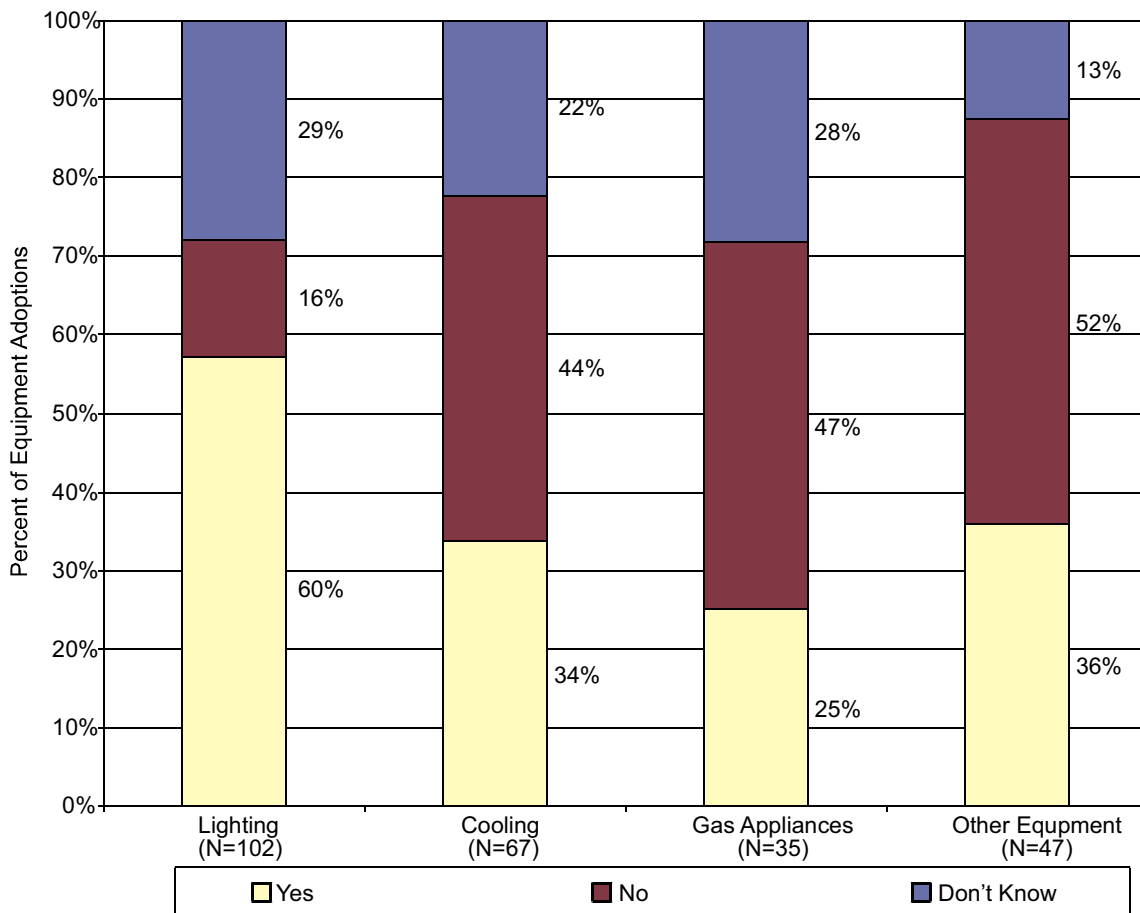
Exhibit 4-35 shows similar data segmented by delivery mechanism. The on-site result is stronger for the customized ("other") equipment adoptions, while lighting and cooling adoptions are more similar across the delivery segments. This is not too surprising, because it is more difficult to make custom equipment recommendations without actually visiting a facility. Lighting is strong for both on-site and phone, while the mail audit lags behind a little. Cooling, however, is highest among mail audit recipients and lower for the phone.

Exhibit 4-35
Percent of Equipment Adoptions Recommended in Audit Report
By Delivery Mechanism
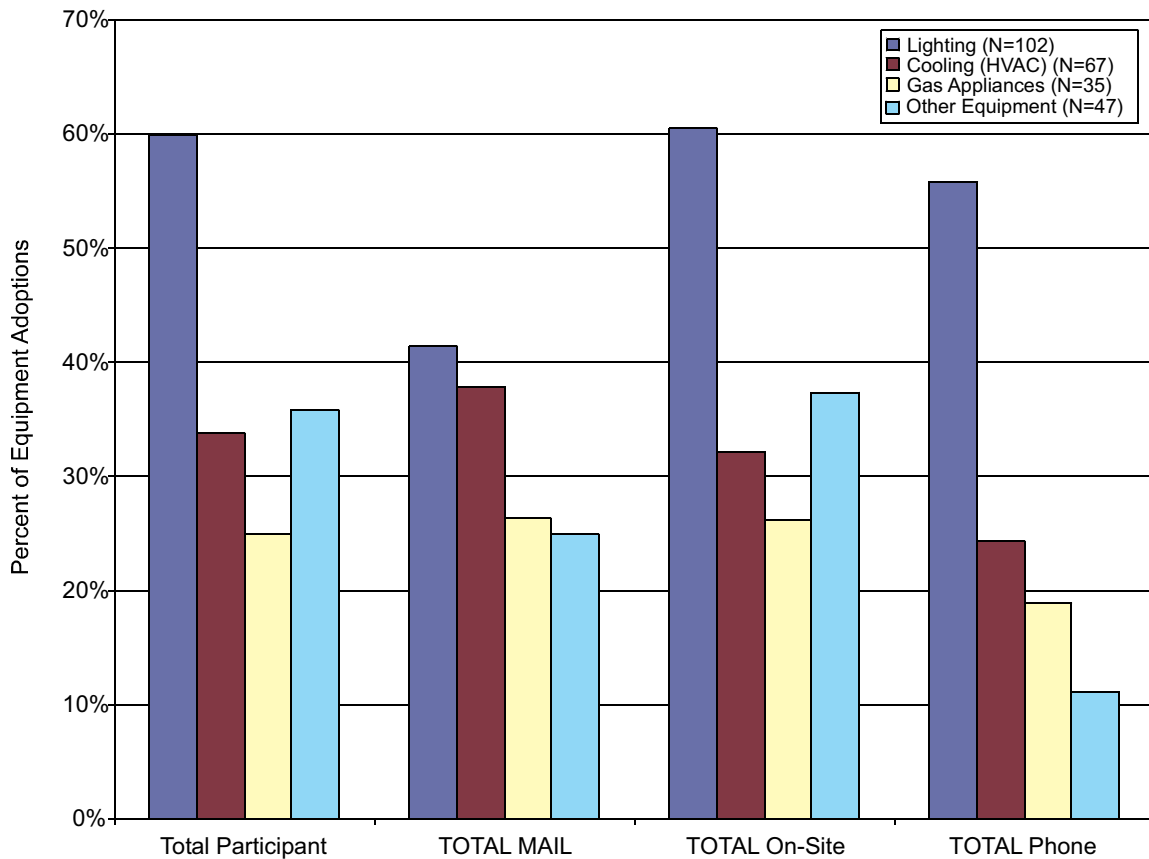
The final exhibit in this sub-section shows the percent of equipment purchased by audit participants for which a rebate was obtained. This data is based on self-reported information from survey respondents. The results are shown in Exhibit 4-36 below.

Exhibit 4-36
Percent of Equipment Adoptions with Rebate
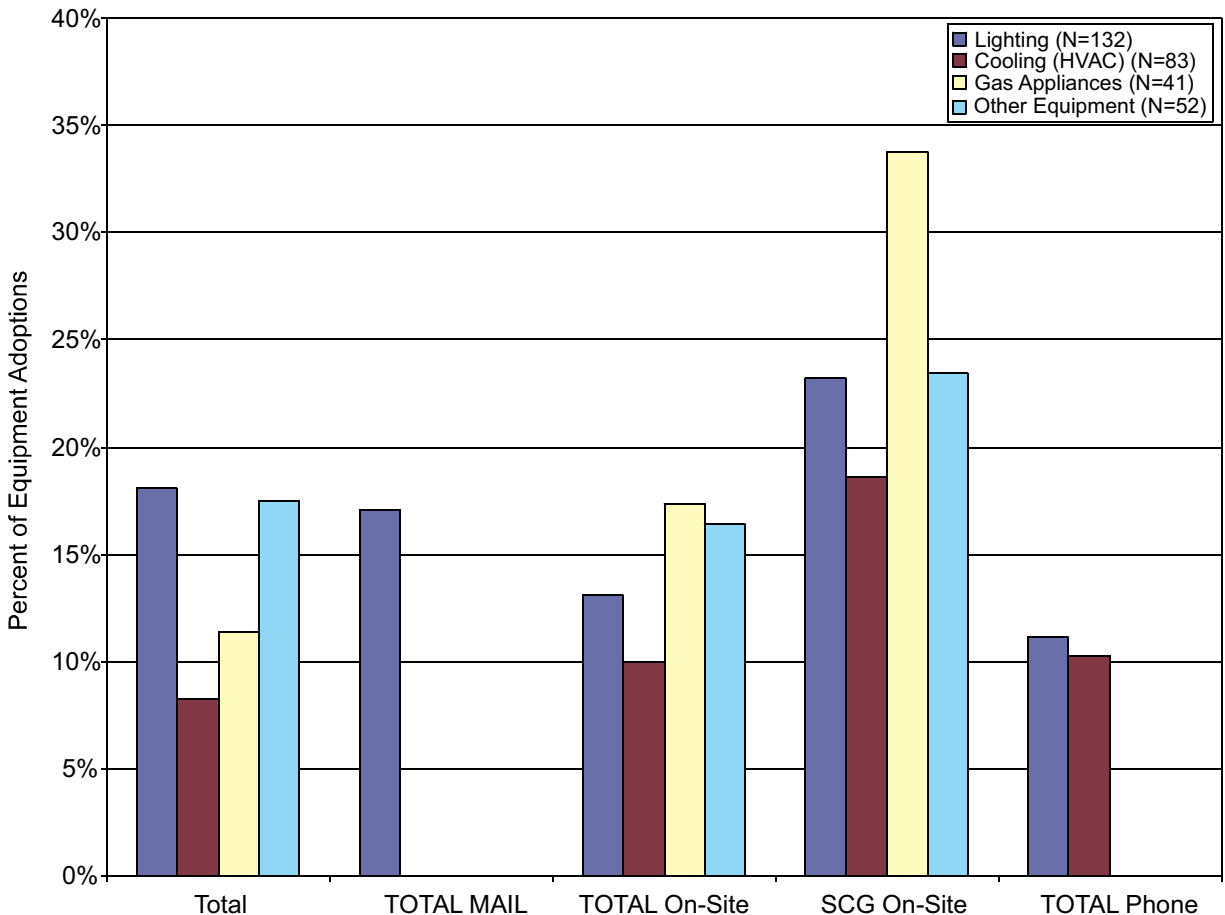
The percent of equipment that was rebated is not substantial, ranging from 8 to 18 percent. The pattern of rebates generally reflects the patterns of audit program success. Lighting, which has the highest follow through rate and the highest influence scores, also has the highest rate of rebated equipment. SCG is shown in the graph above specifically to illustrate the high rate of rebates associated with gas appliances, an end use they have had significant success with. Connecting customers with rebates seems to be a good indicator of success in inspiring recommendation follow through. On the other hand, the mail and phone audits, which had fairly strong results based upon adoption rates and other measures of audit influence show poor connection with rebate programs. This might be a relatively easy to obtain performance enhancement for these audits, i.e. to better connect participants with rebate programs. Perhaps mailing follow up material under separate header with rebate information could improve the connection.

4.3.3 Condition of Removed Equipment

This last sub-section examines the degree to which early adoptions occur within the participant population versus the nonparticipant population. Exhibit 4-37 shows the percent of adoptions that were early replacements, i.e. the removed equipment was fully functional. Lighting and cooling results are shown for both participants and nonparticipants. For gas appliances and other equipment only the participant result is shown because the data was not collected for nonparticipants.

The results show that participants are more likely to be early replacers than nonparticipants for both the lighting and the cooling end use. Fifty-nine percent of participant lighting adoptions are early replacements versus 51 percent in the nonparticipant population. The percentage of early replacement among cooling equipment adoptions is smaller, as we would expect, with the larger capital cost associated with cooling technologies. The result for gas appliances and other equipment is respectable, and is highly suggestive of audit program influence in these end-uses.

Exhibit 4-37
Percent of Equipment Adoptions that are Early Replacements
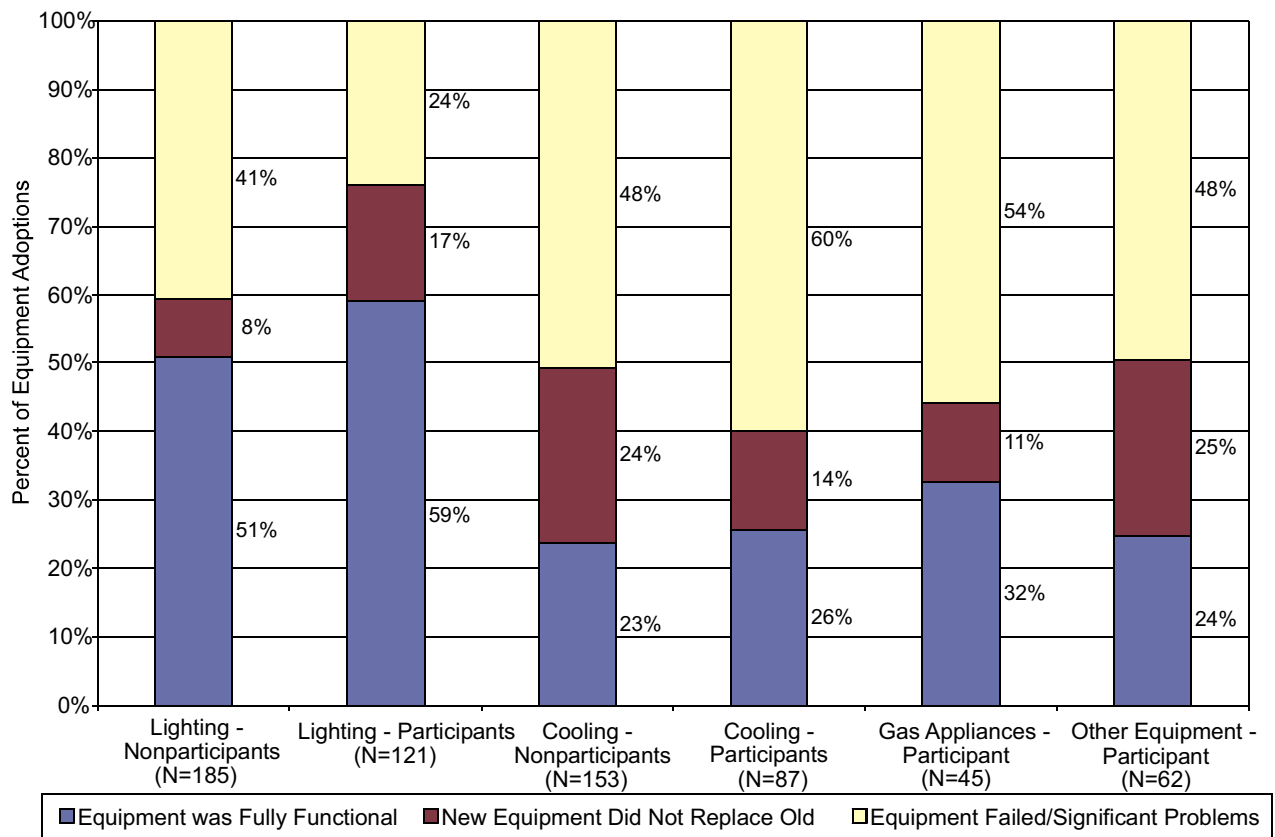
The strong lighting results shown thus far prompted further investigation into the condition of removed equipment for this end use. Early replacements for technologies with the highest adoption rates are shown in Exhibit 4-38 below and compared with nonparticipant rates. The results show that for the higher capital cost installations, T8 fixtures and electronic ballasts, participants are making more early adoptions than nonparticipants. For CFLs the rate of early adoption is somewhat higher in the nonparticipant population.

Exhibit 4-38
Early Lighting Adoptions by Technology, Participants versus Nonparticipants
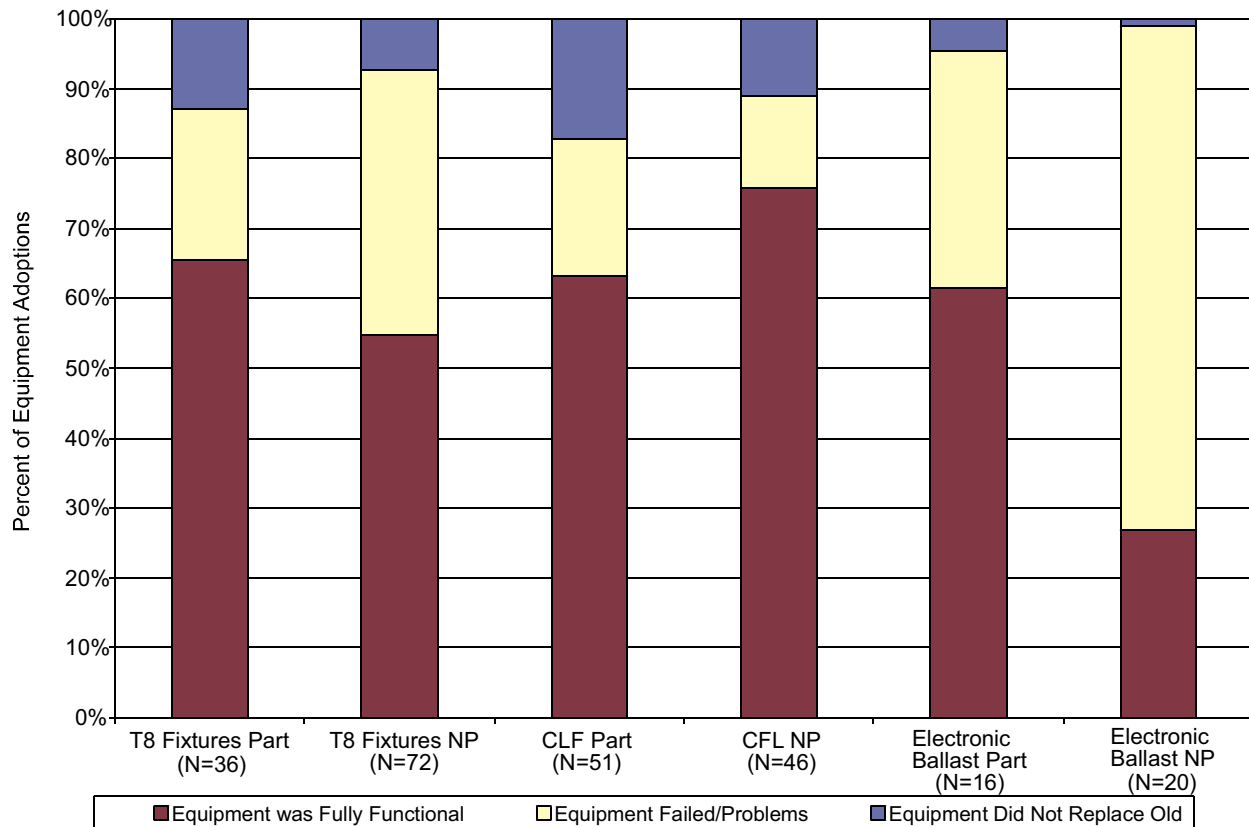
4.3.4 Influence of Audit on Participant Conservation Practices

Rather than asking participants to rank how influential the audit was on their conservation practices, they were asked which measures were initiated as a result of the audit. Recall that Audits were found to enhance the savings from the conservation practices of participants beyond those taken by non-participants. Thus, though both cohorts reported a similar amount of conservation practices, those taken by participants were more thorough and resulted in higher energy savings.

Exhibit 4-39 below presents evidence that the conservation measure recommendations in the audit are inspiring participants to begin conservation practices. This exhibit shows the percent of conservation measures started as a result of the Audit for various population analysis segments. Over one third of the conservation measures currently in practice by participants were self-reported to be a direct result of the audit recommendations. This result is quite consistent across the segments. The hard-to-reach segments tend to have higher than average results, such as renter, rural, other language and 'any HTR'. The medium size category is notably lower than the others. As it is further shown in Exhibit 4-40, it appears that smaller and hard-to-reach customers are more responsive to conservation measure recommendations.

Exhibit 4-39
Percent of Conservation Measures Begun as a Result of the Audit
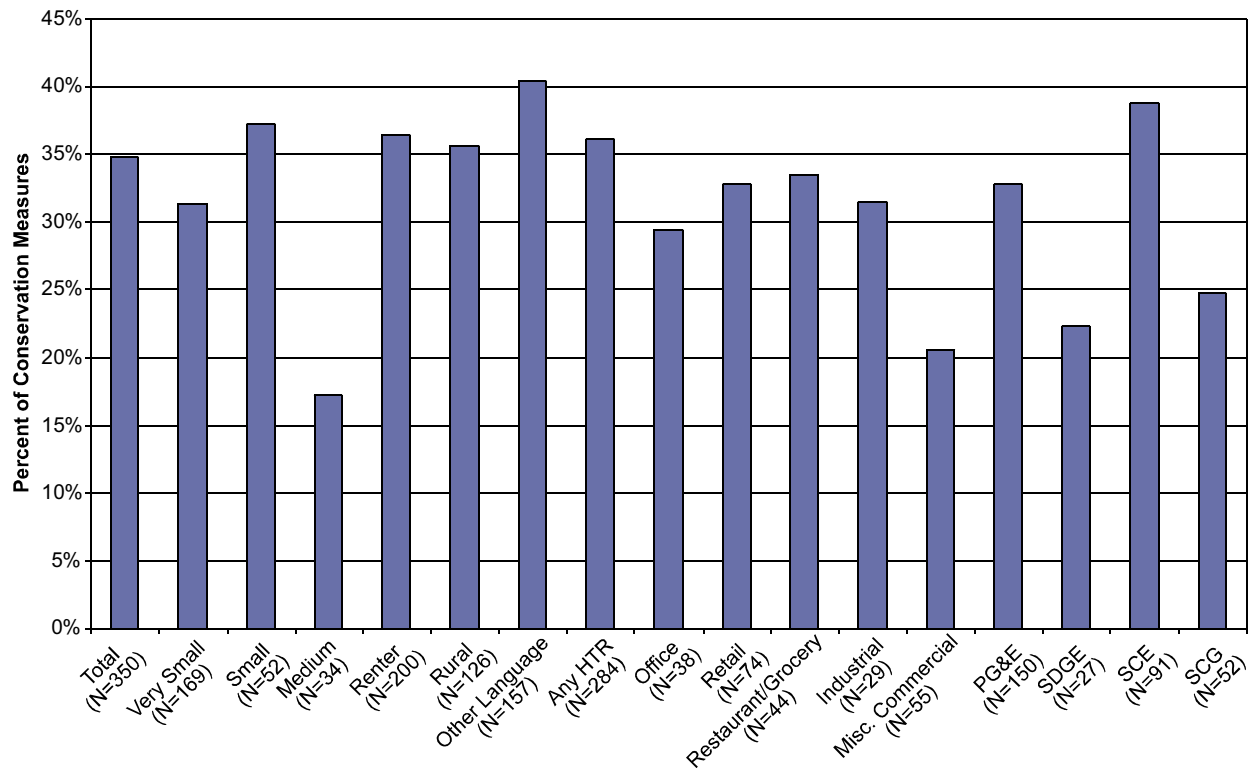
Exhibit 4-40 below shows the same data for segments related to utility and delivery mechanism. Notice that the SCE Vendor audit result towers over the others, and the MCD audit is notably lower. The vendor audit is directed toward the smallest businesses, while the MCD audit is directed at larger customers. Previous results indicate the SCE Vendor audit customers have very low rates of equipment adoption, even lower than nonparticipants. The evidence below suggests that the SCE Vendor audit is moving customers to adopt conservation practices. Although the rate of conservation practice among SCE Vendor participants does not notably exceed nonparticipant rates, it seems that without the program the conservation rate among these customers would be lower than the nonparticipant rate.

Exhibit 4-40
Percent of Conservation Practices Begun as a Result of the Audit
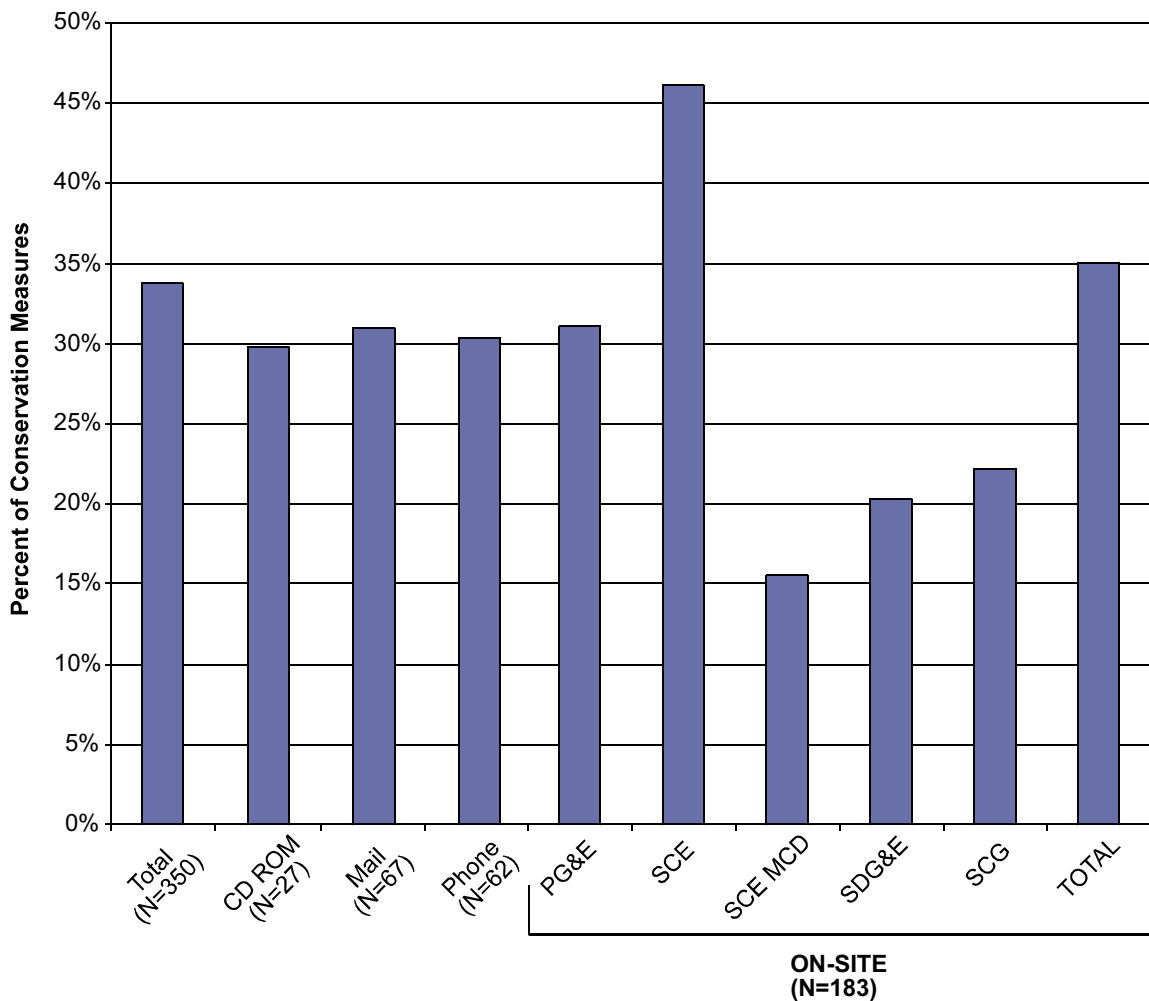
4.4 GAP ANALYSIS

This section examines the portfolio of 2002 audit recommendations as well as patterns of follow-through relative to those recommendations. This 'Gap Analysis' examines the available set of audit recommendations to better understand their content and identify areas that seem to warrant greater or lesser emphasis. It also compares participant adoptions with audit recommendations to estimate a recommendation 'realization rate.' The former analysis is based on tracking data and the latter on tracking data combined with survey responses. Due to data constraints, analysis is restricted to PG&E phone and on-site audits and the SCE MCD audits.

4.4.1 Portfolio of Recommendations

PG&E

Exhibit 4-41 below shows the distribution of recommendations made in the PG&E 2002 Phone and On-Site audits by end-use category. The percentages represent the portion of all recommendations made that fall into each category. The categorization of recommendations is based upon tracking system groupings. There are 8 end-use categories: lighting, HVAC, Refrigeration, Water Heat, Food Technology, Agriculture, and Motors.

Exhibit 4-41
PG&E 2002 Phone and On-Site Audit Recommendations
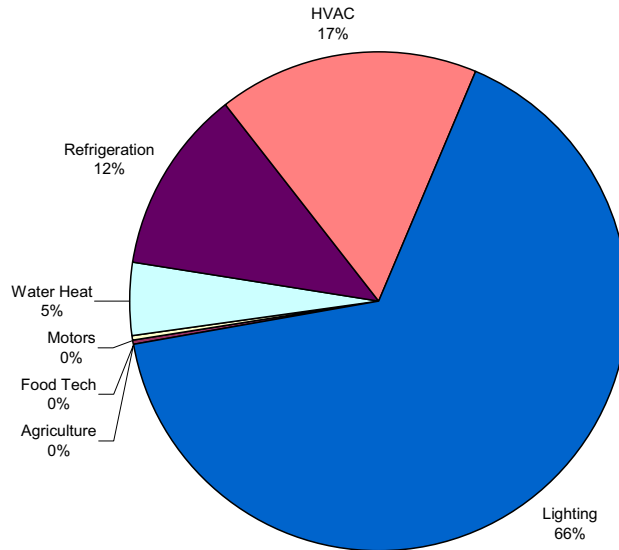
The 2002 PG&E phone and on-site audit recommendations were primarily lighting, at 66 percent of all recommendations. HVAC and Refrigeration follow with sizable portions, 17 and 12 percent respectively. Water Heat was not uncommon, at 5 percent of recommendations.

Although Food Technology, Agriculture, and Motors recommendations are present in the 2002 audit database of recommendations, they represent less than one-half of one percent of all recommendations. When rounded to the nearest whole percent for display in the graph they appear as zero. These end-use categories represent a gap in the portfolio of recommendations. The audit program could improve the breadth of audit reports and customer adoptions by concentrating on some of these end use categories.

The program would only stand to benefit by emphasizing a greater variety of recommendations if customers are interested in adopting equipment in these end uses. Exhibit 4-42 below presents the distribution of PG&E phone and on-site audit participant adoptions using our Impact Survey data. The distribution of participant adoptions is not terribly different from the distribution of recommendations, which indicates that recommendations are basically appropriate and effective. However, there are some important differences. HVAC is 30 percent of adoptions, but only 17 percent of recommendations. It appears customers are more interested in HVAC equipment than is reflected in the audit recommendations. Food Technology equipment represents 4 percent of adoptions, but less than one-half of one percent of recommendations. This is another category that customers are indicating could be further emphasized in audit recommendations. Finally, the 'other' category represents 7 percent of adoptions. These include business machines (such as fax, copiers, printers) gas dryers, appliances and industrial machines. This category of equipment is also under-represented in audit recommendations.

Exhibit 4-42
2002 PG&E Phone and On-Site Customer Adoptions
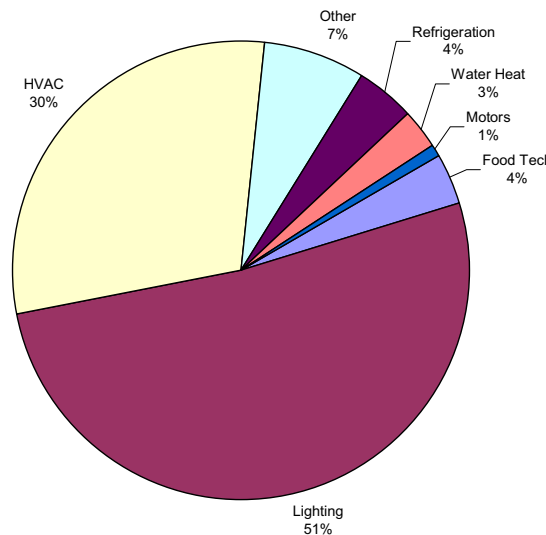
The phone and on-site instruments offer the auditor varying degrees of ability to customize audit recommendations. The next 'gap' we examine is whether the greater ability to customize recommendations is fully utilized in the on-site audit. On-site audits are more expensive to conduct but also afford an opportunity to recommend custom equipment. With an emphasis on larger customers, the expectation is that the on-site audit would recommend a greater number of upgrades for refrigeration, motors, food technology and agricultural and industrial systems.

Exhibit 4–43 below shows the end-use category distribution of adoptions for Phone and On-Site audit survey respondents separately. When broken into separate categories, phone and on-site recommendations are very similar at the end-use level. The end-use distribution suggests that the phone and on-site audits do not vary in their level of customization and sophistication of recommendations, but does not provide conclusive evidence. For this, we look further into the types of lighting and HVAC recommendations being made by the two audit delivery mechanisms.

Exhibit 4– 43
Comparison of the End-Use Distribution of Recommendations
For the 2002 PG&E On-Site and Phone Audits

On-Site Audit Recommendations

HVAC
16%

Refrigeration
14%

Water Heat
4%

Motors
0%

Foos Tech
1%

Agriculture
0%
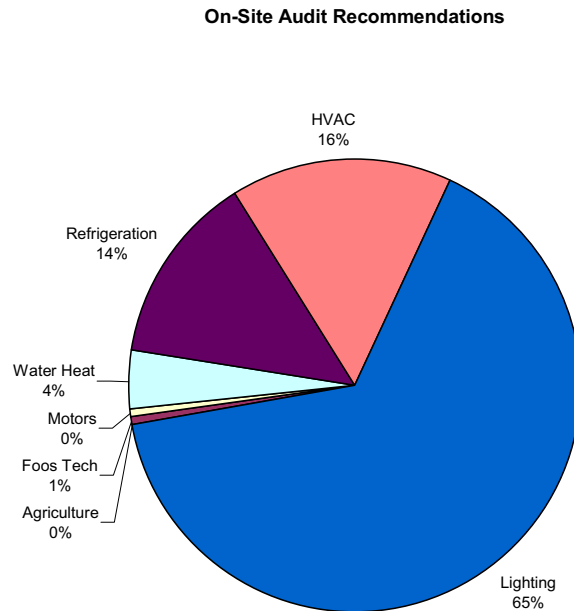
Lighting
65%

Exhibit 4– 43 (continued)
Comparison of the End-Use Distribution of Recommendations
For the 2002 PG&E On-Site and Phone Audits

Phone Audit Recommendations
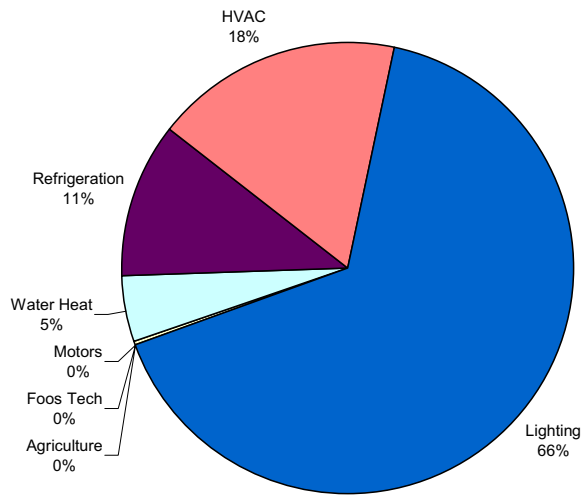
Exhibit 4-44 below presents the distribution of lighting technology recommendations made in the On-Site and Phone audit instruments. Both audit recommendation distributions are concentrated in T8 lamps with electronic ballasts and replacing incandescent with compact fluorescent bulbs. The phone audit is more concentrated in these two technologies than the on-site—92 percent of phone recommendations versus 81 percent of on-site recommendations are in these two technologies. Emphasis in photocell, delamping and adding reflectors is low in both audit technology distributions. Exit signs, HID, and occupancy sensors are somewhat higher in the on-site audit distribution. Overall, the difference between these distributions is fairly minimal. There does not appear to be a greater degree of customization and sophistication in the lighting recommendations provided through the on-site audit.

Exhibit 4-44
Comparison of Lighting Technology Recommendations
In the 2002 PG&E On-Site and Phone Audits

	On-Site		Phone	
Lighting Recommendation	Frequency	Percent	Frequency	Percent
Add Reflectors	41	1	42	0
Exit Signs/CFL or LED	228	4	36	0
HID	126	2	54	1
New T-8 w/ EB's	3306	61	6361	71
Occupancy Sensor	500	9	458	5
Other Light	91	2	41	0
Photocell	13	0	8	0
Removal of Lamps	5	0	0	-
Repl Inc W/CFL	1061	20	1922	22
Retrofit w/ EB's	12	0	7	0

Exhibit 4-45 presents a comparison of HVAC technologies recommended in the PG&E 2002 On-Site and Phone Audit.   The On-Site audit makes significantly more Packaged and Split System air conditioner recommendations, and less packaged terminal A/C units, which is believed to reflect saturation differences among larger and smaller customers respectively.   The 'other' HVAC category is somewhat higher in the On-Site audit than the phone. Similar to the lighting technology recommendations, the HVAC recommendations are similar across the On-Site and Phone audit reports.

Exhibit 4-45
Comparison of HVAC Technology Recommendations
In the 2002 PG&E On-Site and Phone Audits

HVAC Recommendation	On-Site		Phone	
	Frequency	Percent	Frequency	Percent
Adjustable Speed Drives	6	0	3	0
HVAC Maintenance	341	26	724	30
Other HVAC	43	3	7	0
Package Terminal A/C Unit	24	2	241	10
Reflec Wind Film	172	13	365	15
Rem Cond Unit	4	0	3	0
Setback Prog Therm	560	43	932	39
Single Pkgd/Split Sys A/C	146	11	111	5
Time Clocks	12	1		

Different business types have distinctly different equipment needs, and therefore different portfolios of appropriate recommendations. For example, we would expect to see more motors recommendations within the industrial segment, and more refrigeration and food technology recommendations within the restaurant/grocery segment.   Exhibit 4-46 below shows the distribution of recommendations by end-use for each business type segment.   The distribution is shown as a percent of recommendations is shown for each business type by end-use category, along with the total number of recommendations contributing to the distribution, labeled "N".

Exhibit 4-46
2002 PG&E On-Site Audit Recommendations by Business Type

End-Use	Business Type							
	Agriculture	Industrial	Restaurant/Grocery	Institutional	Office	Commercial Other	Retail	Miscellaneous
Food Tech			2	0	0		0	
Lighting	70	68	59	64	68	68	67	69
Motors	5	3	0	0	0	1	0	1
Refrigeration	8	6	23	10	8	10	13	11
HVAC	15	19	12	21	19	18	15	17
Water Heat	1	4	4	5	4	4	5	3
N	84	389	2,370	569	1,115	1,262	1,209	416

The table shows some 'gaps' in customization by business category. Neither the Agriculture nor the Industrial segment recommendations differentiate themselves from other business types. In both segments there are more motors recommendations than in other business type segments, but the difference is small. The majority of recommendations for both Agriculture and Industrial facilities are in the lighting and HVAC end use. The On-Site audit recommendations should provide substantially greater breadth in recommendations, particularly for complex facilities such as an industrial facility. In particular, the recommendations should not focus on lighting and HVAC in industrial facilities because combined they represent only 22 percent of electric energy use in a typical industrial facility[6]. Restaurant/Grocery facilities should also receive a greater number of Food Technology and Refrigeration recommendations, as cooking and refrigeration equipment represents 29 and 24 percent of electric use in a typical restaurant and 8 and 58 percent in a grocery[7].

The Restaurant/Grocery and Retail segment have a greater emphasis in refrigeration. Institutional and Office facilities have an emphasis in HVAC. These are appropriate and along the lines of expectations.

Exhibit 4-47 below presents the PG&E Phone Audit recommendations by business type. In the Phone Audit the Agriculture segment does distinguish itself with noticeably higher numbers of water heat and refrigeration recommendations. Industrial facilities also receive a somewhat more diversified set of recommendations than other types of facilities, but for both Agriculture and Industrial the differences are still small. There could be greater recommendation diversification for these business types. Although refrigeration recommendations are larger for Restaurant/Grocery than other segments, the food technology recommendations are smaller than expected.

Exhibit 4-47
2002 PG&E Phone Audit Recommendations by Business Type

End-Use	Business Type							
	Agriculture	Industrial	Restaurant/Grocery	Institutional	Office	Commercial Other	Retail	Miscellaneous
Food Tech			0					
Lighting	56	66	65	69	67	66	68	66
Motors		1	0		0	0	0	
Refrigeration	13	11	19	10	9	8	9	11
HVAC	20	14	13	18	20	21	16	16
Water Heat	11	8	3	2	3	5	6	7
N	164	789	2,429	201	2,248	3,530	2,753	694

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[6] California Industrial Energy Efficiency Market Characterization Study, December 2001, XENERGY Inc., Figure 3-10.

[7] PG&E Commercial Building Survey Report, 1999.

The other facet of the 'gap' analysis is to find areas where recommendations have low rates of follow through, or low 'realization rates'. To investigate this the sample was first reduced to only recommendations provided to impact survey respondents. Then we contrasted the sample of recommendations to the sample of adoptions. Unfortunately, this reduces the sample to a rather small number of adoptions, 114 to be precise. With this sample, examining distributions by business type, or even distribution mechanism is not worthwhile, but industrial was separated from commercial segments. Exhibit 4-48 below shows the distribution of PG&E recommendations and adoptions for the phone and on-site audit customers in the impact survey sample.

The exhibit shows that HVAC, while an area of emphasis in the recommendations, has an even greater emphasis in customer adoptions. As we've discussed previously, this suggests that some additional, well-placed HVAC recommendations may be very welcome by customers. Refrigeration recommendations have a relatively low level of follow-through. Lighting and Water Heat are about equal, at a little less than 9 percent. There are many more lighting than water recommendations however, and a 9 percent follow through rate for lighting is very respectable. The table shows that for industrial, customers are interested and following through on lighting and HVAC recommendations. Similar to commercial, the HVAC recommendations have a much higher follow through rate. Here, customers are taking actions in areas not addressed by the audit: food technologies, motors and 'other' technologies. This underscores the point made above that recommendations in the industrial sector should be more diversified.

Exhibit 4-48
2002 PG&E Participant Recommendations and Adoptions
for a Sample of On-Site and Phone Survey Completes

Business Type	End-Use	Percent of Reco's	Percent Adopted	Adoptions as Percent of Reco's
Commercial	Food Tech	0	3	75
	HVAC	17	31	21
	Lighting	67	51	9
	Refrigeration	11	5	5
	Water Heat	4	3	9
	Other	0	7	-
	N	863	101	-
Industrial	Food Tech		8	-
	HVAC	10	23	30
	Lighting	73	54	10
	Motors		8	-
	Refrigeration	12	0	-
	Water Heat	5	0	-
	Other		8	-
	N	100	13	-

SCE MCD Audits

The MCD Audit is available to large customers in SCE service territory. Customers all have assigned account representatives and the audit is conducted on-site. Exhibit 4-49 below shows the distribution of recommendations by end-use category. There is clearly a difference between the distribution of recommendation in the PG&E on-site audit and the SCE MCD audit. Of course, the PG&E on-site audit customer is smaller in size than the SCE MCD customer, and so has somewhat lower need for the diversified set of recommendations shown below. The SCE MCD audit recommendations include significant numbers of industrial process, compressed air, and 'other' (which includes changes in operating hours, 'controls', 'compressors', and other recommendations too generic in the tracking database description to determine the end-use.) In general the recommendations are more customized to the participant facility and equipment than those presented above, based on the PG&E tracking system.

Exhibit 4-49
Distribution of 2002 SCE MCD Audit Recommendations by End-Use Category
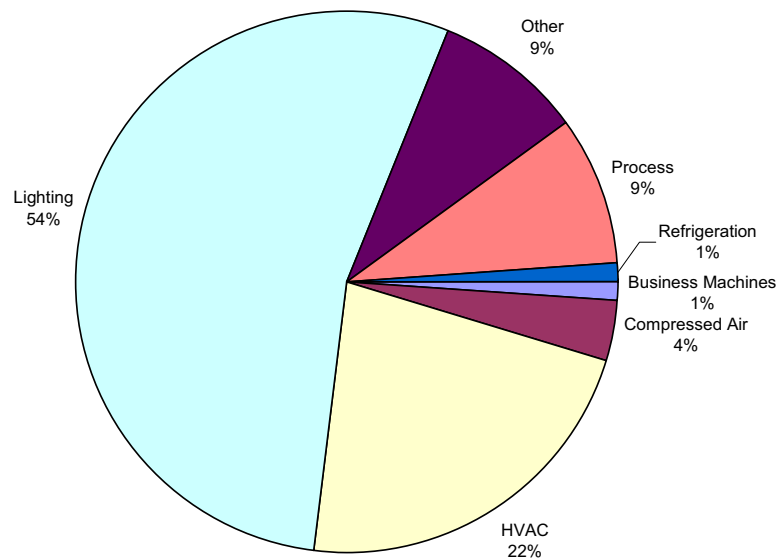
The SCE MCD audit provides a diversified portfolio of end-use recommendations. In addition, within each end-use the MCD audit provides a great variety of recommendations. Exhibit 4-50 below shows the number of unique recommendations within each end-use, as well as the total number of recommendations in the 2002 database.

Exhibit 4-50
A Comparison of Unique Recommendations to Total Recommendation for the SCE MCD Audit
-A Measure of Recommendation Customization

End-Use	Unique Recommendations	Total Number of Recommendations Made
Lighting	23	96
HVAC	27	79
Compressed Air	9	24
Other	16	33
Process	16	20
Refrigeration	6	8
Business Machines	1	6

The Exhibits above demonstrate a wide breadth of recommendations and a high degree of customization. Next we investigate whether there is evidence that the degree of end-use diverisification is appropriately correlated with customer size.

Exhibit 4-51 below shows the distribution of recommendations by end use for the MCD audit customers by customer size. The exhibit shows that as customers become larger, there are more process, compressed air and 'other' recommendations. In a successful manner, the MCD audit places less emphasis on lighting and HVAC recommendations as facilities increase in size.

Exhibit 4-51
2002 SCE MCD Audit Recommendation End-Use Distribution by Customer Size
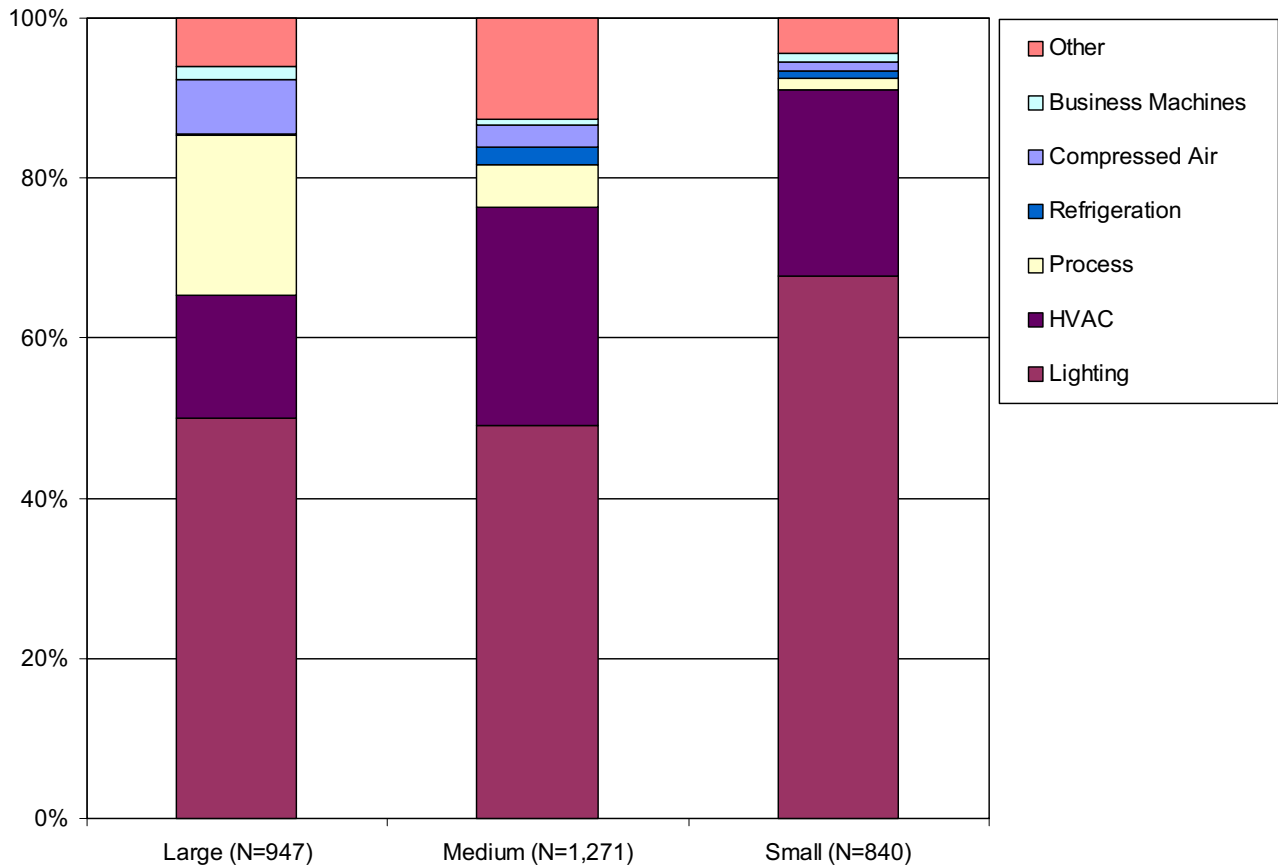
Exhibit 4-52 below is a detailed presentation of the distribution of recommendations by business type category. The Exhibit shows that about one-fourth of the MCD audit recommendations are for industrial customers. These customers receive distinctly different recommendations from other business types. Industrial recommendations are 41 percent process and compressed air, with less than 60 percent lighting and HVAC combined. Other business types show distinguishing features as well. There are more refrigeration and 'other' recommendations among the Restaurant/Grocery segment, and more HVAC and lighting for institutional facilities. Offices have more business machine recommendations than other segments. Overall, the SCE MCD recommendation portfolio appears well-diversified and appropriately tailored to business type and size segments.

Business Type	End-Use	Recommendations	Percent by Business type	Percent of Total
Agriculture	HVAC	1	50	0
	Motors	1	50	0
	Total	2	100	0
Industrial	Business Machines	1	0	0
	Compressed Air	82	10	3
	HVAC	65	8	2
	Lighting	392	48	13
	Other	27	3	1
	Process	256	31	8
	Total	823	100	27
Restaurant/Grocery	Business Machines	1	0	0
	Compressed Air	2	1	0
	HVAC	80	27	3
	Lighting	157	54	5
	Other	21	7	1
	Refrigeration	32	11	1
	Total	293	100	10
Institutional	HVAC	149	50	5
	Lighting	76	25	2
	Other	75	25	2
	Total	300	100	10
Office	Business Machines	20	4	1
	Compressed Air	1	0	0
	HVAC	141	25	5
	Lighting	369	65	12
	Other	33	6	1
	Water Heat	1	0	0
	Total	565	100	18
Retail	Business Machines	3	1	0
	Compressed Air	10	4	0
	HVAC	46	17	1
	Lighting	207	75	7
	Other	8	3	0
	Process	2	1	0
	Total	276	100	9
Commercial Other	Business Machines	8	1	0
	Compressed Air	12	2	0
	HVAC	198	26	6
	Lighting	411	55	13
	Other	104	14	3
	Process	14	2	0
	Refrigeration	4	1	0
	Total	751	100	24
Miscellaneous	Business Machines	1	2	0
	Compressed Air	1	2	0
	HVAC	6	9	0
	Lighting	55	86	2
	Water Heat	1	2	0
	Total	64	100	2

4.5   KEY FINDINGS

The audit program is designed to overcome informational and affordability market barriers for a diverse set of nonresidential customers. The program achieves these goals by providing energy efficiency recommendations and referrals to rebate programs. As discussed in the introduction, the program offers five different audit survey types to provide the most appropriate audit to the widest audience possible. The audit types and their target customer size categories are shown again below for the reader's convenience.

Exhibit 4-53
A Portfolio of Delivery Mechanisms Meet the Needs of Different Sized Customers

Customer Size	Mail	CD ROM	Online	Phone	On Site
Very Small	●	●	●	●	●
Small	●	●	●	●	●
Medium		●	●		●
Large					●

4.5.1   Program Success by End-Use and Customer Size

Lighting is the only end use with compelling evidence of overall program effects. However, a detailed examination of adoption rates across all end uses, with consideration for the types of technologies adopted and the efficiency of the equipment, provides strong evidence of segment specific program effects. A prominent area of success is found within the hard-to-reach segments of the participant population, stemming from a program emphasis on small, rural and otherwise under-served customer classes. For example, participant adoption rates within HTR are substantially higher than nonparticipant rates for the lighting and cooling end uses, and even for gas appliances, although these results stem from the SCG service territory only. There is particularly strong evidence the program is moving smaller and HTR facilities to adopt HVAC controls at high rates (mostly programmable thermostats).

It is important to note that follow-up activities by PG&E explain a large part of the cooling equipment performance of the on-site and phone audits. Among PG&E on-site customers, the cooling adoption rate for those that received a follow up call is 28 percent, while PG&E on-site customers that did not received a call have an adoption rate of 15 percent. For PG&E phone audits, those that received a follow up call had a cooling adoption rate of 41 percent[8], versus 15 percent for those who did not. Interestingly, the difference is not nearly as apparent for lighting adoptions. For lighting, it seems, less prodding is necessary, but this is an area that requires further study before solid conclusions can be drawn.

Larger customers are responding to lighting audit recommendations, manifested in a transfer of adoptions from standard to high efficiency lighting. At the same time, participating larger

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[8] The number of respondents contributing to this calculation is 19.

facilities are actually adopting fewer cooling technologies than nonparticipants, and are instead placing energy investment dollars into motors, insulation, and other custom equipment. The medium/ large and industrial segments are adopting 'other' (custom) technologies at significantly higher rates than nonparticipants. These effects are especially pronounced among SCE MCD audit customers. These adoption rates are so high as to suggest that they may displace investment dollars that might otherwise have gone to cooling. Clearly this segment is responding to program recommendations, which appear to emphasize motors and insulation recommendations.

Gas appliance results are outstanding among SCG participants, a phenomenon coincident with a very high rate of Express Efficiency rebates among adopting customers. This provides very strong evidence that rebate program promotion significantly enhances audit program results. There is no compelling evidence of gas appliance program effects from other IOU/delivery mechanism combinations, due primarily to a lack of emphasis in audit reports. SCG results demonstrate that a greater follow through rate is possible for gas appliances, at least for the on-site tool. It is very important to note that good coordination with rebates programs promotes recommendation follow through. SCG is the only utility that bundled audit and Express rebates in 2002; all customers that received a rebate first received an audit.

Audit results appear weakest for conservation measures, but not completely absent. Both the participant and nonparticipant groups report engaging in conservation practices at significant rates, and are adopting a very similar portfolio of practices. There is evidence that participants are practicing conservation more diligently than the general population, i.e. turning off more of their lights. More research should be done in future evaluations to better understand the impact of audits on no cost and/or low cost measures, especially in light of the high rate of conservation measure adoption closely following the audit. Self-report data can be somewhat unreliable, so we would suggest a billing analysis approach to more successfully augment survey-based research on conservation measure results.

Remote audits are surprisingly effective in inspiring some activity, although the resulting impacts are much greater for on-site delivered audit services. The remote audit showed more success than the SCE Vendor on-site audit. The remote audits require some degree of effort by customers, which may have the effect of spurring recommendation follow-through. That is, a customer who has spent time gathering facility information independently is predisposed to follow through on at least some of the recommendations. The SCE Vendor audit is an example of this effect in reverse. These customers did not seek out information, or schedule an appointment with an auditor, and their adoption rates do not indicate measurable program effects. The data also show that remote audits are not effective with larger customers, consistent with program theory.

The PG&E, SCG and SCE MCD on-site audits all have very solid results. The PG&E and SCG on-site customers tend to be smaller, while the SCE MCD is directed primarily at large customers. It's not too surprising, given their size emphasis, that the PG&E on-site audit has had the greatest success in lighting and the SCE MCD in 'other' (custom) technologies. The SCG audits show outstanding results for gas equipment and strong results for lighting and cooling.

4.5.2 Audit Influence on Measure and Practice Adoptions

Results of the analysis of audit influence on measure and practice adoptions are for the most part supportive of adoption rate analysis results. For example, lighting recommendations have the highest average influence in addition to the highest implementation rate. Cooling recommendations are the next most influential. Differences across delivery mechanisms are not as large as expected, with mail and phone audits comparable in influence scores to the on-site audit. Larger facilities tend to follow through on the more customized equipment recommendations, such as that provided in an on-site audit.

Further analysis of audit influence both from a free ridership and spillover perspective should be considered for future evaluations. To measure the relative influence of competing forces, a logit model could be developed that allocates portions of energy efficiency adoptions to each influencing force, such as rebates, the audit program, Flex-your-Power and other media or incentive programs. This is an objective way of separating program from other effects and allows self-report data analysis to serve as a secondary and complimentary information source.

The 'gap' analysis assessed the portfolio of recommendations, particularly in relation to business type, delivery mechanism and customer adoptions. Due to constraints in data availability, only the PG&E Phone, PG&E On-Site, and SCE MCD audit delivery mechanisms could be examined. Analysis of these recommendation databases yielded the following key findings:

- Additional end-use diversification in the PG&E audits may be desirable for certain participant groups. In particular, the industrial segment might benefit from an emphasis in motors, process and other specialized equipment recommendations.

- Also Food Technologies were under-represented in the restaurant/grocery segment, and Agriculture facilities also had few specialized equipment recommendations.

- End use distributions also revealed little distinction between the phone and on-site audit reports. If on-site audit recommendations were more distinct in character from the Phone audit, participants might appreciate the additional customization available from an on-site professional auditor.

- The SCE MCD audit, directed at larger customers, and shown to be effective in previous analyses, has a broad scope of recommendations, and evidence of appropriate customization across size and business type. This type of audit together with the larger target customer group is more appropriate use of on-site resources.

5. PROCESS ASSESSMENT

This section presents the results of the 2002 Audit Program Process to review and assess the implementation-related aspects of a program. Research undertaken for the process evaluation component of this project included in-depth interviews with program managers and vendors associated with the PY2002 Program in June of 2003 and telephone interviews with 500 participating customers and 800 general nonresidential population customers during the summer of 2003.

The process assessment specifically seeks to:

- assess the effectiveness of IOU program marketing

- determine what drives participation

- identify what participants desire from an audit,

- assess participant satisfaction,

- investigate market effects of the audit by comparing knowledge, intentions and attitudes of participants and the general population,

- assess upstream market actor involvement (mainly retailers and contractors),

- assess effectiveness of program delivery and marketing, and

- identify possible program improvements.

The organization of this section seeks to first set the stage for the remainder of this process assessment by presenting interview results with the program managers in *Section 5.1*, covering all aspects of program implementation. The program managers convey important information regarding the direction that the program has recently taken, with an emphasis on statewide coordination and enhancements to, and recommendations regarding, program delivery and marketing.

In *Section 5.2* a program tracking assessment is provided, an area of great importance for feedback during implementation and to downstream program evaluation, but also an area not covered in great detail as part of the program manager interviews.

The 2002 Participant Process survey results are then examined. *Section 5.3* provides a marketing assessment, *Section 5.4* examines participant drivers, *Section 5.5* reports participant satisfaction ratings for various aspects of the program, and *Section 5.6* assesses the effect of the program on customer energy efficiency knowledge and future intentions to purchase high efficiency equipment.

This is followed with the results from in-depth interviews with program implementation vendors.

This chapter closes with the Process Assessment Key Findings and Recommendations.

5.1 PROGRAM MANAGER IN-DEPTH INTERVIEWS

This section presents the results of the standardized open-ended interviews with managers and staff of the Statewide Nonresidential Audit Program. The interviews were intended to capture an insiders' perspective on changes in process, management, marketing and customer service. This section summarizes key findings from these interviews. Two interviews each were completed with SCE and PG&E personnel while three interviews each were completed with SDG&E and SoCal Gas personnel. Appendix H contains the program staff interview guide that was used.

The interviews covered the following nine topics:

1. Program Process, Recent Enhancements, and Prospective Changes,

2. Statewide Coordination,

3. Relative Success in Program Delivery,

4. Differences in IOU Program Implementation,

5. Implementation Recommendations,

6. Recent Marketing Efforts, Improvements, and Prospective Changes,

7. Hard-To-Reach Goals,

8. Cross-Program Issues, and

9. Follow-Up Evaluation

In this section, we present only a summary of the results for the first eight of these topic areas. The interview results concerning the follow-up evaluation efforts are discussed in Chapter 7.

5.1.1 Program Process, Recent Enhancements, and Prospective Changes

The biggest differences between the 2001 Program and the 2002 Program were that the 2002 Program was Statewide, and that there were new components added. For two of the four IOUs, the new components were the mail audit, telephone audit, the online audit, and the CD audit. For PG&E, the new components were the CD and online audits. For SDG&E, the phone audit was not deployed in 2002 due to software delays. It is being offered in 2003. During 2002, there was an attempt to standardize all audit types while placing a special emphasis on reaching the hard-to-reach (HTR) population. During 2002, all IOUs used Nexus for the CD and online audits with three of the four utilities using Nexus for the phone audits as well.

While some IOUs say that it is too soon to say whether these changes in the 2002 Program have been successful, others feel that these changes have been, for the most part, successful since the different offerings can now meet the needs of their diverse customer populations.

Various ideas for improvements were mentioned with some of these having already been made or currently being implemented. The Fast Track Audit[1] option of the online audit has been moved to the first part of the audit process to make it more accessible. PG&E is already working on a Spanish version of the online audit. In addition, because PG&E was concerned that the customers in the CD Audit had to wait too long to get their billing data, they hired a programmer to get accurate billing histories more quickly. SoCalGas wanted to set realistic expectations regarding the information needed and the time required to complete the online audit. If a customer knows what information will be needed they can obtain the information they need ahead of time and have a better sense of how much time the audit will require. SoCalGas has begun sending out what they refer to as the "onsite audit tool kit," which provides this type of information.

There are a number of suggestions provided by the Program Managers for further improving these audits:

- provide account representatives with more structured training,

- pre-qualify customers for the CD audit to make sure that they are utility customers,

- make the CD audit more customer-specific,

- build in more graphics,

- change the program tracking system to identify duplicate audits [There may be good reasons why customers choose to participate more than once in a given year or multiple times over a number of program years. They don't necessarily want to discourage this but to understand it],

- refine all areas of program implementation,

- increase its ethnic outreach and raise awareness with respect to the online audit,

- improve the target marketing of the program, and

- conduct more on-site audits, as some Program Managers feel these are the most effective way to reach customers.

Of course many of these enhancements would require an increase in budgets.

The main objectives of these innovations are to:

- increase enrollment,

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[1] The Fastrack Audit requires less customer input, and thus provides audit recommendation in less time and with less work on the part of the customer.

- raise awareness of the online audit and set reasonable expectations,

- increase product quality,

- make more efficient use of marketing dollars.

- better respond to data needs such as customer billing data,

- answer more detailed questions, and

- increase customer satisfaction.

5.1.2   Statewide Coordination

The coordination occurred over a six-month period beginning in late 2001 and consisted of three to four in-person meetings and daily/weekly conference calls and e-mails. The coordination in 2002 was entirely by conference calls and e-mails. Program managers reported a substantial exchange of e-mails in coordinating the program during 2002.

The effort to achieve statewide consistency had mixed success. Within 2002, the IOUs agreed to implement the same type of audits by the end of the year, agreed to perform pilot projects within a single utility in order to explore new approaches, and created a statewide fact sheet. If a given pilot works, then other IOUs would consider it. At the same time, they recognized that because they have different customer populations with somewhat unique needs and wants, different levels of annual funding, and different organizational structures (e.g. in the form of account representatives), their programs cannot, and should not, be entirely consistent. Thus, the development of all audit types was a coordinated effort producing a great deal of consistency across all audit types except for the on-site audit where some differences remain.

They felt that the effort to achieve consistency has improved inter-IOU communication and collaboration, created program materials that have a more formal look, and generally benefited customers. Increasing the types of audits offered provides a better match of IOU services to customer needs and wants. However, some also noted that the need for consistency was, at times, forced and hindered innovation.

5.1.3   Relative Success in Program Delivery

Every customer is eligible for all the various audit types. Each audit delivery mechanism is designed to reach a specific customer class according to rate schedule (and sometime other factors), as stated in the statewide fact sheet. For example, large customers, while they are eligible for all the audit types, are generally not given the CD-ROM, Mail-In, Phone, or Online audits – only on-sites – because these other delivery mechanisms are not as applicable for large customers. One IOU targeted small customers, which made the mail, phone, and CD-ROM the

most appropriate options. The strengths and weaknesses of each of the audit types are listed in Exhibit 5-1.

Exhibit 5-1
Strengths and Weaknesses of Audit Types as Reported by Program Managers

Delivery Channel	Strengths	Weaknesses
Online	Customer has an action plan by measure or by end use. Site has many useful links. Possible to track if customers' return to the web site more than once, how they search within the URL, and time spent on each page.	Little known about the customer. Fastrak gives all possible EE measures based on information that the customer provides and Project Managers believe this could be confusing to the customer. Customers have no reliable way of accessing the audit (at times difficult to find).
CD ROM	Comprehensive tool with supplemental information, links to websites, and publications are available on the CD-ROM. The CD ROM is designed to reach those with no dial up connection or who prefer to work offline.	Long turn around time and complexity of the process for getting the billing history for a customer (this is for PG&E, not others). Difficult to verify that the CD was distributed to an IOU customer. Accuracy and usefulness is limited by the software and the data that are input by the user. Customers may or may not do the audit – they may only do the brief audit or they may find it confusing, all of which would limit the use of this product. Fuel prices cannot be changed for the CD-ROM and customers are not likely to go to the web site to get updated gas prices.
Mail	Mail audit reports are perceived by Project Managers to have very nice design that is attractive to customers. It has a good turn around for the process. Mail-in is an inexpensive and effective way to distribute basic information.	Questions are too general and results are not very customer specific.
Telephone	Short, which the customer likes (5-10 minute survey) with a quick turnaround. Colorful, with rebate information. Provides information about eligible measures.	Information may be inaccurate based on how it is collected (i.e. fixture counts may be off). Can be surprisingly expensive given the hiring and training of phone auditors.
Onsite	Relationships are developed with each customer, and the audit can be better customized to each participants needs. Greater accuracy. Better fits customers' expectations. These are usually done in conjunction with other activities, yielding greater value. Customers appreciate the opportunity to interact with a representative and can ask questions.	For PG&E, it is a multi-step, time consuming and expensive survey. The auditor completes the survey and then goes back to PG&E to enter the information, then generates a report that is then sent to the customer.

All IOUs felt that they played a major role in making important design changes in the Nexus CD and online audits as well as the other audit tools. IOUs also realize that many of the tools were Nexus products, which they were able to customize using their knowledge of their customers. While Nexus implements/owns the license to some of the audits, the utilities controlled what information should be provided or what information is contained in the audits. Note that PG&E has its own phone survey[2], but other IOUs use Nexus for their phone audit.

While having no specific recommendations about how resources ought to be allocated, most IOUs feel that the onsite audit should continue since customers really want the personal attention. One IOU expressed serious concerns regarding the continued use of the CD-ROM audit and noted that the penetration of Internet access has increased dramatically since the advent of the CD-ROM audit. At the same time, all IOUs recognize that they should provide alternative mechanisms in response to customers' needs and preferences.

5.1.4   Recent Marketing Efforts, Improvements, and Prospective Changes

This section summarizes recent IOU marketing efforts, the ways in which marketing techniques are different from previous years', and marketing techniques under consideration for future years. Program Managers were asked to assess the relative success of each effort and these comments are also summarized below.

The primary goal of recent audit program marketing efforts is to increase awareness and interest in the audit program and the various audit types. Moreover, the IOUs want people to associate audits with reduced energy bills, saving energy and the environment, and improved working conditions.

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[2] PG&E has a different phone survey because they have spent lots of PGC funds to develop it (it is embedded in their mainframe and customer database). The instrument has different questions as well as a different software tool.

In Exhibit 5-2, we describe the marketing and promotion activities for 2002, by IOU.

Exhibit 5-2
Marketing and Promotion Activities in 2002, by Utility

Activity	PG&E	SCE	SDG&E	SoCalGas
Account Representatives	●		●	
Direct Mail	●	●	●	
Electronic Newsletters	●	●	●	
Bill Inserts	●	●		●
CBOs/Non-profits	●	●		●
Trade Associations	●		●	
Community Events		●	●	●
Chambers of Commerce				●
E-mail Blasts			●	
Outbound Phone Calls			●	
Press Releases			●	
Cold Calls to Small Customers[*]		●		
Public Advertising (T.V., Print, Presentations to Groups, Seminars, Editorials)			●	

[*] May be the same as "account representative"

Below, we provide Program Manager assessments of how effective these efforts were, how recent marketing efforts differ from past efforts, and proposed future marketing and promotion efforts.

PG&E. Based on customer comments and 2002 participation, PG&E felt that their marketing and promotion efforts were very effective. Specifically, with the small onsite audits, they targeted the underserved markets and provided relevant, interactive, quantifiable, and quality recommendations with geographically comprehensive coverage. There was enough information to direct customers to Express Efficiency or the Business Call Center. They also observed an initial and short-lived spike in customer requests after the bill inserts.

PG&E is planning to do similar marketing in 2003. They will increase the website marketing in 2003. PG&E is developing a Spanish version of the online survey. PG&E is also considering development of the statewide fact sheet in 3 languages.

SCE. SCE noted that it is hard to distinguish which tools work well. However, they do feel cold-calls work the best – the marketing and audit is completed in the same step (marketing/audit rolled into one). In 2001, they piloted the onsite audit using cold-calls from outsourced vendors to emphasize HTR, including an emphasis on smaller customers and as a

means of addressing language barriers. SCE finds email blasts to be relatively ineffective. However they are considering offering a reward in 2003 to make them more successful. Specifically, they are considering offering a $5 gift card from Starbucks. In 2001, they had used direct mail to market the Business Edge mail-in audit. A card was sent to each customer which they could return to SCE if they were interested, and then SCE would mail out the audit questionnaire. They have changed the mail-in tool to be similar to the online audit, and the direct mail marketing is more efficient because the survey is mailed out initially.

SCE is also considering a link to the audit and/or information about the audit program in the billing section of their website. This way customers will see the information when they are actively considering their bill, for example, when customers pay their bill online or have a question or concern about their bill.

SDG&E. In general, SDG&E feels that their marketing efforts were successful since they did meet their goals. They noted that if they had a larger budget, they could do more to reach the smaller and HTR customers.

In 2003, SDG&E increased their marketing for the online audit via e-mail blasts. In addition, they continue to improve the audit links to chambers of commerce, trade associations, and rebate programs through website links, marketing material and audit report content.

SDG&E is also exploring the possibility of having a drawing for customers who complete a certain number of questions in the online audit. They also might send direct post-cards to announce the availability of various types of audits to the owners of the businesses. They feel that this would be more effective than just a bill insert, which they don't use because the accounting department usually gets the bill insert and not the owner/decision maker. They are also considering combining the audit and the Express Program in a two-step process – where the customer must first participate in the audit program and then is eligible for Express Efficiency.

SoCalGas. SoCalGas felt that going to events and distributing the CD was successful. Bill inserts were moderately successful as they observed a spike in participation following the mailing.

In 2003, SoCalGas won't just rely on customers to call in for the phone audit. Rather, they now instruct their Call Center to inform customers, who might be calling about other issues such as large bills, services request, etc., about the various audit options, thus taking a more proactive approach. They make a special effort to communicate that the online audit is quick and easy. In addition, they stress that the utility is there to support customer business needs and help them to grow. Finally, they are also participating in marketing information exchange groups to learn from the best practice of other utilities.

In the future SoCalGas will to provide a separate URL so that the customer can go directly to the audit web site and avoid navigating through the SoCalGas website to find the audit.

5.1.5   Differences in IOU Implementation

Differences in IOU program implementation span a variety of areas—marketing, follow up program efforts, internal audit processing, and audit instruments.

Each IOU had a slightly different approach to program marketing, which is discussed in detail in the following section.

SCE used a highly unique outreach effort for its onsite audit involving an unscheduled visit by an auditor to complete an on-site survey. The forms (templates) for these small customer audits were different for SCE in 2002. They were less complex than in previous years' and relative to other IOUs and included simple payback calculations.

PG&E had a follow-up program effort that consisted of calling audit customers one month following the audit. No other IOU had a similar program. (The success of this program is discussed in more detail in the *Chapter 7 Follow-Up Program Assessment*.)

PG&E also has a computer-based program for processing onsite audits, while other IOUs use mainly a paper system.

The IOUs are working toward a more common look and feel for audit reports.

While the *types* of audits offered are the same across all utilities, some of the instruments vary across IOUs. PG&E has a different phone survey relative to the other IOUs because they spent lots of PGC funds to develop it (it is embedded in their mainframe and customer database). They have different questions as well as a different software engine. Other utilities use Nexus for the phone survey and have questions and algorithms similar to those on the CD-ROM and online surveys. The PG&E phone survey asks questions more like their onsite survey.

The format and content of questions in the onsite audits are slightly different and are presented in a different sequence across utilities. The resulting written reports are also unique in format. These differences are due to the fact that these onsite audits are done by different groups with differing levels of funding, and each has its own unique legacy. However, the interviewees suggest that these onsites are all designed to achieve the same objectives. The goal in the design of each onsite tool was to take on the same look and feel with only minor differences. PG&E's particular history causes their audits to be more notably different from the others, and PG&E feels these differences should be preserved. A lot of time and money was spent in development of their onsite tool, and they feel that to replace it with a more conforming statewide tool may reduce its quality.

5.1.6 Customer Follow Through on Recommendations

This section discusses Program Managers' impressions of customer follow through. More specifically, it discusses their thoughts regarding where follow through is the greatest, what features of the current program are best at encouraging follow through, and what new features could be added to the program that would maximize follow through.

While it depends on the customer—their resources available, sophistication, corporate policy— in general the measures that are low cost with high paybacks, that improve the operating characteristics or meet the needs of the customer are the most likely to be implemented. Customers prefer recommendations with lower first costs and shorter paybacks, making the link to IOU incentive programs critical.

Program Managers mentioned quite a few current features of the program that are effective in encouraging recommendation follow through among participants.

- Some assert that the On-site audit is the best way to encourage energy efficiency actions because of the in-person interaction between the IOU representative and the customer. The On-site audit is able to provide a superior list of recommendations and savings estimates.

- Presenting a clear link with rebate programs encourages implementation by reducing the first cost and financial constraints.

- SCE provides a list of vendors and suppliers which assists the customer in the selection of a contractor and in locating the required equipment (however the content of this list is rather general and could be significantly improved, as discussed below.)

- Providing payback information based on accurate savings estimates and bill reductions is effective in encouraging adoptions.

- Follow-up telephone calls are also perceived to encourage customer adoption by increasing interaction between the customer and the IOU representative.

- Lastly, providing detailed information on recommended equipment encourages customer adoptions by reducing information and performance uncertainty concerns.

Prospective program features expected to encourage greater customer follow-through were discussed:

- Increasing awareness of financing options, possibly through the IOUs would help increase adoptions. Some thought IOU-based financing options were a great idea while others had serious reservations because interest rates offered by third parties are extremely high and the companies would be better off going to their bank for a loan for this type of investment. However, it might be possible to provide links to state loans or to Small Business Administration (SBA) loans that are available to small businesses.

- Providing the customer with a short list of contractors and vendors in their area would be an effective way to reduce the hassle of selecting a contractor and locating the appropriate technology.

  - Currently, SCE can only provide a general list for the entire service area, which means that there may be very few suppliers in a customers' local area.

  - This approach is controversial also. To which company should they send customers? Program managers felt like this would be like walking a tight rope. Similar drawbacks exist to recommending a vendor since some vendors are just fly-by-night companies.

- Resending the audit report after some time has passed (for example, 6 months or one year) to remind customers of recommended measures and increase IOU and customer interaction.

- Finally, motivating customers to use the utility websites, which have numerous links to a wide variety of utility and non-utility resources should also help.

5.1.7 Hard-To-Reach Goals

As presented in *Section 2.1*, the IOUs met their HTR goals, suggesting that efforts to encourage these customers to participate were successful. Program Managers were pleased with the success of their hard-to-reach programs in 2002.

In attempting to meet the HTR participation goals set by the CPUC the IOU's implemented several changes:

- a small customer onsite audit was designed specifically for the HTR population

- IOUs set goals differently for representatives in areas that are considered HTR in order to reach the goals

- IOUs held extra meetings in order to convey HTR goals to staff

- there were more rigorous reporting schedules to ensure the program was on track to meet goals, including bi-weekly internal meetings and quarterly CPUC reporting.

SoCalGas and SDG&E noted that the HTR component had less impact on them since they felt that the vast majority of their customers are HTR anyway. In general, this experience also opened up a new marketplace, forcing IOUs to go beyond those customers that their intuition suggests may be interested in energy audits.

PG&E has concerns about the current definition of a hard-to-reach customer. For example, there are customers that meet all 5 CPUC criteria[3] and also participate in IOU programs each year. In their eyes, these customers should not be considered hard-to-reach. PG&E asserts that defining hard-to-reach by historical program participation and IOU contact may be more appropriate.

SCE's hard-to-reach marketing effort was the face-to-face cold call approach. SCE hired vendors, including some non-English speakers, to go door-to-door to hard-to-reach customers and offer to perform an on-site audit. They found this a very effective way of encouraging HTR participation.

SoCalGas made a special effort to target the very small customers who were all HTR by sending Mobile Energy Workshops out to small customers. Anecdotal evidence seems to suggest that small customers were pleased with such outreach efforts. They were very happy to get the attention of the utility. While they had heard about energy efficiency, they have not had any time to explore on their own.

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[3] Less than 20 kW, less than 10 employees, rural location, renters, and those for whom English is a second language. See Chapter 2 for more details.

SDG&E did more target marketing using direct mailers to reach the small business owner. They also used trade associations, community-based organizations, area chambers of commerce, editorial promotion using e-mails, CD-ROMs, and newsletters, tradeshows, seminars and events. They felt it was successful since they can be more flexible allowing them to better meet the needs and wants of customers'.

5.1.8   Cross-Program Issues

All the IOUs actively promoted the various rebate programs in their audits. PG&E has a report on how many phone and onsite audit customers go on to participate in these other programs as a result of the audit. In 2003, PG&E allows audit customers to reserve incentive monies following small customer onsite audits. . SoCalGas is waiting for the results of the Quantum evaluation to determine how many of their audit participants go on to participate in the Express and SPC Programs. While also waiting for Quantum results, SCE perceives the number of Express Efficiency applications to have increased significantly since the inception of the audit program. SDG&E actively promoted the Express Efficiency Program to its small and medium size customers and the SPC Program to larger customers. However, SDG&E cannot determine how many audit participants go on to participate in the Express Efficiency or SPC Programs since, in 2002, they did not have a tracking system that would allow them to merge with the Express and SPC tracking system and count the matches. They are developing a tracking system that will allow them to answer this question.

5.2   PROGRAM TRACKING ASSESSMENT

A well-planned program tracking system, designed to accommodate continuous real time program implementation assessment and to meet all Measurement and Evaluation (M&E) needs, is an extremely valuable program element. Good program tracking is crucial for Program Managers to enhance program delivery and to recognize and resolve problems early. It is also crucial to many M&E efforts that can better determine program impacts and required enhancements.

Tracking system data that is linked to customer information systems provides for accurate and detailed customer segmentation as well as the ability to analyze participating customer billing data. These components allow for more flexible, sophisticated and useful sample design and analysis techniques.

Exhibit 5-3 presents a comparison of program accomplishments contained in the 4th quarter program status reports submitted by the IOUs to the CPUC with program tracking system records obtained from the utilities for this evaluation. The table provides some very important process-related findings and relevant suggested improvements that would better facilitate further program evaluations and other activities using these tracking records. For example, this table examines how well populated key variables were in the tracking systems.

Exhibit 5-3
Summary of Tracking System Contents for Key Variables

Utility and Delivery	Accomplishments in Q4 Status Report	Tracking System Records*	Account Numbers	Contact Name	Contact Phone	Participant E-Mail	Measure Recommend-ations
PG&E							
On-Site	1,038	1,097	994	1,085^	1,085^	0	Yes
Phone	2,055	2,126	2,019	2,105^^	2,105^^	0	Yes
Mail	1,888	1,500	1,485	1,173	1,500	0	
Online	1,028	1,028	0	0	0	564	Partial
CD	478	561	544	0	561	0	
Total	6,487	6,312	5,042	1,173	2,061	564	
SCE							
On-Site	6,934	7,660	4,080	7,627	7,578	14	Partial
Phone	42	42	42	42	42	0	
Mail	584	588	0	0	0	50	
Online	1,177	1,337	0	0	0	1,282	
CD	107	202	173	197	197	0	
Total	8,844	9,829	4,295	7,866	7,817	1,346	
SDG&E							
On-Site		736	0	0	736	0	
Mail		120	0	0	0	0	
Online		3,046	0	130	0	912	
CD ROM		58	0	58	58	52	
Total	3,977	3,960	0	0	736	0	
SCG							
On-Site		1,512	1,512	1,277	0	0	
Phone		78	78	0	0	0	
Mail		743	743	0	0	0	
Online		4,497	0	1,436	0	1,857	
CD-ROM		294	0	0	281	0	
Total	7,051	7,124	2,333	2,713	281	1,857	

* Shaded cells represent tracking system records provided by utilities too late for use in sample design or analysis. Remaining cells represent records provided by the utilities for use in this evaluation.

- A severe shortcoming in the tracking systems affecting all four utilities (for at least one program delivery channel) is lack of account numbers or other unique premise identifiers.

  - None of the IOUs could provide account numbers for online audits, severely restricting evaluation of this important program component. Although it is a second-choice solution, the online tool could be evaluated using web tools that track how the URL is used and what recommendations are made. Customer feedback

might be collected through pop up surveys on the audit websites, or sent via email to users. Selection bias become more of an issue with the latter approach.

- Missing account numbers also restrict cross-program analysis by not enabling program tracking system merges. Merging the audit tracking system to Express, SPC and others would allow for an accurate assessment of the success of cross program marketing efforts. Moreover, it would facilitate a more accurate understanding of the 'feeder' function of the audit program which underscores a key value of the program.

- For certain delivery channels (and utilities) the tracking systems did not store key contact data including business name, address, contact name and phone number. These data are crucial for successful outreach to the participant population and for ensuring samples that best represent the participant population.

  - For this particular evaluation, the resulting evaluation samples are most representative of the utilities that kept detailed participant records, leading to an evaluation result that does not best represent participation overall.

  - For example, lack of contact information in the tracking systems ultimately led to relatively low telephone survey completion rates for the Online and CD-ROM Audits, yielding a relatively poor evaluation of those elements, as noted in the Section 4.2 Impact Assessment.

- Tracking systems do not always record specifics regarding the energy efficiency recommendations that are provided to each customer in the Audit report. Of interest to the evaluation are statistics on the recommended technology, the existing technology, the capacity of equipment, the number of units, hours of operation, load factors, etc.

  - Furthermore, Audit reports sometimes include estimates of the usage distribution by end-use (or specific equipment) and/or the equipment inventory is recorded, which could also be included in the tracking system for use in subsequent energy efficiency interventions and program evaluations. To the extent possible, tracking systems should seek to record details regarding the recommendations made and other relevant data concerning a given customers' energy use, such as equipment inventory.

  - Accurate tracking system-based records of what was recommended during the Audit can help with Express and SPC planning, and calculate recommendation realization rates and spillover effects. Furthermore, evaluators may choose to prompt customers specifically about measures that were recommended, rather than asking more generically about their energy efficiency actions since the Audit (as was the case for this particular evaluation).

- The only delivery mechanism used by the IOUs that is poorly adapted to tracking is the CD-ROM. One possible solution would be to make the CD-ROM available only by request and require the provision of contact information as part of that request.

These gaps or weak points in the tracking systems have affected the evaluation approach used and, in some cases, hampered the evaluation team from implementing approaches that would

have proved valuable. Furthermore, working with a less than perfect tracking system creates additional, unnecessary work.

Another tracking system review that the IOUs should consider is an examination of how complete customer-specific information is for marketing efforts that are completed. While outside of the current evaluation scope, it would be useful to follow-up with various groups of customers that were approached using a variety of Audit marketing methods, in an effort to assess customer response(s) to various marketing messages and methods. Furthermore, with appropriate merge variables, such as account number, populated in the marketing and Audit tracking systems, a merge of these two datasets would quickly provide quantitative evidence of the marketing efforts that work best or possibly those that are most cost-effective. Ultimately the point here would be to identify best practices and provide the utilities with recommendations regarding upcoming marketing efforts. While evidence of marketing effectiveness, such as spikes in program participation were noted above by program managers in *Section 5.1*, an evaluation of marketing channels might yield additional valuable insight on their cost-effectiveness.

5.3   MARKETING ASSESSMENT

Our surveys of 2002 participants and the general population collected information regarding how customers became aware of audits. (See Appendices E and G for the survey instruments.)

Utility Marketing Channels

The rate of awareness of the audit program in the general population is very high, at 42 percent. As shown in Exhibit 5-4, rates of awareness are consistent across IOU service territories, but not surprisingly, tend to be higher in non-HTR segments than HTR segments. The difference is relatively small, a tribute to successful and substantial efforts made by the IOUs to recruit these customers into the audit program. However, the differences in awareness by customer size are quite large. Sixty-five percent of large customers are aware, compared with only 32 percent of the very small customers. This positive relationship of size and awareness is nearly linear across the very small, small, medium, and large.

Exhibit 5-4
Rates of Audit Program Awareness in the General Population
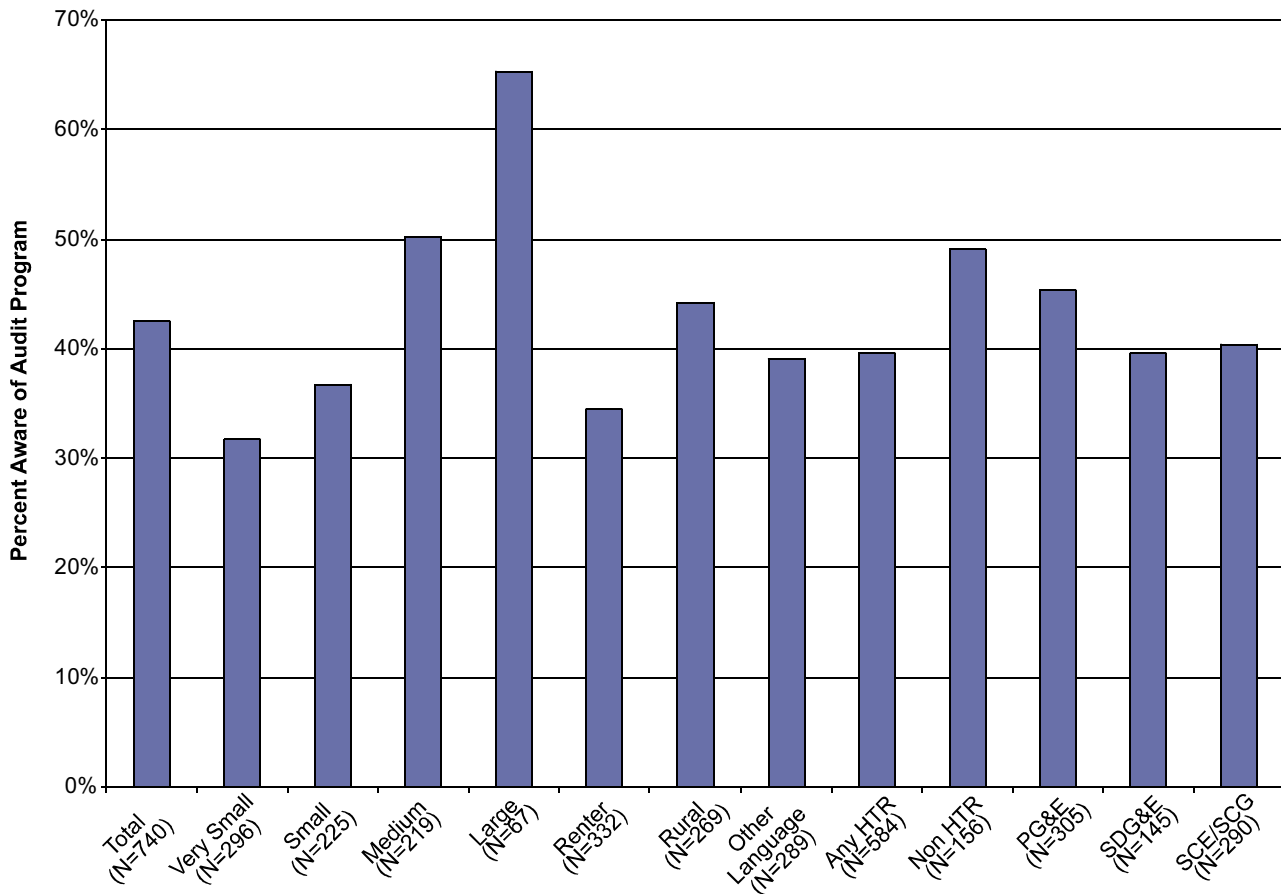
Awareness of audits in the general population is driven by the IOUs, who account for two-thirds of overall awareness through bill inserts, brochure mailings and utility representatives, shown in Exhibit 5-5.

Exhibit 5-5
Utility Marketing Channels as Sources of Program Awareness
In the General Population
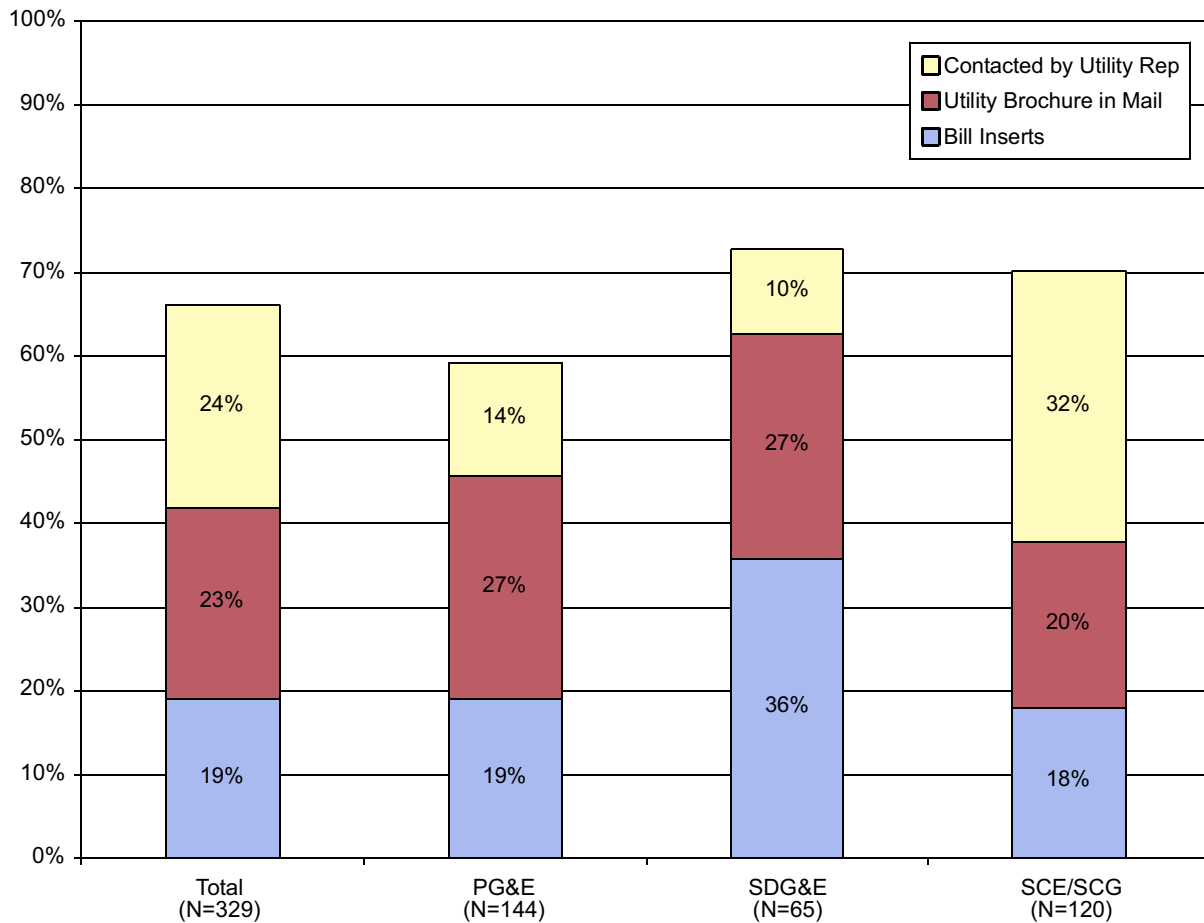
In general, customers are nearly twice as likely to learn of audits through the mail (42percent brochure/bill inserts) than from a utility representative (24%) whose role in making customers aware varies by IOU. SCE and SCG customers are far more likely to become aware of audits through utility representatives than PG&E and SDG&E customers. SCG's service technicians (as well as account executives), who inform customers of utility programs during service calls may account for the large marketing role of SCG representatives.

The 2002 audit program was marketed door-to-door in addition to traditional mass media and utility representatives. SCE had a unique approach to delivering the program, hiring vendors to conduct door-to-door audits for HTR populations. Contractors conducted audits in the field by going door-to-door to small businesses, such as strip malls. In addition, door-to-door audits were designed to reach businesses whose primary language was not English by employing

auditors who spoke languages other than English. For SCE door-to-door auditors were the primary source of awareness among very small participants, while utility representatives (commonly assigned to large accounts) were the primary source of awareness among the medium and large participants.

Audit marketing messages. Half of the respondents who are aware of audits recalled that "Save Energy & Money" was the main message of the marketing material they encountered. Respondents also recalled, "Conduct an energy audit to learn how to save energy and/or money" (27%), "Cut your energy costs" (18%), and "get tips on conserving energy" (14%). SDG&E customers were most likely to associate energy audits with saving money and energy.

Sources of Participant Awareness

Exhibit 5-6 shows the importance of utility representatives in informing participants of the program. The majority of SCE and SCG customers learn about audits through utility representatives. This may reflect the effectiveness of SCE contractors who go door-to-door conducting audits in SCE territory and the SCG service technicians' cross-selling audits during service visits.

Exhibit 5-6
Utility Marketing Channels as Sources of Participant Program Awareness
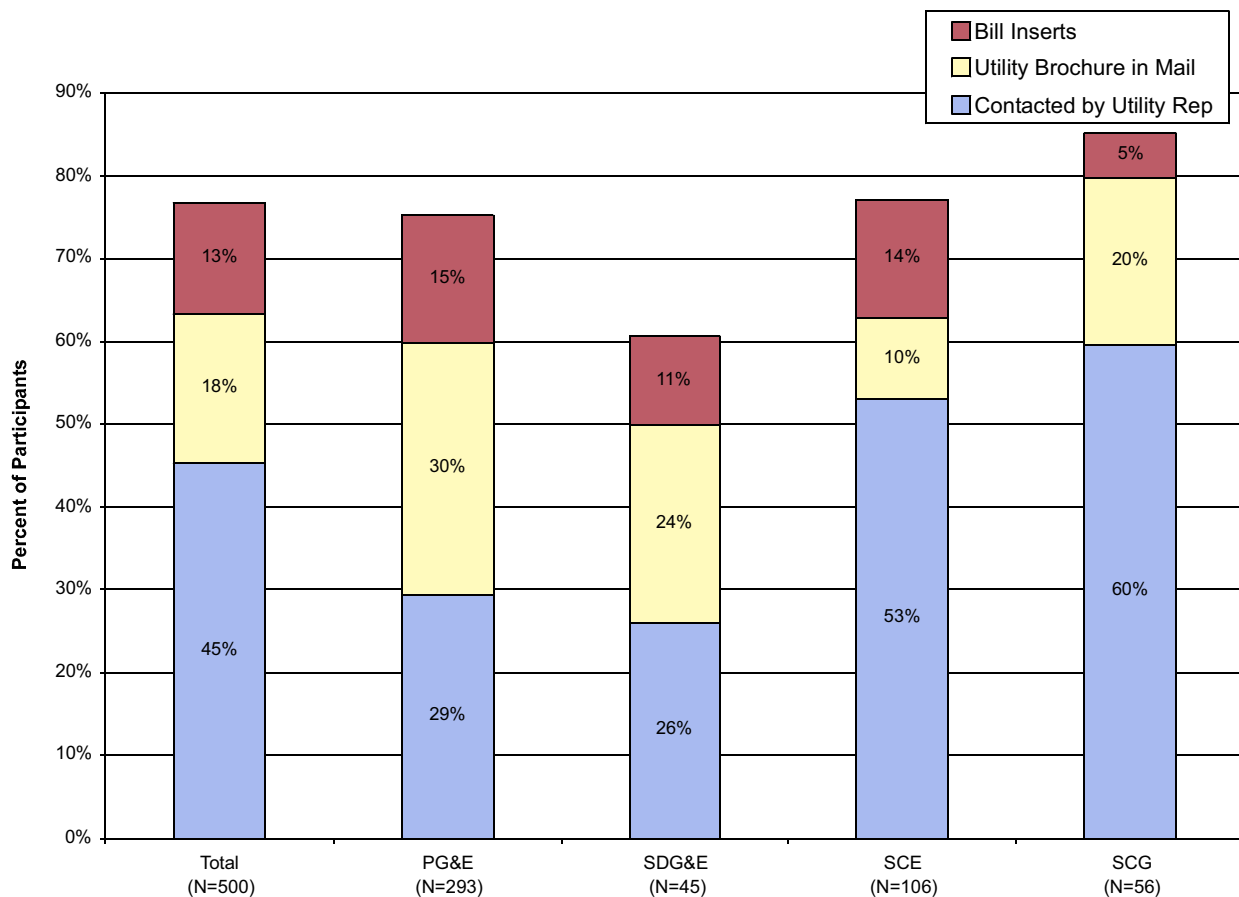
Exhibit 5-7 shows the percentage of audit participants that implemented recommendations by major sources of awareness. Overall, 64 percent of participants implemented audit recommendations. Not surprisingly, customers who took the initiative to contact their IOU were most inclined to implement recommendations (84%). Participants who learned about audits by word of mouth were very likely to implement recommendations (80%). Personal contact with a utility representative seems to be more effective than mass media marketing. Mass media (brochures, bill inserts) were less likely to galvanize customers to implement audit recommendations. Participants who responded to a door-to-door auditor were least likely to implement audit recommendations (54%). These customers are not taking the initiative, but simply allowing the audit to take place when the auditor visited. Also, satisfaction with the technical knowledge of the auditor is lower for the SCE Vendor audit than other types of on-site audits.

Exhibit 5-7
Audit Recommendation Implementation Rates
by Major Sources of Awareness
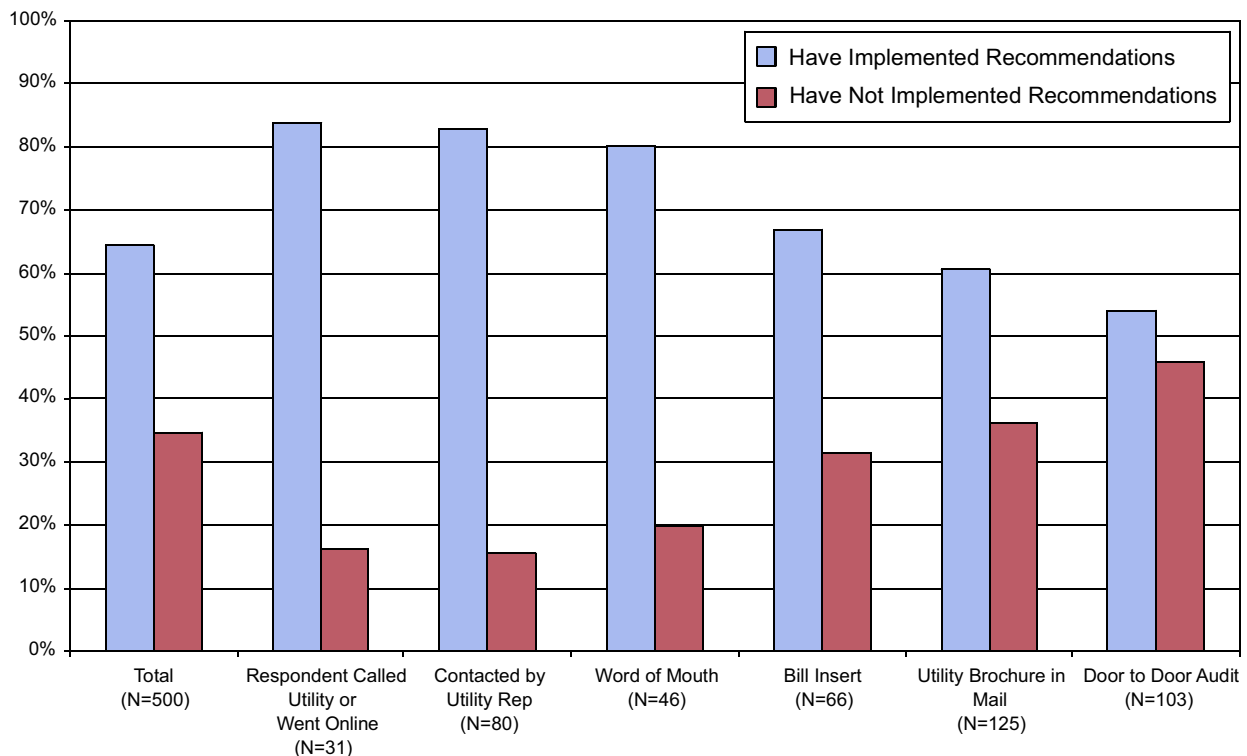
Exhibit 5-8 compares major sources of awareness among participants and the general population. Utility representatives and mass media sources (utility brochures, bill inserts, television/radio/newspapers) are very effective in moving customers to have their facilities audited. For example, 19 percent of the population becomes aware through bill inserts, which had a high rate of success with 13 percent of participants learning about the program through a bill insert.

Exhibit 5-8
Comparison of Participant and General Population
Sources of Program Awareness
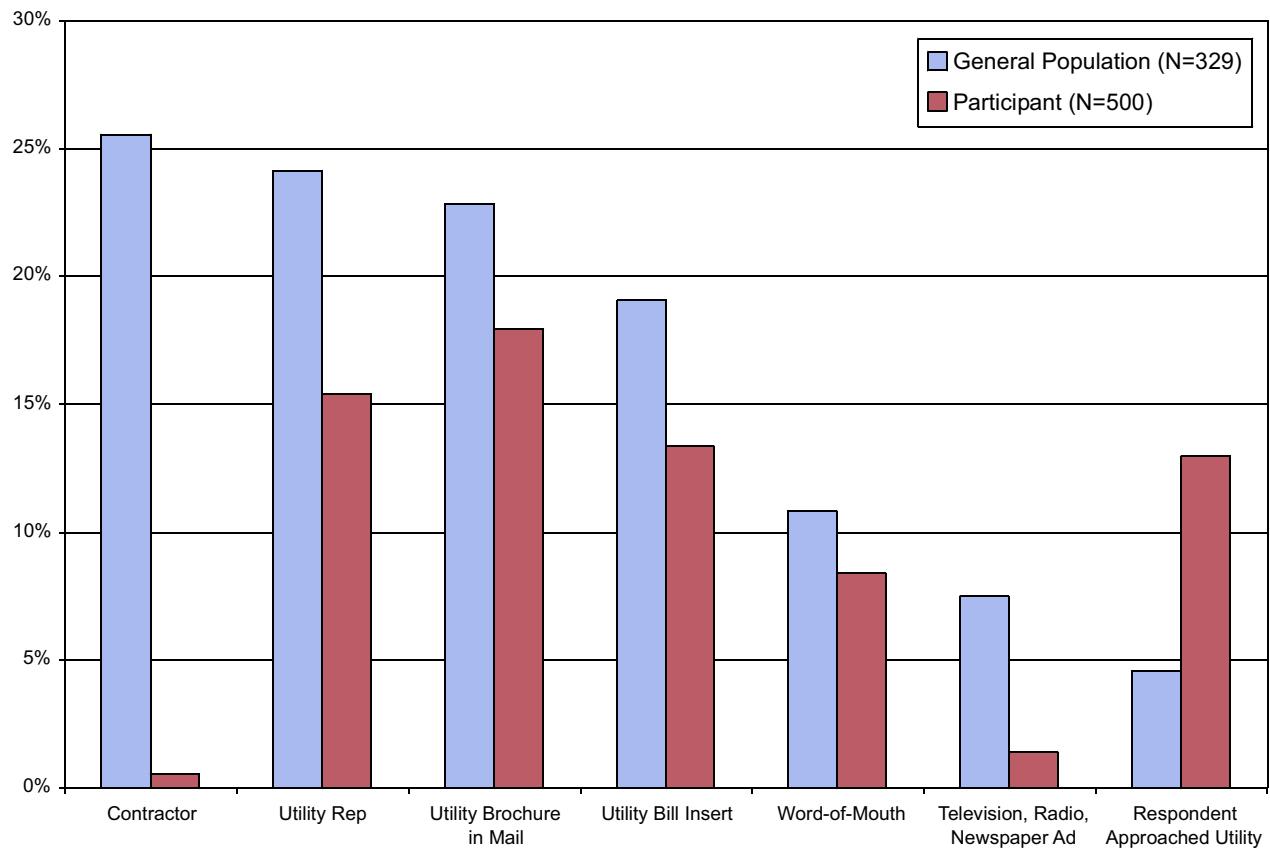
Audit participants were informed of audits by utility representatives (15%); Utility mailing brochure (17%); bill inserts (14%); work of mouth (9%); or approached the Utility (14%.) It is interesting to note that contractors are informing customers (26 percent of the general population learned of audits through a contractor), but customers are not responding to contractors. Only 1 percent of participants became aware of audits through contractors. Mass media sources reach the population, but are not terribly effective at moving customers to participate, particularly television/radio/newspaper ads. A notable portion of participants approached the utility to inquire about an energy audit, having some general idea that these services exist, but needing a specific referral to the Nonresidential Audit Program.

Exhibit 5-9 shows the effectiveness of utility representatives in reaching HTR populations (<20 kW customers, tenants, rural customers and customers whose primary language is not English). Rural customers and businesses whose primary language is not English report more contact with utility representatives than very small customers and tenants. However, very small customers and tenants who learned of the program from utility reps were highly likely to participate in an audit.

Exhibit 5-9
HTR Customers Aware of the Audit Program
and Informed by their Utility Representative
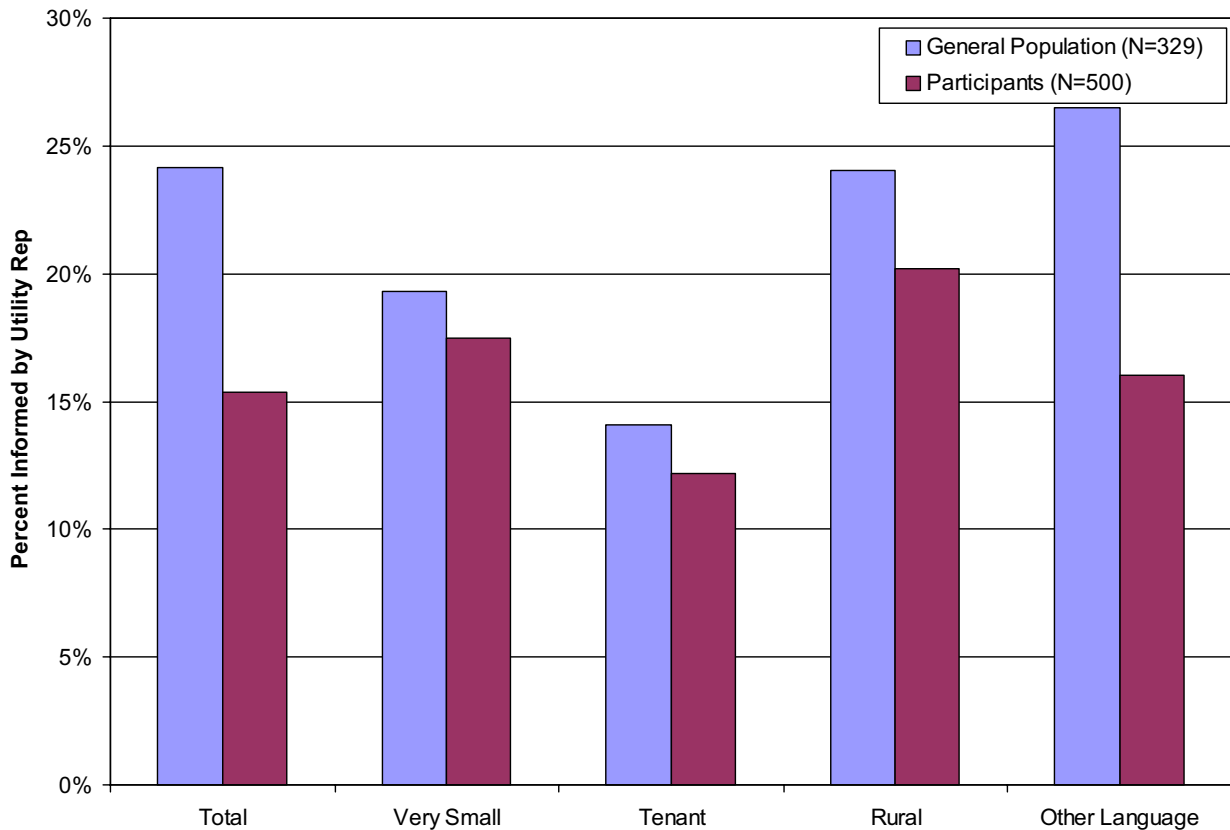
Exhibit 5-10 presents participant sources of awareness by delivery mechanism (CD-ROM, mail, on-site, phone). It appears that utility representatives play the biggest role in on-site and phone audits.[4]

Exhibit 5-10
Sources of Participant Awareness by Delivery Mechanism
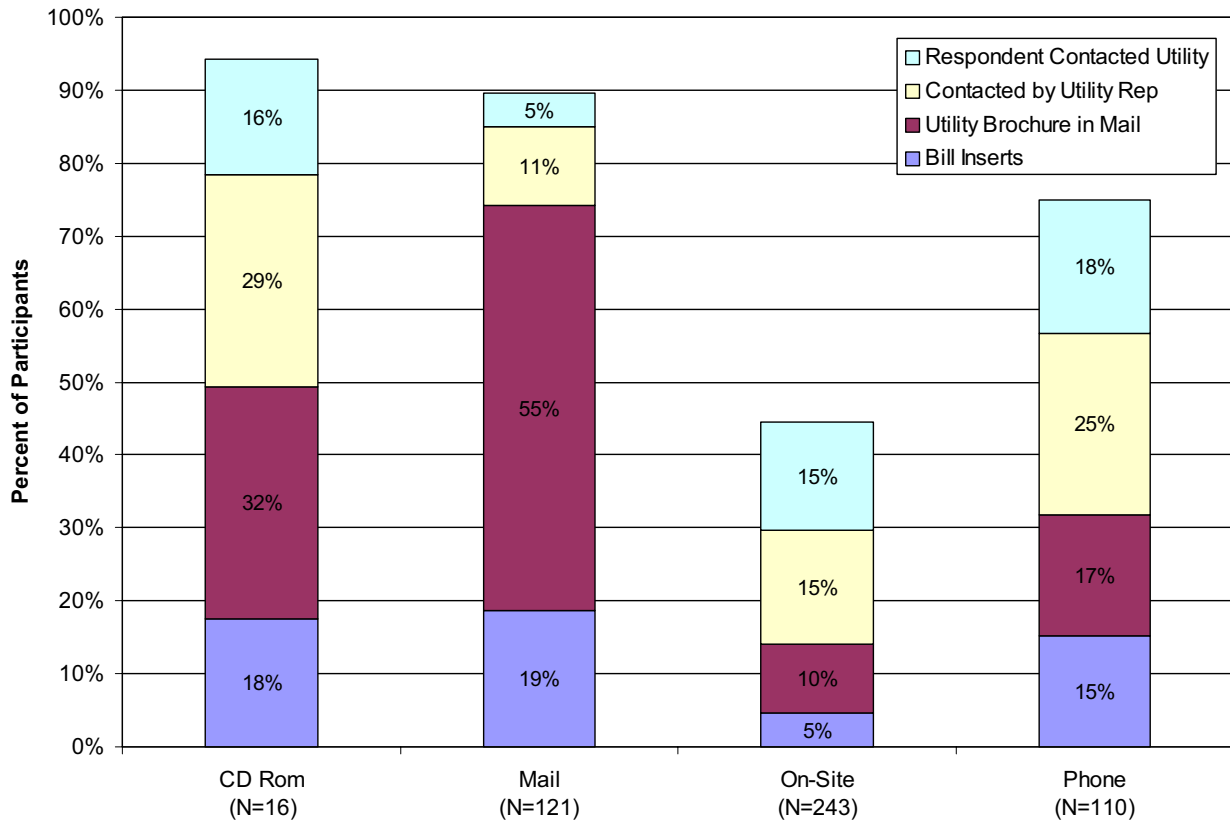
About one-third of participants were aware that customers could choose among several survey options (CD-ROM, mail, on-site, phone). Customers who were aware of other types of audits mentioned mail (25%), online (23%), phone (14%), on-site (11%), and CD-ROM (2%). PG&E customers tended to be more aware of other types of audits than other IOU customers. PG&E, SDG&E and SCG customers were most aware of mail and online audits. SCE customers mentioned mail and phone audits more than any other type.

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4 As noted earlier, "utility representatives" include contractors that conduct audits in the field and service technicians who inform customers of utility programs during service calls as well as account executives.

5.4   PARTICIPATION DRIVERS

Reasons for participation. Participants cited saving money on electric bills (59%) and identifying ways to save energy (31%) as reasons they participated. Utility representatives also played a role in encouraging customers to participate; 7 percent mentioned the audit was recommended by a representative and another 8 percent said they had an audit because a representative showed up and offered to do the audit for free. The role of door-to-door marketing was bigger in SCG (13%) and SCE (9%) territory, where IOUs used service technicians and auditors to solicit customers.

Exhibit 5-11 below presents the distribution of reasons for participation by delivery mechanism. The reasons are generally uniform, with the exception of a component of the SCE on-site audit customers who participated simply because an auditor showed up and offered a free audit.

Exhibit 5-11
Reasons for Participation by IOU and Delivery Mechanism
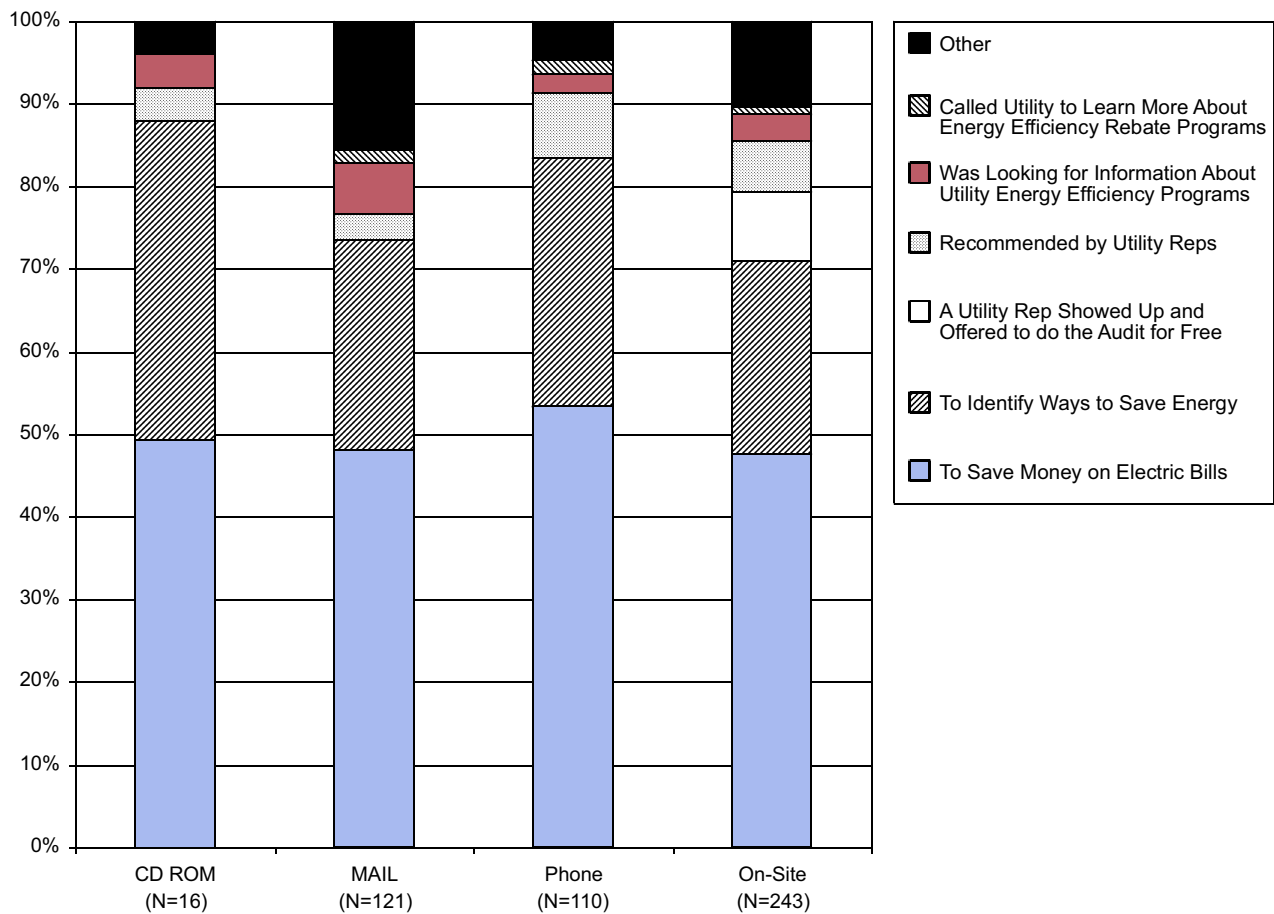
Clearly the main motives for participating are to save money on electric bills and to identify ways to save energy. The data also indicate when a representative speaks with a customer or when the customer is seeking energy efficiency program information there is an opportunity to

draw that customer into the program. There are enough people who claim these solicitations were the primary reason for their participation in the program to support this contention.

In order to exhaust possible implications of the participation drivers, we examined the relationships between reasons for participation and satisfaction with the overall program. The results are shown below in Exhibit 5–12. Differences in satisfaction by reasons for participation in most cases are minor to moderate. The only distinction worth noting is that the customers who participated because an auditor dropped by and offered to do the audit for free are somewhat less satisfied than other groups. This is not too surprising, because this is a passive reason, and doesn't indicate real interest by the customer. This is not to say that all customers receiving unsolicited audits are less interested in the program, but surely the probability of providing an audit to a relatively uninterested customer increases with this approach.

Exhibit 5-12
Mean satisfaction by Reasons for Participation
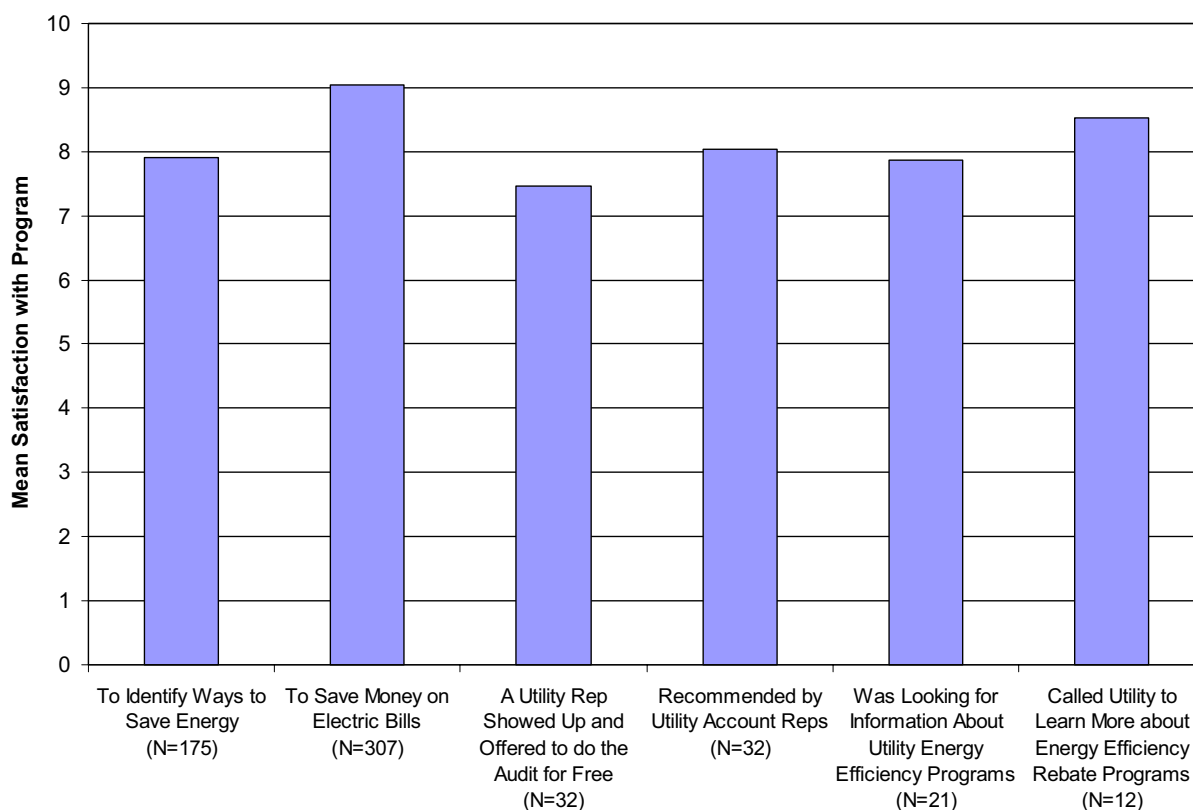
Barriers to Recommendation Follow Through. Customers who received an audit but did not implement its recommendations mentioned lack of money as the main reason they did not take action, particularly for those who received recommendations about changes to gas appliances and cooling equipment. This finding again underscores the need for clear links from the audit program to incentive programs. For those customers who received lighting recommendations, lack of money was less of a deterrent. These customers also mentioned that the estimated savings associated with lighting retrofits did not justify the investment, particularly in light of

other spending priorities. Exhibit 5-13 below provides self-reported reasons for not implementing recommended measures by end-use. Please note the small N for all end use categories except lighting.

Exhibit 5-13
Reasons for Not Implementing Recommended Measures

	Lighting	Cooling	Gas Appliances	Other Technologies
Do not have enough money	39%	46%	66%	45%
Product was not available	1%	0%	0%	0%
Could not find a service provider	1%	0%	0%	4%
Savings did not justify added investment cost	15%	6%	7%	4%
Other priorities for capital spending	15%	11%	14%	6%
No approval (corporate or landlord)	12%			10%
Owner responsible for changes		12%	7%	
No current perceived need	8%		40%	17%
Product unsatisfactory	2%			2%
No Time	3%	7%		0%
Other	3%	9%	0%	13%
No Answer	3%	14%	0%	4%
N	108	37	14	21

Participant Wants and Needs. One-quarter of participants found the audit recommendations to be very customized and relevant to their facility and energy use. Another 32 percent saw the recommendations as "reasonably" customized. Twenty-one percent believed them to be "somewhat" customized, while 17 percent found the recommendations too general to be useful. The desire for more customization was also expressed by less satisfied participants, reported in the next section.

Exhibit 5-14 below shows how participants reported the level of customization and relevance of audit recommendations by delivery mechanism. The On-Site delivery mechanism is further examined by IOU service territory. The results show, not surprisingly, that the SCE MCD audit provides a superior level of customization, with the greatest percentage (91 percent) of customers reporting at least a reasonable level of customization. PG&E ranks second using this criterion, with 73 percent reporting at least a reasonable level of customization.

Exhibit 5-14
Customer Assessment of Customization and Relevance of Audit Recommendations
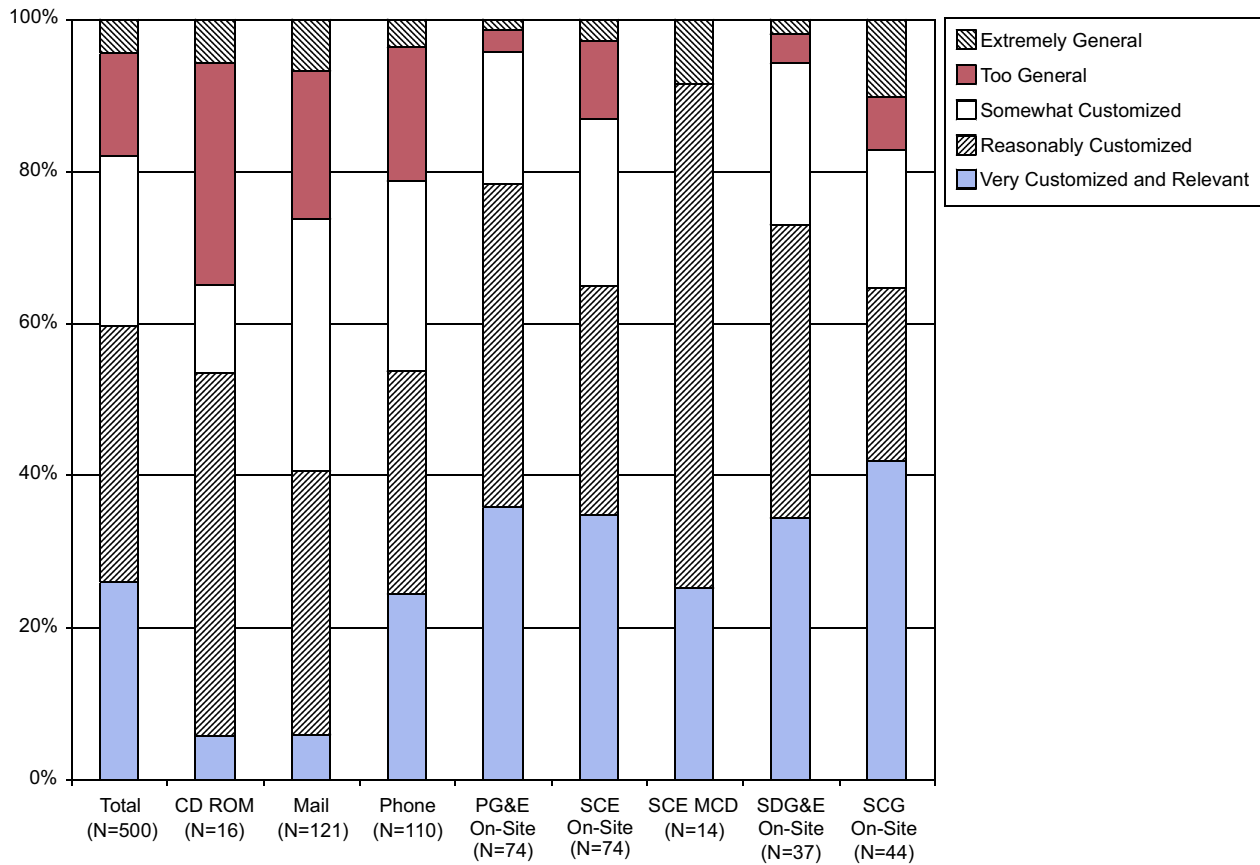
About half of participants prefer simple energy tips (53%) to equipment retrofit projects (23%), while 20 percent desire both. Very small customers, tenants and retailers were particularly interested in low-cost tips instead of equipment retrofits. In fact, there is a clear relationship between customer size and the desire for low-cost energy saving tips. Exhibit 5–15 below shows the percentage of respondents in each size category that prefer simple tips, retrofit projects, or both. The exhibit clearly shows that the smaller the customer, the greater their preference for simple, low cost tips.

Exhibit 5-15
Customer Size versus Recommendation Preferences
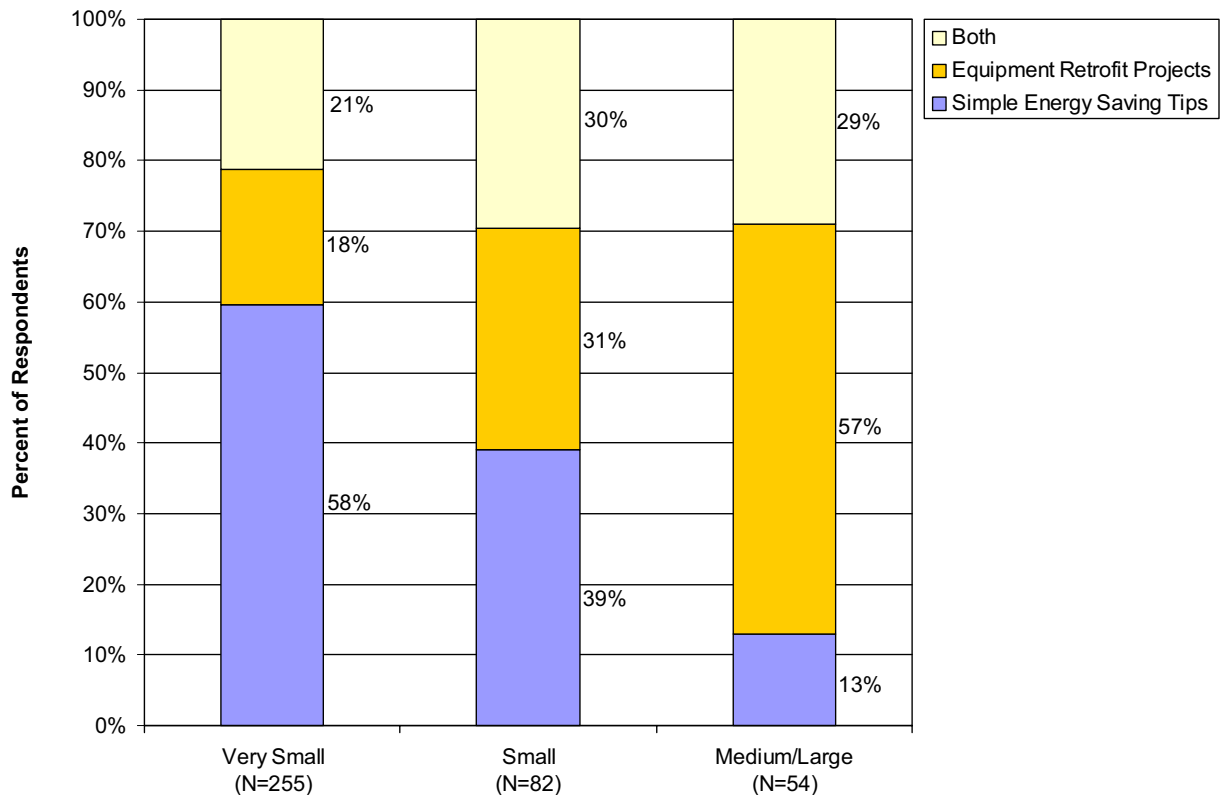
Suggestions for Improvement. When asked for program improvement suggestions, participants overwhelmingly called on the IOUs for more follow up (71%). Many comments focused on follow up phone calls to explain the report and provide more implementation support, such as:

"A follow up call to explain (the report would benefit us)"

"A follow up call after you received the recommendations (would benefit us)."

"… if there is some way they could do a follow-up on (the audit report) and tell people where to go to get stuff implemented or different types of lighting installed (it would improve the program)"

"(Utility) should follow through (with us). (They) talk about energy savings but do not tell us how to (implement recommendations.)"

There were also calls for timely or more frequent follow up, for example,

"(a) follow up call within a week after sending out report would benefit us"

"(I would like a) follow up call after the audit is sent back to me, and fresh in my memory."

Finally, there were general requests for more follow through and more contact, such as

"You guys should call us more often….I would like more contact from (my utility)."

and

"Please send out the energy usage monthly report on a quarterly basis"

"(I would like) more follow up, (it would be great to) have the same technicians come back to see how we are doing."

The need for more customer contact and follow-up was stressed by both the program managers and the vendors as an effective way of increasing customer follow-though. Their detailed comments are presented in *Sections 5.1* and *5.7*. However, the interviewees stressed that in order to respond to customer needs and wants with respect to follow-up activities an increase in the program budget would be required.

Other common suggestions include more customized recommendations (11%), and more cost saving recommendations or rebates (5%). Exhibit 5-16 below shows the suggestions made by customers by audit delivery mechanism. The exhibit shows little difference across delivery mechanisms in frequency of suggestions. There are only a couple of things that stand out. The phone and on-site customers called for less technical language, and mail audit customers felt the business category definitions were too broad.

Exhibit 5-16
Suggestions for Program Improvement by Audit Delivery Mechanism
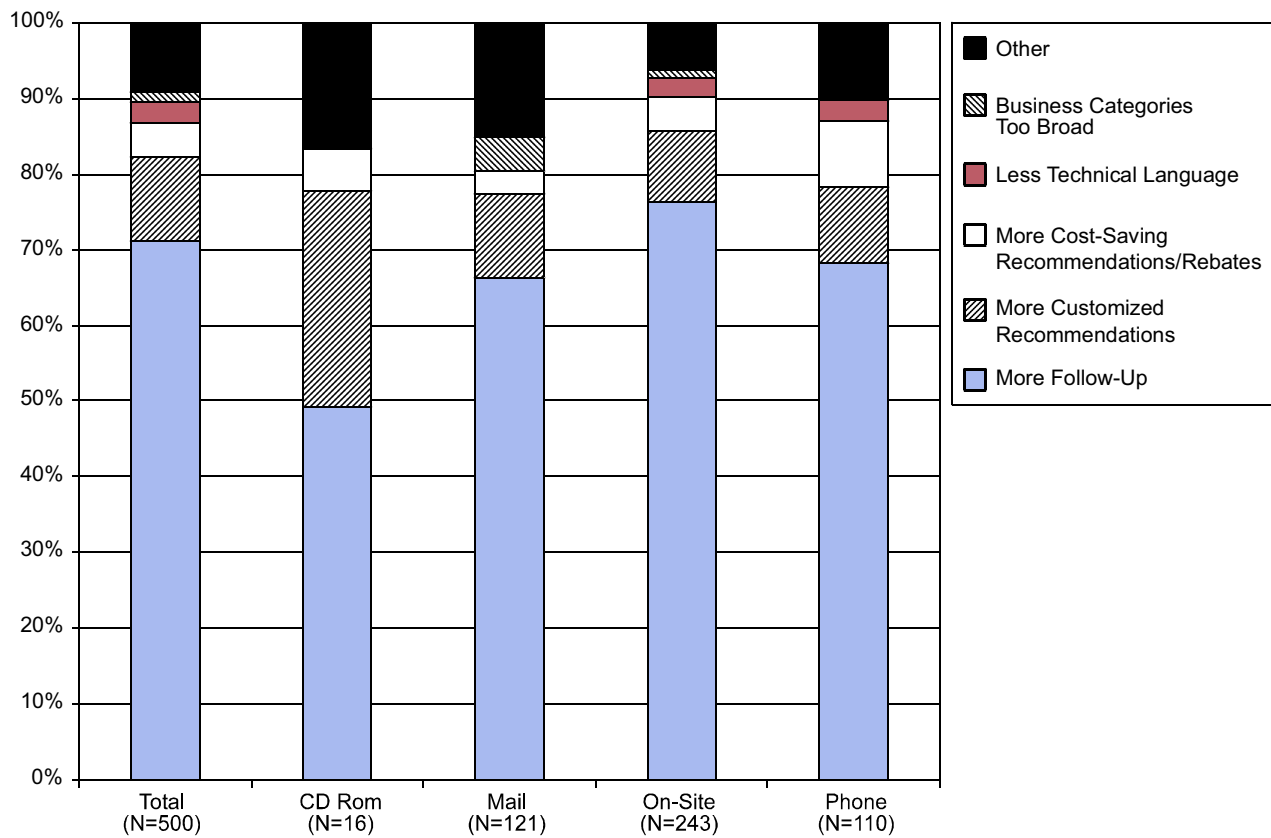
5.5   SATISFACTION

This section examines self-reported participant satisfaction levels and reasons for satisfaction with a variety of program elements. First, the very generalized overall results are presented. This is followed by a number of sub-sections that explore in greater detail satisfaction with each program element.

Participants rated their satisfaction with a variety of elements of the 2002 audit program, shown in Exhibit 5-17. Customers were asked to rank their satisfaction on a scale of 1 to 10. Satisfaction is presented in terms of percentage of satisfied customers. "Satisfied" customers ranked their satisfaction 8 to 10 on a 10-point satisfaction scale, "somewhat" refers to those customers who rated their satisfaction between 4 and 7, while "not at all satisfied" customers' ratings fell between 1 and 3.

Exhibit 5-17
Satisfaction with Audit Program Elements
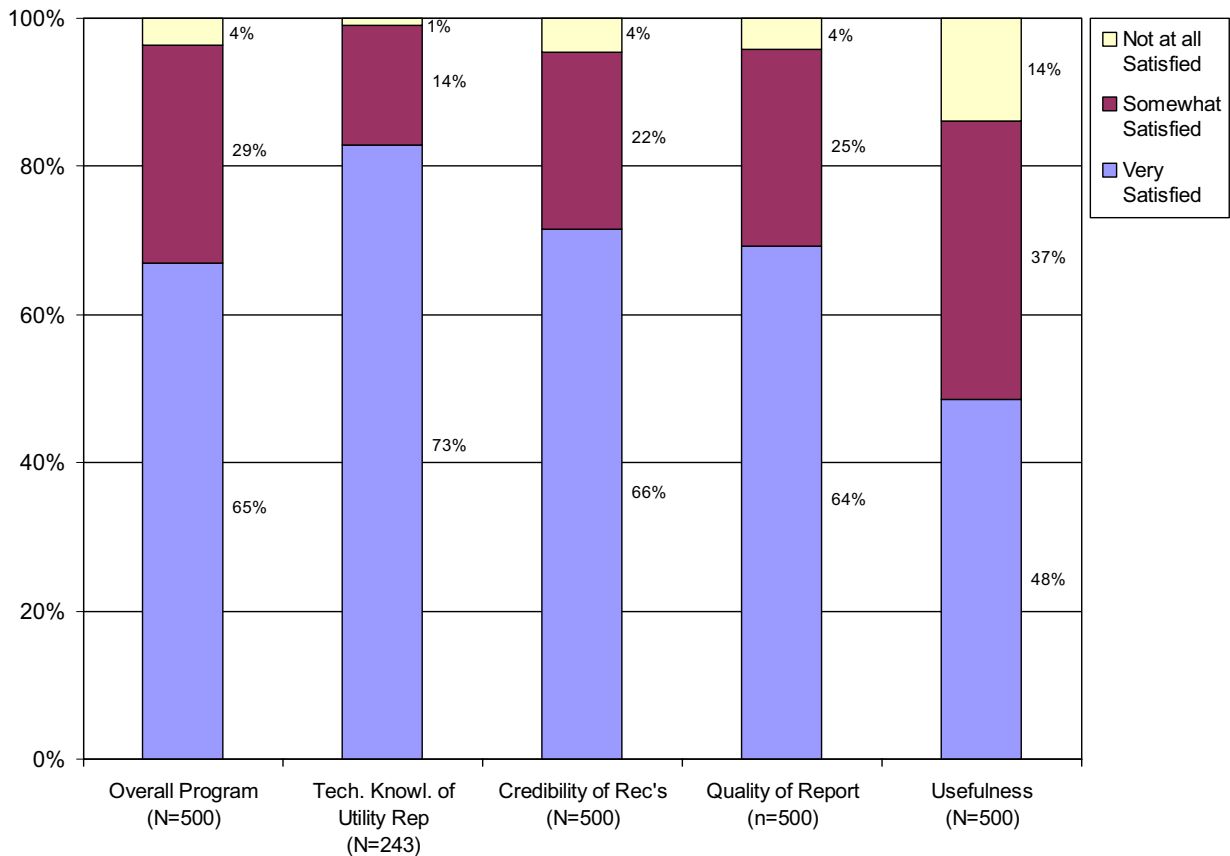
Satisfaction levels are generally quite high. Participants tended to be most satisfied with the technical knowledge of their utility representative. Two-thirds felt that audit recommendations were very credible. Likewise, the quality of the report received praise. However, participants were less impressed with the usefulness of the audit. While more participants found the report very useful than somewhat useful, 14 percent did not find it useful at all.

Differences in Satisfaction among Delivery Mechanisms. In terms of the percent of participants who are very satisfied with the overall Program, the credibility of the recommendations, and the quality of the report, the On-Site audit is clearly superior followed by the Phone audit. With respect to the credibility of the recommendations, the Mail audit is

ranked lowest, suggesting this to be a possible area for program improvement. As shown in Exhibit 5-18, satisfaction with the audit report shows the least variation across delivery channels.

Exhibit 5-18
Satisfied Audit Participants by Delivery Mechanism
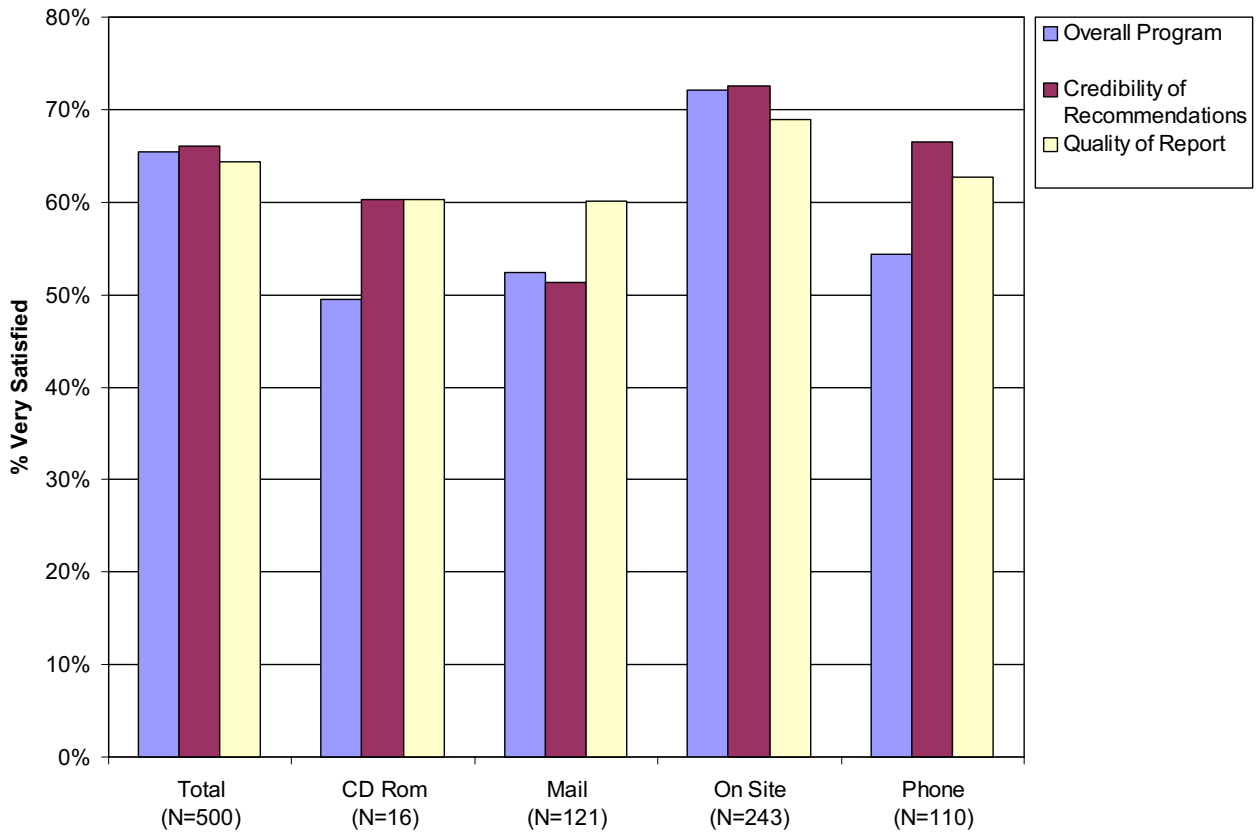
Overall Satisfaction. As shown above, levels of participant satisfaction with the overall 2002 Audit program are high. We also have shown that customers are more satisfied with the on-site audit than the remote audits. Next, we explore the relationship of customer size to overall satisfaction levels. Smaller customers are slightly less satisfied with the Audit program than medium and large customers. Medium and large customers report an average satisfaction rating of 8.5, while very small customers report satisfaction of 7.7.

Exhibit 5-19 and 5-20 below presents the reasons for overall satisfaction by customer size. Exhibit 5-19 presents the distribution of positive comments, with the average satisfaction indicated in the label. Exhibit 5-20 is similar, but presents the distribution of negative comments by size. Positive comments are distributed very similarly across the size categories. A high level of satisfaction with savings and recommendations is the most common sentiment, comprising nearly 60 percent of the positive comments.

Exhibit 5-19
Reasons for Positive Satisfaction Ratings by Customer Size
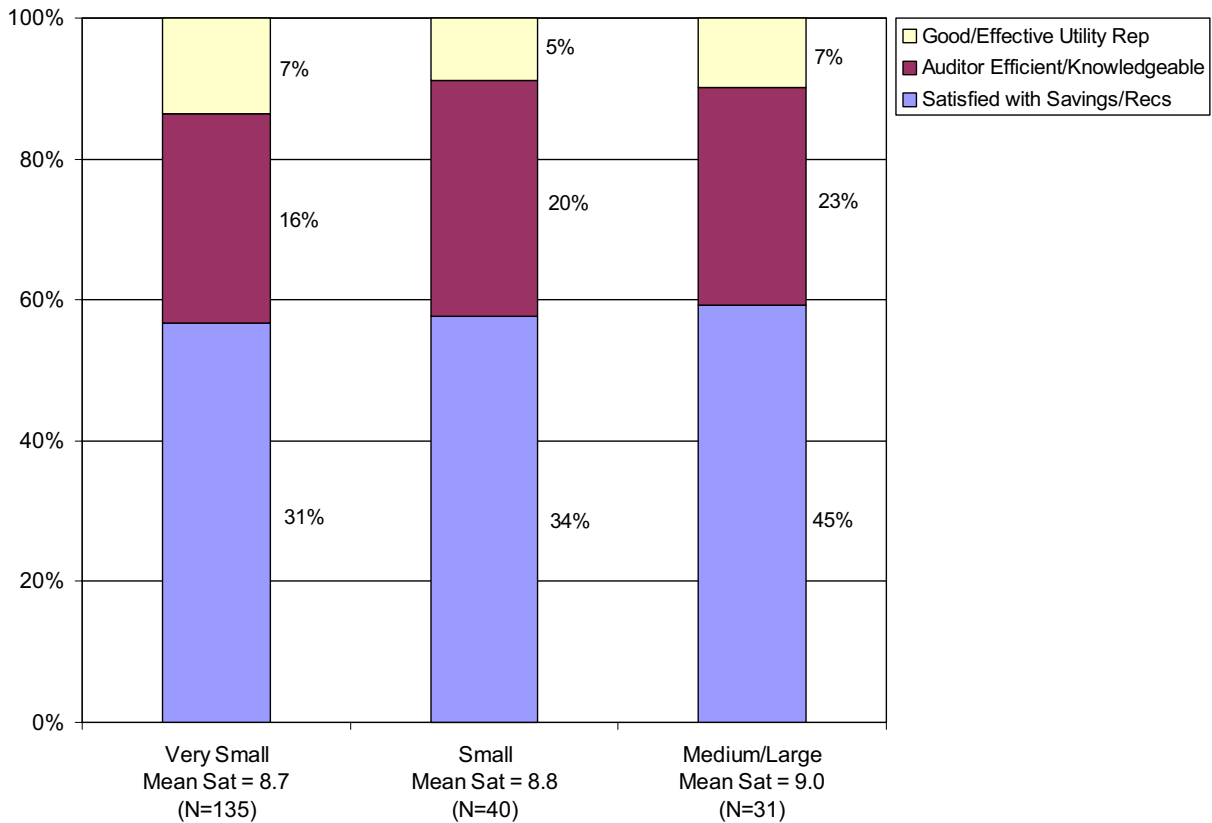
There are more apparent differences across size categories when examining negative comments by size category, as shown in the Exhibit 5-20 below. The exhibit shows that larger customers would like more customized recommendations. Smaller customers are looking for simpler language and more cost- effective recommendations that are less expensive and/or have shorter payback. Not surprisingly, the larger, more technically sophisticated customers expressed no concerns about the technical language. About 27 percent of negative comments made by small customers concerned inadequate follow up by the IOUs after the delivery of the audit report. This comment was also often made as a suggestion for program improvement, as discussed above.

Exhibit 5-20
Reasons for Negative Satisfaction Ratings by Customer Size
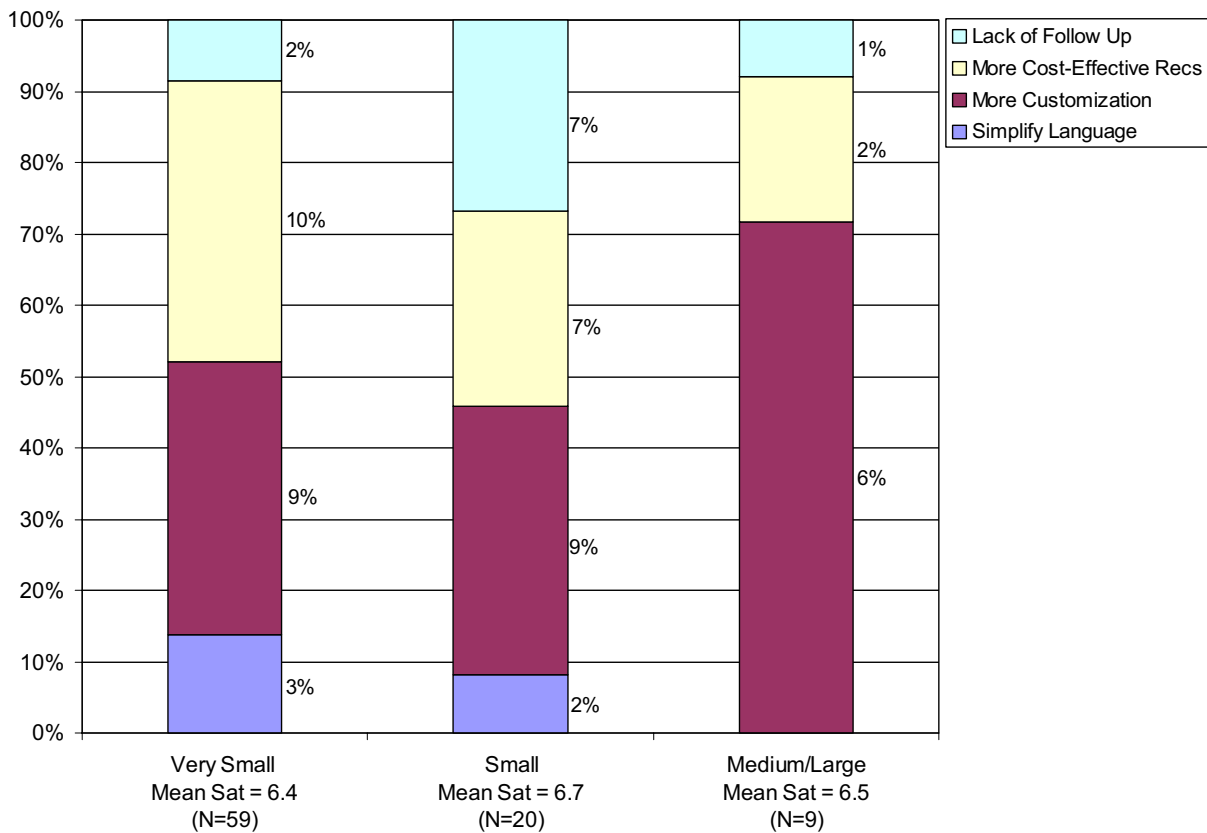
Next, we examine reasons for the satisfaction rating by degree of satisfaction. Exhibit 5-21 below reveals that dissatisfied customers primarily want lower cost or more cost-effective recommendations. They also called for more customized recommendations. In addition, some believed there was not enough savings resulting from the audit process. Those who were most satisfied mentioned the quality of the information and recommendations, as well as the performance of the auditor with whom they worked. Satisfied participants mentioned savings, recommendations, an easy, efficient process and knowledgeable auditors as main sources of their satisfaction.

Exhibit 5-21
Reasons for Satisfaction Rating by Degree of Satisfaction
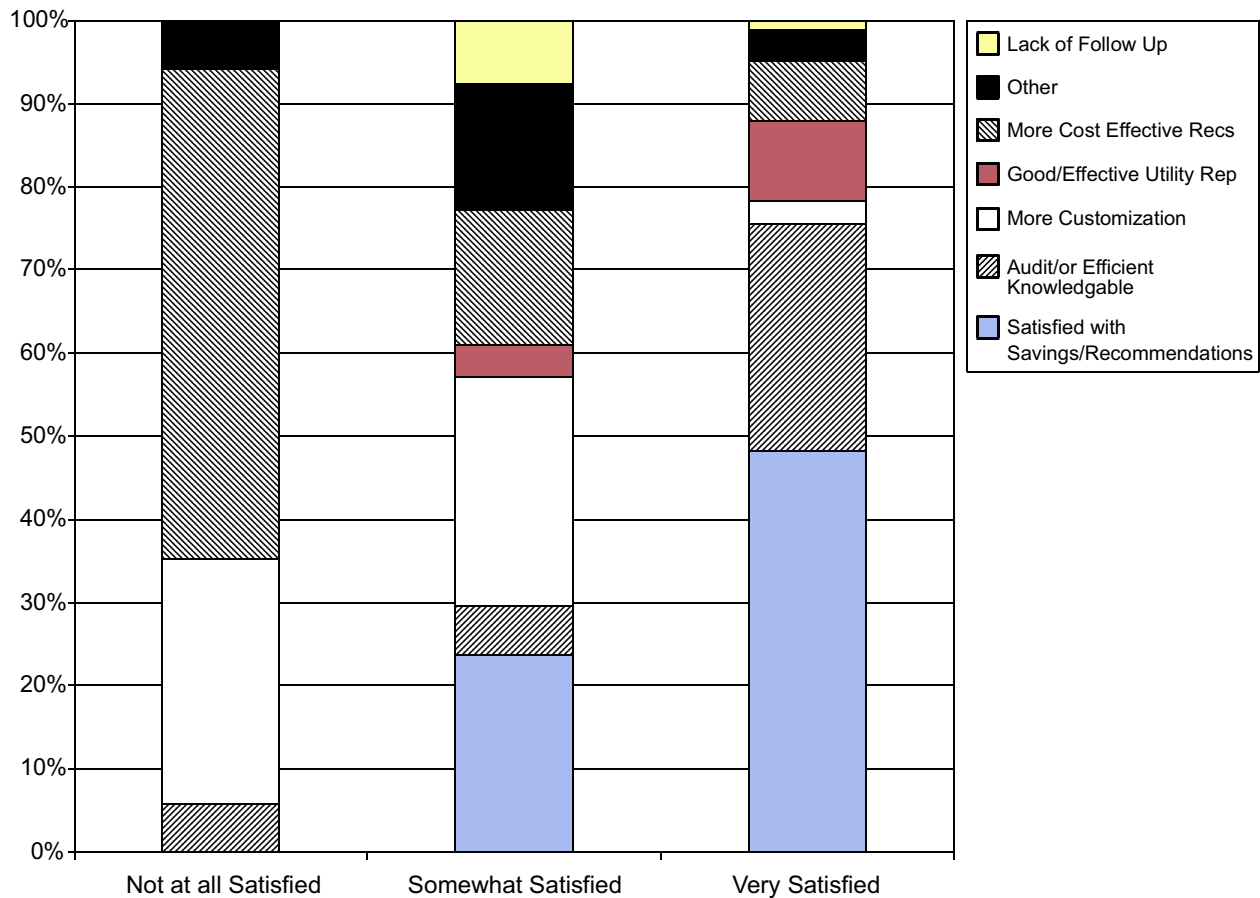
How Worthwhile was the Time Spent on Audit Participation. Another perspective on overall customer satisfaction is to examine participants' perceptions of the worth of the audit. Customers were asked to rate on a scale of 1 to 10 how worthwhile the time they spent on the audit was. Nearly 60 percent of participants found the audit experience and the time it required worthwhile. Nearly one-third believed it was somewhat worthwhile. For 11 percent, the experience was not at all worthwhile. On-site and phone participants tended to find their audit experience more worthwhile than customers who had CD-ROM and mail audits, as shown in Exhibit 5-22 below. These results are consistent with previous exhibits showing somewhat lower levels of satisfaction among mail audit participants than among participants in other audit types. It is not clear whether these differences are inherent to the personal or impersonal nature of the various audit types, or whether the CD-ROM and Mail audits could be improved to be comparable in customer satisfaction with the On-site and Phone audits. This could potentially be an area of future study.

Exhibit 5-22
How Worthwhile Was Audit Participation by Delivery Mechanism
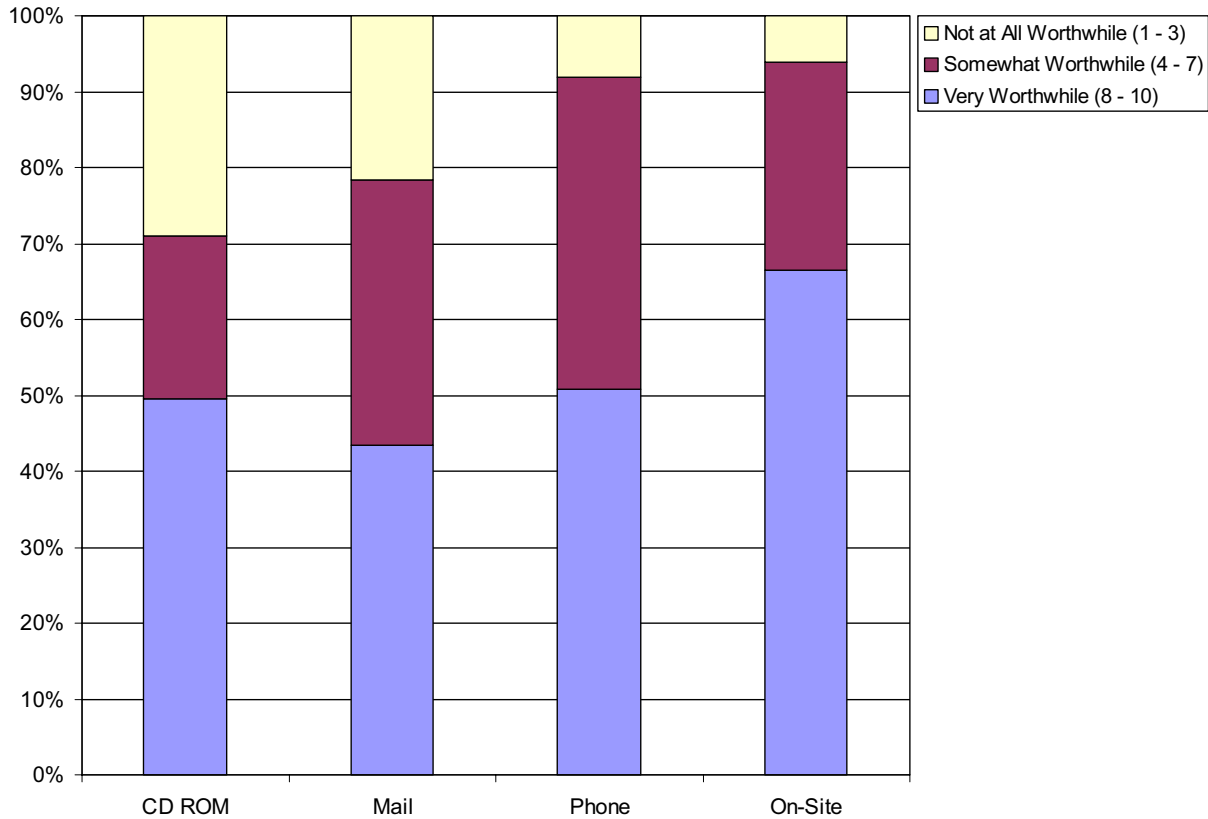
Technical Knowledge of Auditor. Overall levels of satisfaction with the technical knowledge of the auditor are presented in Exhibit 5-23; results are high, with mean values ranging from 8.6 to 9.4. Interestingly, SCE anchors both the highest and the lowest values in this range. The SCE Vendor On-Site audit received the lowest marks, with only 61 percent reporting high satisfaction with the auditor. A much higher 91 percent of the SCE MCD audit customers reported high levels of satisfaction with their auditor's technical competence. It seems that the technical ability of the SCE vendors is somewhat lower than provided by the utility's own auditors, indicating the need for more or better audit training for SCE vendors.

Exhibit 5-23
Mean Satisfaction with Technical Competence of Auditor
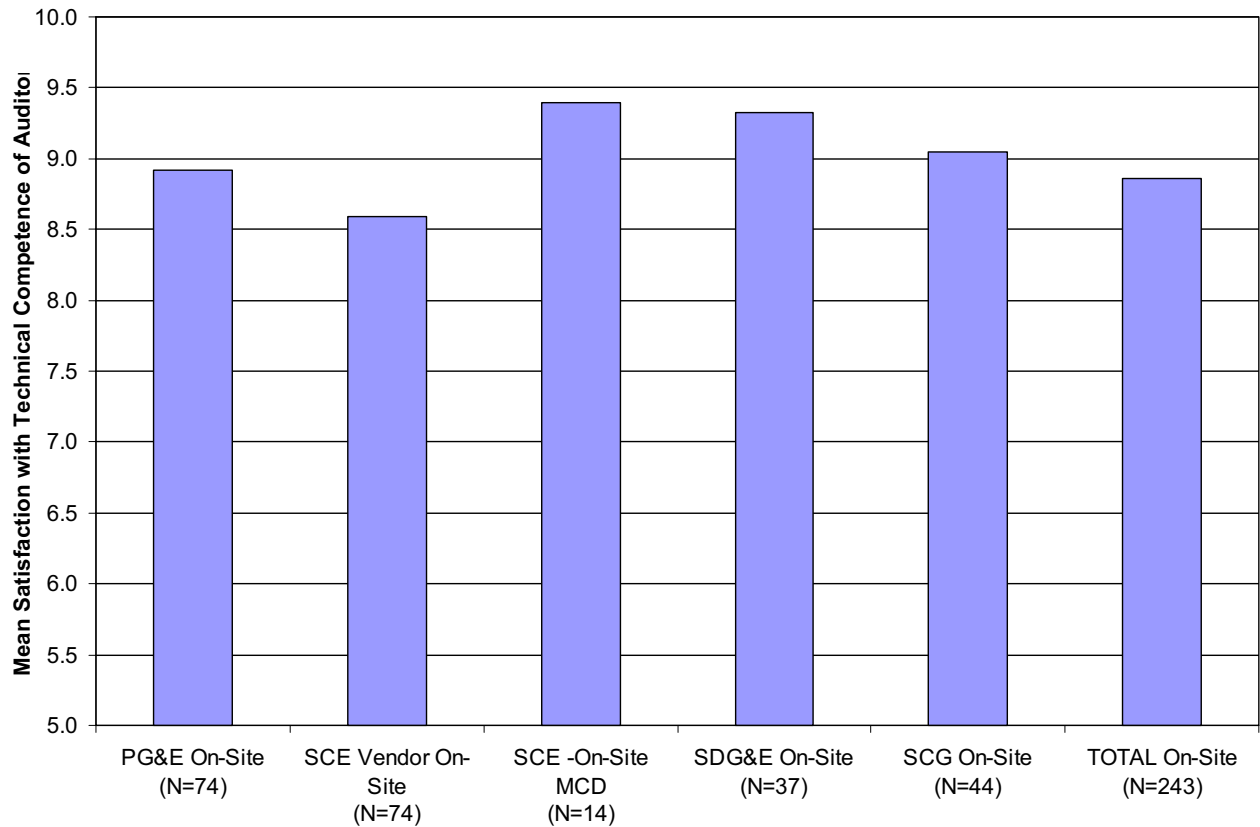
Quality of Report. As mentioned previously, there is little variation in satisfaction with the quality of report among the delivery mechanisms (CD-Rom, on-site, mail, phone). Mean satisfaction by IOU and delivery mechanism is presented in Exhibit 5-24 below. The data show somewhat lower satisfaction reported by mail audit participants, at 7.6 and higher satisfaction reported by SCG On-Site audit customers, at 8.7. CD Rom customers reported very high mean satisfaction with their report, but this should be interpreted in light of the relatively small sample size in this strata (16).

Exhibit 5-24
Mean Satisfaction with Report Quality by IOU and Delivery Mechanism
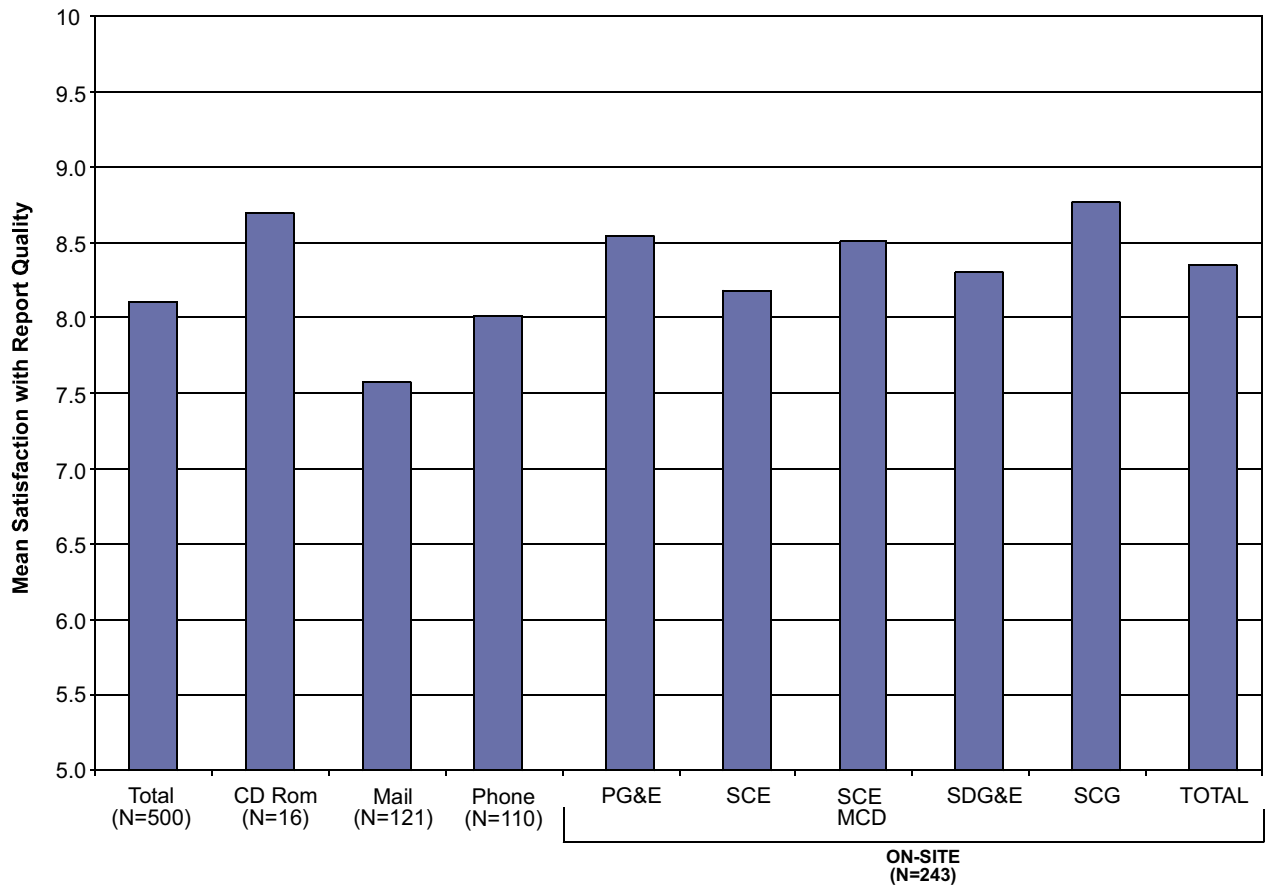
Credibility of Audit Recommendations. Similar to the pattern of satisfaction with report quality, satisfaction with the credibility of audit recommendations is high and rather stable. Thus, credibility of recommendations is an issue that requires minimal improvement going forward. Mean satisfaction ranges from a low of 7.3 for the Mail customers to a high of 8.5 for the PG&E On-Site customers. Differences across on-site audit deliveries are minimal, ranging from 8.2 to 8.5. Phone audit customers are in-between with an average of 8.1.   CD Rom results are on the high side, at 8.4. Exhibit 5-25 below presents mean satisfaction with the credibility of recommendations by IOU and delivery mechanism.

Exhibit 5-25
Mean Satisfaction with Credibility of Recommendations
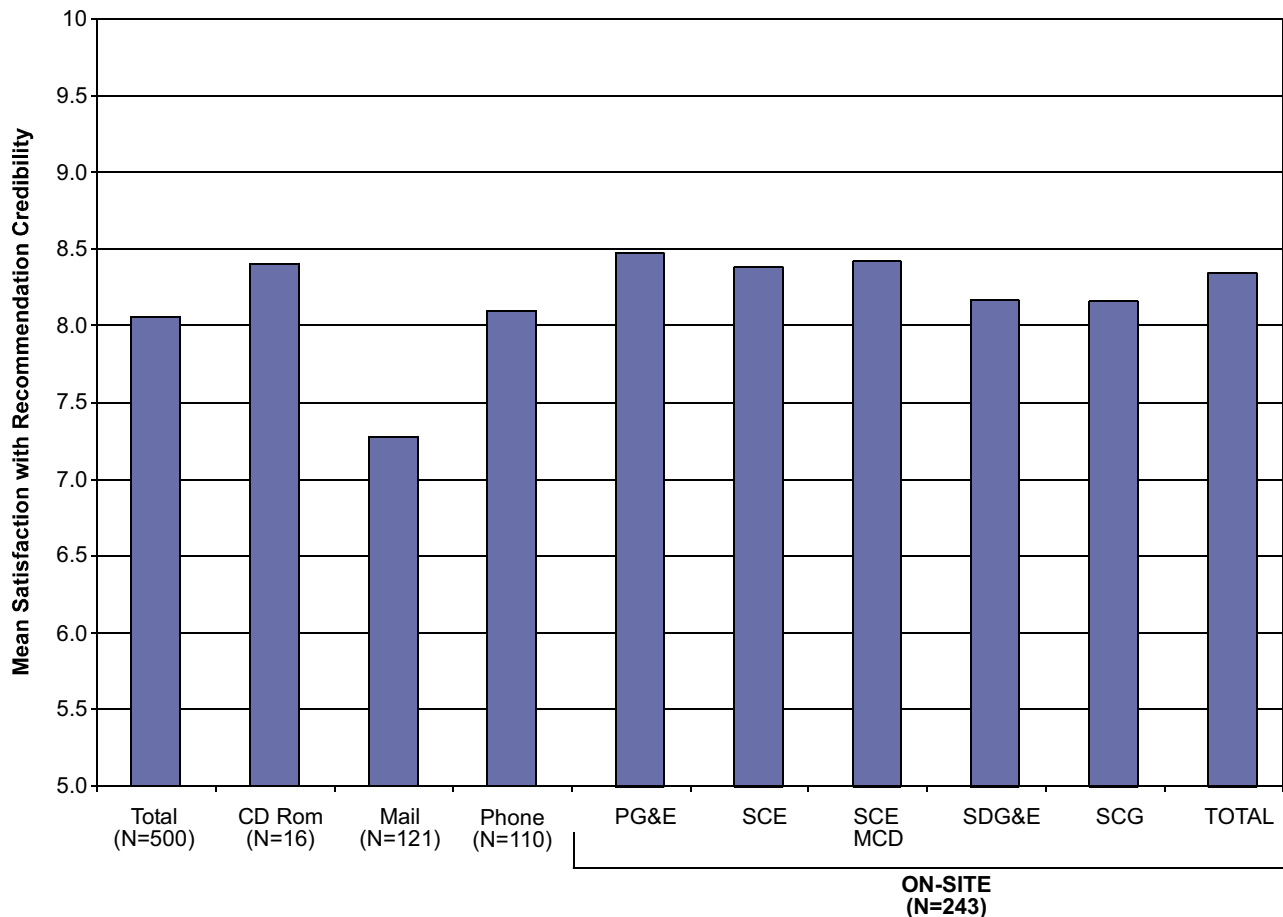
Usefulness. Satisfaction with usefulness is lower than satisfaction with any other program element. About half of participants found the energy audit to be very useful, while 37 percent believed it to be somewhat useful, and 14 percent found it not at all useful. On-site and phone participants were more positive about usefulness of their audits than CD-ROM and mail audit participants.

Exhibit 5-26 below shows mean satisfaction with usefulness by IOU and delivery mechanism. The on-site instruments get higher marks from customers than the instruments used for remote audits, particularly the mail audit. The CD-ROM customers, while very satisfied with the quality of the report and credibility of recommendations, assigned a low rating to the usefulness.

As discussed previously, a common complaint among customers was a call for more cost-effective (lower cost/higher savings) recommendations. This is particularly an issue for smaller customers who are less satisfied with the usefulness of the report than larger customers. Fifteen percent of small and very small customers report being very unsatisfied with the usefulness of the report compared to only three percent of medium and large customers.

Exhibit 5-26
Mean Satisfaction with Audit Report Usefulness by Delivery Mechanism and IOU
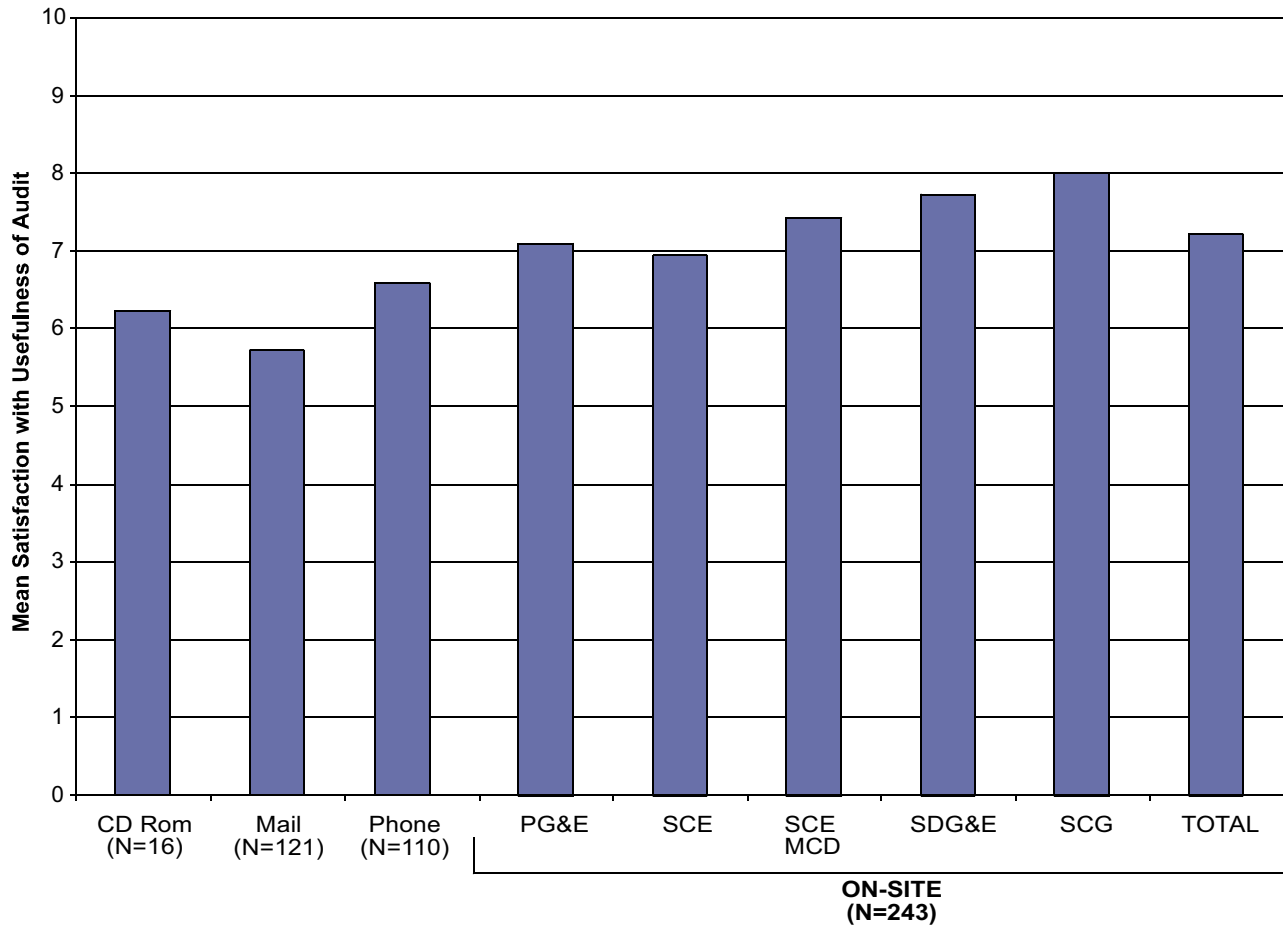
5.6 IMPACTS ON KNOWLEDGE AND FUTURE PURCHASE BEHAVIOR

This section compares participant and general population purchase intentions, knowledge and attitudes in order to assess the effect of the program. This section begins with a presentation of overall energy efficiency intentions and knowledge in Exhibit 5-27 in which participants and the general population are compared in terms of their knowledge of energy efficient products and their stated intentions to purchase energy efficient equipment in the future.

Exhibit 5-27
Comparison of Purchase Intentions and Knowledge
of Participants and the General Population
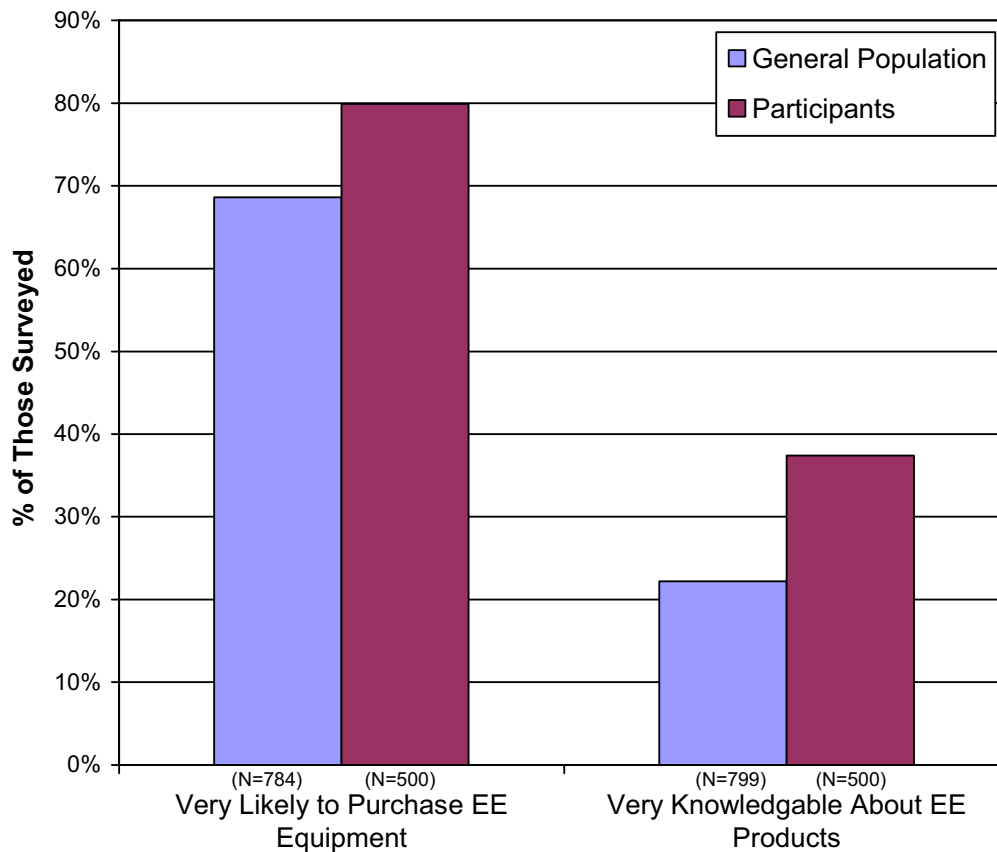
The exhibit shows that participants consider themselves more likely to purchase energy efficient products and more knowledgeable about such products than the general population. When examined by segment, the results are very consistent, as shown in Exhibit 5-28 below. With the exception of the Restaurant/Grocery business type category, participants rate their likelihood of purchasing energy efficient equipment in the future higher than the general population.

Another interesting characteristic to note in the exhibit below is that the probability of purchasing high efficiency equipment has a smooth positive relationship with customer size, for both participants and the general population. This pattern is repeated again in self-reported knowledge of energy efficiency shown in the following exhibit (Exhibit 5-28).

Exhibit 5-28
Likelihood of Purchasing Energy Efficiency Equipment in the Future
in the General Population versus Participants
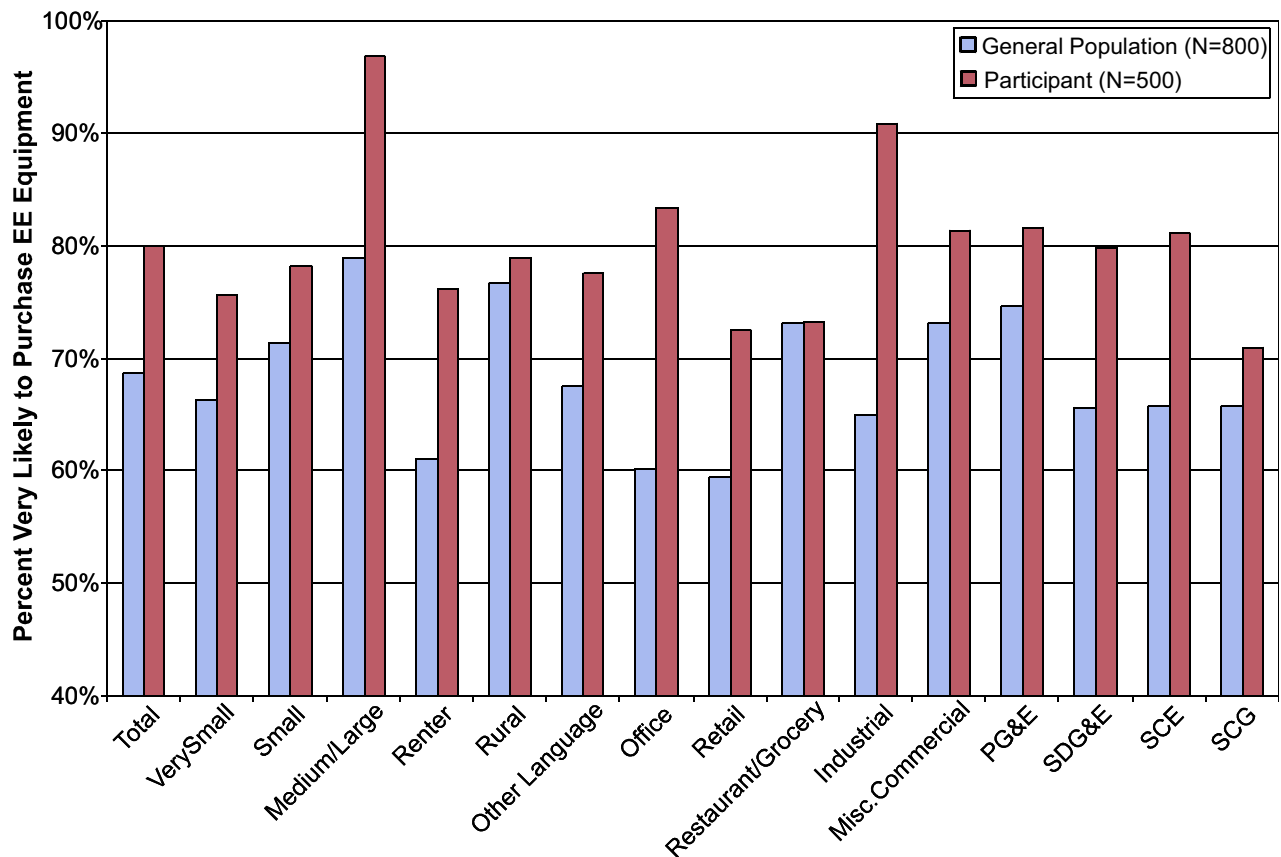
While the program seems to move all customer size segments, there is little variation in the likelihood of purchasing energy efficient equipment across delivery mechanisms. Mail audit customers had the lowest percent, with 74 percent stating they are very likely to purchase energy efficient equipment. On-site audits were higher, at 82 percent, and CD-ROM was the highest, at 89 percent.

When examined by segment, participants' self-reported knowledge of energy efficiency is consistently higher than the general population. Exhibit 5-29 below shows the percent of participants and general population respondents claiming that their knowledge of energy efficiency is very high (8 to 10 on a 10- point scale.) Effects seem particularly pronounced for large, industrial, very small and restaurant/grocery segments.

Exhibit 5-29
Self-Reported Knowledge of Energy Efficiency in the General Population versus Participants
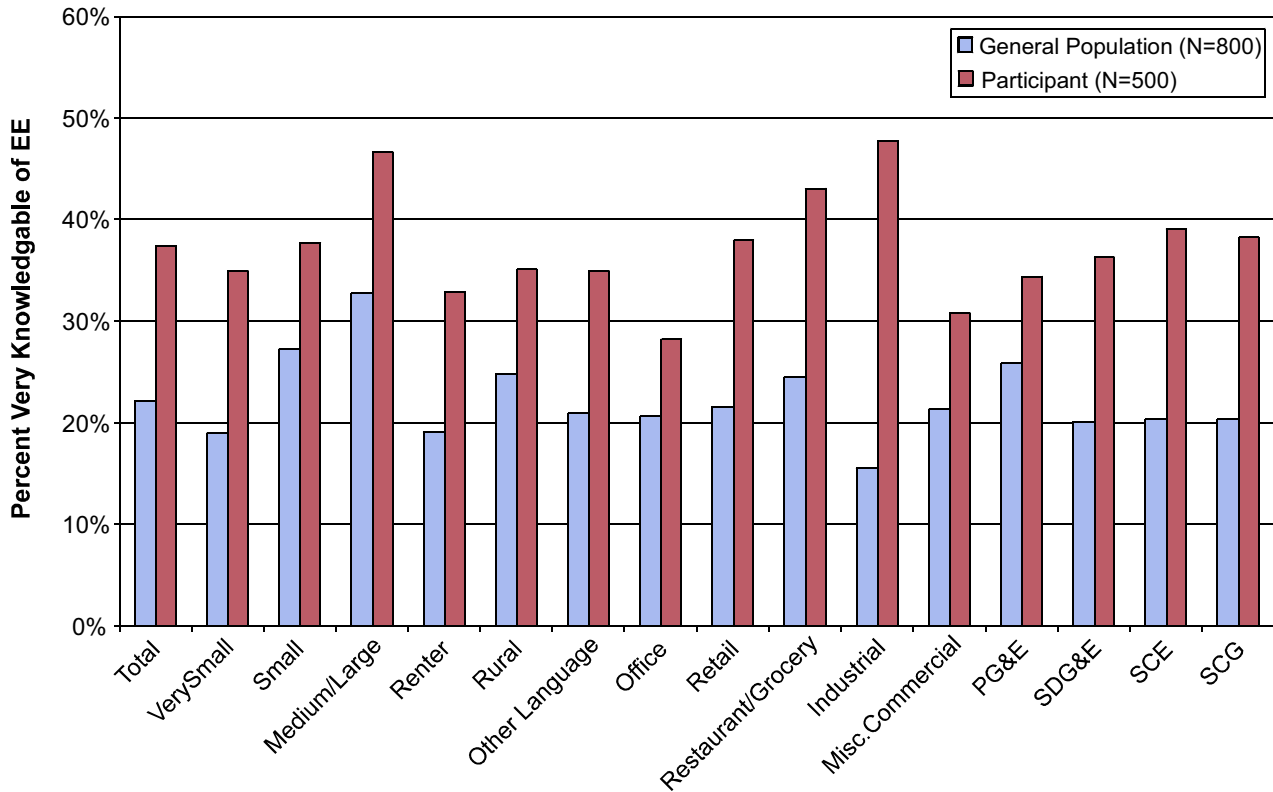
Furthermore, participants report that they are considerably more knowledgeable after participating in the program. Participants were asked to rate their current knowledge of energy efficiency (on a 10-point scale) and then to rate their knowledge before the Audit program. Exhibit 5-30 below presents the percent of respondents who claimed their knowledge was very high (8 to 10 on a 10-point scale.), both before and after the audit. The difference between self-reported knowledge before and after the program is quite pronounced nearly across the board (although office has a somewhat smaller effect than other segments.)

It is important to note, however, that the percent of participants claiming thorough knowledge of energy efficiency remains less than 50 percent for all segments. While the program is moving things in the right direction, by a sizable margin, there still remains a sizable gap in customers' perceived knowledge.

Exhibit 5-30
Self-Reported Change in Energy Efficiency Knowledge Due to Audit Program
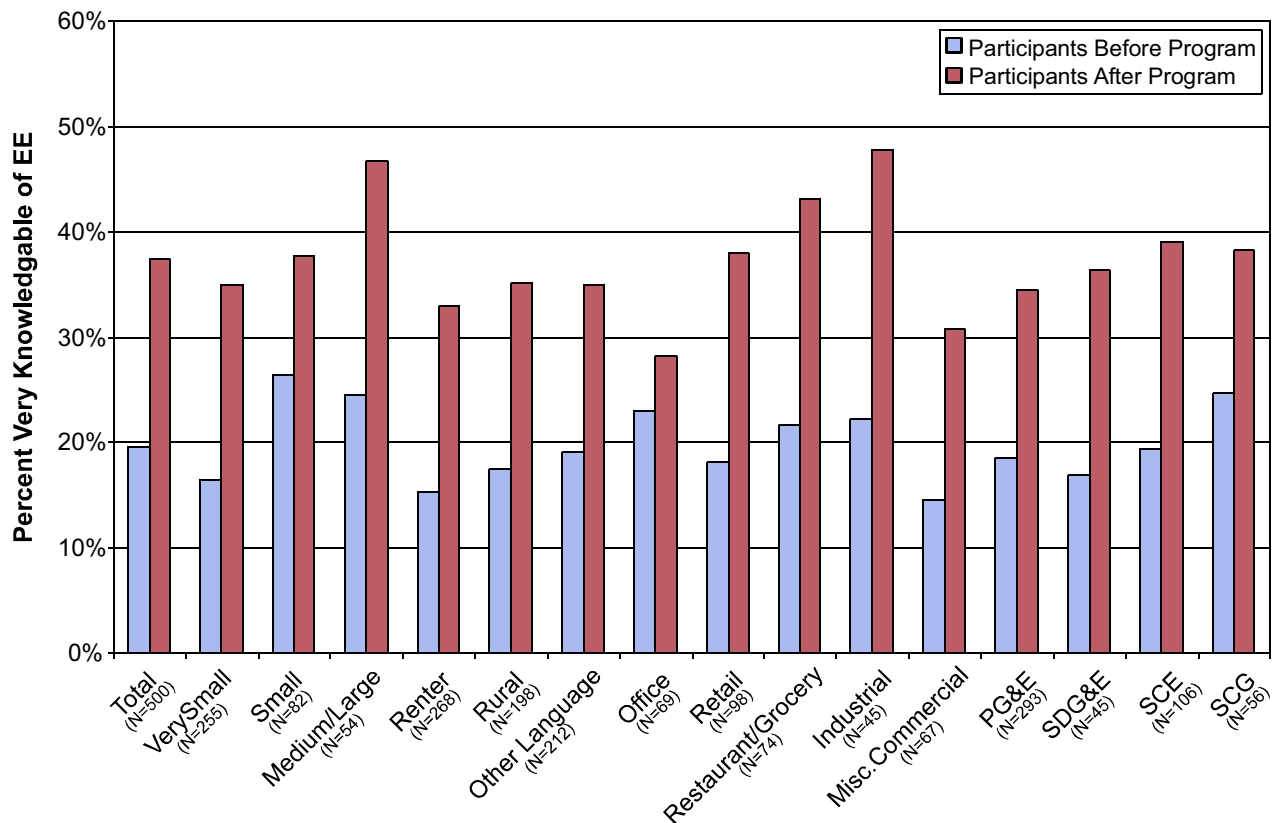
The results of this same analysis segmented by IOU and delivery mechanism are very telling. Exhibit 5-31 below shows the change in self-reported knowledge due to the program. The results show that the on-site audit has a greater educational effect than the remote audits, although the phone audit does come very close. Although remote audit participants tend to be smaller in size, they have higher prior knowledge of energy efficiency. Recall in the impact assessment chapter, the hypothesis that remote audit participants are more responsive to the audit because the remote audits require somewhat more active participation than an on-site audit. Here we see more evidence that these customers are more motivated with respect to energy efficiency than other customers of similar size.

Exhibit 5-31
Self-Reported Change in Energy Efficiency Knowledge by Delivery Channel
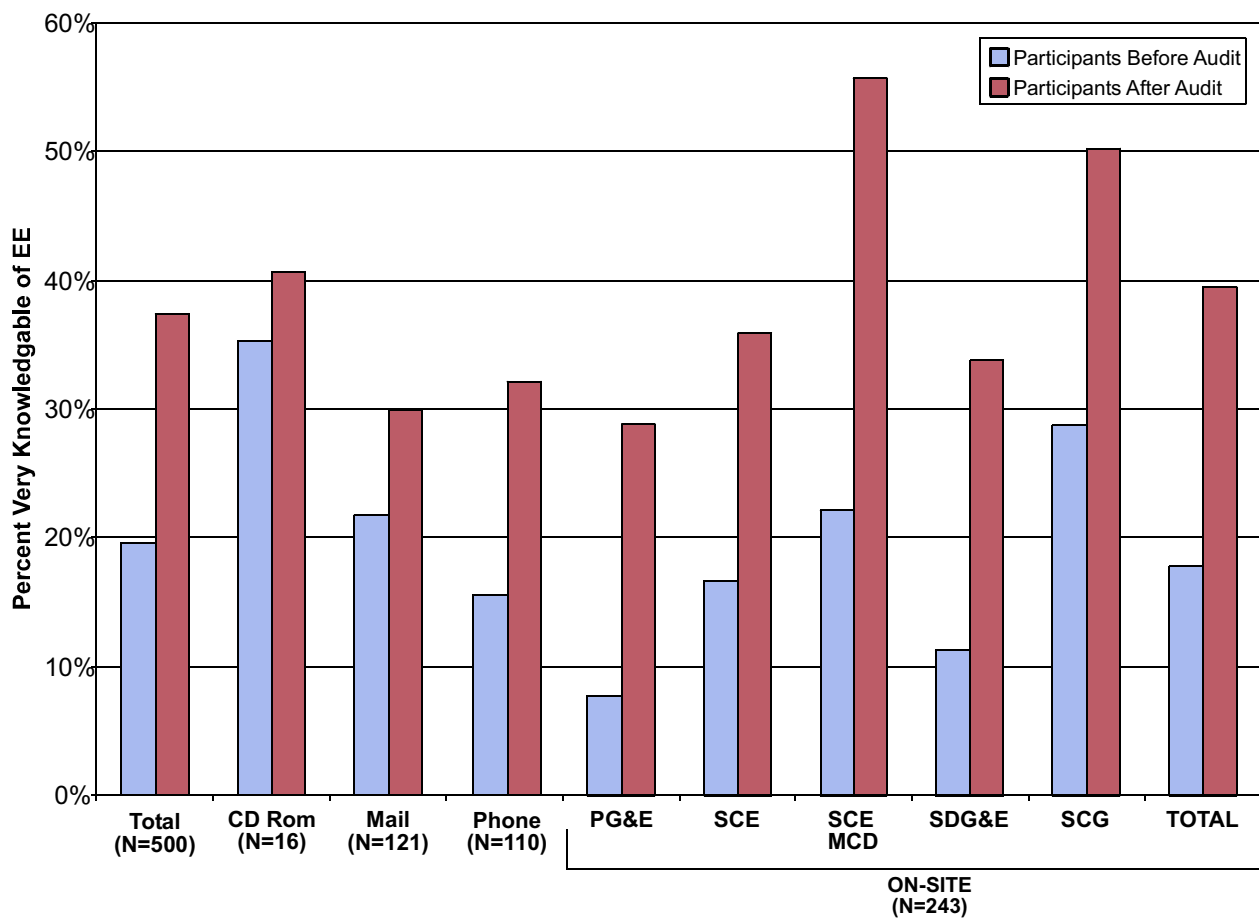
Attitudes Toward Energy Efficiency. Customers were asked their perceptions about various barriers to energy efficiency, and asked how much they agreed with six statements on a 1 to 10 scale, where 10 is strongly agree and 1 is don't agree. Exhibit 5-32 compares the responses of the general population to participants. Audits appear to have mitigated the information barrier. Participants tend be more confident that they can make an informed decision about energy efficient investments than the general population. Participants tend to be more satisfied with the energy conservation decisions they have made than the general population, confirming impact findings presented in Chapter 4 that energy efficiency activity is greater in the participant population.

However, participants also show greater concern that actual bill savings will not match estimated bill savings and believe that finding a contractor is more of a hassle than the general population. This might be due because they are more likely than the general population to have tried to find a contractor. Furthermore, participants are more inclined to view lack of financing as a barrier to making desired energy efficiency improvements than the general population.

Exhibit 5-32
Participant and General Population
Attitudes Toward Energy Efficiency

		General Population	Audit Participant
Concerned that bill savings will be less than was estimated	Agree	33%	43%
	Agree somewhat	44%	38%
	Don't agree	23%	17%
Not enough information to make EE investment	Agree	30%	24%
	Agree somewhat	36%	33%
	Don't agree	35%	41%
Uncertain about reliability of information provided by non-utility firms	Agree	30%	31%
	Agree somewhat	46%	40%
	Don't agree	24%	24%
Satisfied with my energy conservation decisions	Agree	56%	56%
	Agree somewhat	34%	36%
	Don't agree	9%	8%
Too much hassle to select a contractor	Agree	21%	24%
	Agree somewhat	37%	36%
	Don't agree	42%	31%
Lack of financing is a barrier to making desired energy efficiency investments	Agree	25%	38%
	Agree somewhat	34%	36%
	Don't agree	41%	22%

Audit Comparison and Relative Satisfaction. Just 21 percent of participant respondents had been approached in the past about completing a non-IOU sponsored audit[5]. Of these, about 33 percent had completed the non-utility audit and 67 percent declined the offer. Almost half of those who declined the audit cited low credibility of auditors as the primary reason. Similarly, when these same customers were asked why they participated in the utility audit, almost half cited the credibility of utility-sponsored information.

Only 6 percent of participants had completed both a utility and non-utility sponsored audit. These customers were asked to compare the customization and relevance of the recommendations provided by both audits, and also to compare the credibility of the recommendations. Interestingly, about half named the non-utility audit as providing the more customized and relevant recommendations, and half named the utility audit as providing the more credible recommendations.

These results underscore the need in the community for utility-sponsored audits due to a much greater perceived credibility. It is not surprising that the non-utility audits get higher marks for customization, since many non-utility audits cost money or are done as part of a larger project or sales pitch such as through an ESCO or contractor.

5.7   VENDOR INTERVIEW RESULTS

This section presents the results of the standardized open-ended interviews with vendors associated with the PY2002 Statewide Nonresidential Audit Program. (Refer to the Appendix I survey instrument.) In this section, we present a summary of the responses within each of five topic areas:

1. Program Process, Recent Enhancements, and Prospective Changes,

2. Implementation of Recommendations,

3. Recent Marketing Efforts, Improvements, and Prospective Changes,

4. Hard-To-Reach Goals, and

5. Cross-Program Issues.

5.7.1   Program Process, Recent Enhancements and Prospective Changes

Program Process. The roles of the four companies represented by the interviewees were quite diverse. Base Energy performed onsite detailed energy audits of large manufacturing, commercial, and institutional facilities for PG&E. Base Energy also has worked with SoCalGas in the past (for 8 years) in a similar program.

FCI Management Consulting was contracted to perform small business onsite audits for all of the LA county area during the 2002 program year. The respondent is an Edison retiree who

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[5] Non-IOU sponsored audits include those performed by Energy Services Companies (ESCOs), contractors, third party energy program providers, or local utilities.

used to be a field representative, and so has insight on both sides of the issues. Nexus provided the small/medium commercial business analyzer tool for the four utilities. There are 4 channels of delivery handled by Nexus: mail, online, CD-Rom and phone. SDG&E, SoCalGas, and SCE used the analyzer tool for the phone audit, the short version of the mail-in audit, the CD-Rom and the online audit. PG&E also uses Nexus for the short version of the mail-in audit, the online audit, and the CD-ROM.

Prospective Changes. With respect to future improvements,

- The Base Energy respondent noted that if the onsite presentation to the customer were to include the consultant and PG&E, it might improve implementation. While the consultants are available during the presentation and afterwards for questions, they are on the phone, not in person; PG&E does the actual onsite presentation.

- The PG&E representative observed that there could be more measures added to the BEST tool.

- The FCI respondent noted that there should be less paperwork. In addition, she noted that utilities need to provide better-organized and cleaner customer lists that do not include accounts that cannot be audited such as meters on apartment complexes and fire meters.

- The Nexus representative noted that utilities could create a unified promotion strategy that should increase participation. Currently there is an uncoordinated multi-channel approach. They do mailings to promote the mail-in audit, but don't promote the online version in that same mailer. Also, each utility makes its own decisions about promotion. If the utilities were to consult with Nexus, they could give them ideas on how to improve the coordination of marketing. For example, the utilities could broaden the scope of the product to include other languages and use all four channels to promote the different audits.

- Nexus indicated that PG&E is considering the use of PC Tablets for on-site audits. PC Tablets could also help the field representatives in other parts of their job as well.

- Nexus is considering audits in Spanish and other languages (e.g., in Asian languages).

5.7.2 Implementation of Recommendations

Similar to the Program Managers', vendors felt low first-cost and quick payback are the most likely to be acted upon. A very short payback is especially important to the small and medium size customers since they are leasing their space, but first-cost is an important barrier for business of all sizes. Vendors noted that customers are more hesitant to implement energy efficiency measures that deal with plant production even though these are often the ones that save the most.

The barriers to implementing recommended measures depend to some extent on the size of the customer. Because small customers serve many roles (e.g., the employee, the employer, the

human resources manager, the accountant), they have little time to also become an energy expert. In general larger customers are thought to have fewer barriers since they have a larger savings potential, are better educated regarding energy matters, and are more easily reached by the utilities. Vendors felt that uncertainty about the magnitude of the savings estimates is not an issue for the large customers. This is due to the fact that the vendors work very closely with large customers throughout the entire process increasing their understanding of the technology and, as a result, increasing their confidence in its performance.

Vendors noted that discussing the recommended measures with the customer at the end of the audit could have a positive influence on the probability of follow through. Currently, some vendors also send e-mail to customers when they have identified the measures to see if they have any comments.

Vendors felt that while the program provides customers with enough information to make informed decisions, the program could be more effective by following up with customers after the audit.

Vendors mentioned a variety of factors that influence customer follow-through. All agreed that offering rebates and impartial information on cost-effective measures that save energy is most important and that follow-up with the customers is key. However, who should do the follow-up and how it should be paid for were mentioned as issues. The PG&E representative noted that they now mentioned other non-energy benefits such as a reduction in greenhouse gases as a way to influence customer follow-through. Nexus emphasized that better targeting of those customers in greatest need of follow-up can improve the cost-effectiveness of the follow-up component.

5.7.3 Recent Marketing Efforts, Improvements and Prospective Changes

With respect to the messages that they try to emphasize in their marketing and outreach, all stress the energy and bill savings potential and that the audits provide a good roadmap to achieve this potential. In addition, Nexus stresses that the information is tailored to the customers' needs and situations and the PG&E representative attempts to help customers understand how much energy their equipment currently uses and then proceeds to educate them on how to reduce energy use.

5.7.4 Hard-To-Reach Goals

The HTR goals affected some vendors more than others. The FCI respondent noted that, since approximately 80 percent of their customers are small anyway, the goal to reach HTR customers had little effect on their activities. She did note that the customers in the more remote zip codes presented some logistical challenges. The PG&E representative admitted that an extra effort was required to meet the HTR goals, while underscoring the point made by the FCI respondent concerning the challenge and higher costs of reaching those customers.

During 2002, the PG&E representative called ahead in order to make sure he would be able to speak with the decision maker. He felt that it was essential to go through this effort if you were going to be successful. Nexus conducted better target marketing in order to improve the response rate. Nexus claimed that two of the four utilities used their targeted marketing

approach while two chose not to. Nexus claimed that the two that used it experienced increased levels of participation.

5.7.5   Cross Program Issues

All four vendors provide information on one or both of the relevant rebate programs. The Base Energy respondent refers customers to both the Express Efficiency and SPC Programs in the audit report. However, he mentioned that only the SPC Program applies to the large customers with which he works. However, he noted that these programs usually run out of money in a few months. The PG&E representatives identify those customers that are likely SPC candidates. If the money for a given year is exhausted, then they get the customer in line for the following year. The PG&E representative shows the customer the savings potential and the associated rebate along with the application for the Express Program and asks for a commitment. He also does this for the SPC Program, after attempting to identify, as does Base Energy, likely SPC candidates. Because FCI deals with smaller customers, they refer customers to only the Express Program.

In terms of what could be done to improve cross program participation, both the PG&E representative and the FCI respondent mentioned that spending more time with the customer after the audit was very important. Nexus mentioned the option of incorporating, within the planning tool that is available within the Fast Track Audit, the ability to fill out the Express application (as being one way to increase participation in this program).

Finally, three of the four respondents felt that there was a role to be played by the SPC or Express Programs in encouraging audit participation. The audit and the rebate programs work in tandem; the audit quantifies the savings and the rebate programs make it more likely that the measures will be adopted.

5.8   KEY FINDINGS

Program Implementation

The IOUs' marketing and outreach efforts had many strategies in common, such as electronic newsletters and bill inserts, but each IOU employed a slightly different set of activities and each activity was conducted in a unique way. Marketing and outreach efforts in 2002 were successful and the IOUs met participation and HTR goals.

The rate of awareness of the audit program in the general population is very high, at 42 percent. Rates of awareness are consistent across IOU service territories, but not surprisingly, tend to be higher in non-HTR segments than HTR segments. The difference is relatively small, a tribute to successful and substantial efforts made by the IOUs to recruit HTR customers into the audit program.

The IOUs were also successful in reaching the goals of offering all five types of audits in each service territory in 2002.   The Audit program now offers a balanced portfolio of delivery mechanisms designed to reach a diverse customer audience for Audit services. All IOUs agree on the importance of providing alternative mechanisms in response to customers' needs and preferences. Most IOUs feel that the on-site audit should remain the backbone of the Audit program since customers really want the personal attention.

While the mail, phone, online and CD-ROM delivery channels are largely uniform, the on-site surveys being offered across the state vary markedly with regard to the expertise of the auditors fielded, the emphasis on customization, the emphasis on measure recommendations (especially gas for SoCalGas vs. electric for the other IOUs), and the highly unique cold call approach being used by SCE to reach small and otherwise HTR customers. While these differences serve important needs and should be preserved at some level, the program cost-effectiveness at the statewide level could benefit from greater consistency and an integrated use of best practices.

Cold call (door-to-door) audits in very small commercial establishments like those implemented by SCE Vendors in 2002, has proven successful as a low-hurdle approach to reaching HTR goals. However, it is an effort that holds little likelihood of yielding substantial energy efficiency actions, as demonstrated in *Chapter 4*, without further downstream intervention by the utilities. Further, these audits have somewhat lower levels of customer satisfaction, indicating possible need for enhanced auditor training.

One additional variation in program implementation is the use by PG&E of follow-up telephone calls placed with participants at least one month after participation. The objective of this effort is to spur downstream implementation of the measures recommended. As discussed in *Chapter 7*, this is shown to be effective in encouraging participant follow through.

Customer response to the 2002 Nonresidential Audit program has been very positive[6]. Customers report high levels of satisfaction with the credibility of recommendations, quality of the written report and the overall program. The "usefulness" of audit recommendations is an area that customers were somewhat less satisfied, and thus is an area where potential improvement exists. The On-site audit has the highest levels of customer satisfaction in all areas, followed closely by the phone audit.

Both customers and vendors called on the IOUs to perform more personalized follow up with customers after the audit. Nearly 71 percent of customers expressed the desire for more follow up activity, and vendors also suggested it as a way of improving customer follow through on recommendations. Other common suggestions for program improvement include more customized recommendations (11%), and more cost saving recommendations or rebates (5%). Smaller customers express more desire for low-cost energy saving tips, and larger customers prefer more customized, sophisticated recommendations. The IOUs suggested developing Spanish and other language audits to help promote audit participation.

Participants report they are considerably more energy efficiency knowledgeable after participating in the program. The improvement in self-reported knowledge through program participation is consistent and quite pronounced. At the same time, the percent of participants claiming thorough knowledge of energy efficiency remains less than 50 percent for all segments. While the program is moving things in the right direction, there remains a sizable gap in customers' perceived level of energy efficiency knowledge.

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[6] This comment applies to all the audit types except Online, where little participant feedback was available due to incomplete contact information.

Customers that did not implement audit recommendations cited lack of money as the main reason they did not take action. Customers also mentioned, particularly for lighting recommendations, that the estimated savings associated with lighting retrofits did not justify the investment, especially in light of other spending priorities.

Program Tracking System

Tracking system improvements are much needed to facilitate real-time program feedback, early identification and informed resolution of problems, and to ensure the greatest value from future measurement and evaluation efforts. The quality of current tracking system data is inconsistent, and at times incomplete.

Critical improvements include recording identification variables (such as account numbers) and complete contact information (business name, address, contact name and phone number.) This data allows unbiased and complete survey sampling, as well as the ability to merge tracking data to customer information systems, which would allow better characterization of audit program customers and also performing billing analyses to enhance post-audit energy savings estimates. It is also important for cross program participation tracking.

Other valuable tracking system improvements would be adding facility information collected in the audit process and detailed data regarding recommendations, both of which would facilitate sophisticated impact analyses. (These data are currently available for some audit types for some IOUs but not all.)

Two delivery mechanisms face particularly difficult tracking system challenges: CD-ROM and Online. Current participation processes for these audits severely limit available tracking data. (Refer to Chapter 8 for recommendations regarding how to begin resolving some of these difficult tracking issues.)

6. LONG-TERM ASSESSMENT

The Long-Term Assessment characterizes the longer-term benefits of the Audit program, emphasizing issues of how implementation enhancements unfold over time, how long the audit remains a useful energy efficiency reference guide and in what ways it is most often used. To do this participant adoptions are measured over time and the audit influence on those adoptions is assessed. The persistence of conservation practices is also investigated, focusing on those practices adopted due to audit participation. This includes an assessment of the persistence of conservation practices and the relationship of audit participation to conservation practices over time. Similarly, program market effects are examined over time, including energy efficiency knowledge, attitudes and awareness.

It is an essential role of the audit program to provide a report or list of energy efficiency recommendations that can be referenced over time, particularly in times where the need for conservation greatly increases, such as during the crisis of 2000/2001. The recent energy crisis provides the opportunity to investigate the success of audits as a reference guide during times of extreme need. The audit program interaction with the energy crisis is examined, including an assessment of how customers made use of the audit report during this period and how it influenced customer energy conservation actions and choices through this period.

The energy crisis also provides an opportunity to highlight and put into perspective the conservation effects of the audit program relative to ongoing outside energy efficiency influences. The energy efficiency actions related to the crisis are compared with those attributable to audit participation. This analysis demonstrates clear audit participation effects.

The Long-Term Assessment also examines the longevity characteristics of the audit, long-term usefulness and customer audit recall. This section also includes an analysis of the turnover of audit contact personnel and the ability of key audit contact personnel to recall participation.

Finally, change in participant satisfaction over time is examined. This indicates whether program innovations over the period have had positive effects on customer satisfaction.

6.1   LONG-TERM BENEFITS OF THE AUDIT

This section presents audit program benefits that occur over a longer period of time[1]. For example, customers may implement some program recommendations after a significant period of time has passed. In support of this analysis 497 PY 2000 participants were interviewed regarding the timing of adoptions that have occurred since January 2000, and the influence of the audit on those adoptions. The goal is to identify the relationship between adoptions, program participation and time.

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[1] While Chapter 4 adoption rates and other measures of program benefits were used to assess the influence of the audit 0.5 to 1.5 years after participation, this section explores audit benefits after more than 2.5 years have elapsed since participation.

Also of interest are comparisons between PY 2000 participants' energy efficiency knowledge, attitudes, awareness and intentions with those of PY 2002 participants (as informed based on the PY 2002 process survey). This may provide insight regarding the nature of program effects, and to what extent they fade or build over time. Although the energy crisis of 2000-2001 had a great effect on energy efficiency knowledge and awareness, both groups experienced the same crisis. Thus, these surveys serve as points of reference or comparison to each other.

Areas of Program Benefit

As discussed in detail in Chapter 4 Impact Assessment, the program benefits are greatest in the lighting end-use. To illustrate this point, 2002 participant and nonparticipant adoption rates by end-use are provided in Exhibit 6-1. There are also some benefits in the cooling end-use, although they are less prominent. Recall there are also gas and other equipment effects, but these are segment specific and not consistent across the participant population. Conservation measure effects were somewhat evident in the 2002 participant population, based on the extent of self-reported lighting conservation actions, while the table below reflects adoption rates alone.

Exhibit 6-1
Comparison of 2002 Participant and Nonparticipant
Adoption Rates of Energy Efficiency Measures

End Use Category	2002 Participant	2002 Nonparticipant
Lighting	24%	18%
Cooling	17%	15%
Gas	6%	8%
Other Equipment	9%	12%
Conservation Measures	70%	72%

The lighting end use provides the most consistent evidence of program effects. We examine the unfolding of lighting adoptions over time in Exhibit 6-2 below using the PY 2000 participant survey data. The exhibit shows the timing of lighting adoptions made by PY 2000 participants in relation to the audit report.

Exhibit 6-2
Lighting Adoptions Over Time Compared with the Estimated Nonparticipant Baseline Rate
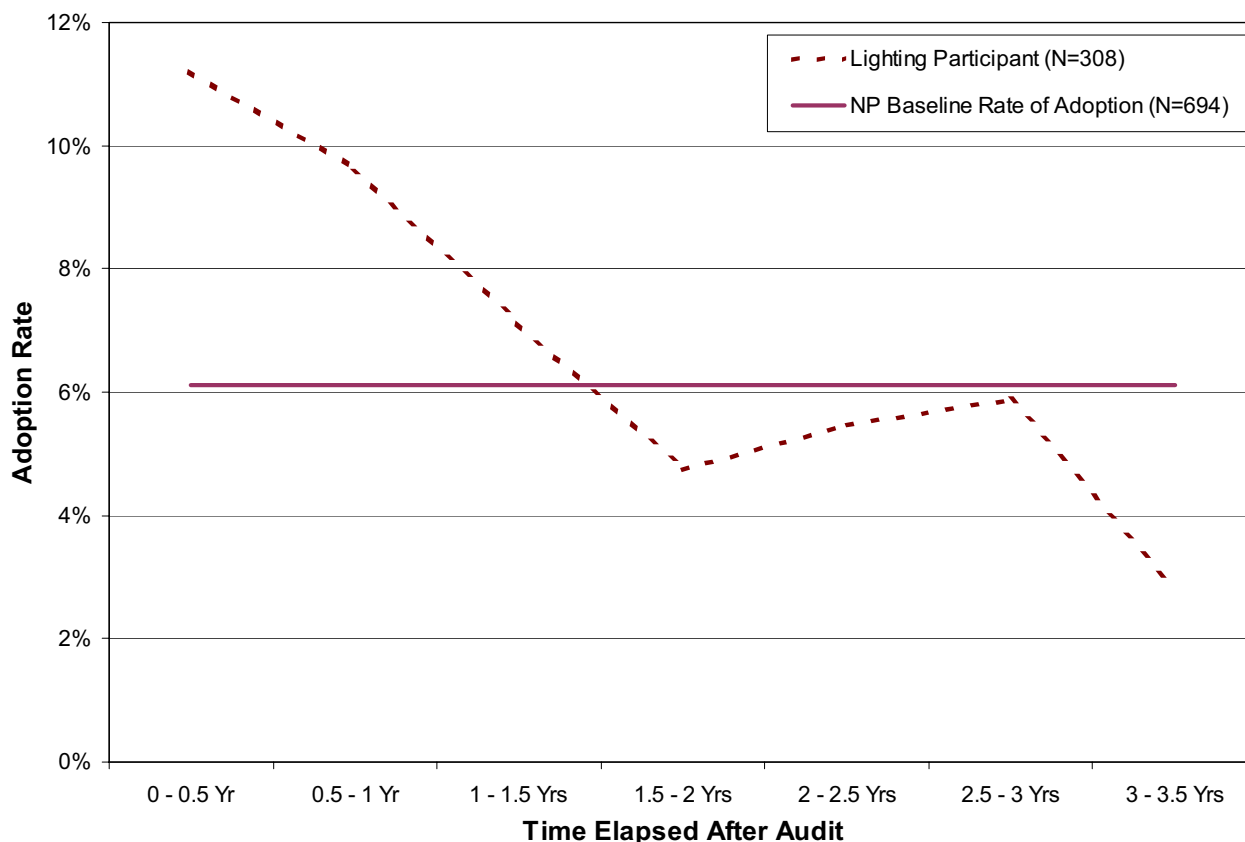
Nonparticipant data from the 2002 survey were used to estimate the baseline annual rate of lighting adoptions within the nonparticipant population. A more detailed graph of nonparticipant adoptions was not possible because the data gathered during the phone survey included only total adoptions over a 1.5 year time period. A total of 18.3 percent of surveyed nonparticipants installed lighting equipment over the 1.5 years spanning January 2002 through June 2003. Dividing by 18.3 by 1.5 yields the corresponding annual adoption rate of 12.2 percent; dividing annual rate by 2 yields a semi-annual rate of 6.1 percent. The baseline rate represents an estimate of average levels of activity in the nonparticipant market and is provided for comparison purposes to assist the reader in interpreting participant adoption activity levels.

The graph shows a significant bump in the participant population in adoptions within one year of the audit. This trails off after 1.5 years, crossing the nonparticipant baseline rate and

dropping lower. This indicates there are two effects of the audit, one is an acceleration effect, moving adoptions in time closer to the audit, rather than the smooth effect we expect from the nonparticipant population. The other effect is an overall higher rate of adoption. The cumulative adoption rate over the period shown in the graph for participants is 47.0 percent, while for nonparticipants the rate is 43 percent.

It should be noted that participants were asked to recall lighting adoptions made since the year 2000, while nonparticipants were asked to recall only the lighting adoptions they have made since January 2002 (over the past 1.5 years). Thus, nonparticipant adoptions made during the energy crisis are excluded. The inclusion of the energy crisis period would probably have the effect of increasing the nonparticipant baseline adoption rate. On the other hand, it is equally true that there is a documented reporting bias that has the effect of increasing the nonparticipant baseline rate. Respondents can recall a greater portion of adoptions when asked to report over a more recent period of time[2]. Thus, by asking participants to report over 3.5 years, while nonparticipants report only over a 1.5 year span, we would expect the nonparticipant rate to be notably higher in the absence of a program effect. Consider the case that the two populations are no different from each other. In this case we would expect the nonparticipants to report a higher lighting adoption rate, since their recall would be more complete over the shorter time period. Considering these sample issues, results presented in this section should be interpreted with caution. Note that the participants and nonparticipant adoption rate comparisons presented in the Chapter 4 Impact Assessment are unbiased with respect to this timing issue, as the surveys were implemented at the same time, covering the same period of performance. With a greater allocation of evaluation scope for nonparticipant adoption data collection, covering a longer period of performance, unbiased (timing/period of performance) comparison data could be collected. Should the utilities more aggressively implement follow-up efforts, long-term program impact assessments will become more important in evaluations, in an effort to examine downstream effects of these interventions. It would, for example, be important to understand when the best time is to call customers back, or when is the best time to approach customers with incentive program information (to bolster their uptake of simple-no/low cost vs. higher cost energy efficiency measures).

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[2] This has been demonstrated statistically in the Multi-Year Billing Analysis completed for PG&E in 1998.

Exhibit 6-3 is similar to Exhibit 6-2 in that it shows how participant adoption rates evolve over the time period following the audit. Exhibit 6-3 illustrates the participant adoptions of cooling, gas and other equipment. The straight lines show nonparticipant baseline rates derived from this study's General Population survey results[3].

Exhibit 6-3
Participant Equipment Adoption Rates Compared with Estimated Baseline Rates
*Cooling, Gas and Other Equipment*
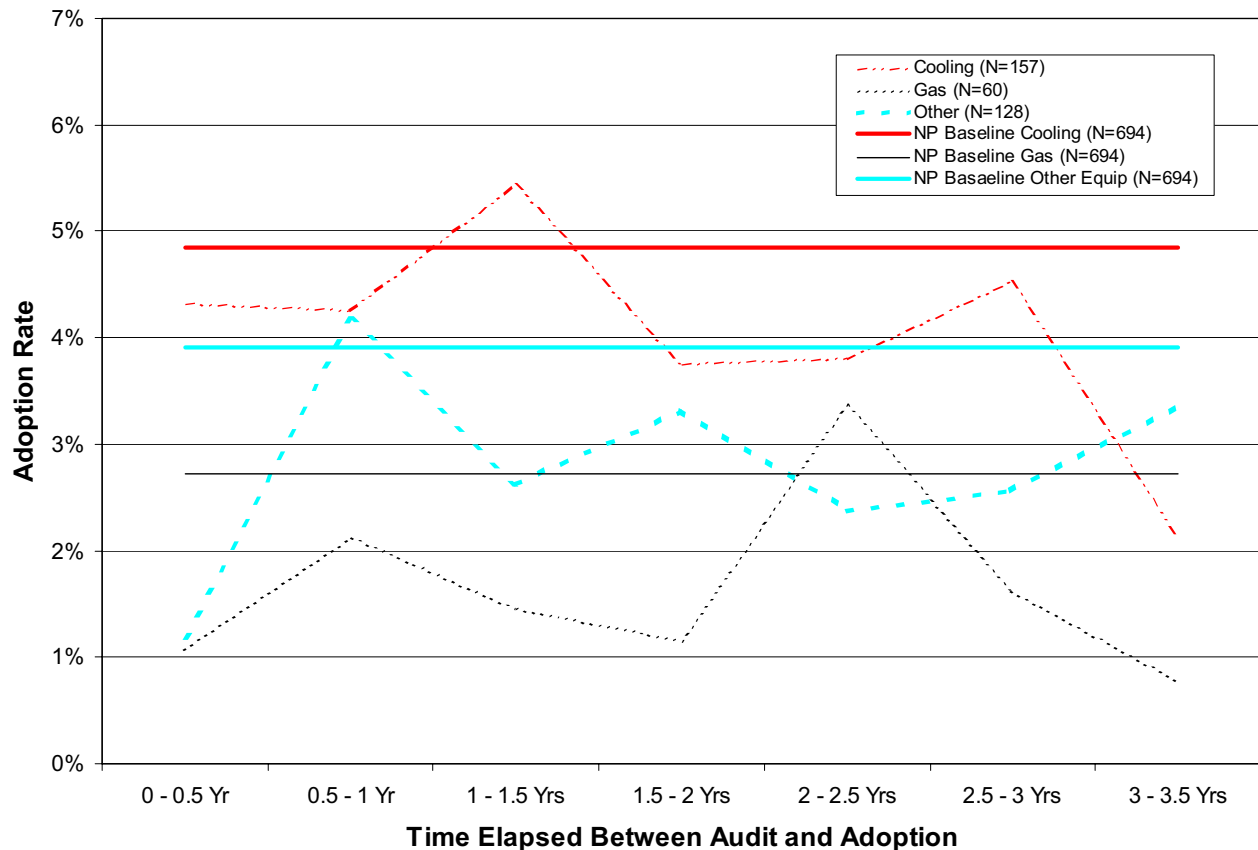
Consistent with the absence of strong overall differences in participant and nonparticipant adoption rates for cooling, gas and other equipment, the pattern of participant measure adoptions over time does not clearly demonstrate program effects. Cooling equipment adoptions are higher in the period following the audit, after about 1 to 1.5 years, and then drop off over time. Trends for Gas and Other Equipment adoptions show a less distinct relationship relative to the audit timing. Comparing the participant uptake of measures for these more complex end uses demonstrates that adoption patterns are lagged, requiring years of consideration (such as capital funding, integration with production schedules, other higher

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[3] Derived analogously to the nonparticipant lighting baseline rate described above.

priority needs, etc.) in some cases before spikes of activity occur. These patterns show that the time lag between the resolution of the information barrier and the resolution of other barriers is related to equipment complexity.

Year 2000 Participants were asked to rate the influence of the audit on their decision to purchase equipment. Exhibit 6-4 shows the average self-reported audit influence score (on a scale of 1 to 10, where 1 is not influential and 10 is extremely influential) for adoptions occurring at the specified interval from the time of the audit. All equipment types are combined in the exhibit below.

Exhibit 6-4
Self Reported Audit Influence on Equipment Adoptions over Time
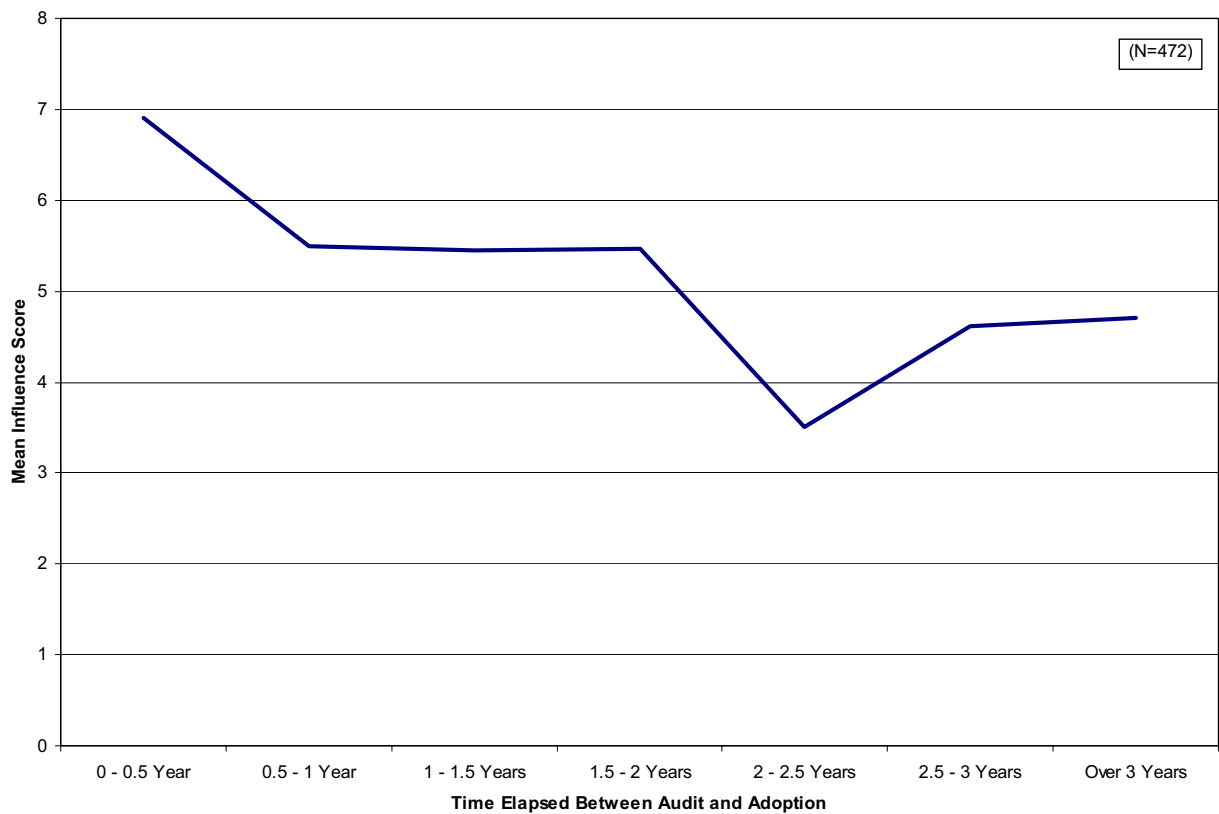
The exhibit shows a general downward trend in audit influence as time progresses beyond the audit, which is consistent with expectations. However, throughout the 3-year period, the audit remains at least somewhat influential (mean score of 4 to 6).

Conservation Practices

As discussed previously, similar rates of adoption for conservation practices were observed in the 2002 participant and nonparticipant populations. However, the *current* rate of conservation actions in the PY 2000 participant population is higher than the PY 2002 population, 89.5

percent versus 70 percent. The PY 2000 participant current rate of conservation practices is well in excess of the current nonparticipant rate, at 72 percent.   The difference between PY 2000 and PY 2002 participants could be due to changing participant demographics as well as the composition of audit delivery mechanism.   Or possibly a change in emphasis of audit recommendations, or synergies between the audit and the energy crisis timing for the 2000 participants that resulted in greater energy conservation awareness than more recent participants.

Interestingly, the Small/Medium Nonresidential Customer Needs and Wants Study[4] conducted during the summer of 2001 showed that 94 percent of customers were taking conservation actions during the energy crisis. The Small Industrial Market Characterization[5] survey results indicated 80 percent of small industrial customers were taking conservation actions during late 2002, confirming a downward trend in conservation actions in the period following the crisis, and supporting a positive program effect within the PY 2000 population.

A limitation of the nonparticipant data is that it does not include a date the measure was adopted or provide an interval for adoption as the equipment adoptions do. However, we did ask nonparticipants to categorize their conservation practices into three categories

- I have always tried to conserve energy in these ways

- I started conserving over the past year or two

- I just recently started conserving over the past few months

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[4] Refer to Appendix K for a full reference to this Study.

[5] Refer to Appendix K for a full reference to this Study.

The baseline nonparticipant measure adoption rate is based on practices begun within the past year or two. These practices compose 38 percent of measures practiced today, translating to a total adoption rate of 27.5 percent over the past 1.5 years (to be conservative.) To calculate a 6-month rate we divide by 3, resulting in about a 7 percent adoption rate over a six month period. This rate is shown as the nonparticipant baseline rate in Exhibit 6-5.

Exhibit 6-5
Conservation Practice Adoptions Over Time Relative to the Audit
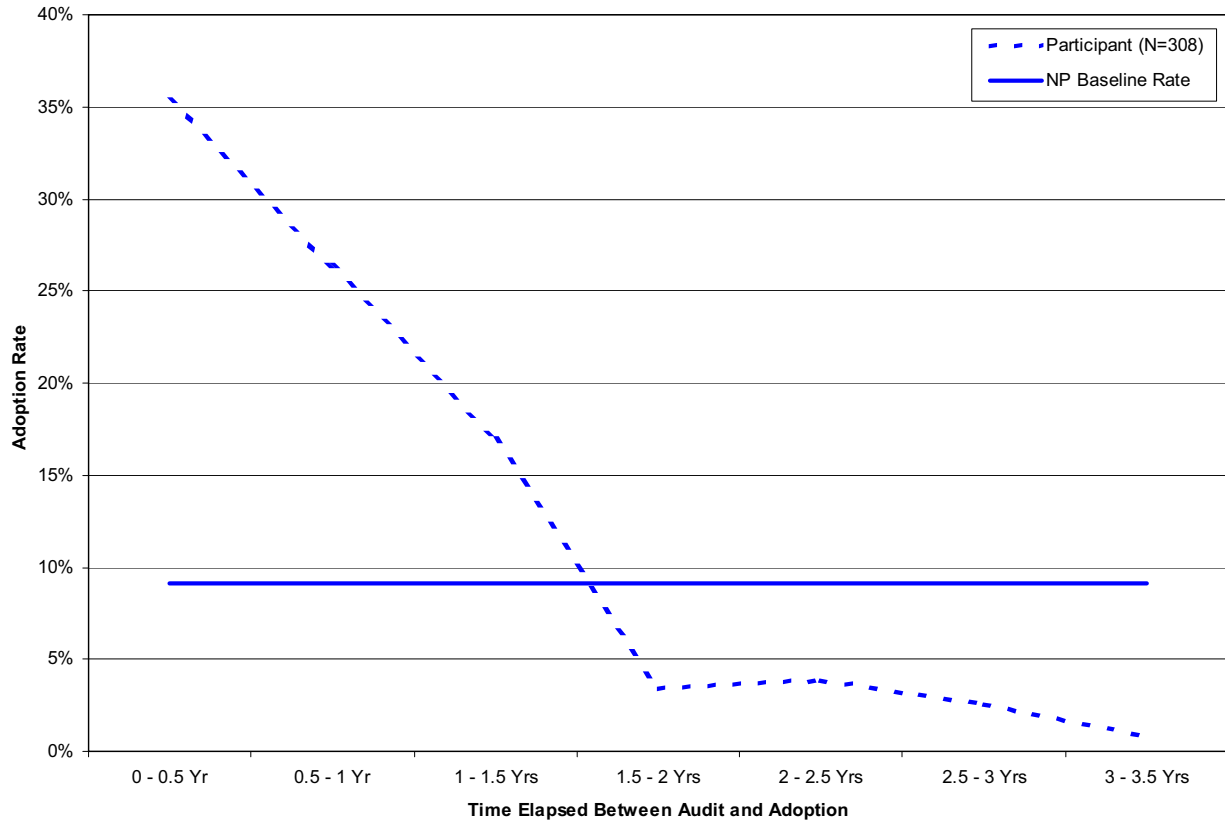
Participant conservation practice adoptions are based upon data collected in the impact survey. In this survey we asked each participant to name conservation practices they were currently practicing and provide the date each practice was initially adopted. These include practices that were self-reported to have started as a result of the audit *and* those that were not. The exhibit shows *marked* program effects shortly following the audit, which fall off rapidly, crossing the nonparticipant baseline at about 1.5 years. These results are compelling because they show a strong adoption spike following the audit despite the disadvantage of trying to report accurately dates and conservation practice adoptions occurring 3.5 years ago.

Next conservation measure adoptions that were self-reported to be a result of audit program participation are isolated. These account for 38 percent of all conservation measures adopted by participants, for a total cumulative adoption rate of 34 percent following the audit. These adoptions are shown in Exhibit 6-6 below as they occurred over time in relation to the audit.

The exhibit confirms the previous result, showing the audit-attributable adoptions to be highest in the first 6 months following the audit and tapering off dramatically by 1.5 years.

Exhibit 6-6
Self-Reported Conservation Measures Adopted as a Result of Audit Participation
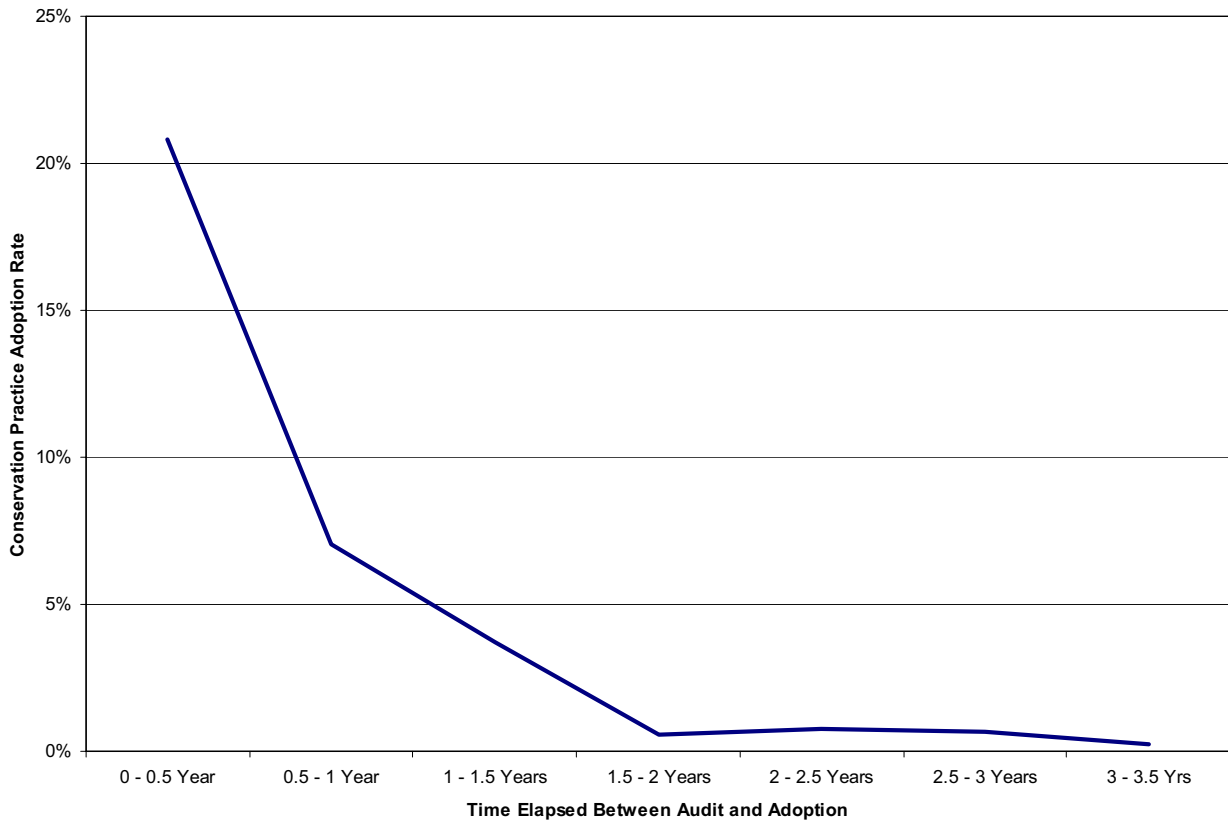
The question of how long these adoptions stay in place is investigated next.

6.2   PERSISTENCE OF CONSERVATION PRACTICES

Through discussions with participants in the PY 2000 long-term effects survey, the persistence of conservation practices is assessed. The interviews with PY 2000 participants included questions about conservation measures adopted and subsequently terminated, and the timing of those events relative to each audit. The survey data also inform how long current practices have been in place—another indicator of persistence.

Exhibit 6-7 below summarizes the data provided by PY 2000 participants for the conservation practices that had been terminated. Of the total 497-point long-term survey participant sample, 90% of those adopted at least one conservation practice they still practice today. An estimated eleven percent of the population began and subsequently ceased performing at least one conservation practice. These data are used to construct an empirical survival function of conservation practices similar to those traditionally produced for energy efficiency equipment retention studies[6]. That is, the exhibit shows the percent of conservation practices in place as time proceeds from the date of adoption, focusing on only those practices reported as terminated. These data should be interpreted in light of some reporting bias. Customers are not as likely to remember practices they began and then stopped, and are more likely to remember current practices. The exhibit shows a relatively short average persistence of 1.4 years for conservation actions that participants have subsequently ceased doing.

Exhibit 6-7
Empirical Survival Function of Conservation Practices Terminated
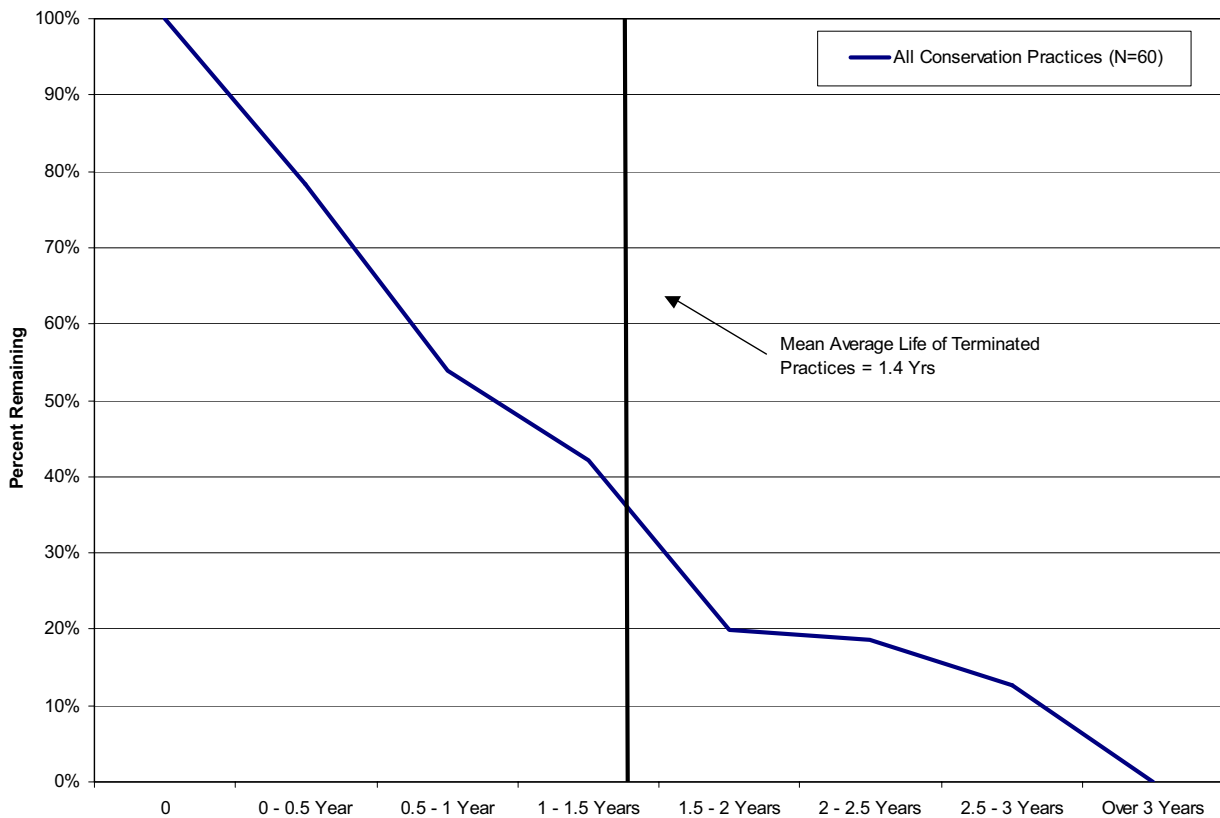
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Terminated conservation measures include a more than proportional number of actions that were not suitable to the customers needs—measures that turned out to interfere with successful business operations or were just too much trouble. In some cases actions were taken during the energy crisis period and then dropped when the crisis was perceived to be over. In fact, the most interesting thing about this data is that it encompasses conservation measures taken up during the energy crisis and dropped shortly afterward. Timing of adoptions relative to the crisis and the audit report is explored in more detail in *Section 6.3.2*.

Exhibit 6-8 shows the timing of terminated conservation actions around the energy crisis. As expected, the terminated measures cluster around the energy crisis period. Each line represents an energy conservation measure and the line spans the dates over which the practice was in place.

Exhibit 6-8
Duration of Terminated Conservation Practices
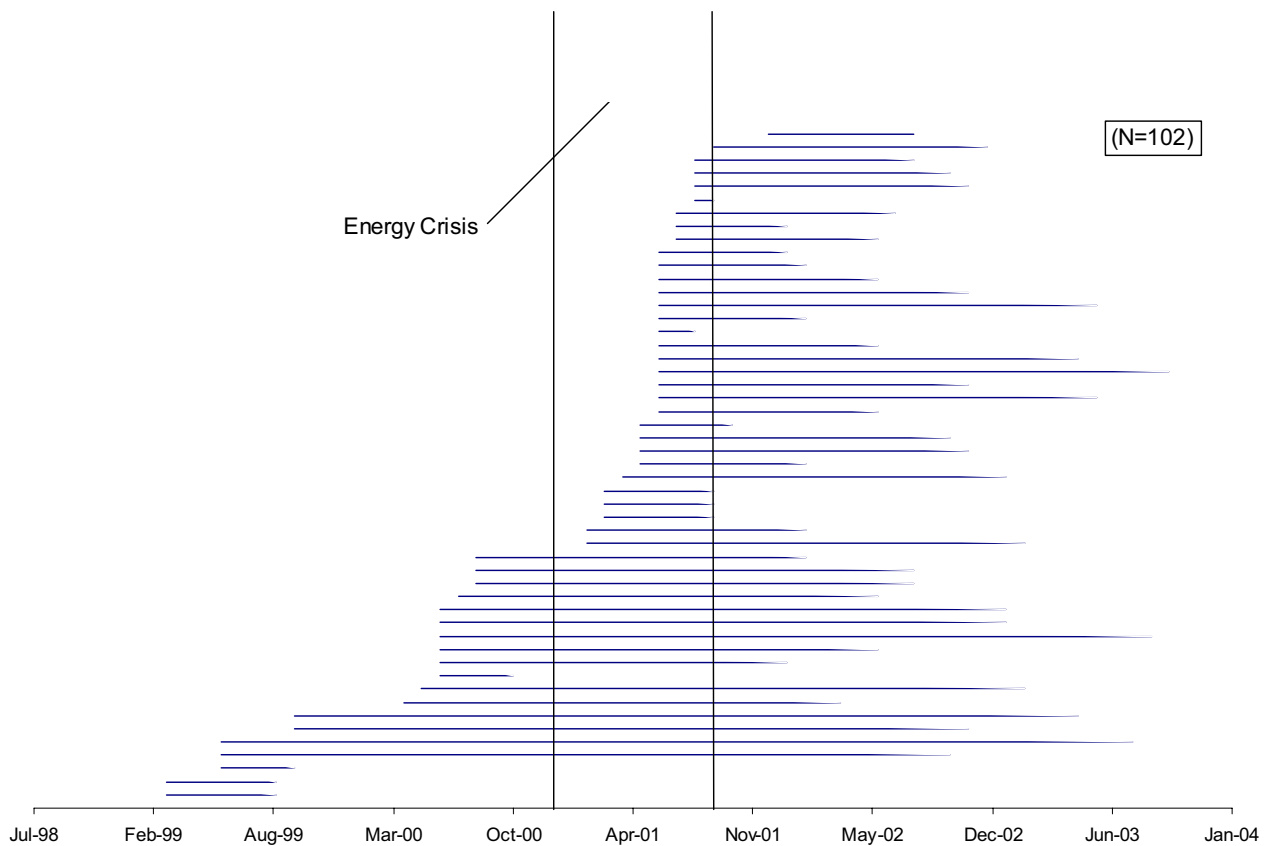
Exhibit 6-9 shows the distribution of the reasons given for terminating energy conservation practices. The two primary reasons for termination are the perception that the effort required does not pay off and that the practice interferes with successful business operations.

Exhibit 6-9
Reasons for Terminating Energy Conservation Practices

Sold Business
8%

Security/Safety
5%

Energy Crisis is Over
24%

Not Worth the Effort
20%

Interfered with Business
Operations
30%

Comfort Level
13%
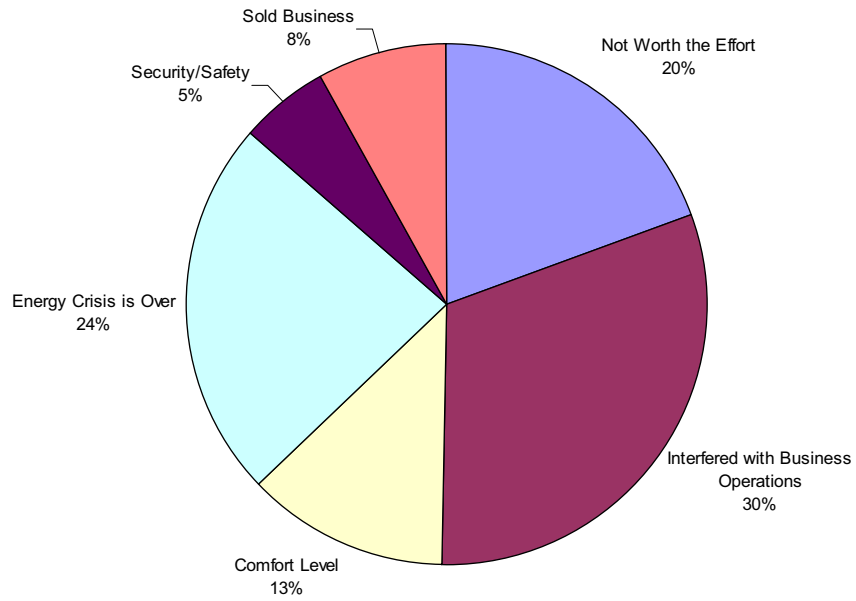
(N=53)

Another way to estimate the conservation persistence is to take a snapshot of how long current practices have been in place. This estimate of persistence has a downward bias, however, because the termination date is conservatively assumed to be the telephone survey date. Exhibit 6-10 below uses current practice and date of adoption data to produce an empirical survival function for conservation practices. The exhibit shows a mean life of conservation practices in place today to be 3.6 years.

Exhibit 6-10
Empirical Survival Function Using Current Conservation Practice Data
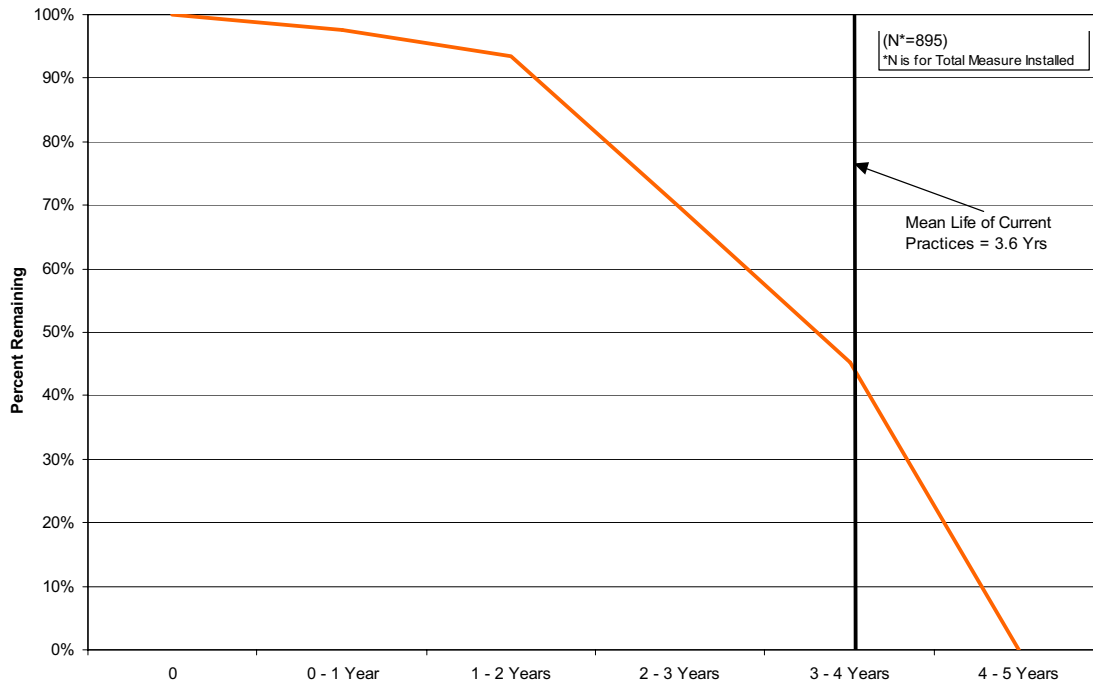
Eleven percent of participants reported a terminated conservation action and 90 percent reported having a current conservation practice in place. When the conservation data are combined the total average life of a conservation practice is conservatively estimated to be 3.4 years.

6.3   AUDIT PROGRAM AND ENERGY CRISIS EFFECTS

This section investigates the interactive effects of the audit and the energy crisis, and the attribution of conservation efforts to each. Interactive effects include the exploration of how useful the audit report was during the crisis, whether participants referred to their report, and whether or not participants implemented audit-based recommendations at that time. The first part of this section emphasizes the role the audit had in guiding participants through the energy crisis. In the second part of this section, the effects of the audit and the crisis are

compared by examining adoption rates over the period following audit participation and by examining adoptions versus the timing of the energy crisis.

6.3.1 Interactive Effects of the Audit Program and the Energy Crisis

We begin by investigating participant perceptions of audit value and the role of the audit through the energy crisis. Customers were asked to rate the usefulness of the energy audit report as a source of energy conservation information during the crisis. Participant responses are shown in Exhibit 6-11 below. The exhibit shows that about half of the participants found the report somewhat useful (score of 4 to 7 on a 10-point scale), and about 12 percent found it very useful (score of 8 or higher). Interestingly, these proportions are very consistent across the delivery mechanisms, showing comparable values for the different delivery channels.

Exhibit 6-11
Self-Reported Usefulness of the Audit During the Energy Crisis by Delivery Mechanism
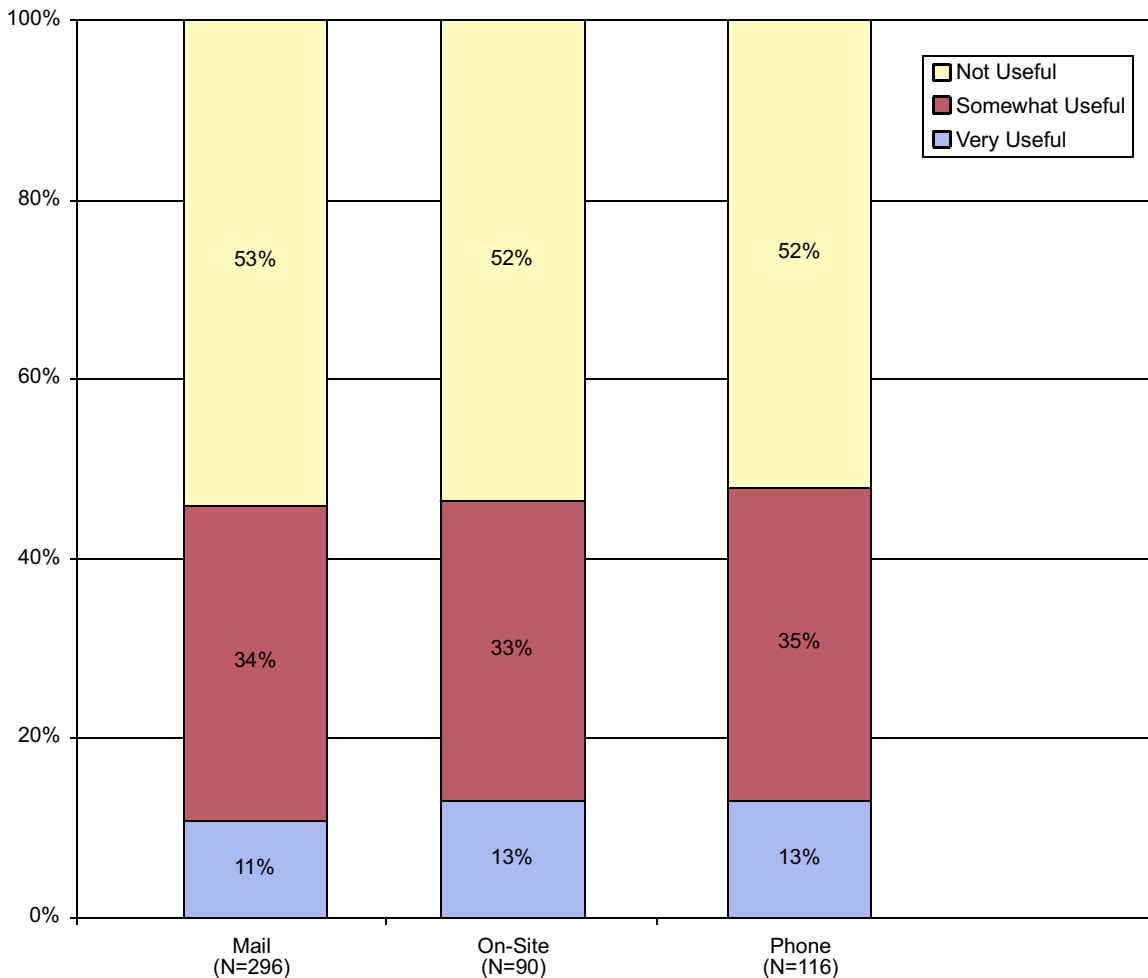
Participants were asked whether they referred to their energy audit report during the crisis for information on energy conservation. The results are shown in Exhibit 6-12 below by delivery mechanism. The exhibit shows that about one-fourth of participants revisited their audit report during the crisis for conservation information. More mail participants did this than phone or on-site, but the differences are small.

Exhibit 6-12
Frequency of Audit Review During the Energy Crisis by Delivery Mechanism
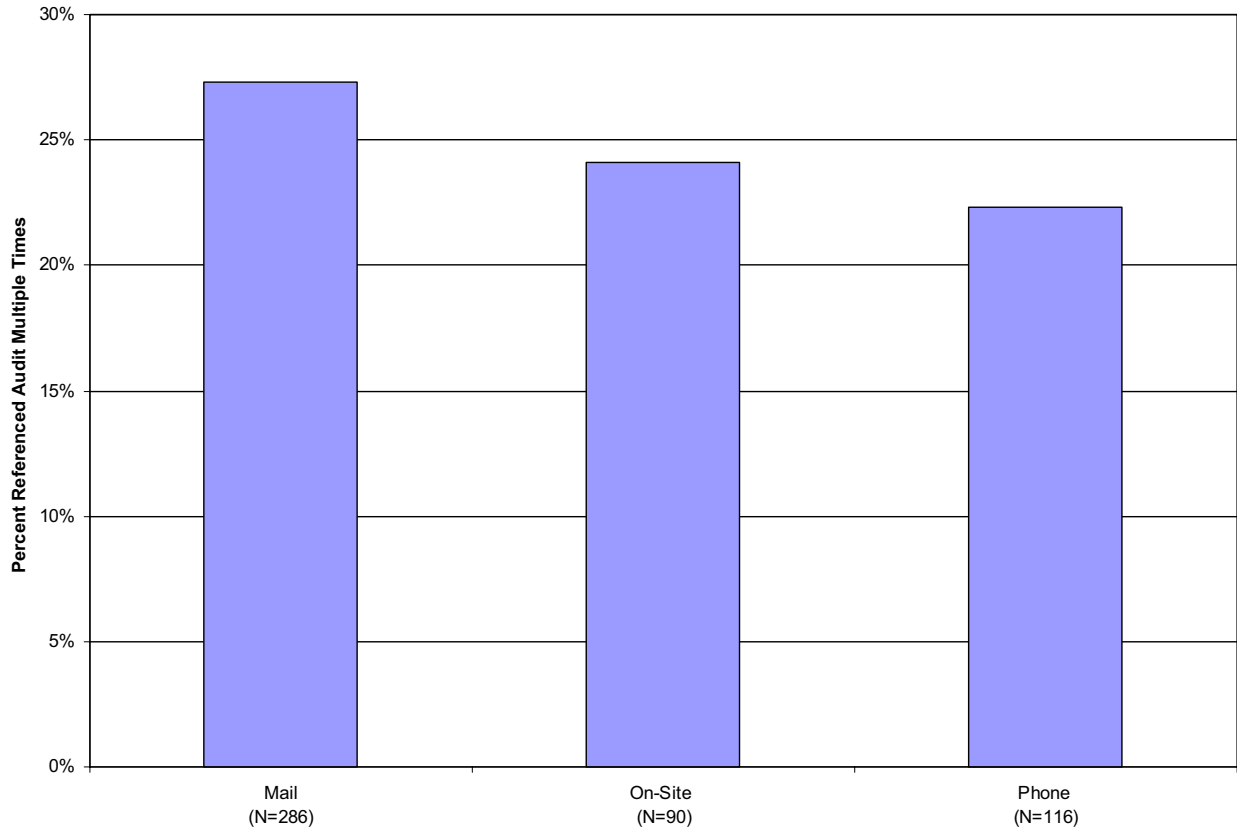
To get a more accurate picture of the prominence of the audit as a guide during the energy crisis, Exhibit 6-13 below shows the proportions of participants who referenced the audit report and/or other sources of information, or no sources of information. About half the participants consulted sources of energy conservation information during the crisis. Of these, more than half (54 percent) consulted the energy audit report, and 37 percent consulted only the audit report and no other sources of information.

Exhibit 6-13
Information Sources Referenced During the Energy Crisis

Both
8%

Audit Only
18%

None
52%

Other Sources Only
22%

(N=492)
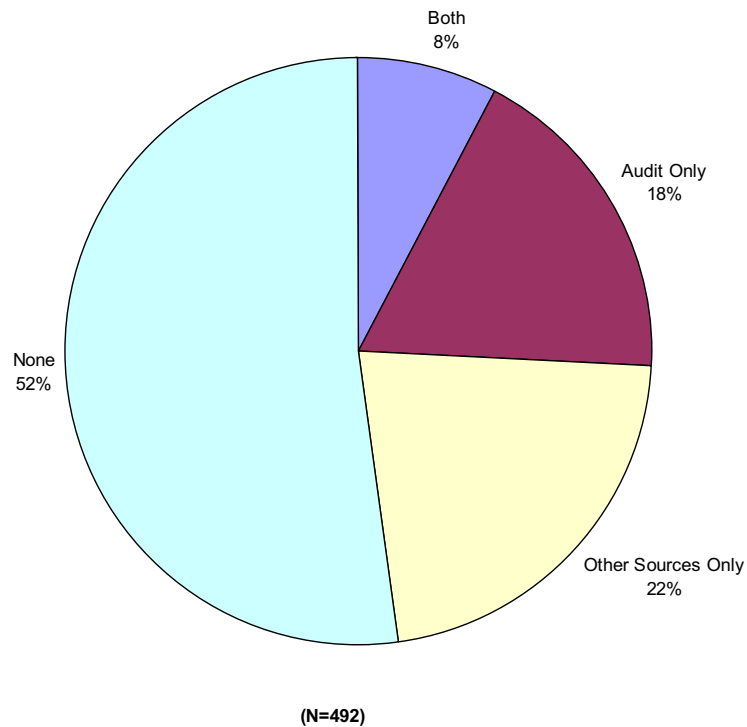
To help us understand what types of information participants found useful during the crisis, Exhibit 6-14 below shows the distribution of other sources of information consulted by participants. The exhibit shows that the IOU's were the primary source of information, with 45 percent of responses. Of the specific IOU information sources, bill inserts and websites were mentioned most often.

Exhibit 6-14
Non-Audit Information Sources Referenced by Participants During the Energy Crisis

(N=144)
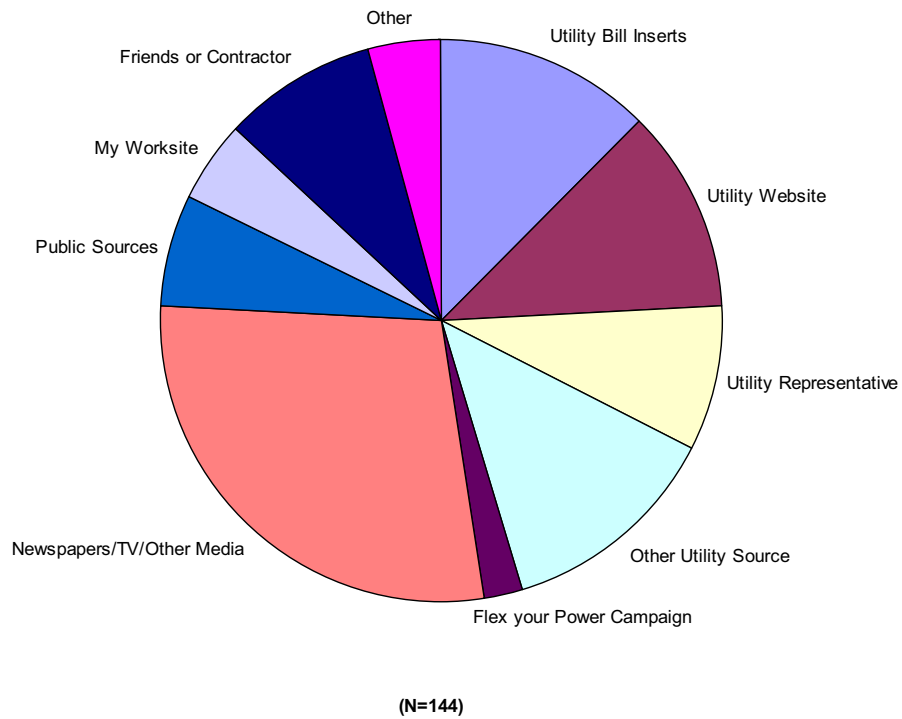
Next, participant implementation of audit recommendations during the energy crisis is explored. Exhibit 6-15 shows the percent of participants that implemented at least one audit recommendation during the energy crisis. The percentages are high, ranging from 35 for the mail audit to 44 percent for the phone audit. The specific timing of adoptions during the crisis is explored in more detail below.

Exhibit 6-15
Percent of Participants that Implemented Audit Recommendations During the Crisis By Delivery Mechanism
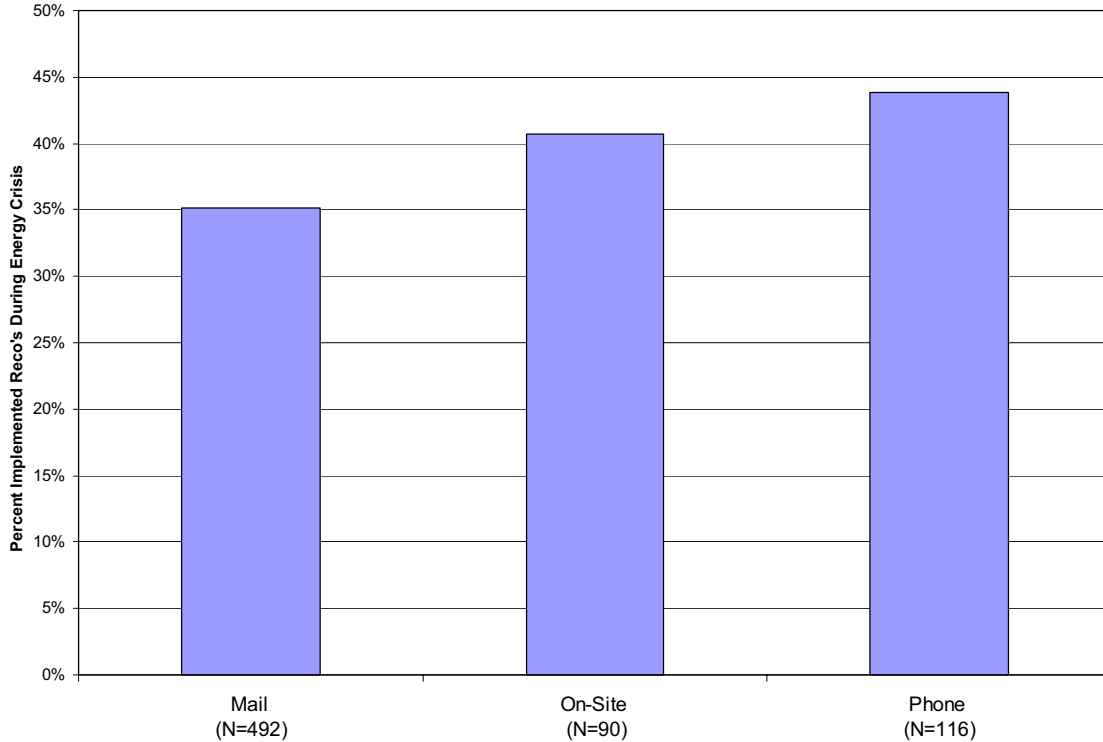
Not only were there a substantial number of recommendations implementation during the crisis, but participants report a high level of influence from the audit program and/or report on their conservation actions taken during the crisis period. Exhibit 6-16 below shows that about 85 percent of participants were at least somewhat influenced by the audit report, and between one-third and one-half were very influenced by the audit. Participants report a higher level of influence from the on-site report than the mail or phone audit report.

Exhibit 6-16
Influence of the Audit on Adoptions During the Energy Crisis by Delivery Mechanism
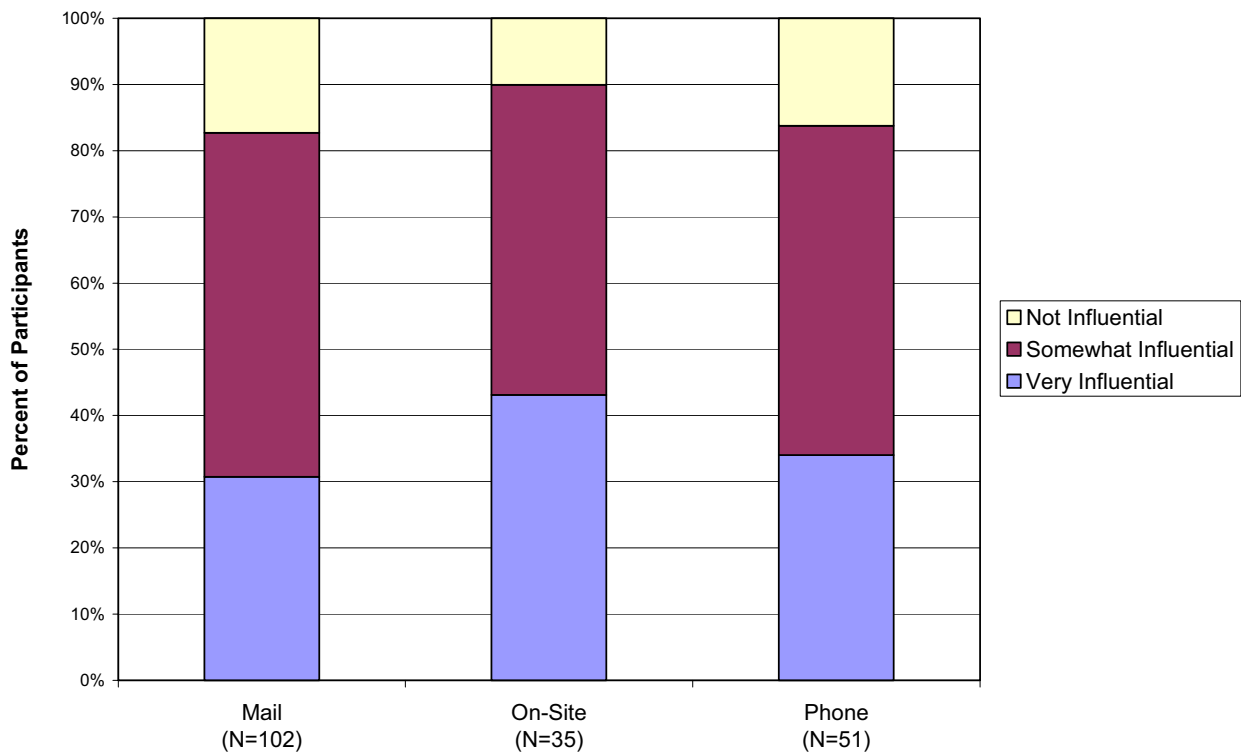
6.3.2   Timing of Adoption Events and Separate Effects of the Audit Program and Energy Crisis

This section explores the timing of participant adoptions relative to the energy crisis. We have already shown that adoptions occur in greater frequency closer to the timing of the audit for both conservation practices and lighting measures. It begs the question, how much of this activity was due to the energy crisis and how much to audit participation? The energy crisis occurred within a year of PY 2000 participation, so by examining the timing of adoption events we can seek to determine whether there are separate and distinct effects in addition to the synergistic effects we have already discussed.

First we examine the timing of conservation practice adoptions that are still in effect today. (See *Section 6.2* for timing of terminated practices.) Exhibit 6-17 shows that the adoption of conservation measures bears a relationship to both the audit and the energy crisis. The period directly following audit participation, but prior to the crisis—the second and third quarter of 2000—shows higher than average adoption rates. There is also a prominent spike in adoptions again during the second quarter of 2001—at the height of crisis awareness.

Exhibit 6-17
Timing of Conservation Actions Relative to the Energy Crisis
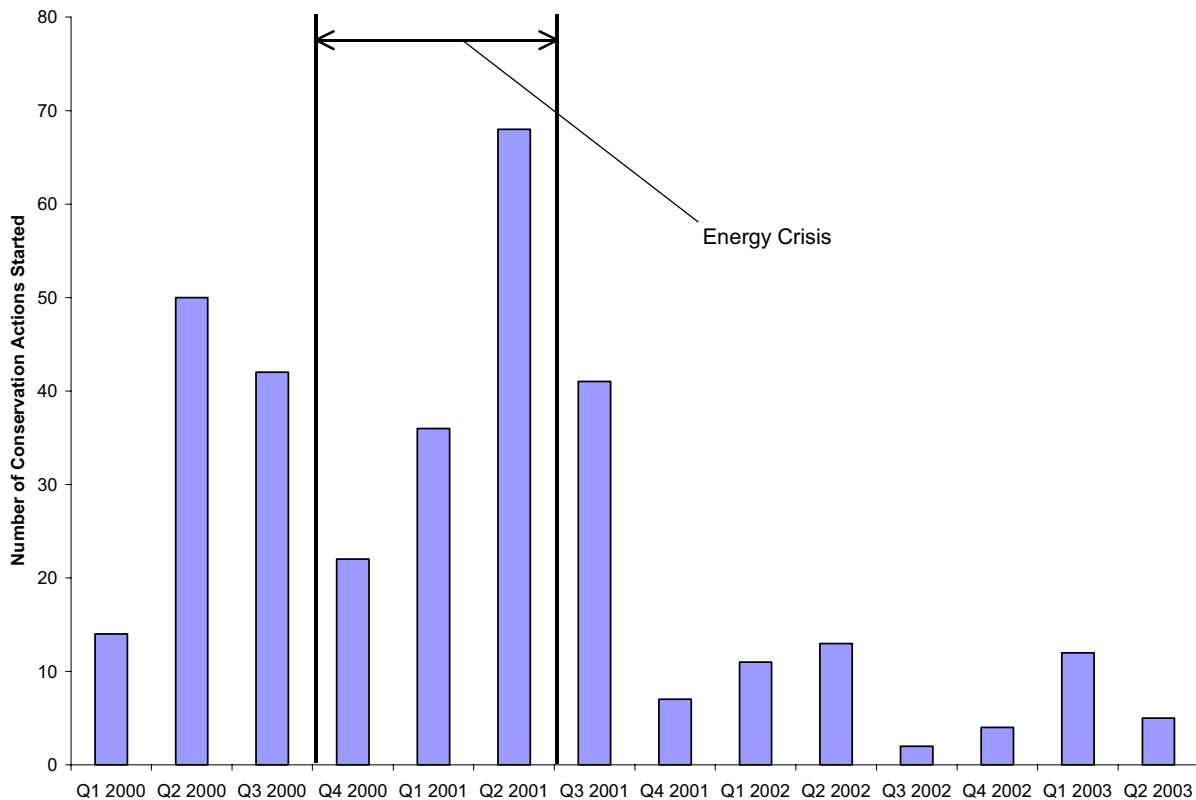
To further distinguish the influences of the crisis from audit participation we examine the timing of adoptions customers self-report to be a result of audit participation. PY 2000 participants were asked to name which conservation practices were started as a result of audit participation. These account for one quarter of all conservation practices in place today in participant premises.

The resulting distribution presented in Exhibit 6-18 supports the reliability of the self-reported data, as the relationship to the energy crisis clearly drops off and the relationship to the audit timing remains prominent.

Exhibit 6-18
Timing of Conservation Actions Attributed to the Audit
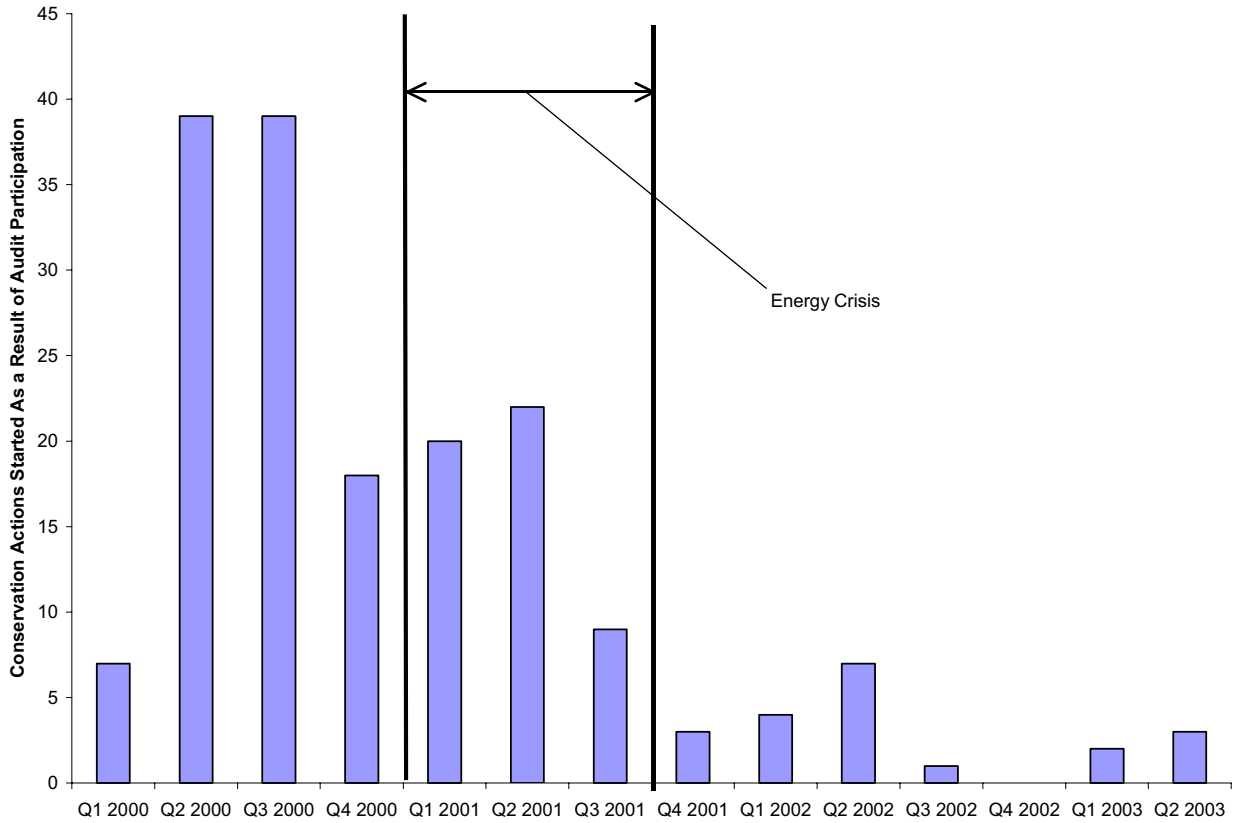
To give the reader an idea of the relative magnitude of these two measurements of conservation action adoption—both those attributed to the audit program and those not attributed to the program—Exhibit 6-19 below shows both frequencies on a single chart. Conservation practice adoptions attributed to the audit are a large portion of total adoptions during 2000—around the time of the audit. These fall off steadily over time. The distribution of conservation practices not attributed to the audit has a mountain shape rising to a peak during the energy crisis and falling off on both sides. These exhibits show that the audit had an independent effect on participants in addition to synergistic effects.

Exhibit 6-19
Timing of Conservation Actions
By Those That Are and Those That Are Not Attributed to the Audit
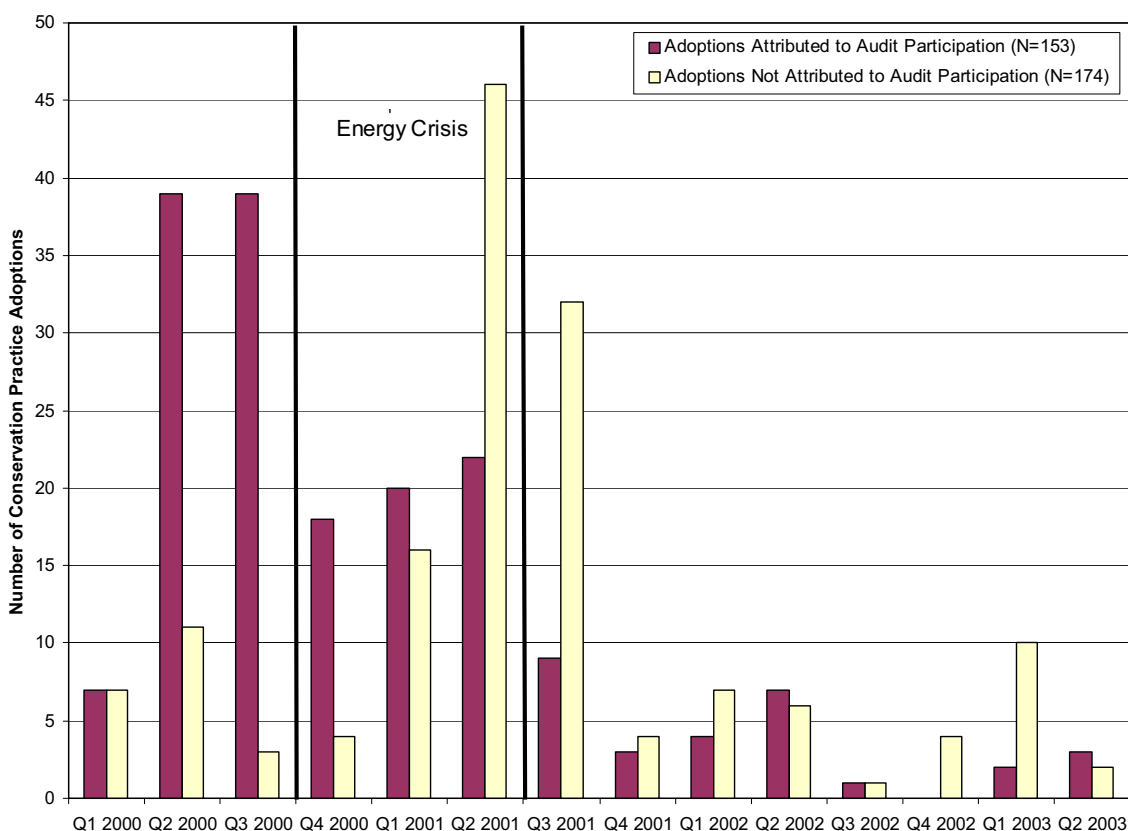
As demonstrated in the analysis of long-term audit benefits, lighting adoptions bear a strong relationship to the timing of the audit. We also know from the impact analysis chapter that the lighting end use encompasses the majority of the program recommendations and program-related adoptions. In the exhibits below we explore the relationship of lighting adoptions to the timing of the energy crisis, to determine whether the crisis accelerated lighting retrofits.

We know from the 2001 Small/Medium Nonresidential Customer Needs and Wants Study that nonparticipant lighting adoptions spiked during the crisis from an annual rate of 12 percent to an annual rate of 18 percent. (The adoption rate reported by PY 2000 participants in 2003 is

smaller—12 percent annual rate—but the timing of the reporting biases the PY 2000 group rate downward. Due to the timing of these surveys, the two rates are not comparable.)

Exhibit 6-20 below shows PY 2000 participant lighting adoptions by calendar quarter from January 2000 through the third quarter of 2003. The frequency distribution has a distinct relationship to the energy crisis, but the relationship to the audit is not as obvious as for conservation measure actions. However, adoptions in the 3rd and 4th quarter of 2001 are smaller than in the 2nd and 3rd quarter of 2000 *before* the energy crisis. This is in spite of a reporting bias favoring adoption occurring later in time. Thus there are indications that the audit had an independent effect prior to the crisis that was later enhanced by crisis factors.

Exhibit 6-20
Timing of Lighting Equipment Adoptions
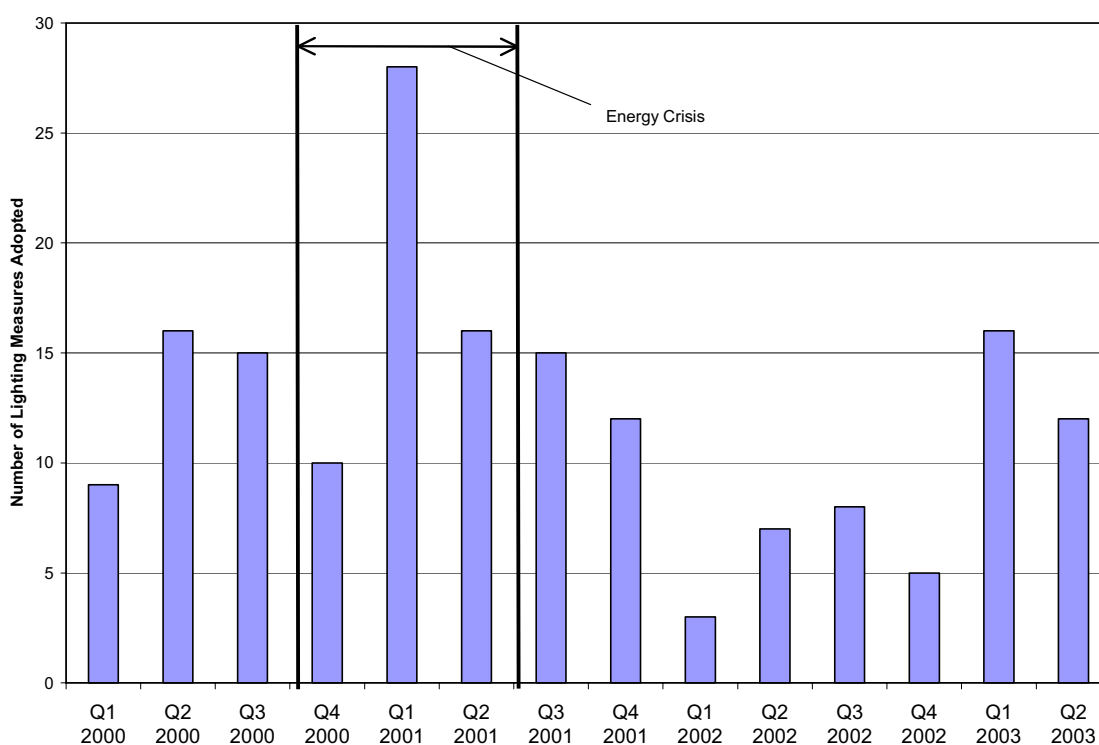
6.4   LONGEVITY OF CUSTOMER AUDIT RECALL

This section covers issues related to the "useful life" of the audit. For how long and how often do participants revisit the audit report? What information were participants seeking when they revisited the report? Did they find it? How much do participants remember from the audit report? What recommendations do they recall? How often should audits be done?

This section also addresses the ability of the evaluation team's survey center in reaching a given participant contact, and the implications of staffing turnover for audit useful life. Audit longevity is impacted by personnel turnover, as it is also impacted by changes in processes,

change in ownership, and building remodels. As personnel turnover increases audit longevity decays, which has direct implications on the appropriateness of eligibility requirements surrounding Audit participation frequency. Currently, participants are eligible once every three years for on-site phone and mail participation, although they may use CD ROM software and online resources as often as desired.

Exhibit 6-21 below presents the frequency with which customers review their audit report. The height of each bar represents the portion of the total participant population that went back to their audit report to review it more than once. The chart indicates that 50 percent of on-site participants reviewed their audit report more than once. The portions of mail and phone audit participants that revisit their report are lower, at 32 and 29 percent respectively.

Exhibit 6-21
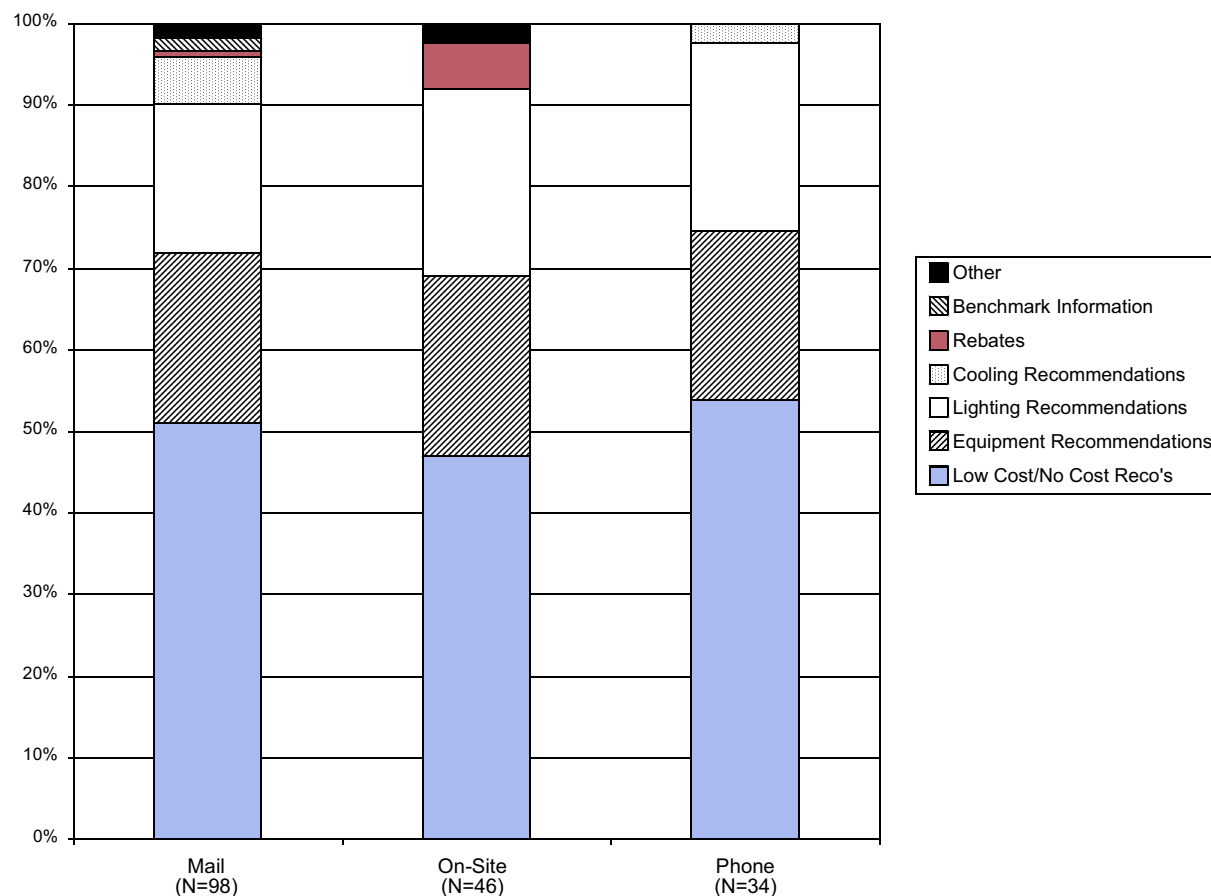*Percent of Participants that Re-Review Their Audit Reports by Delivery Mechanism*
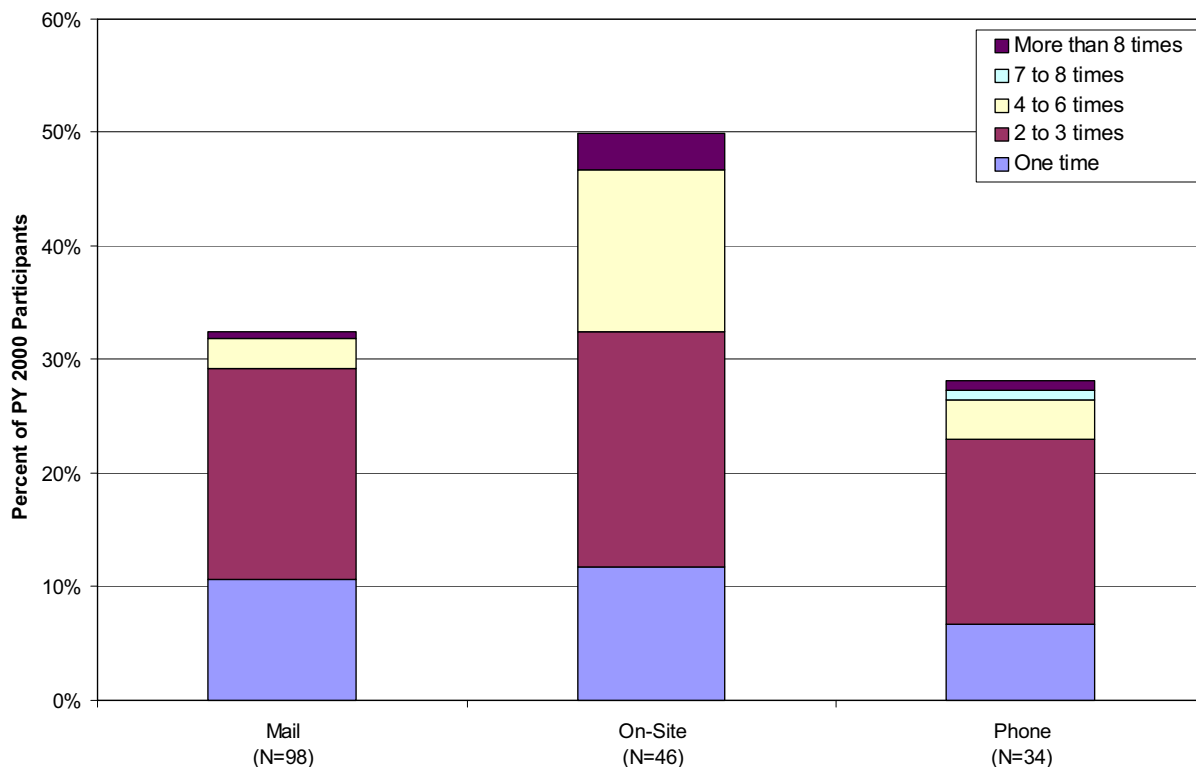
Within each bar different areas indicate the number of times that participant revisited the report. Interestingly, the three delivery mechanisms have similar numbers of participants that revisit the report between 1 and 3 times. However, the on-site audit is the only delivery mechanism able to attract significant numbers of repeat visits, with 17 percent of participants reviewing their audit report at least 4 times. Only about 4 percent of mail and phone participants reviewed their audit report 4 times or more.

These results underscore the value of high quality audit reports. Recall in chapter 5, on-site audits are shown to score higher than others for credibility and customization. It appears that a report with greater customization and credibility also has a longer useful life and a more interested audience. The impact chapter also demonstrated that greater impacts are achieved through the on-site-based delivery channel.

Each participant that indicated they went back to the report at a later date to review the contents was asked what information they were seeking when they revisited the report. Exhibit 6-22 presents the information customers were seeking by delivery mechanism. The types of information are similar across delivery mechanisms. About half of the participants were seeking low cost/no cost measures, and the other half sought equipment recommendations. A small percentage were seeking benchmark[7], rebate or other information. The most frequently sought equipment recommendations were in the lighting end-use. This is not surprising given the emphasis and success of the audit in promoting lighting equipment adoptions.
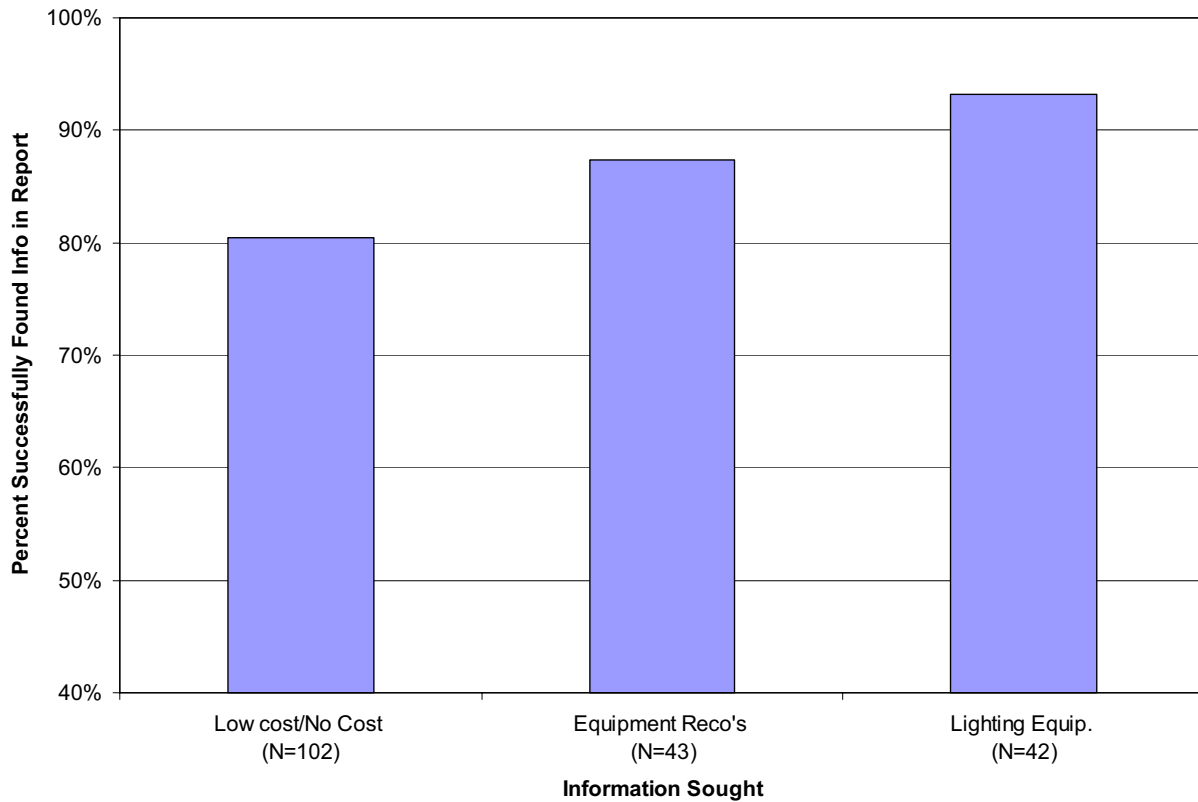
Exhibit 6-22
Information Sought by Customers That Revisit Their Audit Report

Legend:
- Other
- Benchmark Information
- Rebates
- Cooling Recommendations
- Lighting Recommendations
- Equipment Recommendations
- Low Cost/No Cost Reco's

X-axis: Mail (N=98), On-Site (N=46), Phone (N=34)

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[7] For example, the PG&E mail audit provides peer group energy use information for businesses to compare themselves against.

The next exhibit portrays the success of the audit in providing the information participants were seeking when they revisit the report. Exhibit 6-23 below shows the percent of participants reporting success in finding the information sought by type of information. Success rates are generally quite high, between 80 and 95 percent.

Exhibit 6-23
*Success in Finding Information Sought when Revisiting Audit Report*

6.4.1 Audit Recommendation Recall

Participant recall of recommendations is investigated next. Exhibit 6-24 below shows the percent of participants in the PY 2000 and PY 2002 survey groups that reported remembering at least one recommendation. The exhibit shows unexpected results, with higher customer recall from PY 2000 participants than PY 2002 participants. The on-site audit has a somewhat higher rate of participant recall, although the difference between phone and on-site for the PY 2002 group is quite small.

The reasons behind the higher recall among the PY 2000 participants is difficult to determine. Perhaps more proactive marketing and outreach has recruited participants that have a generally lower level of interest in audit recommendations. That is, by encouraging a wider audience for the audit program, there are fewer information seekers and thus lower recommendation recall.

Exhibit 6-24
Participant Recall of at Least one Audit Recommendation
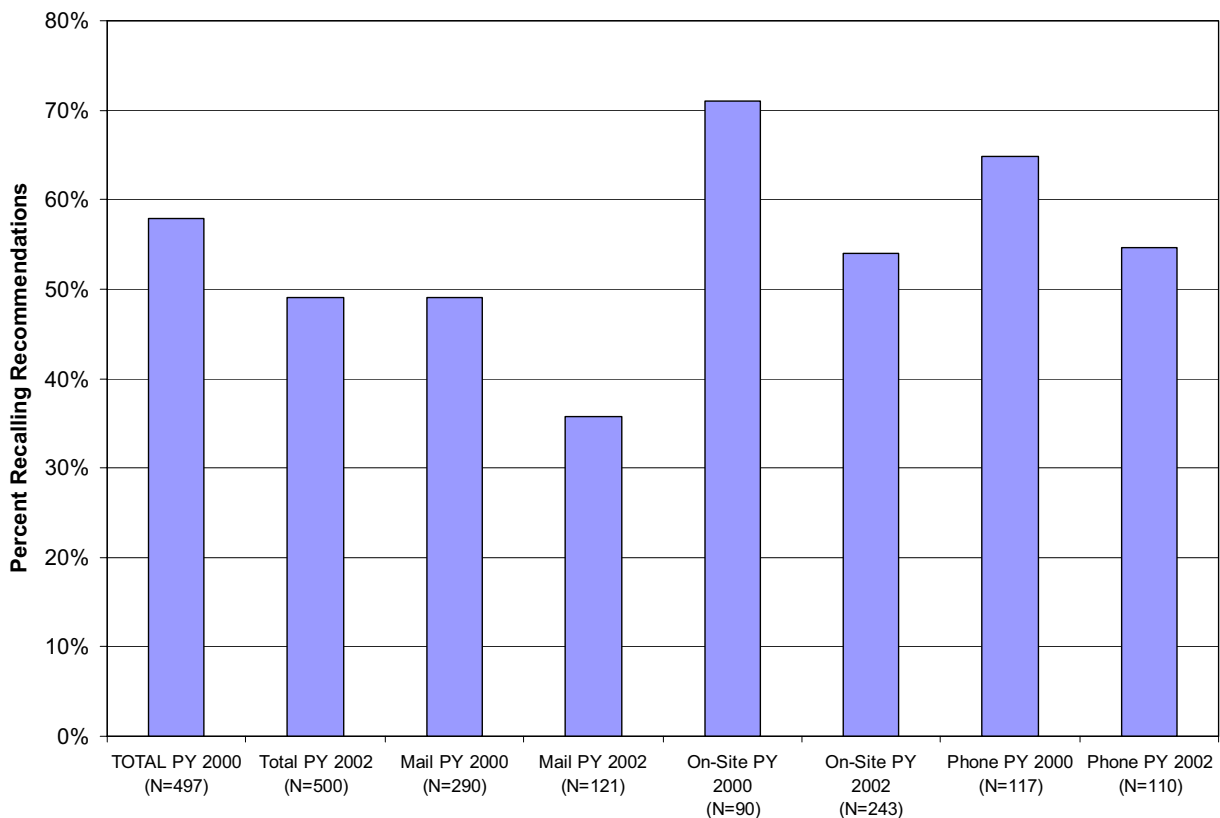
Next the types of recommendations that participants recall is examined. This pinpoints recommendations that are making an impression on participants, i.e. which have the greatest lasting power. Exhibit 6-25.a and 6-25.b below shows the distribution of recommendations recalled for both the PY 2000 and the PY 2002 groups. Lighting composes the largest portion of both distribution pie charts. The PY 2000 participants are particularly focused on lighting recommendations with 62 percent of recollections falling into the lighting equipment category. The PY 2000 group reports more refrigeration, while the PY 2002 group reports more appliance and insulation recommendations. Percentages that recall HVAC equipment, thermostats and turning off equipment are similar across the two groups.

Exhibit 6-25.a
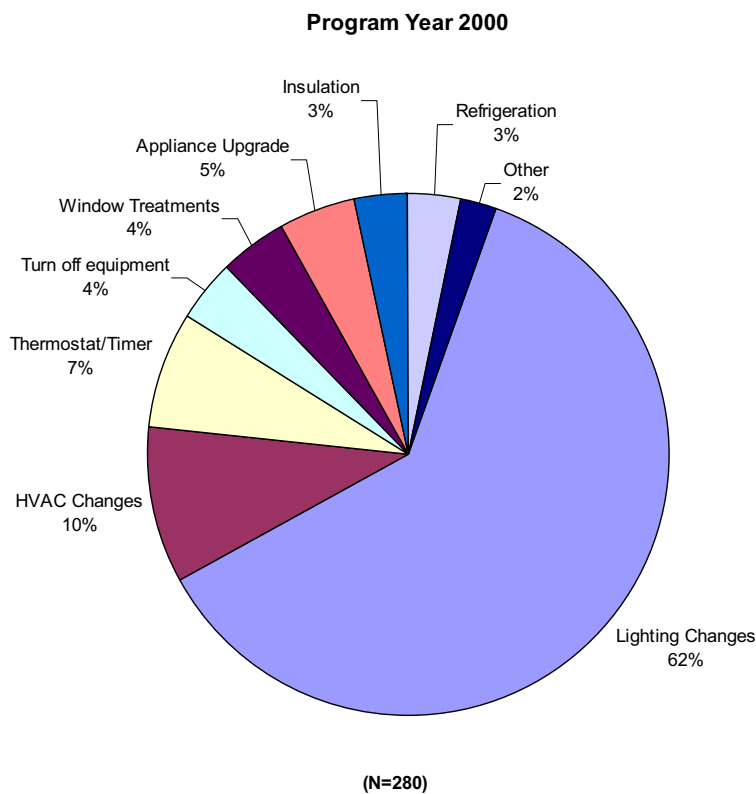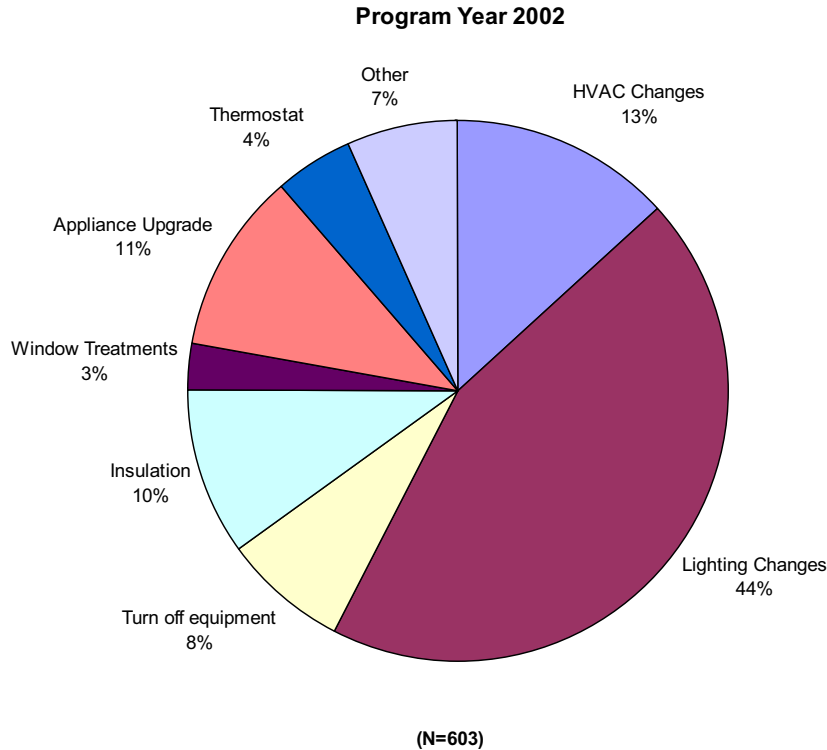*PY2000 Types of Recommendations Recalled*

Program Year 2000

(N=280)

Exhibit 6-25.b
PY2002 Types of Recommendations Recalled

Program Year 2002

(N=603)

6.4.2   *Personnel Turnover and Related Findings from Participant Survey Solicitation*

Participant personnel turnover is important because it is directly related to the longevity of the Audit and the appropriateness of eligibility requirements surrounding Audit participation frequency. Currently, participants are eligible once every three years. High personnel turnover would indicate a shorter interval is optimal between audit eligibility. Similarly, the ability of key contact personnel to recall Audit participation directly affects audit longevity. Telephone surveys were conducted with participants that successfully recalled participating in the audit and receiving the audit report. In this section we explore staff turnover and audit recall using data collected from *all* participants contacted in the process of completing the 1,500 participant telephone surveys supporting this evaluation.

For each phone call made to a participant where a key contact name was provided, we collected data regarding the status of the contact's employment. Bear in mind, for companies that went out of business it is likely that we were not able to contact any personnel at the company, so these data are likely under-represented. Our method estimated participant staff turnover for the key contact stored in the utility tracking systems to be 5.3 percent annually. The rate of key contact staff reassigned within the company is estimated at 0.8 percent annually.

Interestingly turnover rates are much higher among the 2002 participants than the 2000 participants, at 7.1 versus 3 percent, respectively. The difference is most likely due to the recession and layoffs in 2001/2002, as well as the more recent emphasis on HTR customers, who have greater staff turnover. HTR customers are also likely to have greater turnover for the entire business, which is something not directly captured in the data.

A 5 percent annual staff turnover rate translates to 15 percent turnover over 3 years, indicating 85 percent of audit contacts still in place after 3 years. However, the rate at which customers are able to recall their participation is more dramatic. Overall, only 52 percent of 2002 participants we contacted in the process of completing the 2002 participant surveys recalled their audit participation well enough to complete the detailed participant surveys associated with this evaluation[8]. In light of increasing staff turnover rates, the availability of multiple Audit delivery mechanisms, and the relatively low participant recall of the Audit, we believe the 3-year requirement is too long. A one-year requirement is more appropriate, with an allowance to obtain energy efficiency information from more than one delivery channel within a given program year.

CD ROM Installation Rate. Nearly 60 percent of customers who were able to verify receipt of the CD-ROM tool claimed not to have installed the program on their computer. Clearly the effectiveness and longevity of these audits is severely hampered by the disconnect between distribution and installation. On the other hand, similar to Online participation, participants with a CD-ROM tool may repeat their survey as many times as they like, increasing its power over other types of audit deliveries.

## 6.5   LONG-TERM PROGRAM EFFECT INDICATORS

This section examines the unfolding of program effects as time progresses beyond the audit date. Program effect indicators are characterized in the PY 2000 population and compared with both the general population and the PY 2002 group. This helps establish whether program effects diminish over time or build with time.

We begin by comparing indicators of customers' energy efficiency knowledge and intentions to adopt high efficiency equipment across the three surveyed groups. Exhibit 6-26 below shows the percent of each population that expressed a highly favorable attitude toward energy efficiency equipment and the percent that characterize their energy efficiency knowledge as very high.

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[8] Bear in mind that while this suggests an extremely high rate of audit recall degradation, we are unable to determine to what extent these respondents were simply reluctant to complete the survey.

Exhibit 6-26 below shows a clear participation effect, with both groups lying above the general population level. The difference between the PY 2000 and PY 2002 groups are minimal, with the PY 2000 group slightly higher. This indicates that program effects do not diminish substantially over time. In fact, it could be that the program acts as a catalyst for not only a leap in knowledge and energy efficiency intentions at the time of the audit, but also in the capacity for greater building of these characteristics over time.

Exhibit 6-26
Energy Efficiency Knowledge and Intentions to Adopt High Efficiency Equipment
General Population versus Program Year 2000 and 2002
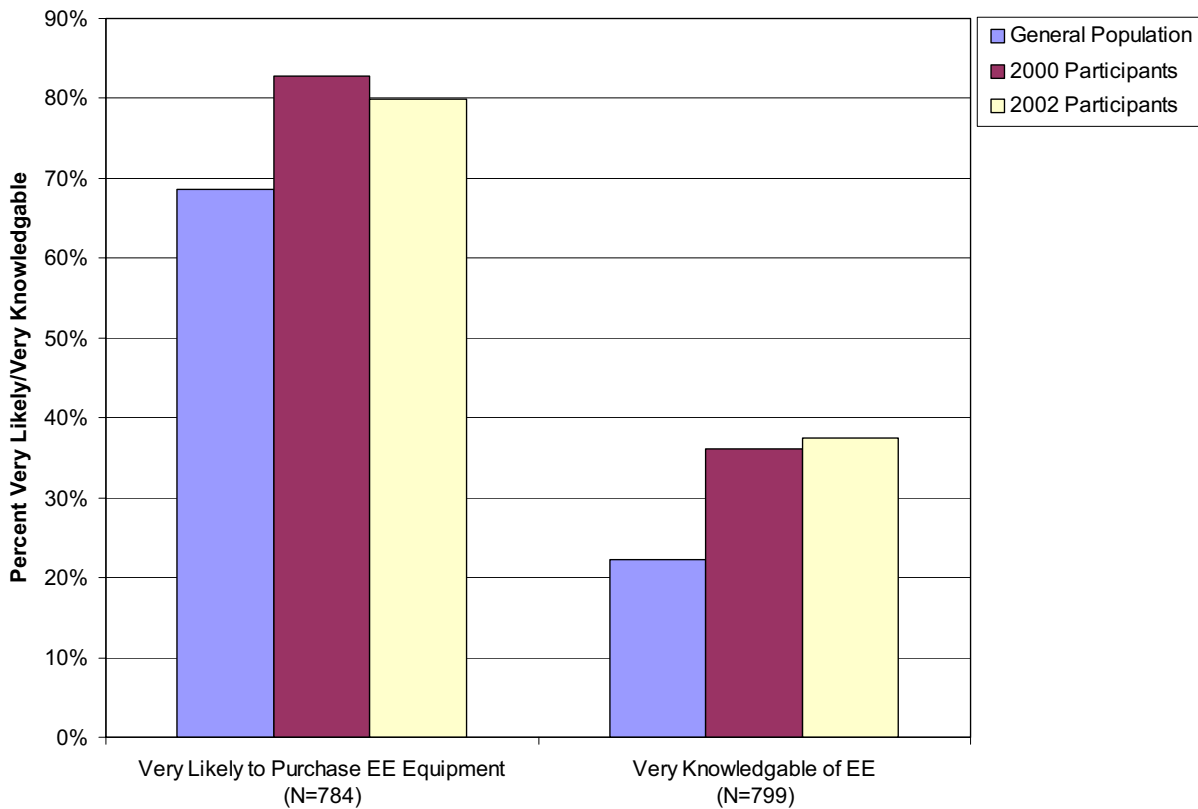
Next these same characteristics are examined across these groups again, but at a finer level of segmentation. Exhibit 6-27 below shows the percent very likely to actively consider energy efficiency technologies when purchasing equipment in the future. Results are presented by size, key hard-to-reach segment and business type. The Exhibit shows very consistent program effects, with mentionable performance in the industrial, retail, renter and very small categories.

Exhibit 6-27
Percent of Population Likely to Purchase Energy Efficient Equipment
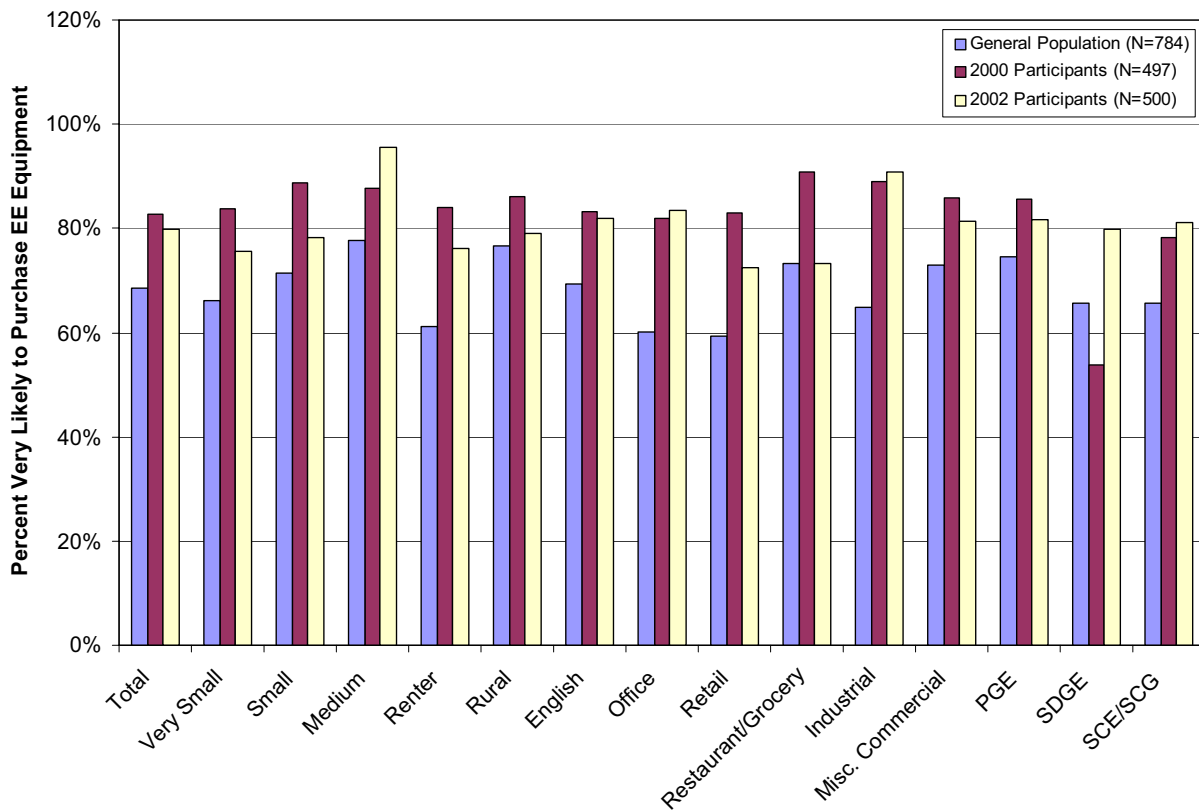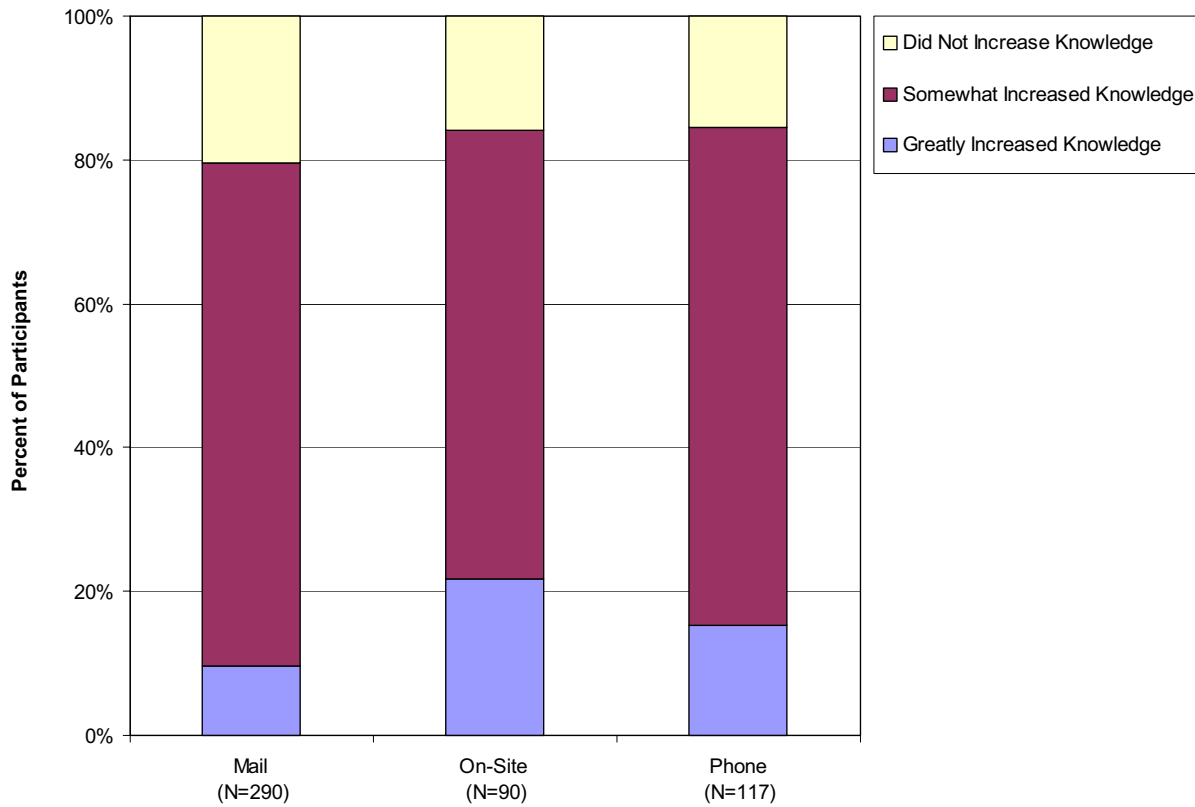*General Population versus Program Year 2000 and 2002*

Exhibit 6-28 below is similar to Exhibit 6-27, but it shows the percent of each population that rates their knowledge of energy efficiency 'very high' (between 7 and 10 on a 10 point scale.) Again, results are consistent across segments, and generally larger than the intentions to purchase high efficiency as shown in Exhibit 6-27. There is noticeably high performance in the industrial, retail and very small categories.

Exhibit 6-28
Percent Rating Knowledge of Energy Efficiency Very High
*General Population versus Program Year 2000 and 2002*
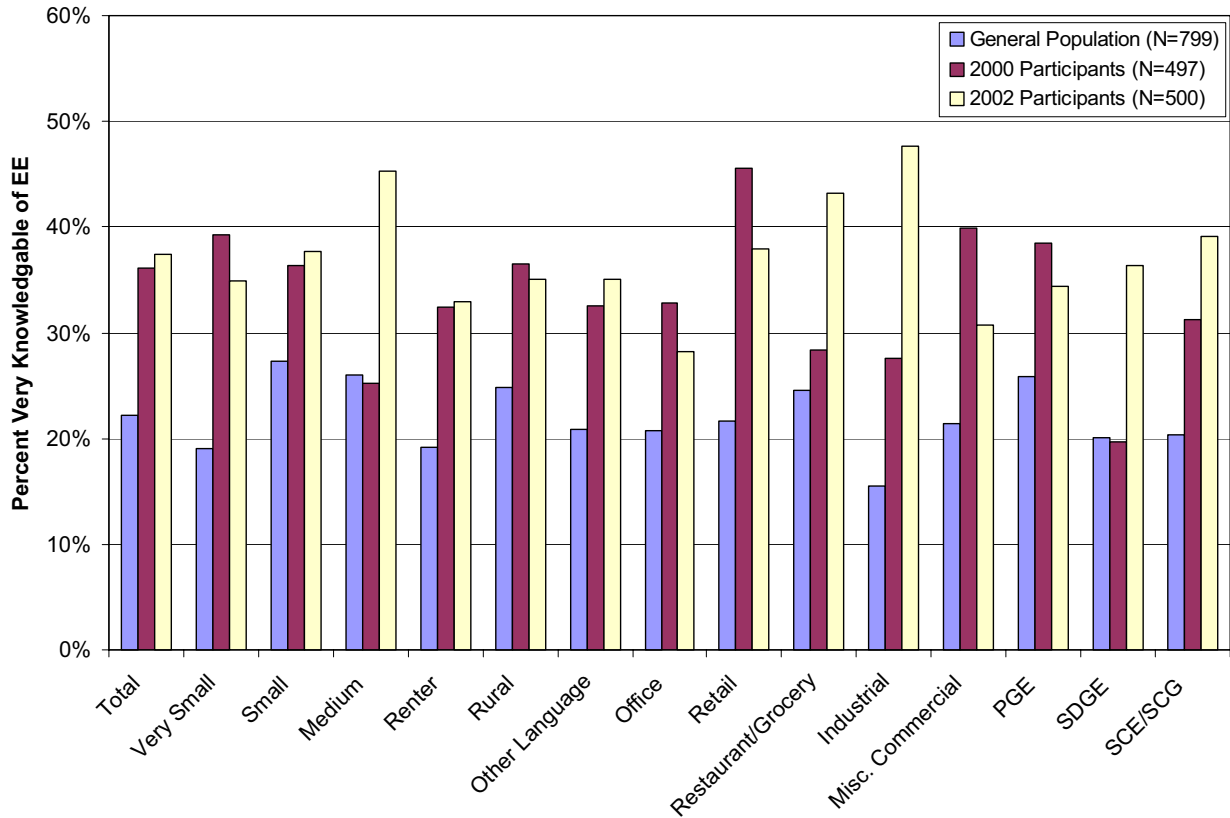
These charts bring up the question of whether the program caused these differences in the PY 2000 group energy efficiency characteristics, or whether they were simply predisposed to high efficiency in the first place. We asked PY 2000 participants whether the audit program had improved their knowledge of energy efficiency and if so, by how much. Exhibit 6-29 below tabulates the responses to this question. The exhibit shows that over 80 percent felt the audit had improved their energy efficiency knowledge at least somewhat, and between 10 and 20 percent felt it improved knowledge very much. Here on-site audits perform noticeably better than mail and phone.

Exhibit 6-29
Percent of Program Year 2000 Participants Reporting EE Knowledge Improvement

Program Year 2000 participants and the general population were asked to indicate how decision makers at their companies viewed energy efficiency issues. Exhibit 6-30 below shows the responses for both groups. There are notable differences in the two groups for the industrial and restaurant/grocery categories. While the participant groups are almost always above the general population, the differences are small for the other groups.

Exhibit 6-30
Importance of Energy Efficiency to Company Decision Makers
*General Population versus Program Year 2000 Participants*
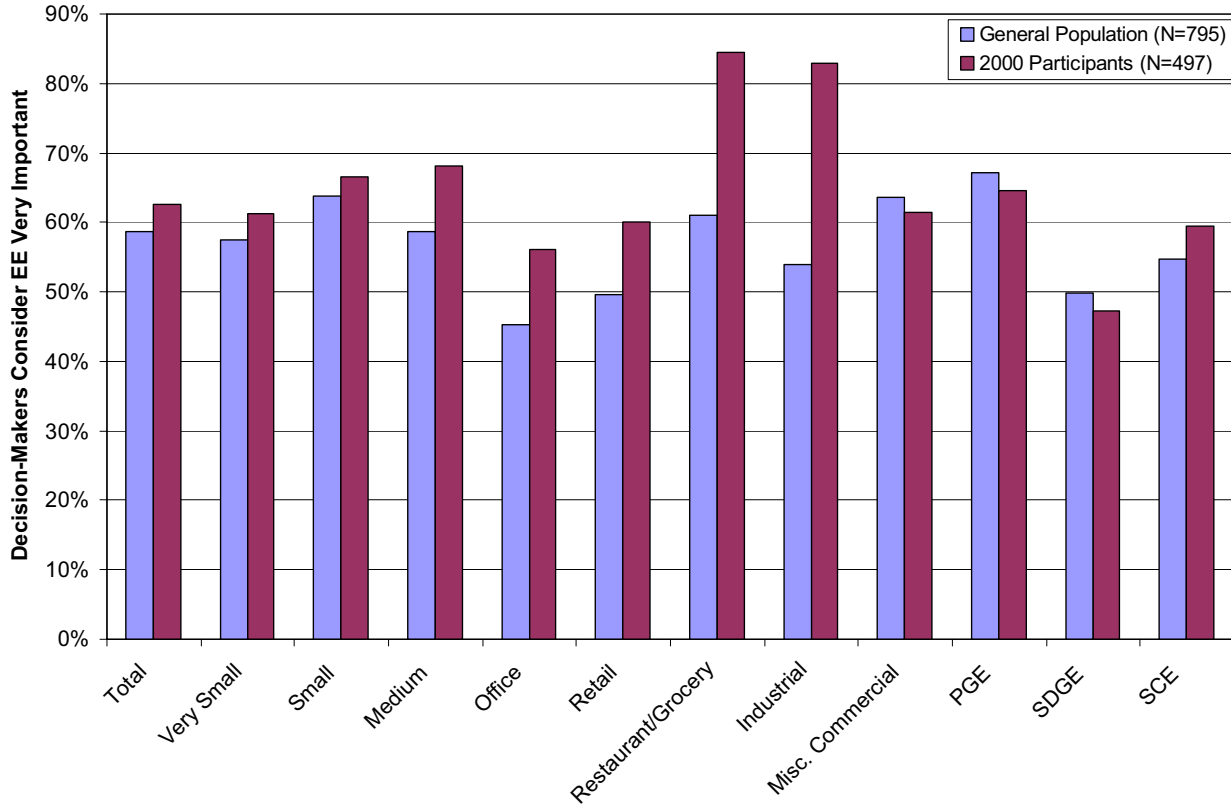
The previous exhibit showed that program participation in larger customer segments, such as industrial, restaurant/grocery and the medium/large group seems to have a greater effect on decision makers. We also know that larger customer are more likely to receive an on-site audit than a remote audit. Exhibit 6-31 below shows percent of respondents who indicate that the decision makers at their company believe energy efficiency to be very important. The Exhibit shows that mail and phone responses look similar to the general population, while the on-site participants are markedly higher.

Exhibit 6-31
Importance of Energy Efficiency to Company Decision Makers by Delivery Mechanism
General Population versus Program Year 2000 Participants
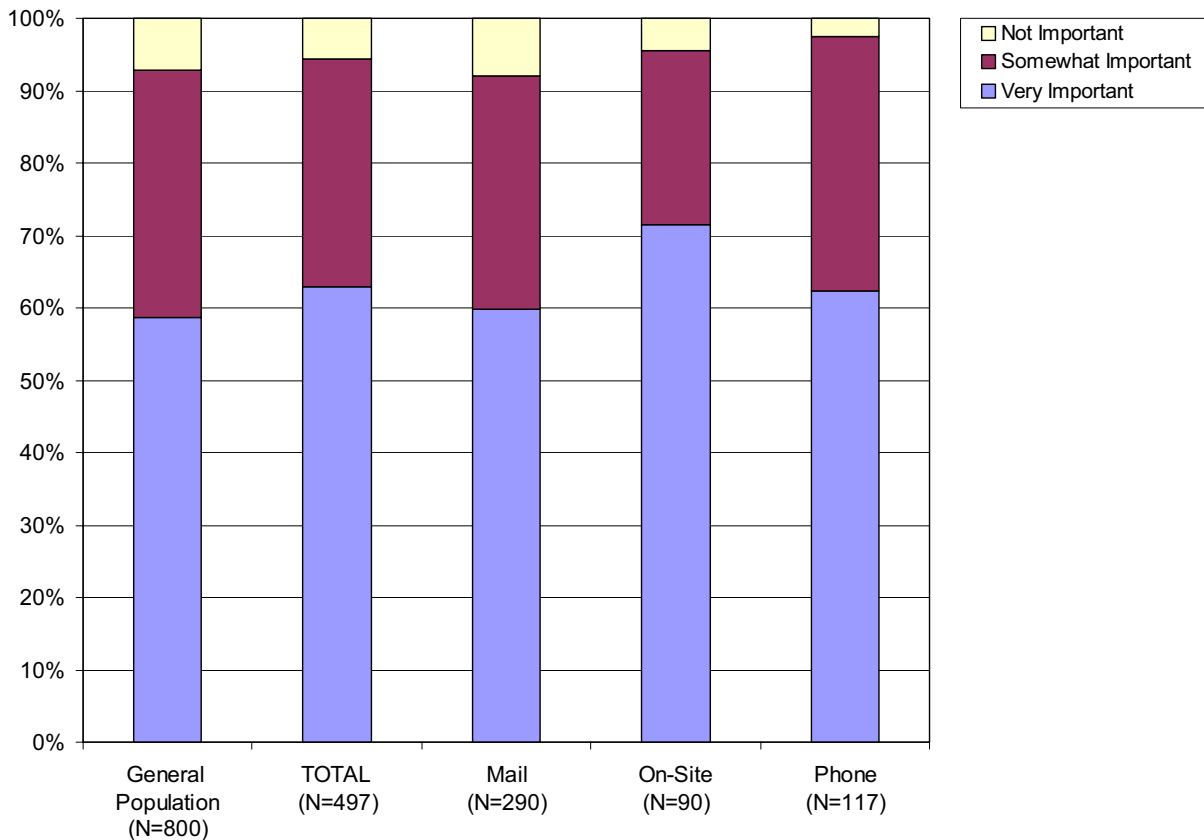
As more confirmation of the contention that on-site audits have been more successful in influencing decision makers Exhibit 6-32 below shows the percent of participant respondents indicating that the audit was very influential on decision makers. The Exhibit makes clear that on-site audits indeed are more successful than others in this key area.

Exhibit 6-32
Percentage of Participants Indicating the Audit was Very Influential on Company Decision Makers – by Delivery Mechanism
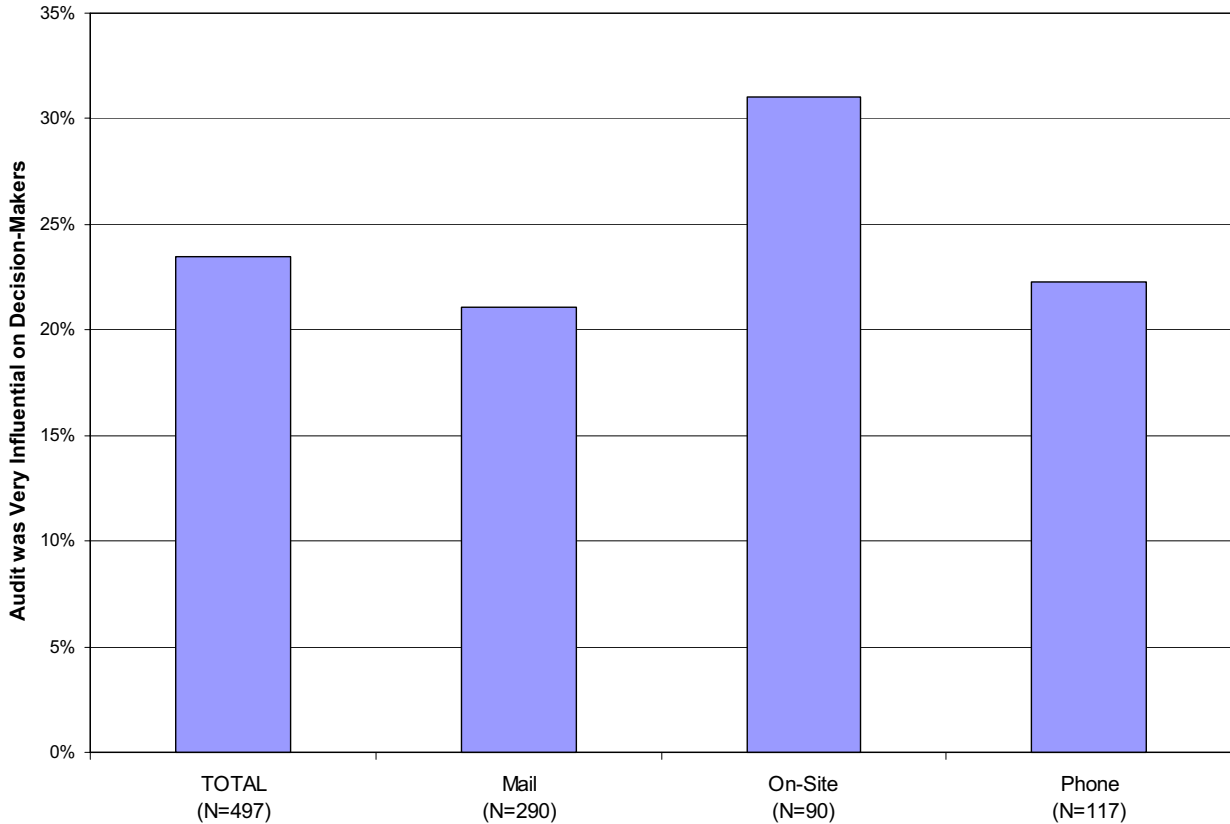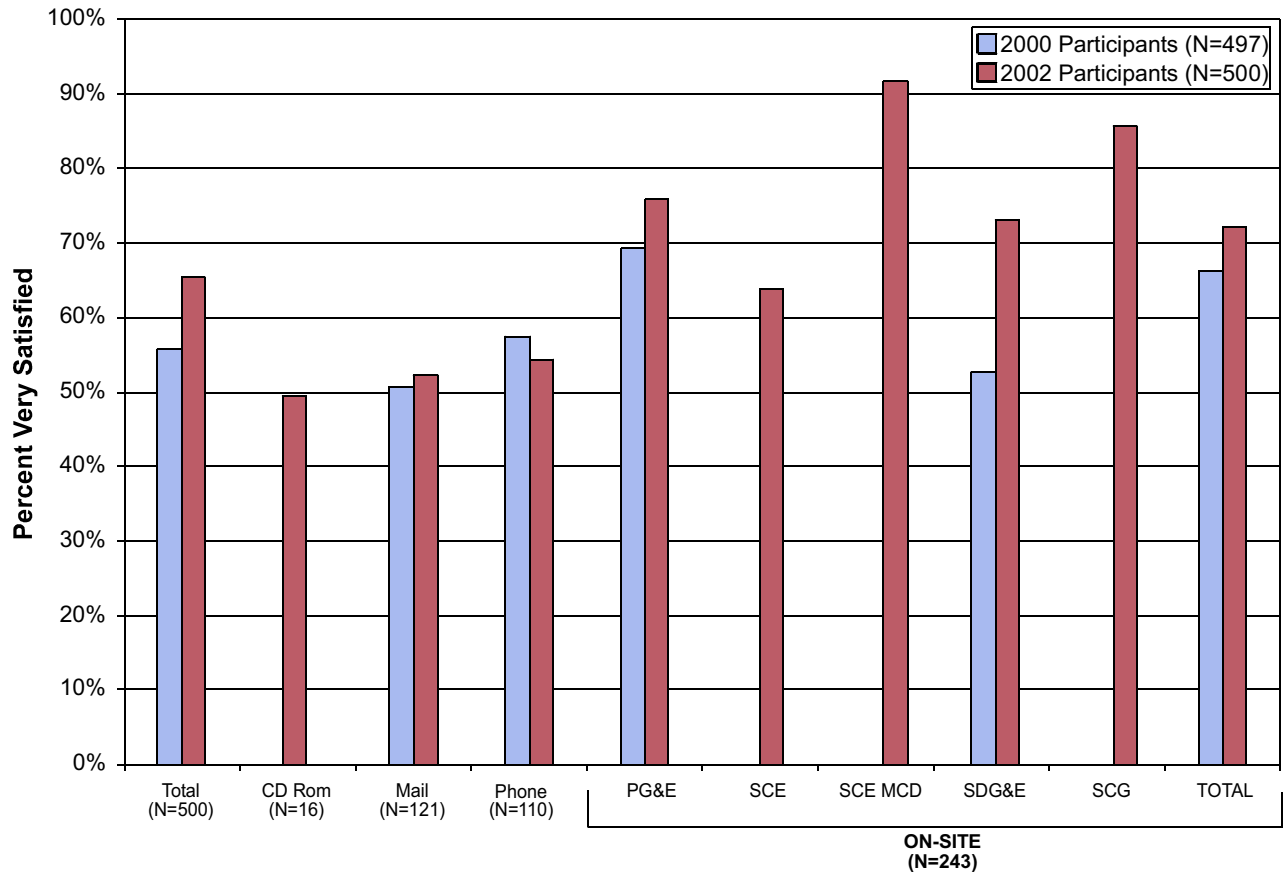

6.6   PARTICIPANT SATISFACTION TRENDS

This section explores changes in program satisfaction among the Program Year 2000 and Program Year 2002 participants. The purpose of this section is to demonstrate whether or not changes in program delivery and many new innovations in program implementation throughout the state are having a positive effect on program satisfaction.

Exhibit 6-33 below presents the percentage of participants that report being very satisfied with the overall program (defined as 7 to 10 on a 10 point scale), segmented by IOU and delivery mechanism. Overall, Program Year 2002 participants report moderately higher satisfaction levels. Generally on-site audit satisfaction levels have improved a bit, while mail remains similar and phone is reduced slightly.

Exhibit 6-33
Percent of Participants Reporting Very High Program Satisfaction

Next we examine how satisfaction with the quality of the audit report has changed across the two program years for each delivery mechanism. Exhibit 6-34 shows the percent of participants very satisfied with the quality of report, as well as the percent reporting dissatisfaction (1 to 3 on a 10 point scale.) The Exhibit shows that satisfaction with the quality of the report is remarkably stable over the period.

Exhibit 6-34
Satisfaction with the Quality of the Audit Report by Delivery Mechanism
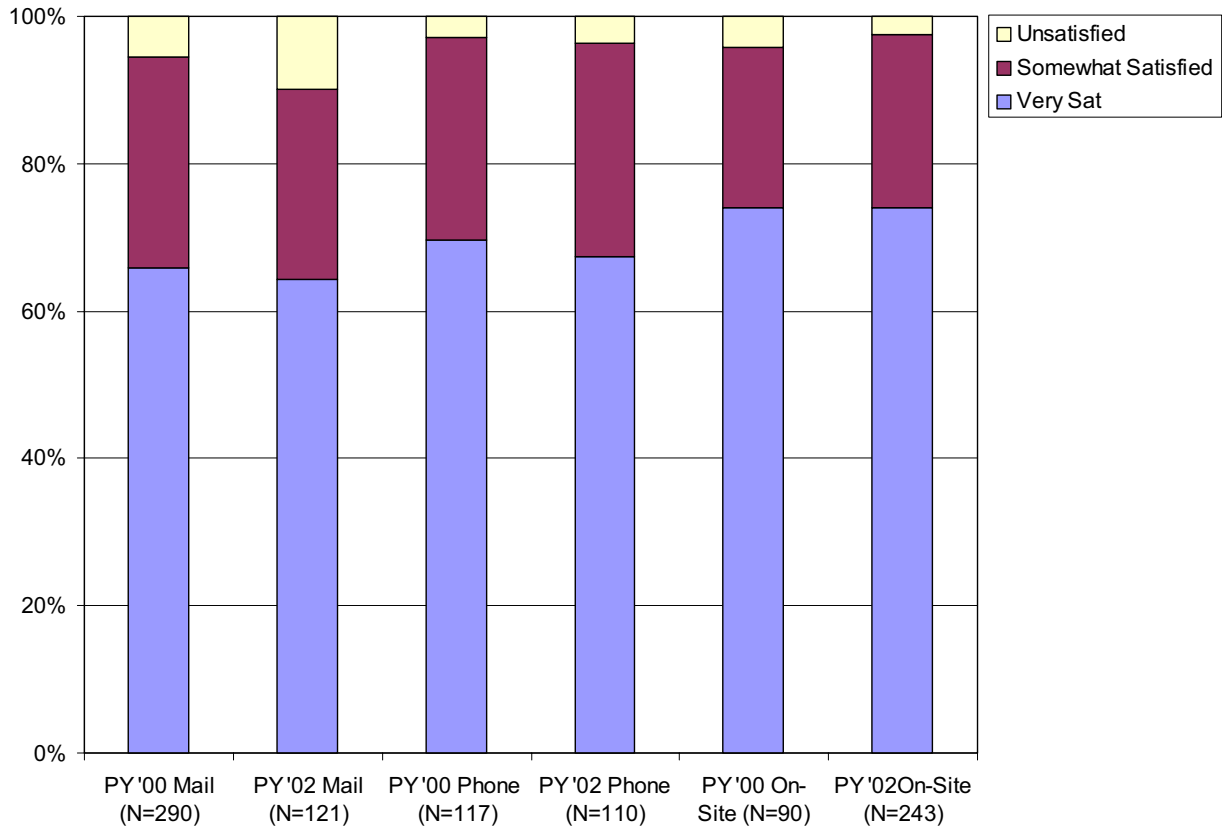
In the last long-term satisfaction exhibit we examine how satisfaction with the usefulness of the audit report has changed between Program Year 2000 and 2002. Exhibit 6-35 shows the percent of participants who report very high levels of satisfaction with the usefulness of the report, as well as the percent that report being dissatisfied with the usefulness of the report. On-site audits show the highest level of usefulness in both years, and show an improvement between 2000 and 2002, both an increase in very satisfied participants and a decrease in unsatisfied participants. Mail and Phone delivery mechanisms shows a marginally lower percent very satisfied but also a smaller percent unsatisfied with the usefulness of the report.

Exhibit 6-35
Satisfaction with the Usefulness of the Audit Report by Delivery Mechanism
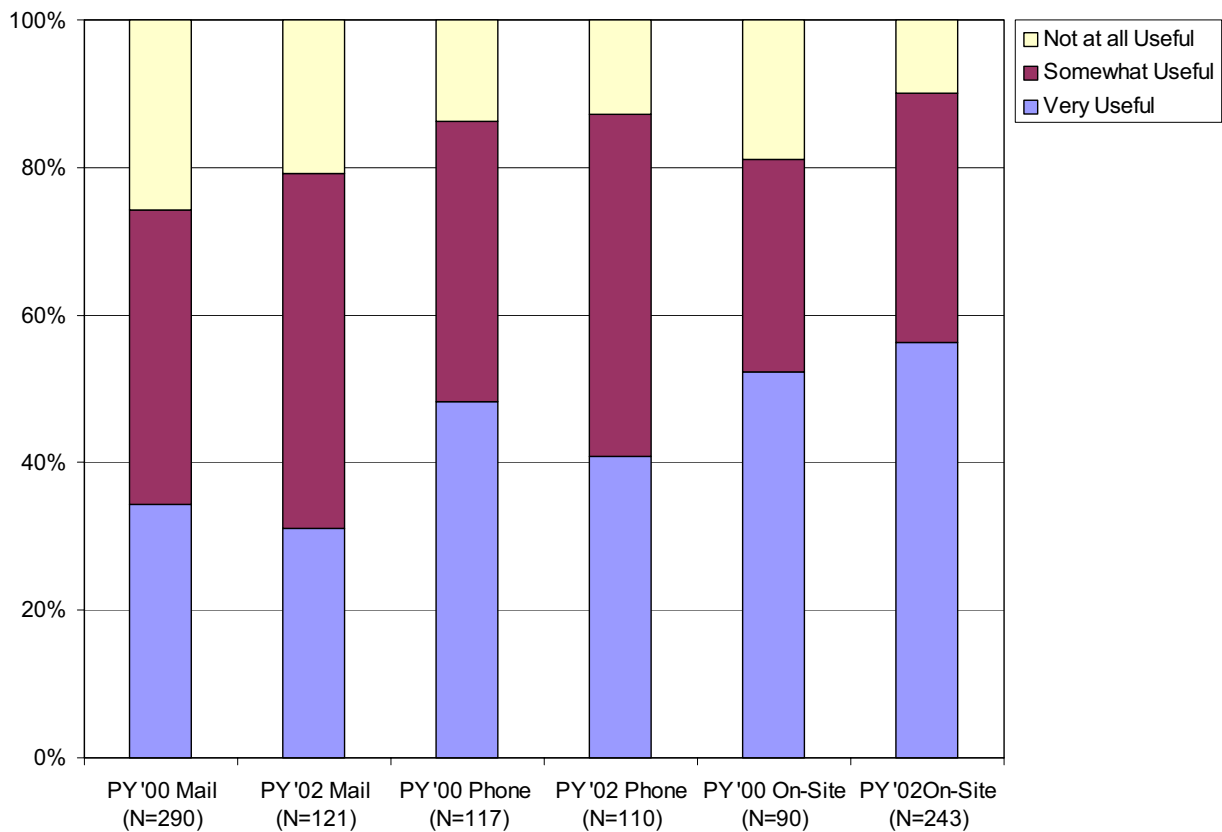
6.7   KEY FINDINGS

Long Term Benefits of the Audit

Examining participant adoptions over the time period following the audit reveals interesting considerations for program design. Relatively simple recommendations are implemented first. Conservation measure and lighting equipment recommendations tend to occur in the first 6 months to one year following the audit. When compared with participant uptake of measures for more complex end uses, one sees that adoption patterns are lagged, requiring years of consideration (such as capital funding, integration with production schedules, other higher

priority needs, etc.) in some cases before spikes of activity occur. These patterns show that the time lag between the resolution of the information barrier and the resolution of other barriers is related to equipment complexity.

It seems that the longer the lag time is between the audit and equipment adoption, the more tenuous the connection with the audit program. That is, lighting and conservation actions (for the PY 2000 group) have a clearly greater activity level in the participant population relative to the nonparticipant population. The recommendations that take longer to implement (cooling, gas, other) also show overall adoption rates closer to those in the nonparticipant population. Similarly, this chapter demonstrates that adoptions occurring closer to the audit have greater (self-reported) audit influence. This is consistent with program theory—information is the primary barrier to the less expensive and less complex measures, while the more complex end-uses have more significant (additional) hurdles such as first-cost and performance uncertainty.

Persistence of Energy Conservation Practices

Eleven percent of participants report terminating a conservation measure. The reasons conservation practices are terminated is primarily interference with business operations, perceptions that the energy crisis is over, or that the effort is not worthwhile. Terminated conservation practices have an average reported life of 1.4 years. However, ninety percent of PY 2000 participants report currently practicing energy conservation. The self-reported average life of currently practiced conservation measures is 3.6 years.

Audit Program and Energy Crisis Effects

About half of the PY 2000 participants surveyed found the audit report useful during the crisis. About one-fourth of participants revisited their audit report during the crisis for conservation information. About 40 percent of participants implemented at least one audit recommendation during the energy crisis. Eighty-five percent of those adoptions were at least somewhat influenced by the audit and between one-third and one-half of those installations were highly influenced by the audit.

A close look at the timing of conservation measures and customers' attribution to the audit program reveals some interesting findings. Survey data were used to divide conservation measure adoptions into two categories, those attributed to the audit (based on self report by the participant) and those that were not. This Study examined the evolution of these two types of adoptions over time. The results show that the audit program has a distinct and significant effect on conservation measure adoption independent of the energy crisis. In fact, the conservation measure adoptions attributed to the audit program spike in the year 2000 and then decline. Conservation measure adoptions that are not attributed to the audit program spike around the energy crisis and then rapidly fall off.

Longevity of Audit Customer Recall

On-Site Audits have a far greater frequency of being revisited by participants than mail or phone audits. Further, they are far more likely to be referenced multiple times. Recall in chapter 5, on-site audits are shown to score higher than others for credibility and customization. It appears that a report with greater customization and credibility also has a

longer useful life and a more interested audience. The impact chapter also demonstrated that greater impacts are achieved through the on-site-based delivery channel.

About half of the customers that revisit their report are seeking information on low-cost /no-cost measures, another 20 percent seek lighting measure recommendation information. Customers are successful in finding the information they are seeking between 80 and 95 percent of the time.

About half of participants are able to recall at least one audit recommendation. Lighting recommendations are recalled most often, followed by HVAC. Together these two end uses comprise approximately 60 percent of the recommendations participants are able to recall.

Personnel Turnover and Related Findings

In light of increasing staff turnover rates, the availability of multiple Audit delivery mechanisms, and the relatively low participant recall of the Audit, the current 3-year participation restrictions should be reconsidered. A one-year requirement is more appropriate, with an allowance to obtain energy efficiency information from more than one delivery channel within a given program year.

Long Term Program Effect Indicators

Some market effects indicators are very pronounced among both the PY 2000 and PY 2002 participants. Both participant groups report more favorable attitudes, intentions and knowledge of energy efficiency than nonparticipants. This underscores program effects and indicates that they do not diminish substantially over time. In fact, it could be that the program acts as a catalyst for not only a leap in knowledge and energy efficiency intentions at the time of the audit, but also in the capacity for greater building of these characteristics over time.

Although one might suggest that participants are predisposed to greater levels of energy efficiency, and therefore a comparison group composed on nonparticipants cannot be used to clearly demonstrate program effects, directional evidence suggests that there are positive participant influences associated with the program. PY 2000 participants report that the program improved their knowledge of energy efficiency. Over 80 percent felt the audit had improved their energy efficiency knowledge at least somewhat, and between 10 and 20 percent felt it improved their knowledge even more. On-sites audits perform noticeably better in this area than the mail and phone delivery channels.

7. FOLLOW-UP EVALUATION

This Chapter presents the Follow-Up Evaluation, designed to measure customer response to program follow-up activities used to encourage audit participants to implement recommendations. The primary focus of the analysis is on the influence and impact of PG&E's follow-up telephone calls made to Phone and On-site audit participants.

The main finding of this section is that the follow-up effort in general had a positive impact on most aspects of customer satisfaction. It also had a moderate impact on the participants' decisions to install equipment. The latter effect is more pronounced for the on-site audit than the phone audit.

This section begins with a description of the audit follow-up activities that were undertaken in 2002, focusing on the more systematic efforts of PG&E.

7.1 DESCRIPTION AND HISTORY OF FOLLOW-UP PROGRAMS

A key finding of the in-depth interviews with program managers and staff, as well as vendors, is that they all feel that follow-up activities to increase adoption rates are very important. Customers also overwhelmingly called upon the utilities to provide more follow up services. The evidence testing the hypothesis that follow-up phone calls increase adoption rates is presented in this section.

SCE conducted phone follow-ups after vendors completed *onsite* audits to verify that the audits were completed and to verify customer satisfaction. While there was not necessarily a tie-in to specifically help encourage the implementation of the recommended measures, it is an additional customer contact, which SCE believes helps customers to follow through with implementation. As a part of verifying that audits were completed and measuring customer satisfaction, SCE also asks customers whether or not they plan to implement any of the recommendations. SCE felt their efforts were successful since they received positive customer feedback. Fifteen percent of On-Site audit participants are called within two to four weeks of the audit and, if there are any additional requests for service, these are passed on to the appropriate program personnel. SCE noted that, if the program is moving toward the goal of saving energy and is not just an "information only" program, it should expand the follow-ups to a greater percentage of customers and also provide more follow-up activities/information. However, additional funds would be needed to carry out this function. SCE is interested in investigating what type of follow-up should be done; especially given that these customers have very limited time. Step one is to determine what is meaningful from the customers' standpoint.

SCG and SDG&E have limited follow-up efforts with audit participants. In order to increase adoption rates, SCG customers are provided information about various rebate programs including SCG's. Express rebate forms are also provided to the participants with their audit recommendations; and in fact, participation in the audit is a required step before going on to participate in SCG's Express Efficiency program. While SDG&E didn't have any time to

conduct follow-up activities, they feel that such follow-up efforts would be effective, given a larger budget to cover those additional costs.

The remainder of this section focuses on the PG&E follow-up activities for participants in the Telephone and On-Site Audits. The rationale for PG&E's follow-up effort is that those who receive a follow-up telephone call will experience more positive results than those who did not. Specifically, it is hypothesized that:

- Those receiving a follow-up telephone call will be more satisfied with their audit experience than those who did not,

- The influence of the audit on a customer's decision to implement measures when *combined* with a follow-up call will be greater than the influence of the audit alone, and

- Adoptions of recommended measures will be greater for those who received a follow-up telephone call that for those who did not.

PG&E's Business Call Center (BCC) made the follow-up telephone calls to Telephone and On-Site audit participants at least 30 days after the audit was conducted. PG&E began follow-up calls in the second half of 2002 with those who participated in the first half of the year. PG&E does not specifically identify customers for follow-up calls based on their response to the audit. PG&E simply waits 30 days and begins calling participants in no particular order. However, they believe that better targeting would produce greater adoptions. The Program Manager also felt that this follow-up effort should be elevated to a major component of all the various PG&E audit types since it not only addresses a variety of market barriers, but also provides a good marketing tool. He noted, however, that this would require additional resources.

In 2002, PG&E met its goal of attempting 600 follow-ups with Phone participants and 400 follow-ups with On-Site participants. This represents 29 percent of the 2,055 Phone participants and 21 percent of the 1,888 On-Site participants.

While they have no hard-to-reach goals, most Phone Audit customers are hard-to-reach, so most follow-ups with phone audit customers are hard-to-reach. A follow-up involves up to three attempts to reach the participant. Every attempt counts towards these two goals, regardless of whether the participant is successfully contacted or not. The follow-up calls are made by trained BCC staff and engineering staff are available to consult with the call staff when complex issues arise.

The script used for the follow-up call is less complicated than in prior years in order to reduce the burden of recording numerous responses. Responses to follow-up questions are recorded using software that provides a pre-determined list of possible responses, and saves the selected option to a database.

The first follow-up question is whether the customer plans to retrofit. If the customer does not plan to retrofit, they are asked for the reason. The software allows for the following response categories:

1. Need technical assistance on equipment

2. Rebates too low, not worth applying

3. Equipment too expensive

4. Retrofit measure not rebateable

5. Need help locating vendor/contractor

6. Busy; no time to retrofit

7. Other

Next, results surrounding the hypothesized impacts of the follow-up calls are presented. Later in this Chapter, results are presented based on the analysis of the Follow-Up Tracking Database.

7.2   CUSTOMER RESPONSE

In the following sections, comparisons are presented of those who received the follow-up telephone call with those who did not; comparisons address satisfaction with various aspects of the audit, the influence of the audit on customer decisions, and customer adoptions of recommended energy efficient measures. To ensure the fairest possible comparison between those who received a follow-up call and those who did not, all comparisons are drawn using pure PG&E samples. As discussed in Chapter 5, PG&E has its own unique phone and on-site audit instruments. Thus comparisons across audit types or service territories would introduce confounding factors. The best control group to isolate the effect of the follow-up call is the set of PG&E Phone and On-site audit participants that did not receive a follow-up call.

When interpreting the results that follow there are several points to keep in mind. First, we are examining the *main* effects of the follow-up call on a variety of indicators (e.g., satisfaction, influence, and adoptions). The small sample sizes did not allow the use of statistical controls that might more accurately reveal the true nature of the relationship. Second, it is not clear whether those who claim to have received a follow-up call are systematically different that those who claim they did not. While those who claim to have received a follow-up call are not statistically different with respect to size and renter/owner status, there could be other unobserved differences that might produce anomalous results. Finally, there was no other way to verify that the follow-up call occurred other than to ask the participants directly. Customers' memories might be faulty, thus introducing unwanted error.

7.2.1   Satisfaction with the Audit

Participants were asked a number of questions regarding their satisfaction with the audit. The hypothesis is that those receiving a follow-up call will express greater satisfaction with the audit than those who did not receive a follow-up call. One question addressed their overall satisfaction with the audit, while the remaining questions addressed their satisfaction with 1) the technical knowledge of the auditor, 2) overall quality of the energy report, and 3) the credibility of the audit recommendations. They were asked to respond on a scale of 1 to 10, where 1 is completely dissatisfied and 10 is completely satisfied. Exhibit 7-1 presents the overall level of satisfaction.

From *Exhibit 7-1*, we can see that across both types of audits, regardless of whether there was a follow-up telephone call, at least 90 percent of the respondents were "very" or "somewhat" satisfied. For the on-site audit, there is very little difference in the percent who are "very" satisfied. However, 10 percent of those who did not receive a follow-up telephone call were unsatisfied. For the phone audit, a much greater percent of those who received a follow-up call are *very satisfied*. For the phone audit respondents who did not receive a follow-up call, 8 percent were unsatisfied. While the levels of satisfaction (very and somewhat) are very high, those who received a follow-up telephone call are more satisfied than those who did not. Next, satisfaction with specific components of the audit is presented.

<div align="center">

Exhibit 7-1
Overall Satisfaction with Audit[1]

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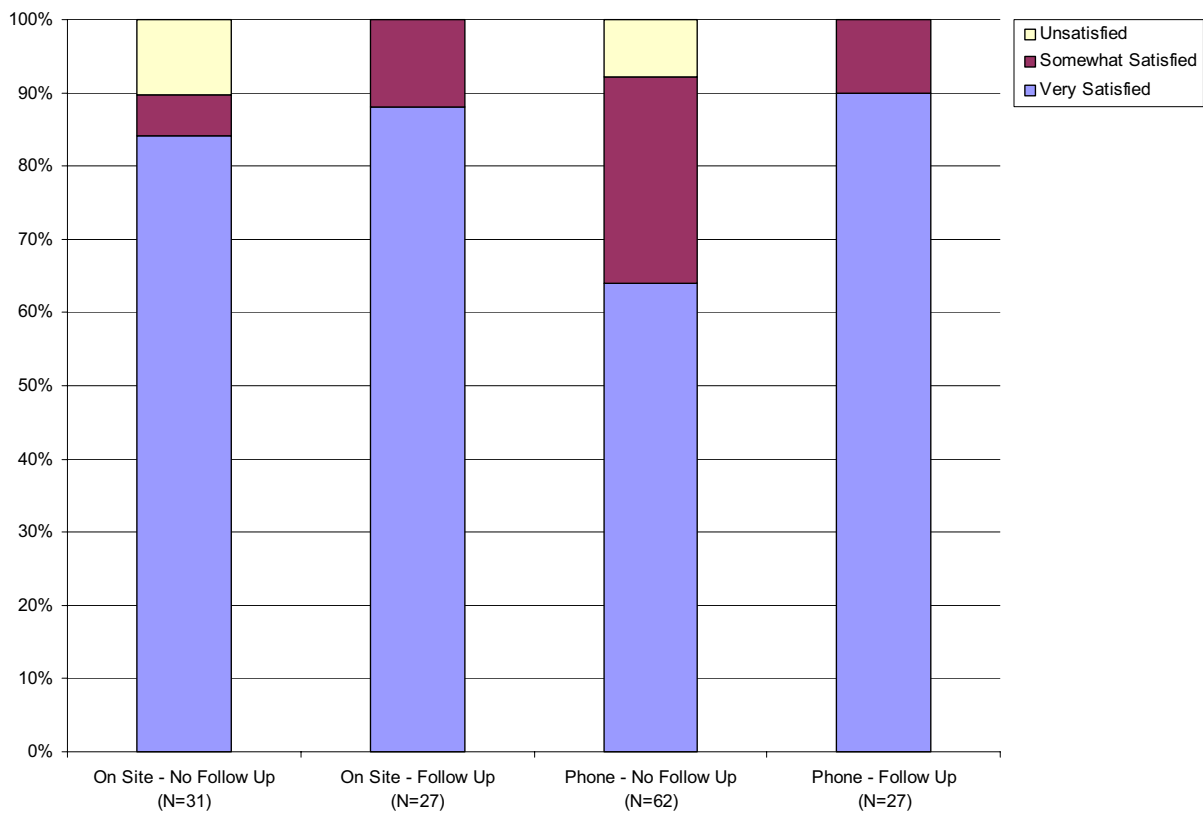
1 These results are based on responses to both the process and impact surveys.

Participants in the on-site audits were asked how satisfied they were with the technical knowledge of the auditor. Exhibit 7-2 presents these results. As one can see, satisfaction with the technical knowledge of the auditor is very similar and very high within both customer groups. All but one of the follow-up customers were very satisfied, and all but 2 of those not receiving a follow-up call were satisfied.

Exhibit 7-2
Satisfaction with the Technical Knowledge of the Auditor
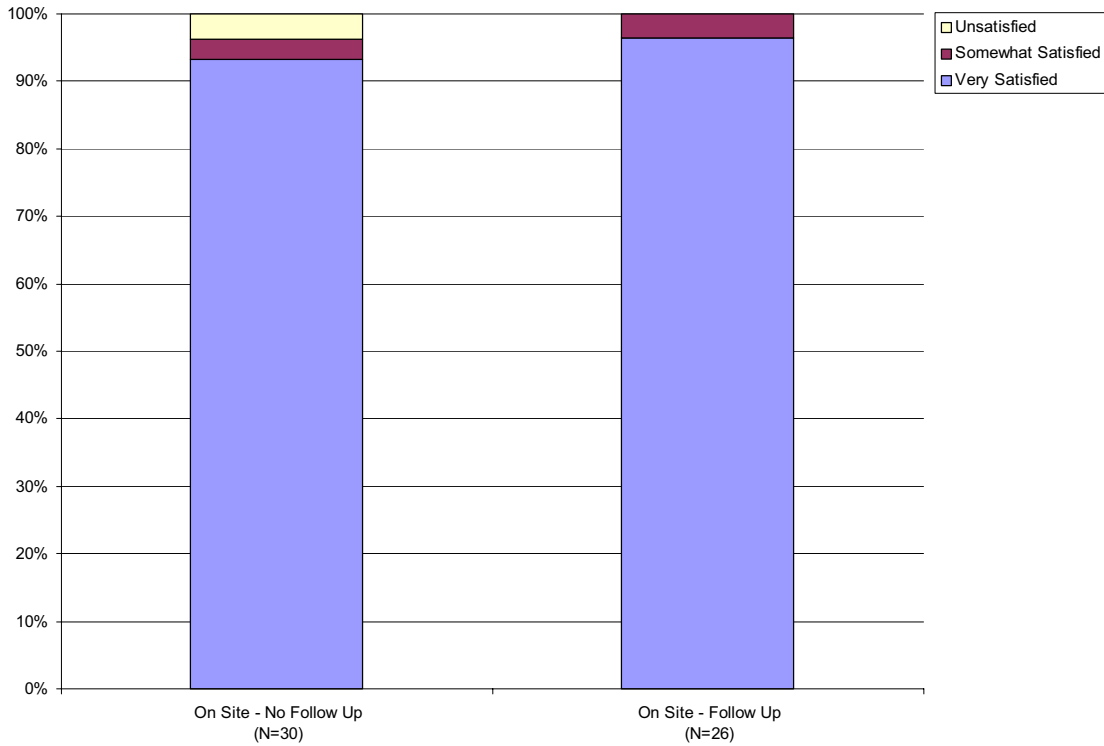
Respondents were then asked the extent to which they were satisfied with the overall quality of the energy report. Exhibit 7-3 presents these results.

*Exhibit 7-3*
Satisfaction with Overall Quality of the of the Energy Report
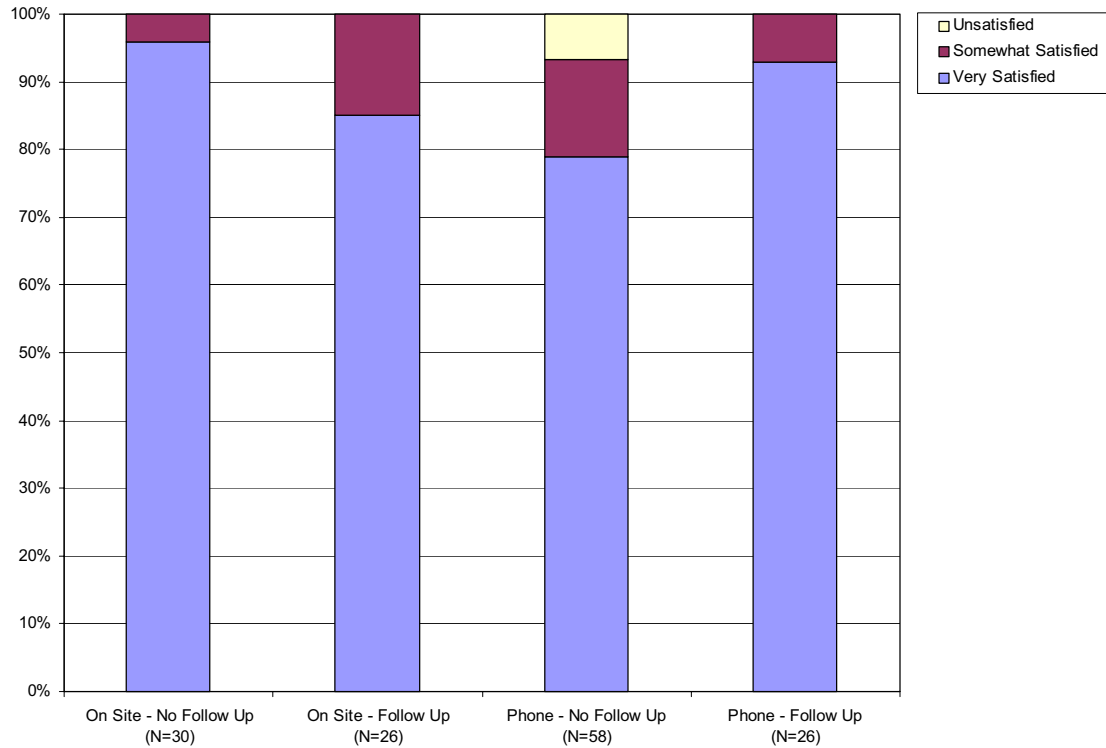
For the On-Site audit, satisfaction levels are very high. However, when focusing on those who are *very* satisfied among those who received an On-Site audit, we see counterintuitive results. Those who did not receive a follow-up call reported somewhat higher levels of being "very" satisfied than those who did not. Given that the mean level of satisfaction is very high, these differences are trivial and of little practical significance. When focusing on the Phone audit, we see results that confirm the hypothesis that a greater percentage of those who received a phone follow-up are *very* or *somewhat* satisfied compared to those who did not. Slightly more than 6 percent of those who did not receive a follow-up call were unsatisfied.

Finally, respondents were asked the extent to which they were satisfied with the credibility of the recommendations they received. Exhibit 7-4 presents these results. Again, for the On-Site audit, levels of satisfaction are very high regardless of whether one reported receiving a follow-up call. Those who did not receive a follow-up call reported slightly higher levels of satisfaction than those who did not. Slightly more than 4 percent of those who received the phone follow-up reported that they were unsatisfied. These differences appear to be of little practical significance. When focusing on the Phone audit, we see results that confirm the hypothesis that a greater percentage of those who received a phone follow-up are very satisfied compared to those who did not. Nearly 8 percent of those who did not receive the phone follow-up reported that they were unsatisfied.

Exhibit 7-4
*Satisfaction with the Credibility of the Recommendations Received*
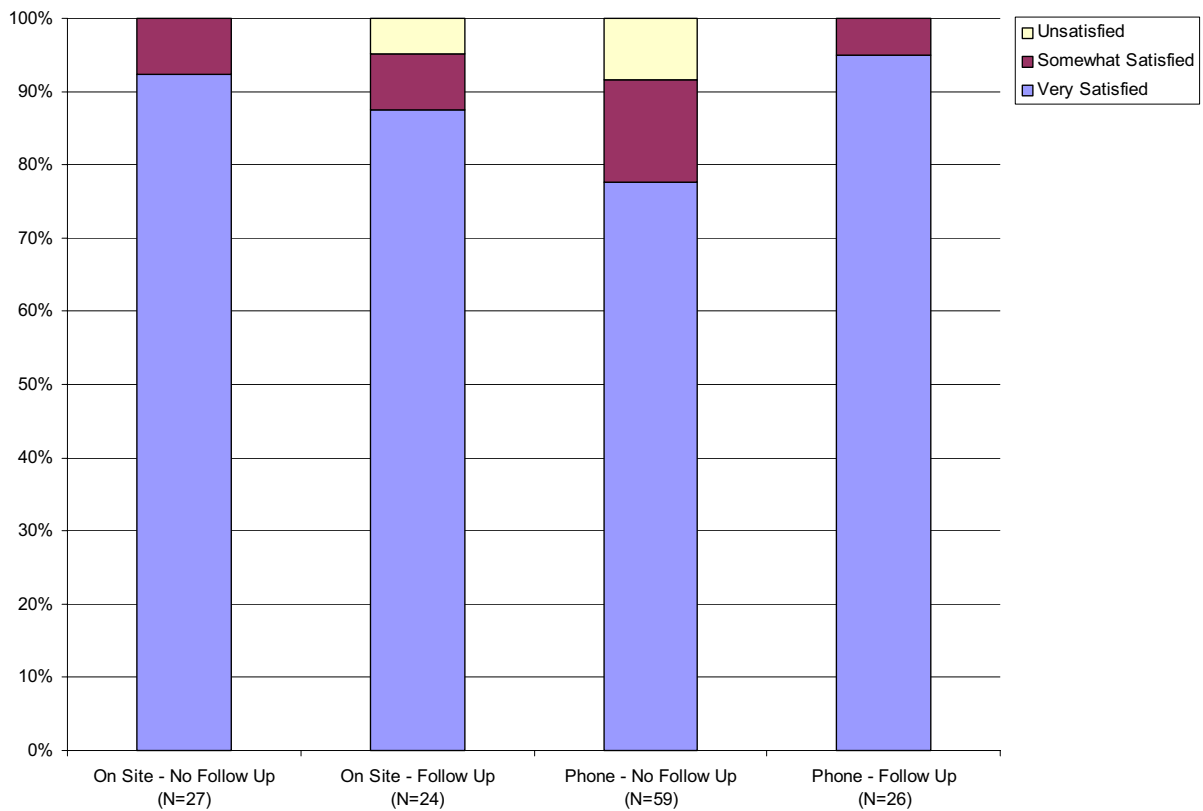
7.2.2 Follow-Up Influence

Respondents who reported that they installed measures after the audit were asked the extent to which the audit influenced their decision to install the equipment. Respondents were asked to respond on a 10-point scale with a 1 being *not influential* and a 10 being *very influential*. The results across all measure types are presented in Exhibit 7-5. The biggest influence of the follow-up call was among those who received the On-Site audit. Nearly 65 percent of those who received the follow-up call reported that the audit was very or somewhat influential compared to nearly 44 percent for those who did not receive a follow-up call. That is, receiving a follow-up call clearly increased the influence of the audit on customers' decisions. However, the influence of the follow-up call on those receiving the Phone audit is much smaller.

Sample sizes are too small to support this same type of analysis at the end use level.

Exhibit 7-5
Overall Influence of the Audit in the Decision to Install Efficient Equipment
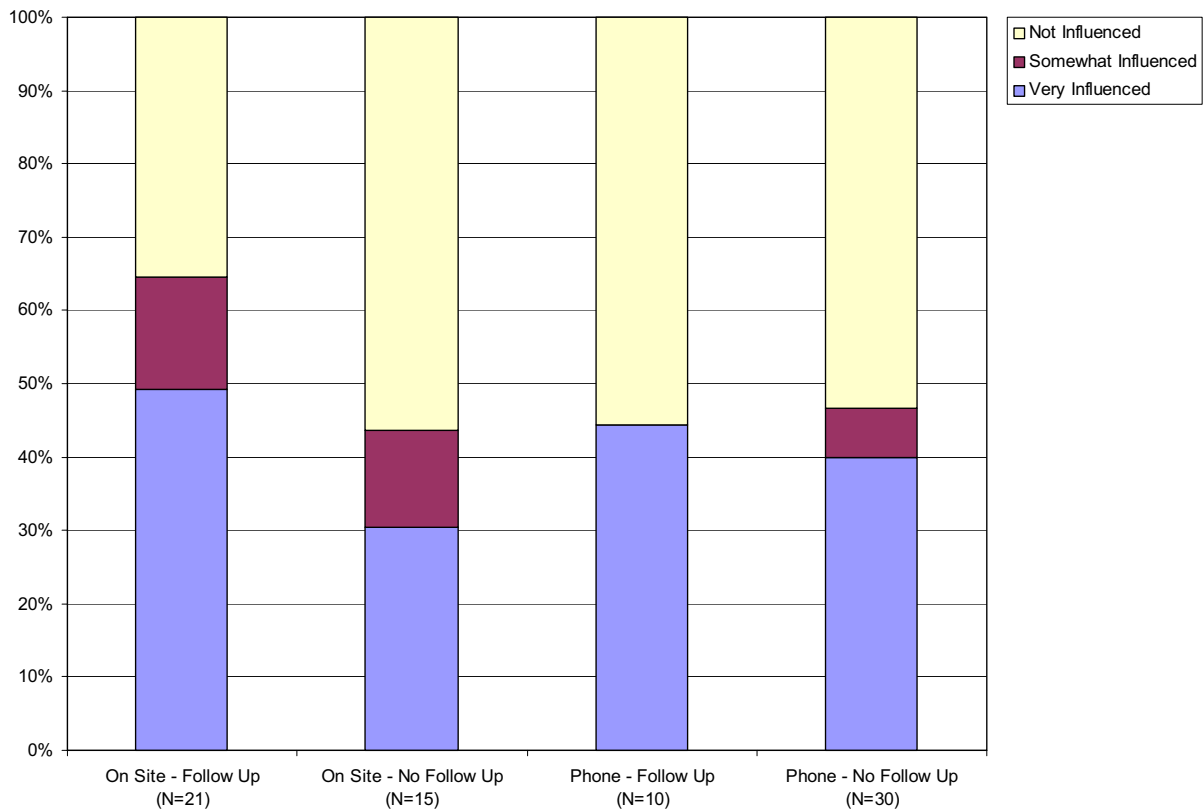
7.3   ASSESSMENT OF FOLLOW-UP PROGRAM

This next section explores the influence of the follow-up effort on program impact indicators and examines information available from PG&E's follow-up tracking system.

7.3.1   Post-Audit Adoptions of Efficient Measures

We now explore participant self-reports regarding the installation of *energy efficient* measures installed *after* the audit. Respondents were asked whether they had installed any energy efficient technologies since the audit. Exhibit 7-6 presents the overall results, across all end uses. The effects of the follow-up calls confirm the initial hypothesis for both audit types. The difference for the On-Site audit is 6.6 percentage points while for the Phone audit the difference is larger at 10.4 percentage points.

One can also explore these effects in terms of odds and odds ratios. The odds that a customer who received a follow-up call will install an efficient measure are 0.33, while the odds of a customer who did not receive a follow-up call are 0.19. To compare the two groups, the odds ratio is calculated as 1.7 (0.33/0.19). This means that the odds of a customer who received a follow-up phone call are 1.7 times those who did not. When controlling statistically in a logistic regression model for size and owner/renter status, the odds ratio increases to 2.4. In this model, the parameter for the follow-up call was nearly significant at the 0.05 confidence level.

Exhibit 7-6
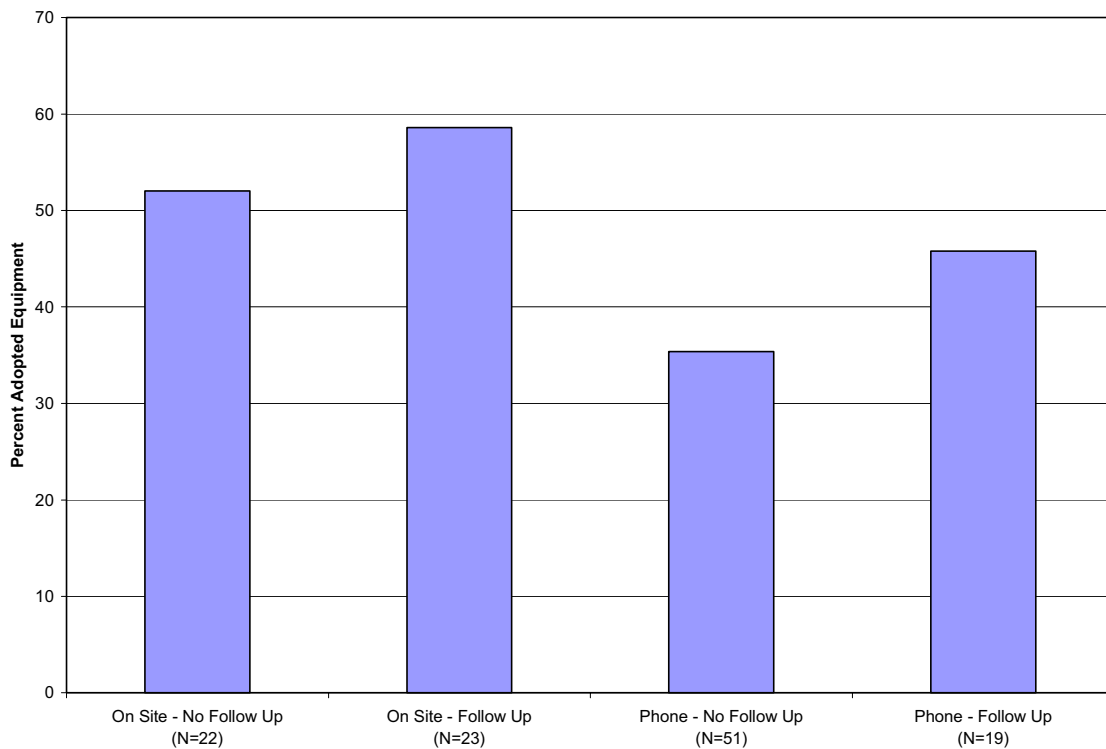*Percent of Participants Adopting at Least One Recommended Measure*

Exhibit 7-7 presents the results for the lighting end use. For the On-Site audit, we see that there is a 15-percentage point difference in adoptions between those who received a follow-up call versus those who didn't. However, for the Phone audit, we see the anomalous result that those who did not receive a follow-up phone call have a 5-percentage point advantage over those who did. We emphasize that these small sample sizes do not provide the confidence required to eliminate the follow-up phone calls for participants in the Phone audit. Based on these results, one should not make program-design decisions about whether to continue the follow-up effort for customers for whom lighting measures are recommended. First, many customers receive recommendations regarding both lighting *and* cooling measures, i.e., if one were to make a program design change based on these results, it would apply only to those who received only lighting recommendations. Second, before deciding to eliminate the follow-up for customers who received only lighting recommendations, more rigorous analysis using much larger sample would be required.

Exhibit 7-7
Percent of Participants Adopting Efficient Lighting Technologies After the Audit
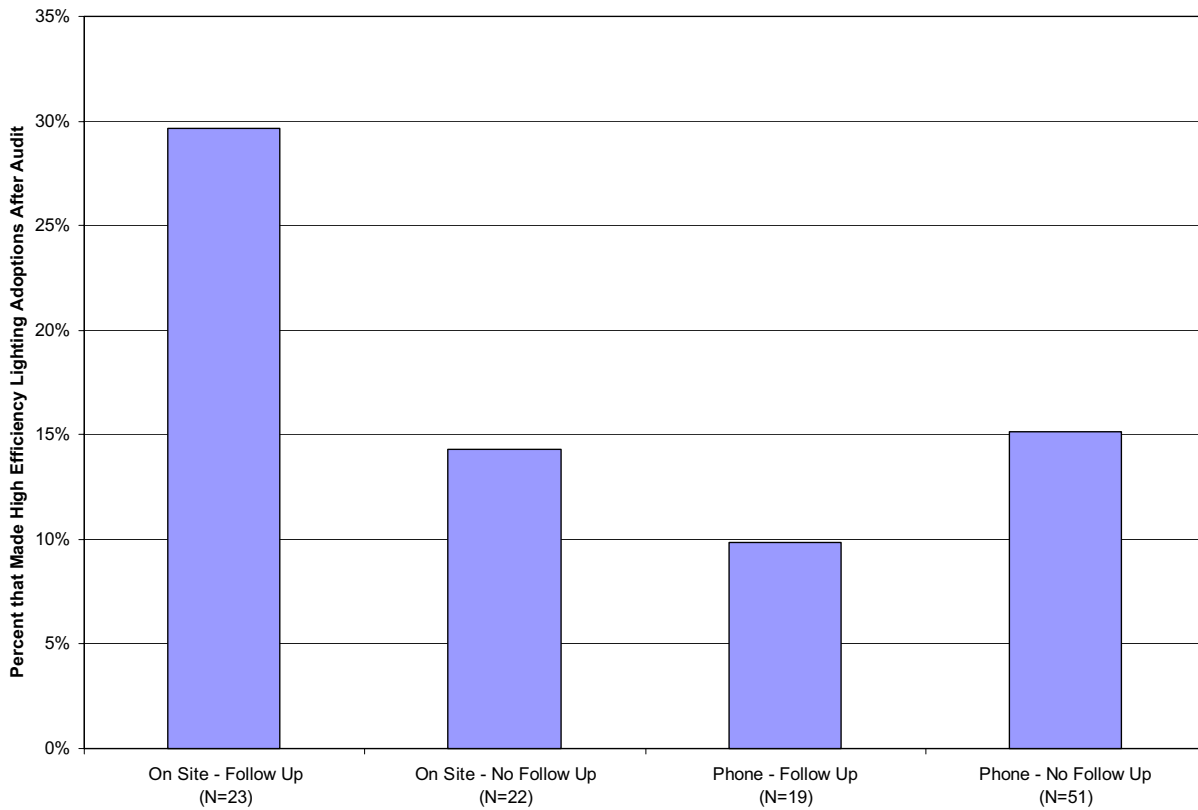
Next, results are presented for the cooling end use. Exhibit 7-8 indicates that the effects of the follow-up call are evident for both audit delivery channels. The difference for the On-Site audit is 4 percentage points while for the Phone audit the difference is much larger at 21 percentage points. Thus, the follow-up call appears to have a definite positive effect on HVAC adoptions for phone audit customers.

Exhibit 7-8
Percent of Participants Adopting Efficient Cooling Technologies After the Audit
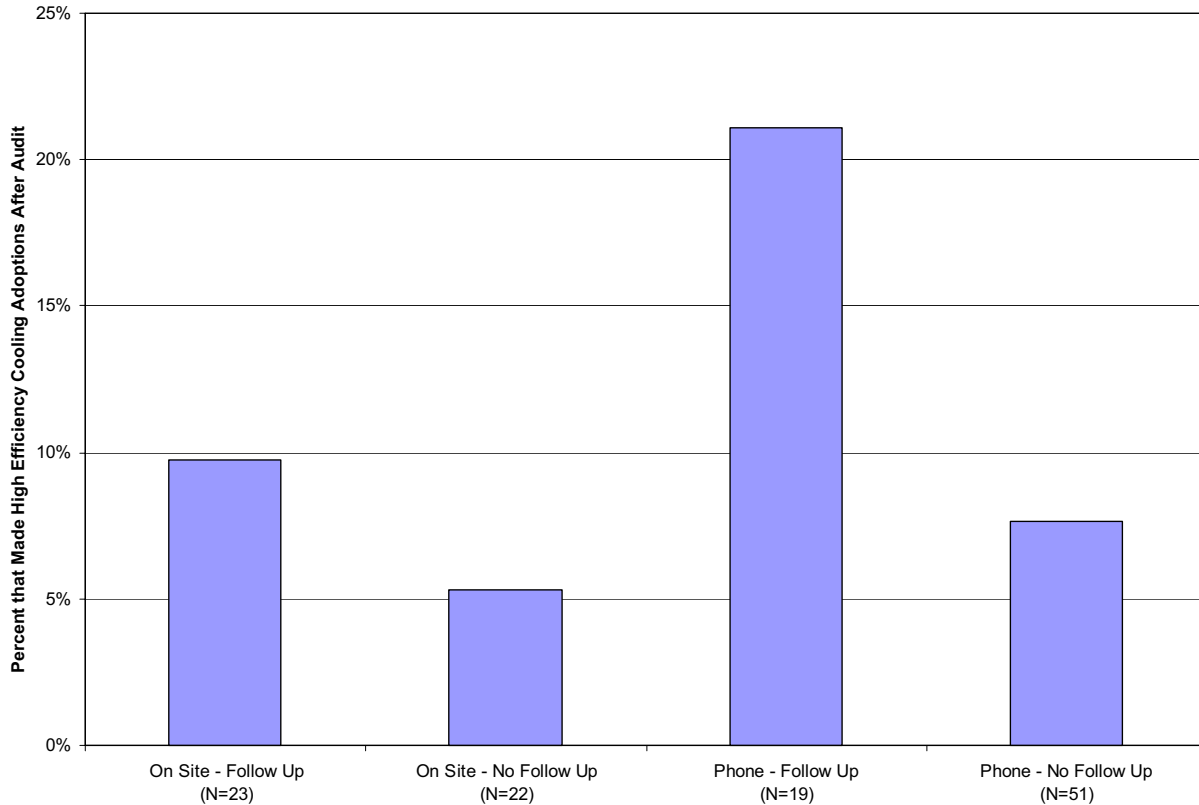
7.3.2   PG&E Phone Center Data Analysis

The PG&E Phone Center Database contains tracking data on follow-up calls made to participants in the PG&E On-Site and Phone audits. There are 6,068 observations in the Database. As mentioned earlier, an effort was made by PG&E to contact a subset of 1,000 of these participants. Of these 1,000, the goal was to attempt to contact 600 participants in the Phone audit and 400 participants in the On-Site audit. That is, an attempt counted towards the goal, even if someone at the audited site could not ultimately be reached after three attempts.

It was difficult to verify whether attempts were made to contact the 600 participants in the Phone audit and 400 participants in the On-Site audit. First, of the 6,068 observations, there are only 357 observations that have a value for the variable "followup1_date", which is assumed to be the date of the first attempt to conduct the follow-up telephone call. Of the remaining 3,728

participants, we could not determine whether attempts were made to contact an additional 643 participants. In addition, there is no variable that discriminates between those who received the Phone audit from those who received the On-Site audit. It is possible that attempts were made to contact the additional 643 participants, but because contact could not be made after three attempts, the effort was not recorded. Thus, on its face, the database appears to be incomplete. Of course, there might be additional data that could be retrieved from other PG&E Audit tracking databases. Nevertheless, basic analyses using the available data are presented next.

Of the 357 participants who were contacted, there were 342 responses recorded to the question regarding any plans to retrofit. From Exhibit 7-9, we can see that 35 percent of the respondents plan to retrofit while 65 percent do not.

Exhibit 7-9
Follow-Up Telephone Results Regarding Plans to Retrofit

Status	Frequency	Percent
Plan to Retrofit	117	35%
Do Not Plan to Retrofit	215	65%
Total	332	100%

An additional question was asked of the 65 percent who reported that they did not plan to retrofit. This question attempted to discover the reasons why those participants were not planning to retrofit. Exhibit 7-10 presents these results.

Exhibit 7-10
Reasons for Not Planning to Retrofit

Reason	Frequency	Percent
Need Technical Assistance on Equipment	0	0%
Rebate Too Low, Not Worth Applying	32	16%
Equipment Too Expensive	1	0%
Retrofit Measure Not Rebateable	3	1%
Need Help Locating Vendor/Contractor		0%
Busy; No Time to Retrofit It	12	6%
No Answer	156	76%
Total	204	100%

Sixteen percent of the respondents indicated that the rebate was too low followed by 6 percent who said that they were too busy. Over three fourths of the respondents provided some other answer that did not fit into the preset categories and was therefore recorded as "No Answer." It is not clear that those who provided these "Other" answers received any additional advice that would allow them to overcome any obstacles to adoption. Given that the responses of so many respondents were recorded as "No Answer," no attempt is made to interpret these results.

We recommend that PG&E routinely record the responses to all the questions in the script and combine this with other available data collected during the audit so that a more comprehensive analysis could be performed (to better understand the obstacles faced by customers and craft appropriate solutions). In addition, utilities implementing a follow-up program element should include a variable that discriminates between those who received the Phone audit from those who received the On-Site audit and make sure that the dates of the first, second, and third follow-up telephone calls are faithfully recorded. Finally, it is clear that the current response categories for the question regarding reasons for not installing the recommended equipment are inadequate. For the following program year, PG&E should consider recording all the responses to this question. With these responses, they could develop a more complete set of response categories.

Finally, a way of linking each customer who receives a follow-up call to their records in the program-tracking database should be developed so that future evaluators do not have to rely on the sometimes faulty memories of survey respondents regarding whether they received a follow-up call.

7.4   KEY FINDINGS

In summary, we have seen that the level of satisfaction with all aspects of the audit is very high, regardless of whether the participants received a follow-up phone call. At a more detailed level, we see that the follow-up effort in general, despite some relatively minor anomalies, had a positive impact on the overall level of satisfaction, satisfaction with the technical knowledge of the auditor, the overall quality of the energy report, and the credibility of the recommendations. Note that anomalies emerge as the level of analysis becomes more detailed and, consequently, are based on sample sizes that produce more uncertainty with respect to the results.

We also see that the follow-up phone call for the On-Site audit had a moderate impact on the participants' decisions to install equipment, while for the Phone audit the impact was much smaller.

Of course, the most important indicator is whether the follow-up phone call produced an increase in the rate at which participants adopted energy efficient measures. Here, when thinking about the impact of the phone follow-up on participants, regardless of the type of audit they received, the follow-up call had a positive impact. For customers who received a follow-up call, the odds of installing an efficient measure are 1.7 to 2.4 times the odds for customers who did not receive a follow-up call. When the On-Site and Phone audits are examined separately, we see a small positive impact for the On-Site audit and a moderate positive impact for the Phone audit. For lighting, impact indicators show that the effect was very large and positive for the On-Site audit but small and negative for the Phone audit. For cooling, the effect was small and positive for the On-Site audit but very large and positive for the Phone audit. Thus, overall, the follow-up phone call appears to have had a positive impact.

8. RECOMMENDATIONS

This chapter presents recommendations stemming from the 2002 Audit Program evaluation. Recommendations are presented in coordination with supporting study findings. The chapter is organized into the following three sections:

- Program implementation considerations

- Program tracking system improvements

- Evaluation suggestions

8.1   PROGRAM IMPLEMENTATION CONSIDERATIONS

This section presents considerations for adjustments in program format and implementation. The information presented in this section is meant to serve as guidance for program managers and planners, and requires their direct input prior to any further action.

- Program managers, customers and evaluation results all indicate that the on-site audit is the most successful delivery mechanism offered through the Audit program, in terms of both customer satisfaction and post-audit measure adoption. However, this evaluation did not investigate the cost effectiveness of each delivery mechanism. Cost effectiveness will be investigated in future evaluations, as the program settles and matures out of its transition period. The following are some of the elements of the 2002 Audit program that were found to be most effective.

  - The SoCalGas on-site audit is very successful at encouraging gas appliance adoptions, and also at referring a large portion of their audit customers to the incentive programs. The SoCalGas on-site Audit implementation is a good example of the benefits of a strong link between the Audit and incentive programs.

  - PG&E had great success in 2002 with hard-to-reach customers, not only recruiting many into the program, but in successfully gaining customer implementation of recommendations.

  - The SCE MCD[1] on-site audits, which are directed at large customers, have very solid impact results and present a broad portfolio of recommendations appropriately customized for larger customers.

  - SCE marketing efforts with Community Based Organizations (CBOs) appear to be very effective.

- Although a solid case has been made for the allowance of differences in program delivery across the state, the program may benefit from more integrated use of best

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[1] Major Customer Division

statewide practices. An optimal tool can possibly be developed drawing on the best characteristics from each IOUs' audit instruments, particularly with regard to the on-site audit where more differences remain. This is an issue that should be re-examined in the 2003 EM&V effort.

- As discussed in Chapter 5, there are many readily observed differences in on-site audit report emphasis across the 4 IOUs. These differences provide an example of the need to establish best practices for audit reports, and eventually incorporate those findings into greater consistency across IOUs and delivery channels, where appropriate.

- For example, a key difference between audit reports is that some delivery channels and IOUs provide customer benchmarking results (for example, vs. a typical customer falling under the same business type) or an estimate of energy use breakdown by equipment type and/or end-use. The value of providing benchmarking results vs. direct energy efficiency recommendations should be assessed and a consensus drawn on the best way to proceed to ensure the IOUs implement in a consistent manner those elements and delivery channels that are found to lead to the highest and most cost-effective energy savings.

- Furthermore, the on-site audit reports present findings using a wide variety of formats, spanning handwritten reports, to highly technical sections involving detailed calculations of energy savings expectations for a given recommendation, to relatively polished marketing brochure-like "images" of the target technology. Comparing and contrasting the current audit reports prepared by the IOUs could help develop the best, blended product. There may be an evaluation role in such an effort, as discussed later in this section.

- It is recommended that the link between the incentive programs continue to be promoted through the Audit program, and that new strategies to further strengthen that link be considered.

    - Customers who received an audit but did not implement its recommendations mentioned lack of money as the main reason they did not take action, particularly for those who received recommendations about changes to gas appliances and cooling equipment. This finding again underscores the need for clear links from the audit program to incentive programs.

    - SoCalGas uses a strategy where they require Audit program participation before a customer can participate in the Express Efficiency program. The other IOUs should consider this and other strategies to strengthen cross-program links.

- While many program success stories are presented in *Chapter 4*, the utilities should spend more time extracting societal value in energy savings from participants once they are drawn into the program. The program design needs to emphasize downstream participant assistance to obtain that goal, especially among the hard-to-reach. If the utilities continue to emphasize HTR, it is recommended that more sophisticated follow-up mechanisms be used to enhance downstream energy savings. More assistance is needed to help time-deprived HTR customers adopt energy-efficient measures and practices. For example, the SCE cold call (door-to-door) audit is a prime candidate for a

follow-up program. These audits have proven successful as a low-hurdle approach to reaching HTR goals, but do not show substantial posterior energy savings.

- While the exact follow-up approach(es) that should be used are not known at this time, the customer need is clear, as is the fact that additional program energy savings will come from such efforts. At this time the utilities should consider a number of follow-up pilots, preferably in a coordinated effort with evaluators, to better serve participants and yield greater program effects.

- One mechanism for consideration would be a campaign of re-delivering audit reports to participants about 1 year following participation, serving as a reminder, possibly in conjunction with other marketing outreach, such as Express summer sales.

- Chapter 7's evaluation of the current PG&E follow-up program demonstrates positive impacts on customer satisfaction and likelihood of high efficiency equipment adoption. Assuming sufficient budgets, there are several improvements to follow-up efforts that could be considered:

  - Increase the goals for the number of follow-up calls for the Phone and On-Site audits.

  - Expand the use of follow-up calls to the other audit types.

  - Obtain more information from participants during the follow-up call so that a more thorough analysis could be conducted regarding the barriers to installation. Such an analysis could result in tailoring different types of follow-up support to different types and classes of customers. For example, it could turn out that large customer need the least assistance since they are more sophisticated regarding energy matters and in many cases already have the support of utility account representatives. It might be that smaller customers need the most assistance particularly with understanding the payback on recommended measures and applying for rebates. Tailoring the audit to various customer types and classes combined with the target marketing of audits should help to better meet customer needs and increase rates of adoption.

- The cost effectiveness of the CD-ROM audit should be re-evaluated to optimize its use.

  - Little is known about the impacts and cost effectiveness of the CD-ROM Audit tool. The year 2002 was the first year that the CD-Rom was implemented—and most IOUs released the CD-ROM late in the year, so results in this evaluation are preliminary. The CD-ROM is considered by some program managers and staff to be somewhat outdated given the considerable growth in online access in recent years. In addition, this is the only delivery channel where accomplishments are measured with respect to delivery of the tool to the customer, rather than tracking based on audit completion and therefore recognition that a customer has obtained a list of recommendations.

- Another important area for program improvement surrounds participant-reported usefulness of the audit report, which scored much lower than other "program element" categories such as the quality of the report and the technical knowledge of the auditor.

- When small facilities were asked whether they would prefer to receive simple energy saving tips or information on potential equipment retrofit projects, those customers overwhelmingly prefer simple tips, nearly 60 percent of the time. Medium and large customers, on the other hand, favor equipment retrofit information about 60 percent of the time.

- Similarly, when asked about reasons for low satisfaction scores larger customers would like more customized recommendations and more technically sophisticated reports, while smaller customers are looking for simpler language and more cost-effective recommendations that are less expensive and/or have shorter payback.

- This evaluation, especially the results presented in *Chapter 4*, provides valuable insight into the potential development of an optimal mix of recommendations by end-use and technology for various segments of the customer population, with important consideration regarding the customization of those measures. This poses, however, a difficult balancing act between an emphasis on sure-fire (lighting, for example) measures and the more specific needs of a given segment of the population. Recall that the lighting end use provides the strongest evidence of program impacts of the four end-use categories (and conservation measures) examined in this report. While, on the other hand, the gap analysis (Section 4.4) provides ample evidence that there is a need for additional end-use diversification, especially when reaching out to industrial customers or businesses with a specialized end-use portfolio, like restaurants.

  - It is recommended going forward that utilities store a record of audit-based recommendations in their tracking systems to support further gap analysis and other impact-related objectives. Additionally, to the degree possible, this should include data supporting the extent of each recommendation (i.e., equipment capacity) and the expected savings from a full implementation of each recommendation.

  - End use distribution of audit recommendations presented in *Section 4.4* reveal little distinction between the PG&E[2] phone and on-site audit reports. The on-site audit recommendations should be distinct in character from the Phone audit, revealing the additional customization available to the on-site professional auditor.

- The On-Site instrument should continue to be directed at larger facilities to emphasize recommendations that are customized and sophisticated. Small customers express little need for specialized recommendations, thus on-site audit are less appropriate for them.

  - The SCE MCD audit, directed at larger customers, and shown to be an effective delivery channel in *Chapter 4*, has a broad scope of recommendations, and evidence of appropriate customization across size and business type. This type of audit together with the larger target customer group is a more appropriate use of on-site resources.

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[2] Recommendation data was available for PG&E phone and on-site audits, and SCE MCD audits only. PG&E recommendation data reflects *only* the small/medium company on-site and phone audit. PG&E offers a very sophisticated large company on-site audit with highly customized recommendations, but the data regarding these audits was not available for this evaluation.

- The remote audits (CD-Rom, online, mail, phone) should be continued, particularly with follow up components and referrals to rebate programs. In this fashion, the remote audits produce effects nearly comparable to those of the on-site audits. .

- It is recommended that consideration be given to dropping the CPUC's mandated three-year eligibility rule, that does not allow customers to participate again in the Audit program within 3 years. This recommendation is based on the relatively high personnel turnover rates and poor participant recall of the Audit (discussed in *Chapter 6*) together with the availability of multiple Audit delivery mechanisms. A much shorter interval of one year is more appropriate. Also, allowing customers to obtain energy efficiency information from more than one delivery channel within a given program year should be allowed.

- Consideration should be given to the strategy of incorporating other measures of accomplishment in addition to the number of completed audits to be able to continuously enhance the energy saving impacts of the NR Audits. For example, set goals and track accomplishments using measured downstream implementation of energy efficiency practices and measures will likely enhance post-audit follow-through activities and participant adoptions. Goals based on the implementation of Audit recommendations could be tracked in tandem with the current practice of measuring goals with respect to audits completed.   Such an effort would require an implementation and tracking strategy that more closely mirrors the Industrial Assessment Center (IAC) program, where recommendation implementation rates are tracked downstream of the audit report[3].

- To ensure that program goals are met, marketing of Audit services is an important program activity, and one that is commendably emphasized by each of the IOUs. There is a need for the utilities to consider, test and verify the audit marketing channels that are most effective. For example, SCE is most active in conducting marketing during various outreach events (and through press releases), often involving partner community-based organizations (or CBOs). PG&E has taken the lead in audit training, which the other utilities are now incorporating within their audit program portfolios.

  – However, it is unclear in these SCE and PG&E marketing pilot examples (and in other program decisions) if full consideration was first given to the cost-effectiveness and/or likelihood of substantially impacting the energy efficiency marketplace.

  – Related to this, more careful consideration is at times warranted by the CPUC before handing down decisions to the utilities. For example, PG&E was the first of the IOUs to become involved in auditor training, prior to the 2002 program. The CPUC instructed the other utilities to run similar training programs in 2002, and so they did. As mentioned in the upcoming evaluation section, real-time evaluation, during program implementation, might better inform policy in the future, especially where

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[3] For more information on the IAC program and recent efforts to measure long-term effects and influence, refer to the 2003 IEPEC Conference Proceedings: Study of Energy Savings Generated by Clients of the Industrial Assessment Center Program.

pilot efforts are being implemented. The idea here is to first measure the value of pilot efforts and then modify policy where warranted.

8.2   PROGRAM TRACKING SYSTEM IMPROVEMENTS

The utilities and their vendors use a variety of tracking system tools to establish program accomplishments and, in some cases, track data on the recommendations made as part of each energy survey. As documented in Section 5.2, data tracking is both inconsistent across the utilities and, in some cases, incomplete. A well-planned program tracking system will provide for better program management and real-time evaluation, as well as meeting a variety of important downstream measurement and evaluation needs.

Going forward it is recommended that the utilities maintain more consistent and complete tracking system records, especially with regard to account numbers, business names, contact names and contact phone numbers. Furthermore, storing the energy efficiency recommendations that are made in each customers Audit report provides a valuable record for use in downstream impact assessments and improvement to future efforts.

- A severe shortcoming in the tracking systems affecting all four utilities (for at least one program delivery channel) is lack of account numbers or other unique premise identifiers. Due to lack of account numbers in the tracking system, a reasonable merge key was not always available to assess the frequency with which Audit participants go on to participate in the Express and SPC programs (and vice versa). This is an important element of the Cross-Program Assessment of this evaluation, reported in a separate deliverable. Account numbers are also essential for performing billing analysis, which could prove a valuable evaluation tool for this program in the future.

- For certain delivery channels (and utilities) the tracking systems did not store key contact data including business name, address, contact name and phone number. These data are crucial for successful outreach to the participant population and for ensuring samples that best represent the participant population. For this particular evaluation, the resulting evaluation samples are most representative of the utilities that kept detailed participant records, leading to an evaluation result that does not best represent participation overall.

- The on-site, mail and phone surveys all require a two-step process involving the collection of relevant customer information and the subsequent processing of those data to produce a set of energy efficiency recommendations and a customized energy management report. Each of these delivery channels has the capability of supporting downstream tracking of accomplishments.

- The online survey faces a relatively difficult situation with regard to accurate program tracking. Currently users are only required to enter their e-mail address, providing no solid link back to the customer that uses the tool. A large portion of the audit program is delivered through the online mechanism, thus there is a significant need to establish a solid link back to the customer using an account number or other premise tracking code. The use of such a code, with software upgrades, would further allow the use of customer billing records to calibrate Audit model savings expectations and other

relevant online results, as well as supporting a multitude of both real-time and downstream evaluation needs and customer follow-up efforts.

- – If the IOUs believe that collecting account numbers as part of the online audit is simply untenable, a second choice evaluation approach would be to analyze patterns of user behavior on the web-site, as well as the use of online "pop-up" customer surveys. This approach to survey data collection, however, has some problems: 1) it is subject some response bias, 2) segmentation would be self-reported, and 3) there is still no link to an account number so no bill analysis or verification activities could take place downstream.

- CD-ROM survey tracking faces unique challenges. The CD-ROM is either sent to customers by mail, or handed out during an outreach event where a business card is collected from the recipient. A database of all available tracking data, including this business card information, should be maintained carefully. However, there still remains the challenge of associating account numbers with CD-ROM participants. No easy solution has yet been identified.

- The Audit utility tracking systems do not always record specifics regarding the energy efficiency recommendations that are provided to each customer in the Audit report. Of interest to the program managers and evaluation are statistics on the recommended technology, the existing technology, the capacity of equipment, the number of units, hours of operation, load factors, etc. Furthermore, Audit reports sometimes include estimates of the usage distribution by end-use (or specific equipment) and/or the equipment inventory is recorded, which could also be included in the tracking system for downstream use. To the extent possible, tracking systems should seek to record details regarding the recommendations made and other relevant data concerning a given customers' energy use, such as equipment inventory. The only delivery mechanism used by the IOUs that is poorly adapted to tracking is the CD-ROM; there is probably no reasonable solution to this dilemma.

Another tracking system review that the IOUs should consider is an examination of how complete customer-specific information is for marketing outreach efforts that are completed. While outside of the current evaluation scope, it would be useful to follow-up with various groups of customers that were approached using a variety of Audit marketing methods, in an effort to assess customer response(s) to various marketing messages and methods. Furthermore, with appropriate merge variables, such as account number, populated in the marketing and Audit tracking systems, a merge of these two datasets would quickly provide quantitative evidence of the marketing efforts that work best or possibly those that are most cost-effective. Ultimately the point here would be to identify best practices and provide the utilities with recommendations regarding upcoming marketing efforts. While evidence of marketing effectiveness, such as spikes in program participation were noted by program managers in *Section 5.1*, an evaluation of marketing channels might yield additional insight On the cost-effectiveness of these among various customer segments, and ultimate EEMs adoptions.

8.3   EVALUATION SUGGESTIONS

The recommendations for Audit program evaluation activities revolve around the belief that audit program success can be greatly influenced by real-time evaluation of the program, while seeking prospective improvements, including recommendations for program adaptation during implementation. Real-time refers to the Northwest Energy Efficiency Alliance (NEAA) model sometimes referred to as Adaptive Management. Also, there is a need within the program to characterize best practices Statewide (and beyond) in program implementation and tracking, providing more consistency and higher quality in Audit delivery, Audit reports and program tracking. This would emphasize the use of program components that work best.

The evaluators in this model are an integral member of the program team, seeking to objectively observe inner-program workings, while testing innovative hypotheses on a real-time basis. NEEA has used this approach successfully over the years. While real-time evaluation should not replace retrospective evaluation needs, the Audit program would best be served at this time by such a model. Specific evaluation objectives that should be addressed using this model are described in more detail below.

On-site audit delivery across the state is based on a wide variety of approaches and the resulting audit reports vary substantially in content and format. It would likely pay great dividends for an evaluator, in conjunction with the utility program managers, to compare and contrast delivery procedures and the current reports (now being used across the state), to assess their strengths and weaknesses, and develop the best blended product, with further consideration of innovation. While not included within the scope of this evaluation, a brief examination of audit reports yields the following relevant examples of current practices and differences:

- SCG on-site audits spend considerable time estimating use by equipment and offer only ranges of savings for most recommendations. Recommendations are normally low cost/no cost practices rather than equipment-based measure upgrades.

- The on-site hard copy audits that we examined as part of this evaluation, often do not include relevant impact information that would have been very useful, if populated, in the impact assessment described in *Section 4.2*. For example, equipment capacity information related to a given measure was often not included in the hard copy forms.

- SCG hard copy on-site audits provide recommendations for gas measures only, but why not also provide recommendations for electric savings? However, contrary to this observation from the hard copy audits, participants that were interviewed often cited electric savings recommendations. This implies that the auditors do provide verbal electric savings recommendations but do not record that information in the audit report.

- Similarly, the electric utilities should do a better job of identifying and making gas recommendations during audits. Observed recommendations in both the hard copies and tracking systems were very electric-centric.

Evaluation research is also needed to systematically examine the effectiveness of Audit program marketing. The first step, if not already in place, would be for the utilities to actively track marketing campaigns, as discussed at greater length in Section 8.2 above.

Lastly, research is needed to assess and accept and/or reject various follow-up methods, approaches and hypotheses prior to implementation of additional pilot efforts. The evaluation of PG&E's 2002 follow-up program presented in Chapter 7 suggests the approach is effective, but the sample size upon which conclusions are drawn is limited. A similar evaluation effort on a larger scale would add more clarity and substance to these findings. This and other follow-up evaluation efforts would serve to inform the societal value and cost-effectiveness of intervention downstream of the audit, for use in program design updates.

As for retrospective evaluation needs, substantial additional work is needed to measure full Audit program impacts.

- First, given data constraints in this evaluation, it was only possible to measure impacts for the lighting and cooling end uses. While this evaluation has shown evidence of program impacts in other end-use categories[4] (and possibly for conservation practices), data available in the program tracking systems, hard copy audit reports and telephone survey data did not adequately support an assessment of impacts. In short, the impact estimates provided in this report are very conservative.

- Second, this evaluation was not able to measure impacts for the CD-ROM and Online audit delivery channels, which is an important objective that still needs to be addressed. What is the impact-based value to society for energy efficiency information delivery using those channels? In this case, inadequate participant contact data made it difficult to contact an adequate number of CD-ROM and Online audit participants, leading to a gap in the evaluation impact results for the program.

- Third, consideration should be give to examining program impacts using billing regression analyses.

- Fourth, measurement of net impacts for the program is needed, through the derivation of a net-to-gross (NTG) ratio, therefore accounting for free-ridership and spillover. Past NTG findings are unlikely to be applicable today, given the programs emphasis on HTR participation.

  – To measure the relative influence of competing forces on a customers decision to adopt a measure or practice, a logit model could be developed that allocates portions of energy efficiency adoptions to each influencing force, such as rebates, the audit program, Flex-your-Power and other media or incentive programs. This is an objective way of separating program from other effects and allows self-report data analysis to serve as a secondary and complimentary information source.

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[4] Program impact indicators, for example, suggest adoption rate differences in the participant and nonparticipant populations, and likely program impacts in other segments/end uses.

Quantum Consulting Inc.   *8-9*   *2002 Statewide Nonresidential Audit Evaluation*
Recommendations