

**2003 STATEWIDE NONRESIDENTIAL
AUDIT PROGRAM EVALUATION**

Study ID# PGE0206.01

March 1, 2005

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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As part of its Customer Energy Management Programs, Pacific Gas and Electric Company (PG&E) has engaged consultants to conduct a series of studies designed to increase the certainty of and confidence in the energy savings delivered by the programs. This report describes one of those studies. It represents the findings and views of the consultant employed to conduct the study and not of PG&E itself.

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***2003 STATEWIDE NONRESIDENTIAL AUDIT PROGRAM
EVALUATION***

FINAL

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TABLE OF CONTENTS

Section		Page
1	EXECUTIVE SUMMARY	1-1
	1.1 Program Description	1-1
	1.2 Program Accomplishments	1-2
	1.3 2002 Program Developments	1-2
	1.4 Evaluation Objectives	1-2
	1.5 Evaluation Findings	1-3
	1.6 Program Implementation Recommendations	1-24
	1.7 Program Tracking System Improvements	1-29
	1.8 Evaluation Suggestions	1-29
2	INTRODUCTION	2-1
	2.1 Overview of the Audit Program	2-1
	2.2 Study Objectives	2-7
3	STUDY METHODOLOGY	3-1
	3.1 Overview of Study Approach and Data Collection Strategy	3-1
	3.2 Sample Design	3-3
	3.3 Analysis Weights and Segmentation Scheme	3-9
	3.4 Impact Approach	3-19
	3.5 Key Findings	3-26
4	IMPACT ASSESSMENT	4-1
	4.1 Participant Measure and Practice Adoption	4-1
	4.2 Audit Program Gross Impacts	4-40
	4.3 Influence of the Audit on Equipment and Practice Adoptions	4-47
	4.4 Key Findings	4-57

5	PROCESS ASSESSMENT	5-1
5.1	Program Tracking Assessment	5-1
5.2	Program Awareness and Sources of Awareness	5-7
5.3	Participation Drivers	5-12
5.4	Audit Program Satisfaction and Usefulness	5-14
5.5	Suggestions for Program Improvement	5-25
5.6	Market Effects	5-26
5.7	Cross-Program Elements	5-30
6	ON-SITE AUDIT BEST PRACTICE ASSESSMENT	6-1
6.1	Key Findings	6-1
6.2	Approach to Evaluating On-Site Audit Best Practices	6-4
6.3	Discussion of Current Practices	6-8
6.4	Best Practice Conclusions	6-18

Appendix

APPENDIX A: SMALL AND VERY SMALL CUSTOMER SURVEY RESULTS	A-1
APPENDIX B: MEDIUM AND LARGE CUSTOMER SURVEY RESULTS	B-1
APPENDIX C: OTHER MISCELLANEOUS EQUIPMENT ADOPTIONS	C-1
APPENDIX D: PY2002 NRA STATEWIDE TRACKING DATA SUMMARY	D-1
APPENDIX E: SMALL AND VERY SMALL PARTICIPANT SURVEY INSTRUMENT	E-1
APPENDIX F: SMALL AND VERY SMALL NONPARTICIPANT SURVEY INSTRUMENT	F-1
APPENDIX G: MEDIUM AND LARGE PARTICIPANT SURVEY INSTRUMENT	G-1
APPENDIX H: MEDIUM AND LARGE NONPARTICIPANT SURVEY INSTRUMENT	H-1
APPENDIX I: PROGRAM MANAGER INTERVIEW GUIDE	I-1
APPENDIX J: REFERENCES	J-1
APPENDIX K: GLOSSARY	K-1

1. EXECUTIVE SUMMARY

This section provides a synopsis of the background, objectives, key findings and resulting recommendations associated with the evaluation of the 2003 Statewide Nonresidential Audit Program. Readers would greatly benefit from a review of the 2002 Statewide Nonresidential Audit Evaluation¹, which in many ways is the foundation on which this report was built.

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

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

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.

¹ http://www.calmac.org/publications/2002_Statewide_Nonres_Audit_Report.pdf

Based on the 2003 fourth quarter report, each of the IOUs met their survey complete goals, with PG&E and SCE substantially exceeding goals. Exhibit 1-2 below shows the goals and accomplishments of each IOU for total participation and HTR participation. Statewide the utilities completed 29,744 audits in 2003, exceeding goals by 32%.

*Exhibit 1-2
2003 Nonresidential Audit Participation Versus Goals*

	Total Participation		Hard-to-Reach Participation	
	Q4 Report	Goals	Q4 Report	Goals
PG&E	11,865	6,500	9,059	3,500
SCE	8,533	7,100	3,963	2,840
SDG&E	5,063	5,000	2,621	800
SCG	4,283	4,000	475	400
Total	29,744	22,600	16,118	7,540

1.3 2003 PROGRAM DEVELOPMENTS

The IOUs moved in several new directions with the 2003 Nonresidential Audit program—trends that have continued in 2004. These trends include following up with audit participants, utilizing new technology to enhance data capture and audit reporting, and changes to program delivery.

- In 2002, PG&E was the only IOU doing follow-up. By 2004, all the IOUs follow-up with customers that receive audits, either in person or by telephone. Follow-up efforts are concentrated on helping customers follow through with the rebate programs.
- SCE began offering wireless on-site audits for small customers in 2003. With the new wireless technology, an auditor takes a hand-held computer device to a site, enters pertinent site information, and is able to generate an Audit report instantly. Other IOUs are following suit in 2004 by testing wireless devices. This approach has multiple advantages including gains in efficiency, and greater customer follow through to the Express Efficiency program.
- The IOUs have been experimenting with door-to-door delivery methods (with the exception of SDG&E, who stopped doing door-to-door audits). A ‘door-to-door’ delivery consists of an auditor canvassing small businesses, and offering to perform an energy audit for free.

1.4 EVALUATION OBJECTIVES

This Study is designed to support both impact-related and process-related objectives, and to provide guidance to optimize program value. There are five main study components, each with their own set of key objectives. These components and their individual objectives are shown below.

The **Impact Assessment** has two primary, distinct components. The first component is a first year program impact assessment that focuses on small and very small customers only. The second component is a second year program impact assessment for medium and large customers.

- The first year impact assessment for small and very small customers provides program impact analysis results for small (20 – 100 kW) and very small (<20 kW) PY 2003 participating customers. Objectives include documenting program-related energy efficiency actions and estimating energy and demand savings attributable to the program.
- The second year program impact assessment for medium and large customers measures program-related energy efficiency actions taken over the first two years following the Audit. This study component measures participant impacts for medium (100 – 500 kW) and large (more than 500 kW) on-site Audit customers. The longer time window provides time necessary for customers to implement more complex measures such as industrial process retrofits.

The **Process Assessment** includes both a tracking system assessment, and the evaluation of implementation-related program elements.

- The Tracking System Assessment verifies program audit completes by delivery channel versus goals with an emphasis on changes and improvements in tracking systems relative to PY 2002.
- The remainder of the process assessment centers on the evaluation of implementation-related program elements, such as participant satisfaction, reasons for participation, and the usefulness and practical roles of the Audit.

The **Best Practices** assessment centers on a review of current (program year 2004) on-site audit tools and reports. The assessment provides up-to-date, prospective recommendations for the best approach to on-site audits for various customer size classes.

1.5 EVALUATION FINDINGS

Participant Adoption of Energy Efficiency Measures and Practices

Energy efficiency measure and practice 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 customer size and end-use category.

This Evaluation finds strong evidence of program effects in the lighting, industrial process and cooling end-uses, as well as for conservation measures. There are also indications of program effects in some customer segments of the gas and other equipment end-uses.

Exhibit 1-3 below shows the small and very small customer adoption rates by end-use and efficiency level. The exhibit compares participant rates with those of nonparticipants. There are dramatic differences in adoption rates for efficient lighting and cooling, and a measurable difference in 'other' miscellaneous efficient equipment.

Exhibit 1-3
Small and Very Small Customer Adoption Rates by End-Use and Efficiency
PY 2003 Participants versus Nonparticipants

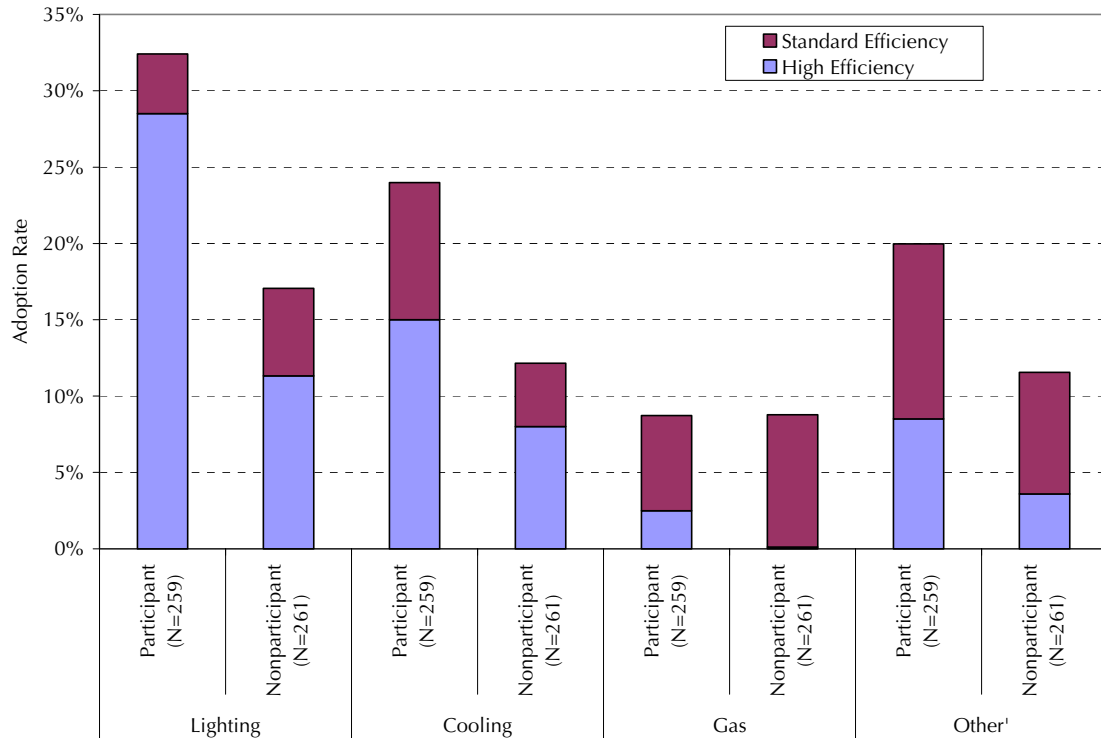
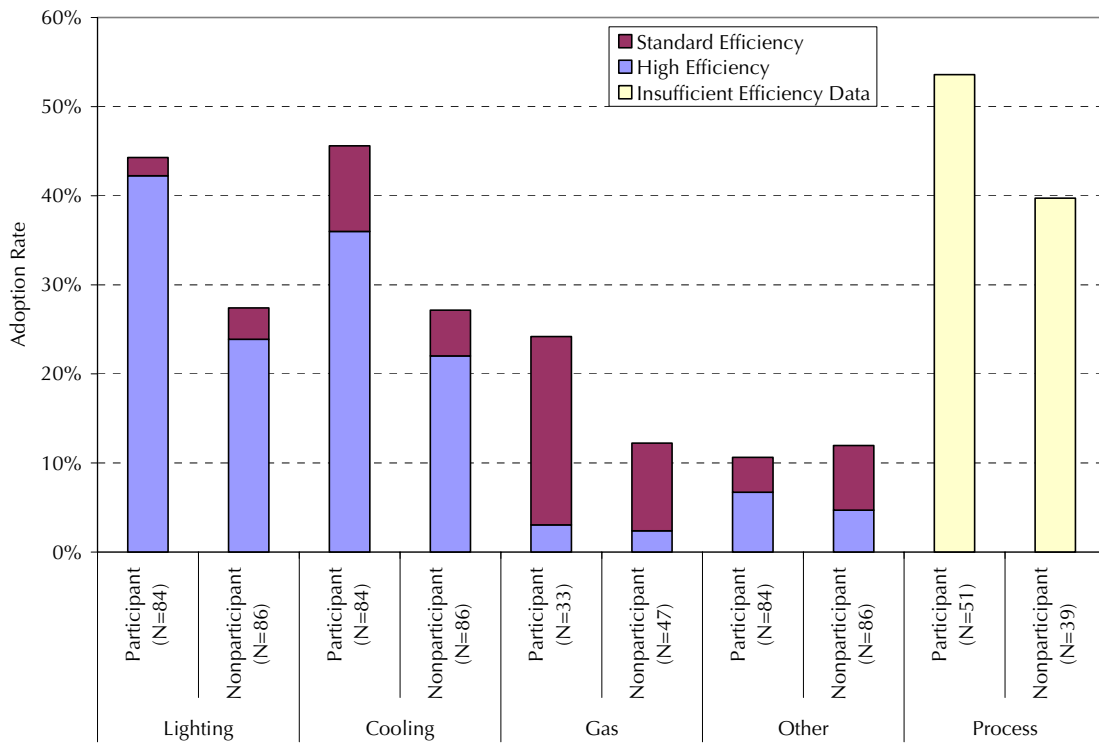


Exhibit 1-4 below shows the medium and large customer adoption rates by end-use and efficiency level², and compares those rates with nonparticipants. The exhibit shows marked differences in high efficiency adoption rates for lighting, and cooling. Although efficiency data is generally inconclusive for industrial process, the activity level is much higher among participants. . Note the sample sizes are small, especially for gas and industrial process. For this reason, results should be interpreted with caution.

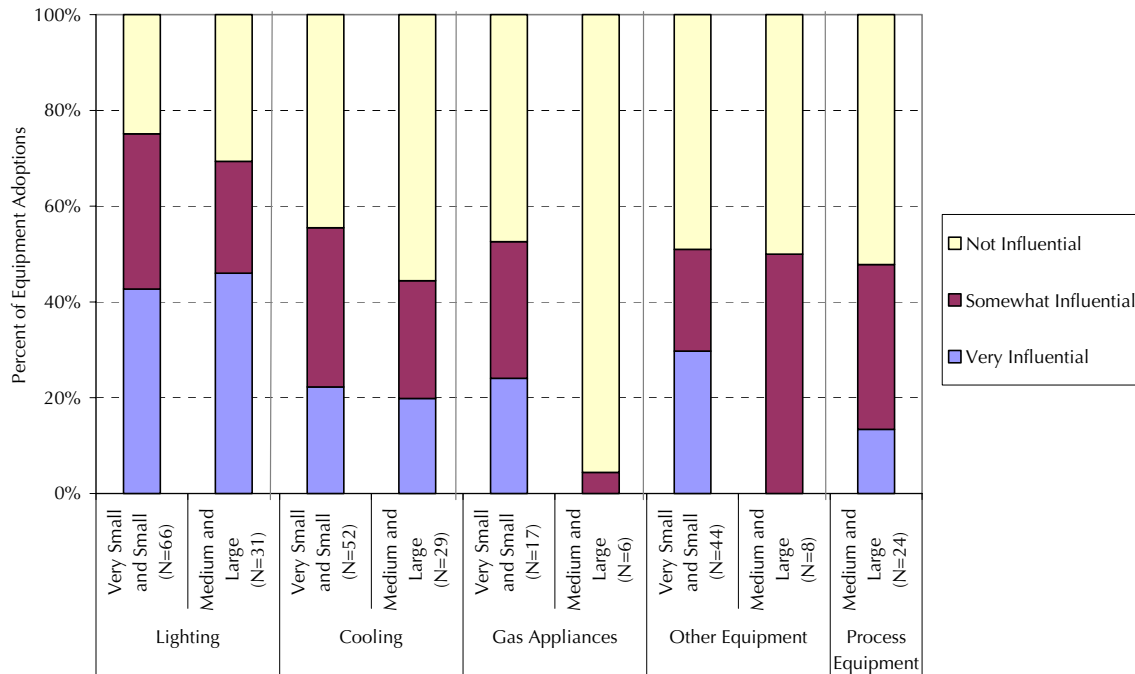
Exhibit 1-4
Medium and Large Customer Adoption Rates by End-Use and Efficiency
PY 2002 Participants versus Nonparticipants



² Efficiency data for industrial process adoptions was often inconclusive, resulting in too great a random component in the measure of efficient equipment adoption rates.

Exhibit 1-5 below shows self-reported levels of Audit influence on equipment adoptions by customer size and end-use. The exhibit provides further evidence of strong program effects within the lighting end-use, and measurable effects within the cooling and industrial process end-uses. The exhibit also supports the finding of program effects in the 'other' equipment end-use among small and very small customers.

Exhibit 1-5
Self-Reported Influence of the Audit on Participant Equipment Adoptions

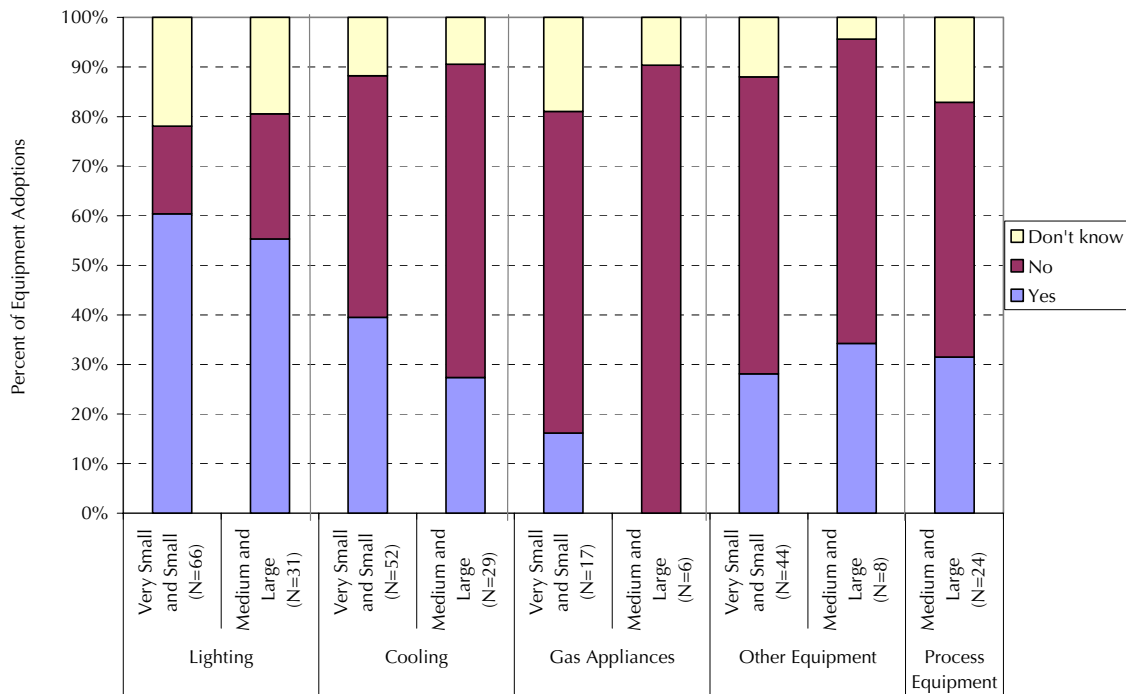


*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery

Another way to approach the issue of program influence on equipment adoptions is to measure the number of adoptions that were specifically recommended in the Audit report. Although by no means a complete measure of program influence, the association indicates a direct connection between the Audit report and customer actions. Participants were asked to self-report whether each reported equipment adoption was recommended in the Audit report. Exhibit 1-6 below shows participant responses to this question by end-use and customer size category.

The exhibit again confirms lighting as the end use with the greatest rate of customer follow-through in both customer size categories. Among small and very small customers, cooling follows lighting as the next most effective recommendation category. Forty-percent of small and very small participant cooling adoptions were specifically recommended in the report. Among medium and large customers, industrial process recommendations have a very strong result, with nearly one-third of adoptions specifically recommended in the Audit report.

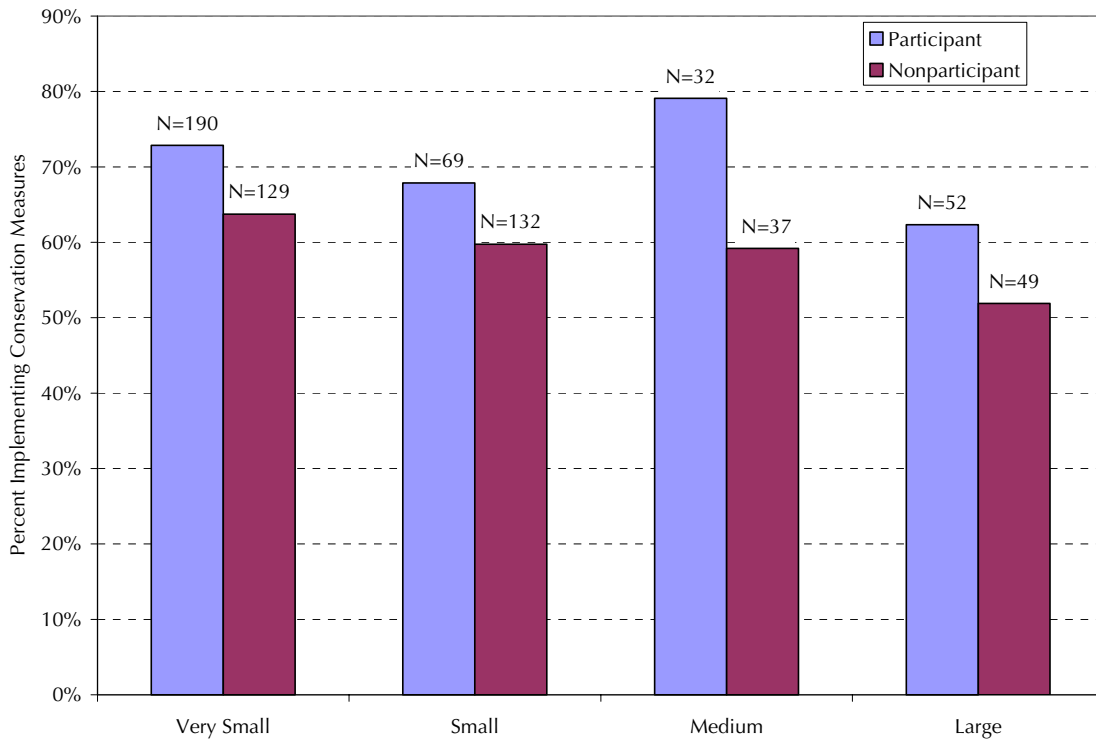
Exhibit 1-6
Equipment Adoptions Specifically Recommended in Audit Report
By Customer Size and End-Use



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Exhibit 1-7 below shows the rate of conservation measure implementation in the participant and nonparticipant populations by size. Participation in the Audit program is associated with higher levels of conservation in all customer size categories.

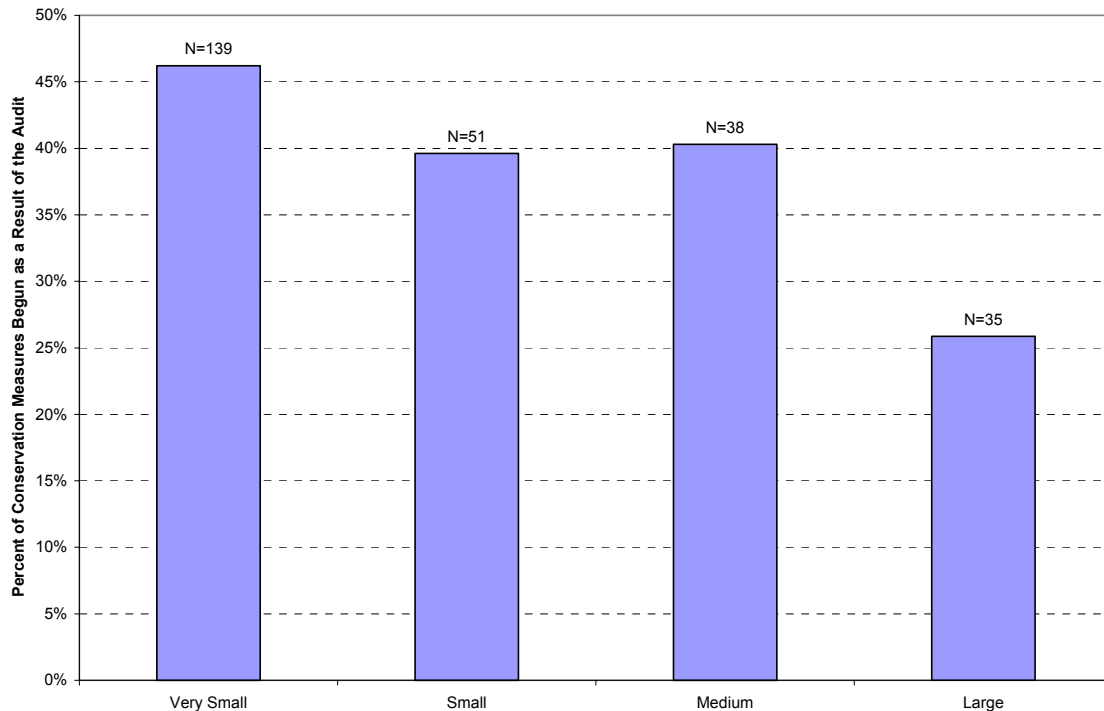
Exhibit 1-7
Conservation Measure Rates by Customer Size
Participants* versus Nonparticipants



*Note very small and small participants are PY 2003 and include all delivery mechanisms, medium and large participants are PY 2002 and on-site.

Exhibit 1-8 below presents further evidence that the conservation measure recommendations in the Audit are inspiring participants to begin conservation practices. This exhibit shows the percent of conservation measures that were self-reported to have been a direct result of Audit participation. Program effects range from 46 percent among the very small to about 25 percent for the largest customers.

Exhibit 1-8
Percent of Conservation Measures Begun as a Result of the Audit
By Customer Size



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Tracking System Assessment

Good program tracking is crucial to many M&E efforts directed at enhancing program delivery and a valuable tool for tracking program accomplishments versus goals. 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 customers' billing data. These components allow for more flexible, sophisticated and useful sample design and analysis techniques. Other critical elements of the tracking systems include contact names and phone numbers for the individual that completed the Audit. These provide the best possible contact information for completing participant follow-up and telephone surveys.

Exhibit 1-9 below summarizes tracking system content for program year 2003. All four IOUs have shown measurable improvements and commendable progress in the quality of their Audit program tracking systems between 2002 and 2004. However, work still remains in order to bring the statewide tracking to a uniform high quality. In both 2003 and 2004, account numbers

and phone numbers remain missing for between 20 and 30 percent of Audit participant records. Note that at least one IOU has an effective tracking system for each of the five delivery mechanisms. Thus, with time and guidance from successful IOUs, all tracking systems could become equally effective. This idea is discussed in more detail in the *Section 1.7, Tracking System Improvements* later in this Chapter.

Exhibit 1-9
Summary of 2003 Program Tracking System Contents
Statewide and by IOU

Audit Type	4th Qtr Report	Total Records	Records with Account Numbers	Records with Phone Numbers	Customer Contact Name	Account Numbers Successfully Merging to CIS
SCE						
Total OnSite	-	6658	6161	6492	6353	4767
Phone	-	231	231	230	231	140
Mail	-	608	96	222	315	45
CD-ROM	-	440	412	433	432	254
OnLine	-	596	237	382	530	81
Total	8533	8533	7137	7759	7861	5287
SCG						
Total OnSite	1314	1308	1308	791	1308	1299
Phone	1039	984	984	360	984	955
Mail	852	962	962	312	962	954
CD-ROM	521	600	0	483	581	0
OnLine	557	515	4	357	436	4
Total	4283	4369	3258	2303	4271	3212
SDGE						
Total OnSite	886	880	707	824	757	659
Phone	1720	1698	1697	1697	1698	1595
Mail	567	567	0	508	487	0
CD-ROM	1283	1270	0	1200	1148	0
OnLine	607	577	3	0	0	0
Total	5063	4992	2407	4229	4090	2254
PG&E						
Total OnSite	4370	4478	4440	4265	4478	3763
Phone	1303	1304	1303	1299	1304	1143
Mail**	1649	1649	331	301	294	252
CD-ROM	2515	2515	2508	2263	2515	2263
OnLine	2150	2150	0	0	0	0
Total	11987	12096	8582	8128	8591	7421
STATEWIDE						
Total OnSite	-	13324	12616	12372	12896	10488
Phone	-	4217	4215	3586	4217	3833
Mail	-	3786	1389	1343	2058	1251
CD-ROM	-	4825	2920	4379	4676	2517
OnLine	-	3838	244	739	966	85
Total	29866	29990	21384	22419	24813	18174

**For PG&E mail audits, account numbers, phone numbers and customer contact names exist, and therefore could be provided by PG&E upon request.

Marketing

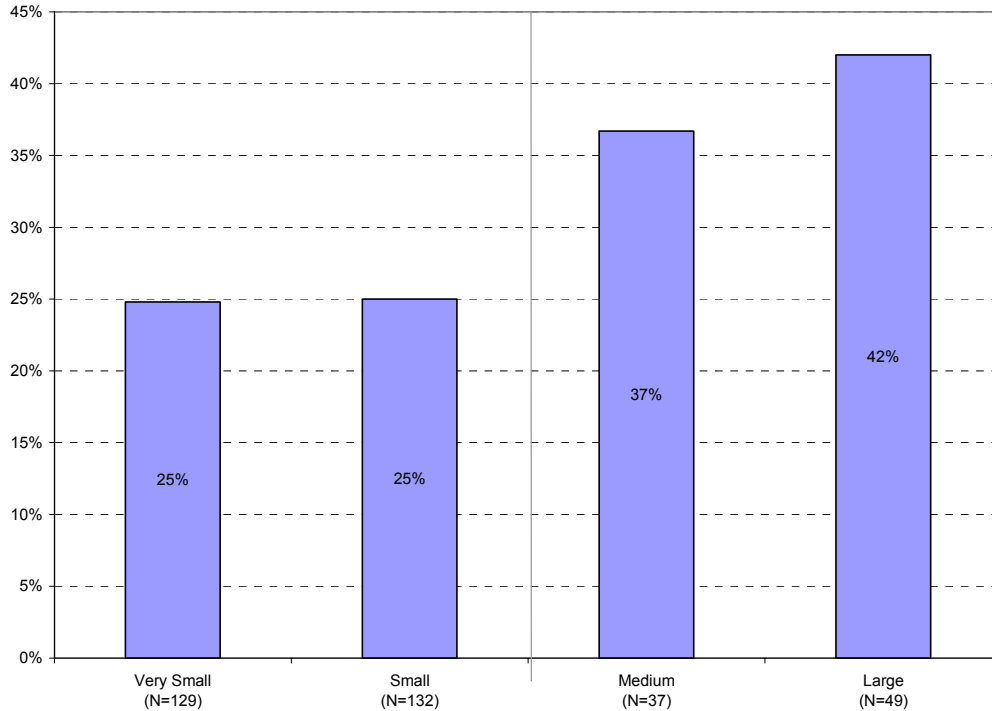
To ensure that program goals are met, marketing of Audit services is an important program activity, and one that is emphasized by each of the IOUs. A wide array of marketing methods are used, spanning direct mail campaigns, e-mail blasts, flyer distribution (and other marketing strategies) at outreach events, press releases, and newsletters. Exhibit 1-10 presents IOU marketing accomplishments that were obtained from the fourth quarter program status reports submitted to the CPUC.

Exhibit 1-10
Nonresidential Audit Program
Marketing Accomplishments

Utility and Marketing Efforts	Q4 Accomplishments
PG&E	
E-mail newsletter	37,000
Bill insert	1,250,000
Direct-mail outreach	3,000
Brochures	106,000
Direct-mail audit packages	30,000
Invitation to Audit training	25
Marketing materials to CBOs and Business Associations	525
Newsletter	47,000
SCE	
Direct-mail outreach	285,000
Press release	2
Brochures	46,300
Flyers and handouts	4,500
Outreach events	83
Direct-mail outreach	49,000
e-mail blasts	412,000
Newsletters	7,000
Chinese language signs	6
SDG&E	
CD-ROM	1,283
Direct-mail outreach	1,265
Direct-mail audit packages	60,163
Brochures	20,544
SCG	
CD-ROM	28
Bill inserts	230,000
Direct-mail audit packages	79
Flyers and handouts	733
Direct-mail outreach	98,042

A measure of the success of the marketing is customer awareness of the Nonresidential Audit program. As shown in Exhibit 1-11 below, the rates of awareness of the audit program are higher among the medium and large customer segments than among the small and very small customer segments, as would be expected. About one-quarter of small and very small nonparticipating customers are aware of the Audit program. Thirty-seven percent of medium size customers and 42 percent of large customers report being aware of the program.

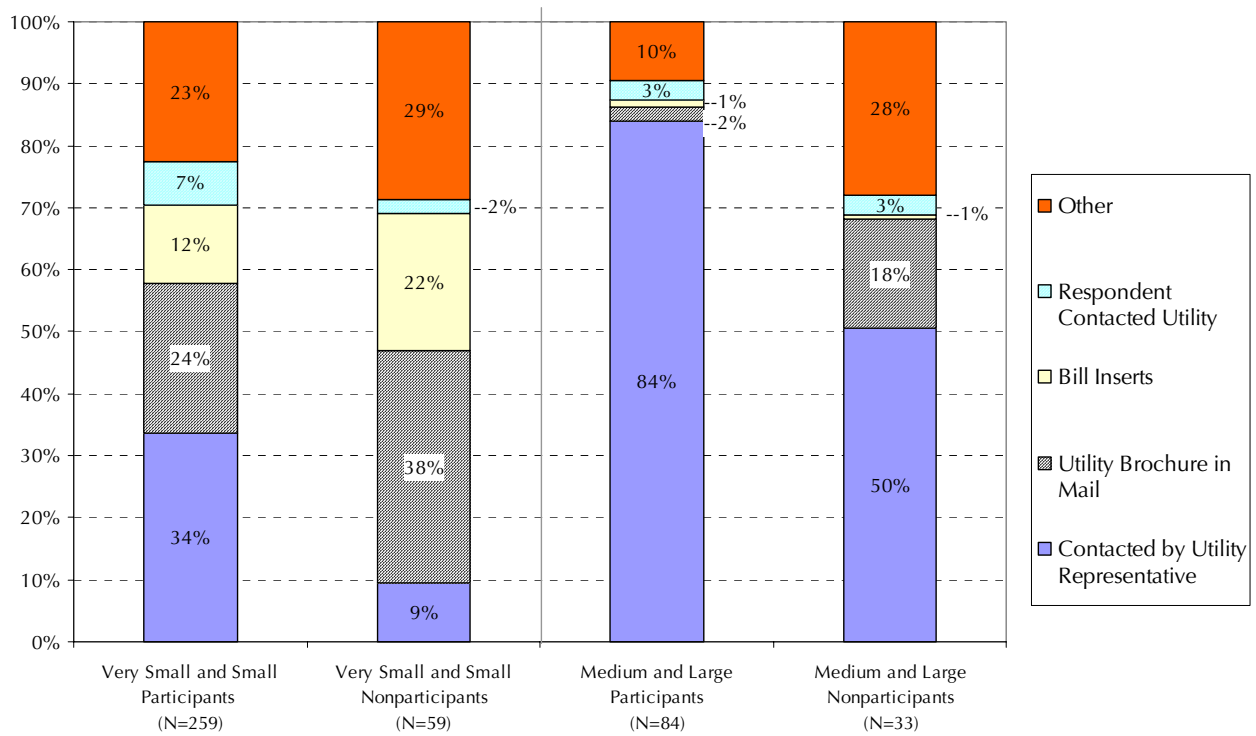
Exhibit 1-11
Rates of Audit Program Awareness in the Nonparticipant Population



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

As shown in Exhibit 1-12, awareness of audits in the nonparticipant population is driven by the IOUs, who account for about 70 percent of awareness through bill inserts, brochure mailings and utility representatives. Contact with utility representatives is a significant source of awareness among participants. Mail media (brochures and bill inserts) is effective among small and very small customers, but not very effective among medium and large customers.

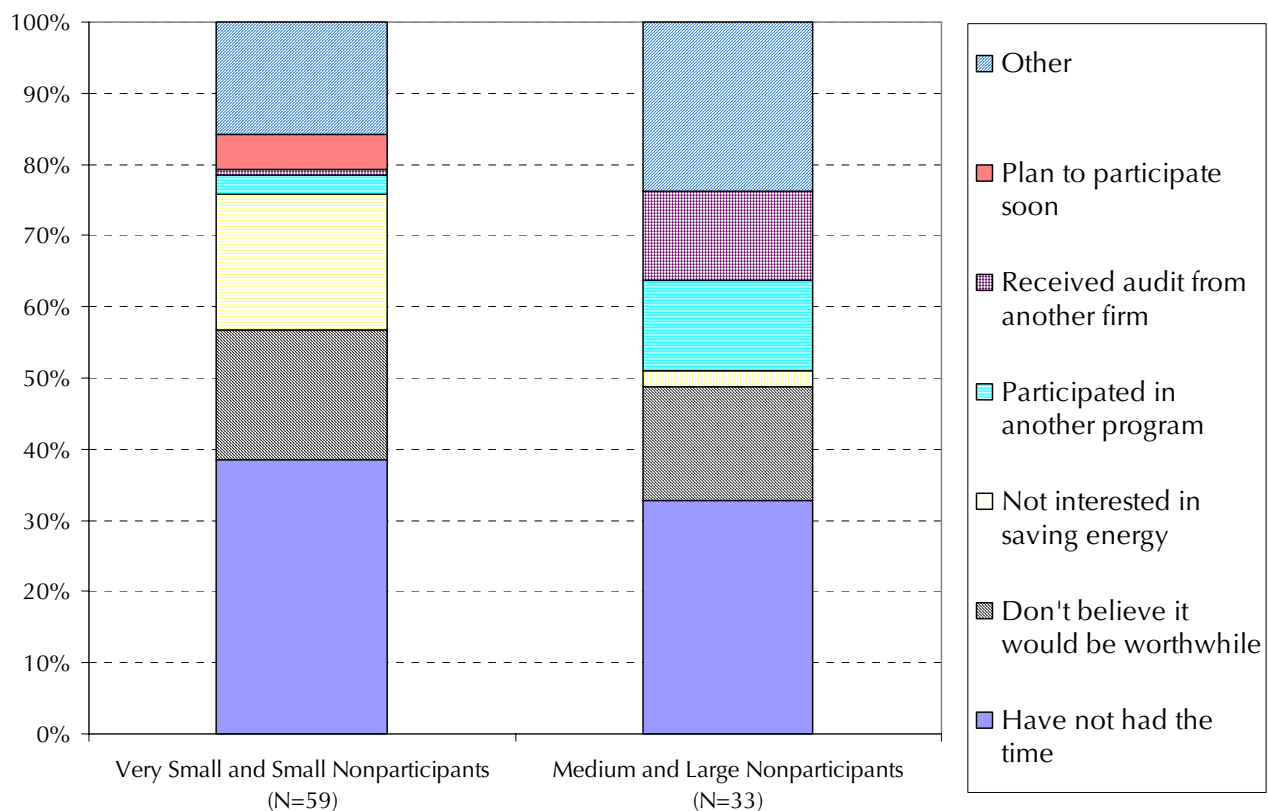
Exhibit 1-12
Sources of Program Awareness



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Nonparticipants that report being aware of the audit program were asked to report why they have not yet participated. Exhibit 1-13 shows the distribution of nonparticipant responses to that query. *Lack of interest* in energy efficiency appears to be a significant barrier to Audit participation for small and very small customers, but not for medium and large customers. Medium and large customers are much more likely to have received audit services from another firm—over 10 percent among medium and large customers versus less than 2 percent of small and very small customers.

Exhibit 1-13
Reasons that Aware Customers Have Not Yet Participated in the Audit Program



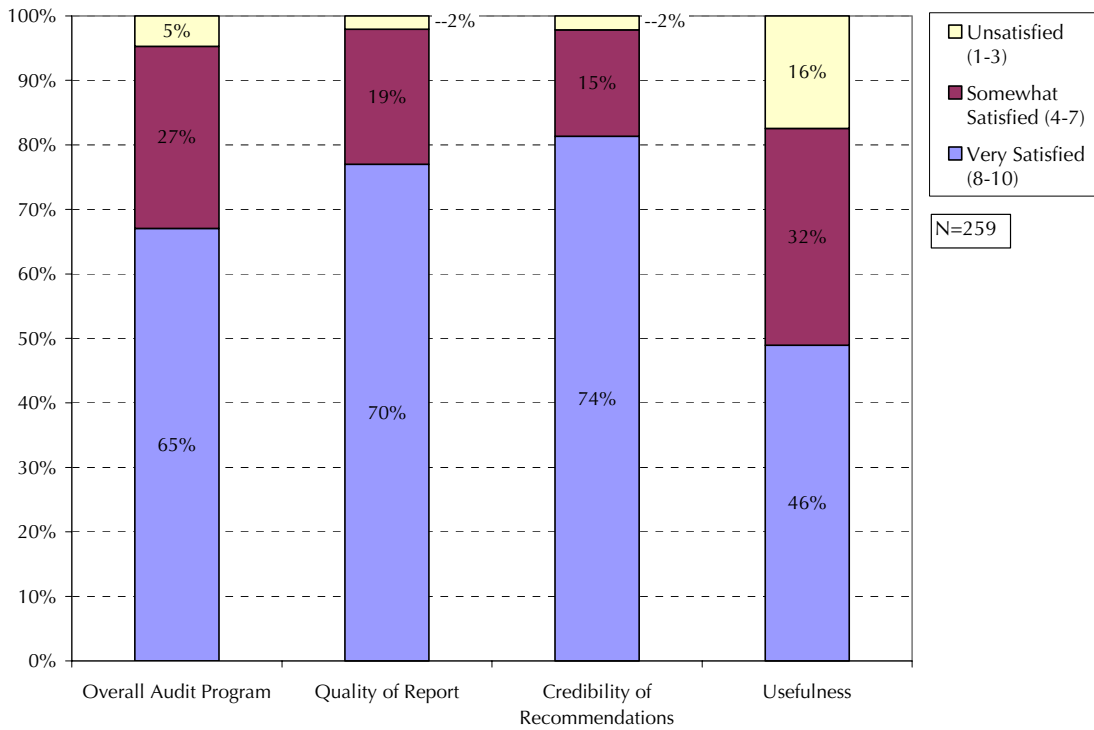
*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Customer Feedback

Participant satisfaction with a variety of elements of the 2003 Audit Program is shown in Exhibit 1-14. Customers were asked to rank their satisfaction on a scale of 1 to 10. Satisfaction is presented in terms of percentage of satisfied customers. “Very Satisfied” customers ranked their satisfaction 8 to 10 on a 10-point satisfaction scale; “Somewhat Satisfied” refers to those customers who rated their satisfaction between 4 and 7; while “Unsatisfied” customers’ ratings fell between 1 and 3.

Satisfaction levels are generally very high, and the overall program is well received. Participants tended to be most satisfied with the credibility of recommendations, with nearly 75 percent 'very satisfied'. The 'quality of the Audit report is also highly regarded, with 70 percent 'very satisfied'. However, participants were less impressed with the usefulness of the audit. While 46 percent found the report very useful, and 32 percent found it somewhat useful, 16 percent did not find it useful at all.

Exhibit 1-14
Small and Very Small Participant Satisfaction³



³ Percentages shown may not add to 100 percent, due to "don't know" responses by some customers.

Medium and large participants were asked to provide a satisfaction rating with Audit usefulness, and reasons for their rating. The distribution of satisfaction ratings is very similar to the small and very small customer group, with 36 percent rating the Audit 'very useful' and 17 percent reporting it was 'not useful at all'. Exhibit 1-15 summarizes the remarks made by participants segmented by their level of satisfaction with audit usefulness. The most frequent negative comments made by less than fully satisfied customers include 1) a lack of new information, 2) too few recommendations, and 3) a complaint that the recommendations did not apply or were not feasible.

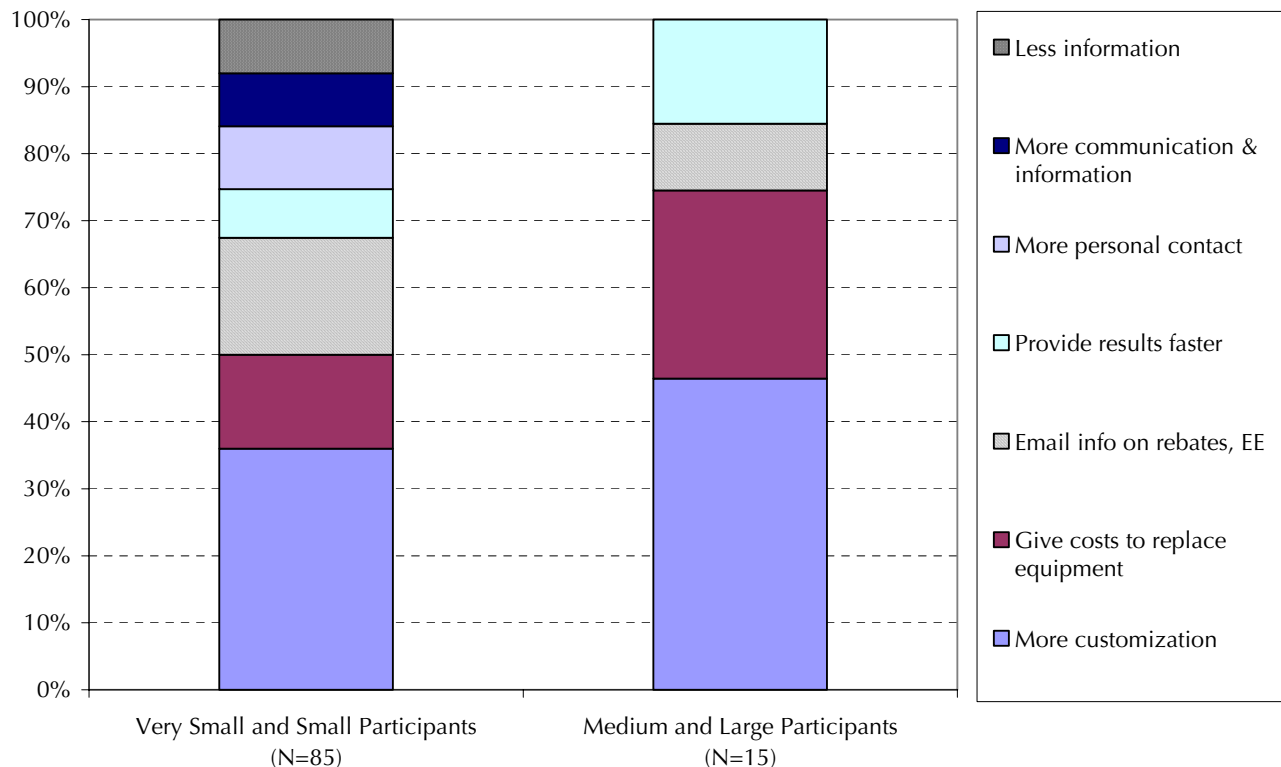
Exhibit 1-15
Reasons for Satisfaction with Audit Usefulness
PY 2002 Medium and Large Participant Survey Results

PY 2002 Medium and Large Customer Participant Survey Results			
	<i>Results are Shown in Percent</i>		
	S25. Usefulness of Audit (1-10 scale)		
	Very Useful (Rating 8 - 10) (36%)	Somewhat Useful (Rating 4 - 7) (46%)	Not Useful (Rating 1 - 3) (17%)
S25A. Why do you give that usefulness rating?			
Positive			
Made us aware of what we can do	50	20	-
Recommendations were helpful	12	6	29
Utility is consistent and helpful	6	-	-
Neutral			
Reinforced our prior decisions	7	18	10
No new info/would have made decision anyway	-	28	21
Negative			
Not many recommendations	-	9	14
Recommendations did not apply to us/not feasible	3	9	13
Other	18	9	12
Don't know	3	-	-
N	34	36	11

Participant survey respondents were asked to provide suggestions for program improvement. Only a small portion of respondents offered any suggestions—32 percent of small and very small participants and 20 percent of medium and large participants. Their comments are summarized in Exhibit 1-16 below. In 2002 the most common suggestion for program improvement was to that the utilities should follow-up with customer. The IOUs responded to this request, and all 4 provided follow up services in 2003. As a result, suggestions for program improvement in 2003 do not include a request for more follow-up.

The most common request is for more customization in audit reports, followed by a desire for information on costs to implement recommended measures. Customers also expressed a desire to be e-mailed energy efficiency and rebate program information. Small and very small customers requested more personal contact from the utilities, such as face-to-face presentation of the Audit report or an on-site audit rather than the remote audit report they received.

Exhibit 1-16
Suggestions for Program Improvement by Customer Size



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

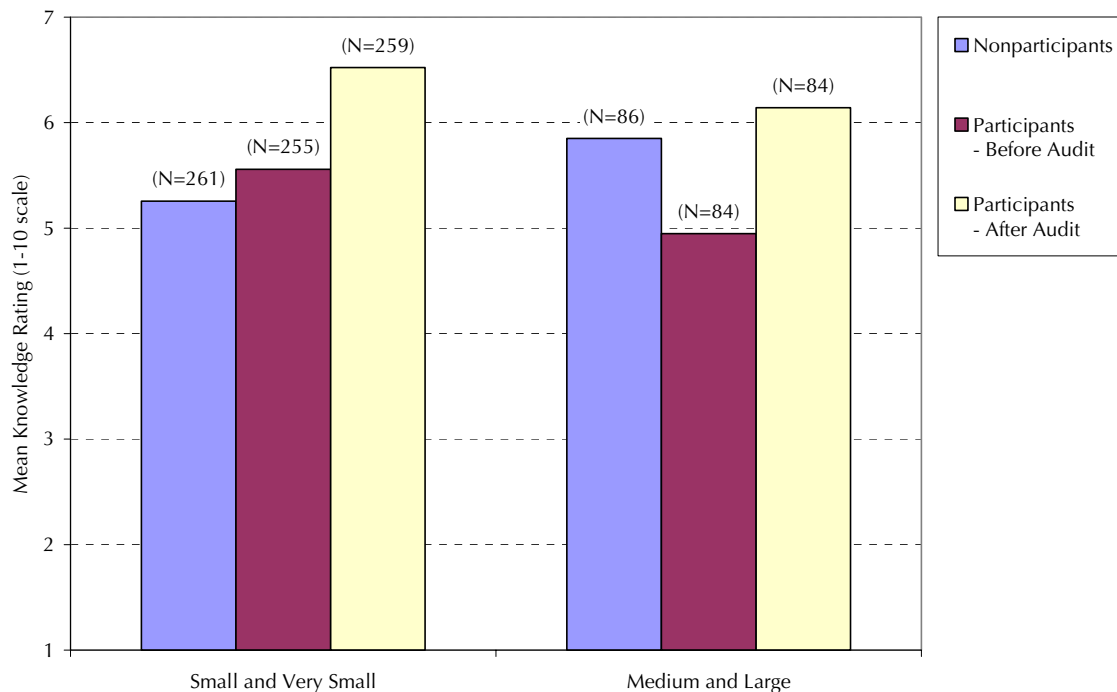
Market Effects

The self-reported change in customer energy efficiency knowledge and the likelihood of purchasing energy efficient equipment in the future are important indicators of Audit program effects. This Study finds important results in these areas.

Participants and nonparticipants were asked to rate their knowledge of energy efficiency on a scale from 1 to 10. Participants were also asked to rate their pre-audit knowledge of energy efficiency. The results are summarized in Exhibit 1-17 below, which presents mean self-reported levels of knowledge. The exhibit shows a measurable increase in energy efficiency knowledge resulting from the Audit, relative to both nonparticipants and pre-Audit levels.

It is a curious result that the medium and large nonparticipants report a higher level of energy efficiency knowledge than the self-reported participant pre-Audit level. One explanation for this is that nonparticipants already had energy efficiency information, which may also explain why they are nonparticipants. Nonetheless nonparticipant knowledge of and participation in the rebate programs is lower than participants'. This is evidenced in the self-reported awareness of rebate programs and the portion of purchases made through rebate programs, which are much higher among participants. Furthermore, willingness to consider energy efficiency is greater among participants⁴, purchases of high efficient equipment are more frequent⁵, and energy conservation practices are more common⁶. Thus, while medium and large nonparticipants may consider themselves fairly well informed regarding energy efficiency, this does not translate into comparable energy efficient choices, behaviors and attitudes.

Exhibit 1-17
Self-Reported Knowledge of Energy Efficiency
Participants Versus Nonparticipants



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

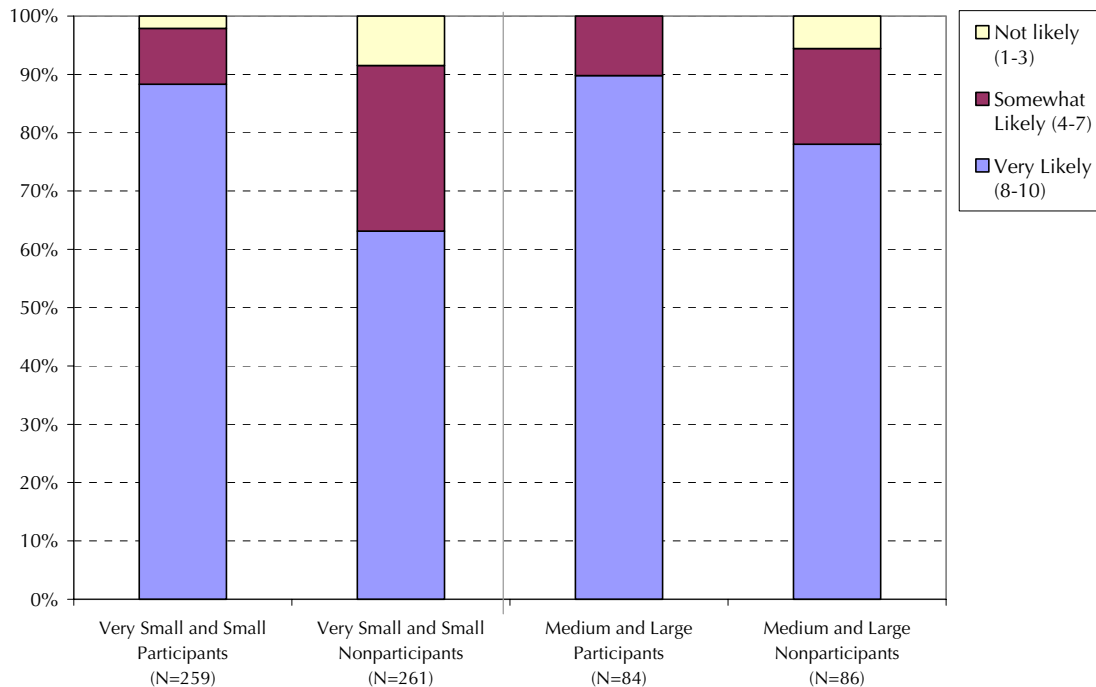
⁴ See Exhibit 1-18.

⁵ See Exhibit 1-4.

⁶ See Exhibit 1-7.

Exhibit 1-18 below shows the self-reported likelihood of purchasing energy efficient equipment in the future. The exhibit clearly shows a greater propensity to consider energy efficient equipment by participants than by nonparticipants, particularly among small and very small customers.

Exhibit 1-18
Likelihood of Installing Energy Efficient Measures in the Future
Participants versus Nonparticipants



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Cross Program Elements

A key function of the Audit program is to funnel customers into the Express Efficiency and Standard Performance Contracting⁷ rebate programs. This Study examines the rates of awareness and participation in these programs by Audit participants and compares these rates to those of nonparticipants. Similar analyses and results can be found in the 2002 Statewide Cross-Program Evaluation^{8,9}.

⁷ Express Efficiency provides rebates to less than 500 kW customers for prescriptive measures. SPC provides rebates for customized measures, and is directed to greater than 500 kW customers.

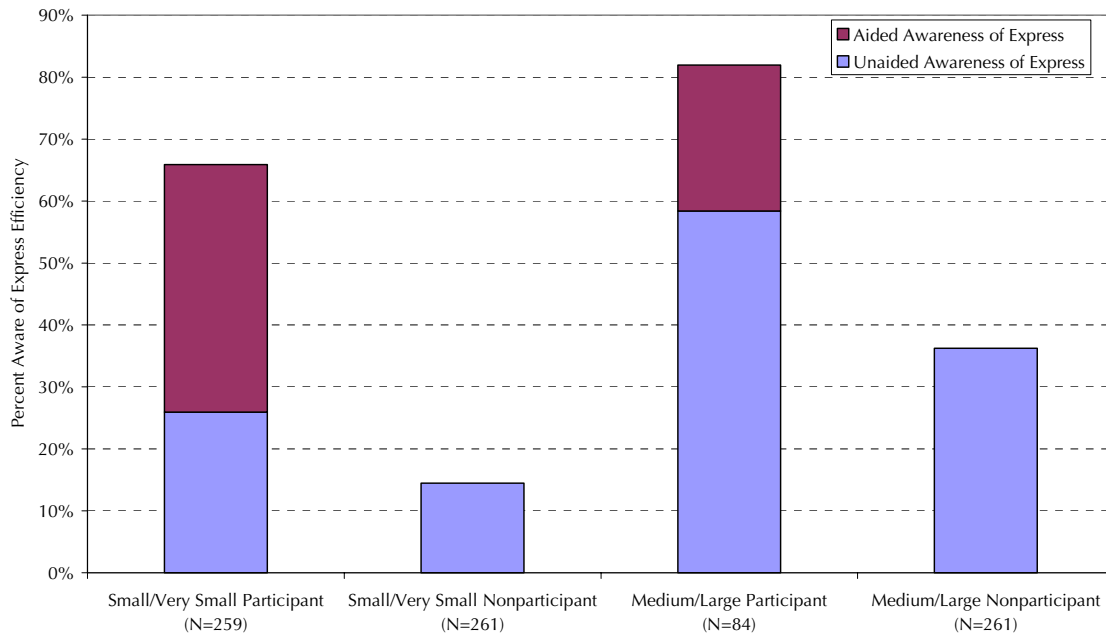
⁸ www.calmac.org

⁹ There are important differences in how awareness data was collected for the 2002 Statewide Cross-Program Evaluation and this Evaluation. The data presented in the two Evaluations are not directly comparable.

All customer surveys fielded for this evaluation¹⁰ include a battery of questions relating to awareness of IOU-sponsored energy efficiency programs.

Exhibit 1-19 below shows the rates of awareness of Express Efficiency in the participant and nonparticipant populations. The exhibit shows rates of ‘unaided’ awareness are notably higher among participants than nonparticipants, demonstrating a clear program effect. The majority of participant respondents in every size category are aware of the Express Efficiency program.

Exhibit 1-19*
Rates of Express Efficiency Awareness – Participants versus Nonparticipants

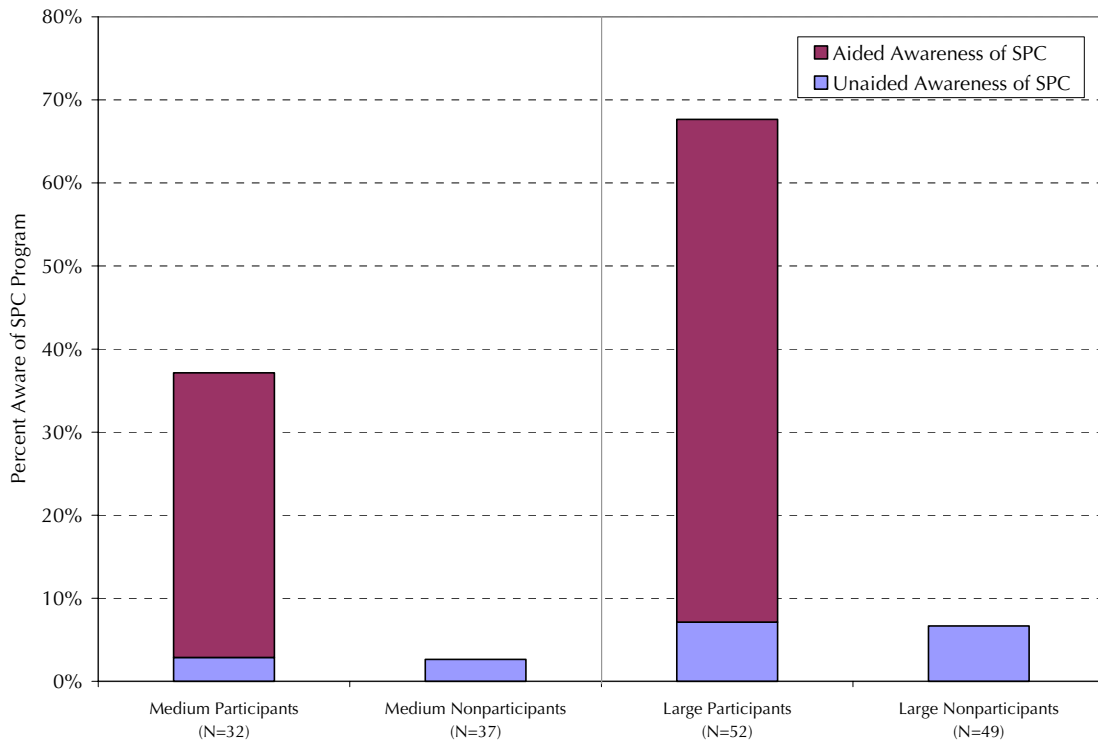


* Respondents were asked to name all of the IOU-sponsored energy programs they were aware of. If Express Efficiency is among the programs mentioned, this is counted as ‘unaided’ awareness. Regardless of which programs were mentioned, participants were also asked if the Audit program referred them to the Express Efficiency or SPC programs; this is counted as ‘aided’ awareness because Express Efficiency is mentioned by name in the question.

¹⁰ There were 4 surveys: a PY 2003 Small and Very Small Participant survey, a Small and Very Small Nonparticipant survey, a PY 2002 Medium and Large On-site Audit Participant survey, and a Medium and Large Nonparticipant survey. See Chapter 3 for a more detailed discussion of the surveys and the sampling approach.

Exhibit 1-20 below shows rates of SPC awareness among medium and large¹¹ sized participants and nonparticipants. Levels of unaided awareness of the SPC program are similar, and relatively low¹² among participants and nonparticipants. However, when participants were asked specifically if the Audit had provided a referral to the SPC program, they were able to recall the program and the referral. Thus, rates of ‘aided’ awareness are very high among participants.

Exhibit 1-20
Rates of SPC Program Awareness—Participants versus Nonparticipants

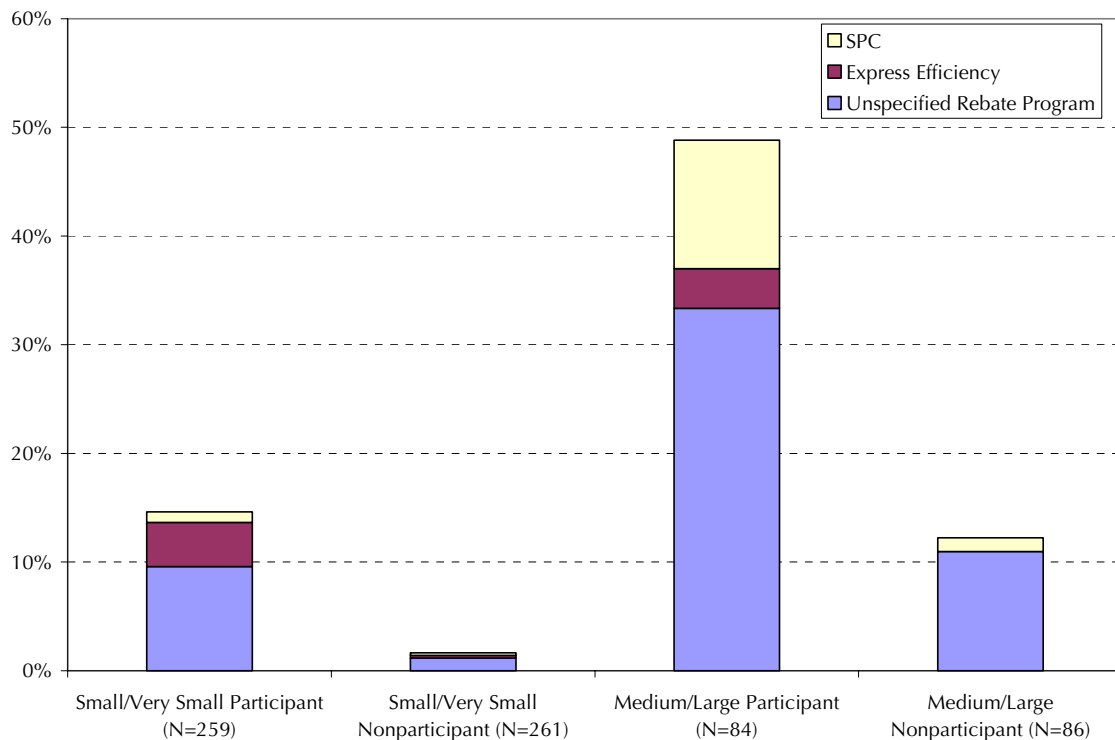


¹¹ Small and very small participants are not shown below, due to the SPC program’s orientation toward larger customers.

¹² Please note that 53 percent of participants and 24 percent of nonparticipants reported being aware of “rebate” programs. These generic responses were not included in the SPC awareness data, although undoubtedly *some* belong.

Next we examine rates of participation in rebate programs among participants and nonparticipants. Survey respondents were asked if they received a rebate for the equipment they reported purchasing. In a follow up questions, respondents were also asked whether the rebate was from the Express Efficiency or SPC program. Exhibit 1-21 below shows the rates of participation in rebate programs for both customer size categories. The lowest section of each bar reflects third party rebate program participation. These may also include manufacturer rebates. The dark segment of the bars shows the rebates reported as Express Efficiency, and the lightest section reflects SPC rebates. The exhibit demonstrates strong program effects. Participants are purchasing rebated equipment at much higher rates than nonparticipants in both customer size categories. As expected, there is a strong link to Express among small and very small participants, and a strong link to SPC among medium and large participants.

Exhibit 1-21
Rebate Program Participation—Participants versus Nonparticipants



1.6 PROGRAM IMPLEMENTATION RECOMMENDATIONS

The recommendations presented here are meant to serve as guidance for program managers and planners, and requires their direct input prior to any future changes in program format or design.

On-Site Audit Best Practices

As discussed above, and presented in the *Chapter 6 On-Site Audit Best Practice Assessment*, a primary objective of this Evaluation is to assess statewide on-site Audit practices and begin to examine best practices in on-site Audit outreach, tools, delivery and presentation.

A key finding of this assessment is the particular importance of tailoring program delivery by customer size. Customer needs and responses to the Audit are vastly different, for example, among very small and large customers.

Exhibit 1-22 below summarizes the on-site audit best practice recommendations.

Exhibit 1-22
**Key Findings Stemming from a Best Practice Assessment
of the On-Site Audit Delivery Channel**

Customer Size On-Site Audit Approach	Very Small (<20 kW)	Small (20 - <100 kW)	Medium (100 - <500 kW)	Large (>500 kW)
Program Outreach -- program goals should drive the focus of the outreach effort to obtain the desired mix of small, medium and large customers				
Set goals based on number of completed audits	●	●		
Implement audit outreach to Express Efficiency participants*		●	●	
Set goals based on energy saving targets			●	●
Site Visit -- for smaller customers all audit services should seek to maximize energy efficient equipment adoptions and Express Efficiency participation.				
Deliver the audit report during the site visit	●	●		
Provide an Express Efficiency application; filled-in where possible	●	●		
Furnish a list of qualified service providers	●	●	●	
Audit Report and Recommendations -- tailor audit products to customer wants and needs by customer size				
Smaller customers need educational information on relevant measures	●	●		
Smaller customers need measures ranked by the cost to the bottom line	●	●		
Larger customers need customized information relevant to their facility			●	●
Larger customers need measures ranked by ROI to justify investment			●	●
Audit Follow-up -- Motivate account representatives to follow-up using job performance incentives to achieve the desired mix of program savings and equitable program spending				
Track account rep. performance using completed Express applications	●	●		
Track in-depth follow-up efforts with larger customers to maximize savings			●	●

* Recommended outreach to Express Efficiency participants includes a telephone call and direct marketing package that addresses the audit program and provides energy efficiency information in the form of several technology one-pagers (or technical briefs). For very small customers, no such follow-up is recommended, as it is not cost-effective to carry-out direct marketing to very small customers, especially given that those customers must then still act. Overall, a direct install program is a preferable no-hassle vehicle to bringing energy efficiency to the under 20 kW market.

** It is recommended that follow-up for very small customers be delegated to a call center, to ensure the cost-effective use of program funds.

The recommended on-site audit best practices differentiate program delivery by customer size. In many respects recommended on-site audit practices are similar for the small and very small customer classes, as are the recommended practices for medium and large customers. There are, however, exceptions to these rules. In particular, there are areas where the very small (less than 20 kW) and the large customer (over 500 kW) classes require special treatment and consideration.

On-Site Audit Best Practice Considerations for Very Small Customers (< 20 kW)

Very small customer delivery requires careful scrutiny of delivery cost versus the probability that the very small customer class will take energy efficiency actions, and thereby provide society with the desired program benefits. For very small customers the following additional considerations are needed to ensure the audit program is providing cost-effective on-site audit services:

- Overall, a direct install program may be a preferable delivery channel for bringing energy efficiency to the under 20 kW market. Direct install programs are effective because they greatly reduce the hassle-burden for this generally time-constrained and disinterested segment of the nonresidential population. This type of ‘turnkey’ approach for very small customers has been shown to be effective in third party programs in San Francisco, the East Bay and elsewhere.
- At a minimum, providing a turnkey program alternative that combines Audit and Express services may improve program results for very small customers. Some IOUs already employ these practices, as noted below.
 - Provide partially filled out Express applications along with Audit reports. (Currently in practice by SCE.)
 - Identify equipment replacement opportunities under the Express Efficiency program in Audit reports, and cite both savings and rebates associated with recommended measures. (Currently in practice by PG&E, SCE and SCG.)
 - Provide a verbal rebate program referral during or following an on-site Audit. (Currently in practice by all 4 IOUs.)

On-Site Audit Best Practice Considerations for Large Customers

Large customers also require special consideration. Large customers have been shown to be willing and able to take considerable energy efficiency action following information delivery via audit services. Best practices for these customers’ consists of a few specialized audit delivery practices to maximize the energy saving return that results from the societal investment in those audit services. These include:

- Provide in-depth follow-up services to maximize recommended measure uptake.
 - In-person follow-up by a utility representative has been found to be an effective method of encouraging action.
 - The representative should present highlights of the report, be able to answer questions and provide support for SPC participation.

- Provide well-documented, detailed return-on-investment (ROI) calculations, and emphasize high ROI measures in Audit report.
 - Large customers need to justify investments with competitive returns.
 - Credible return-on-investment data provides the foundation on which decisions can be made.
- Include significant analytic customization and site-specific research in Audit reports to large customers.
 - Basic energy efficiency knowledge is generally already present in the large customer class.
 - It is the site-specific technical information that provides the greatest value to large customers and thus can prompt energy efficiency actions.

It should be noted that many of these on-site audit best practices are preliminary findings. Results are based on 1) extensive experience surrounding California's nonresidential programs and the markets in which these programs operate and 2) opinions expressed by the Audit program managers and their rationale for directions the programs have taken and are currently taking. The findings presented and opinions expressed still require corroboration from the customers themselves. For this reason it is recommended that future evaluation efforts seek to develop further quantitative evidence that either supports or rejects the findings and recommendations developed in this chapter.

This concludes the on-site Audit implementation recommendations stemming from the Best Practices component of this Study. The remainder of this section presents recommendations that apply to the whole Audit program, or to one of the remote delivery mechanisms. In some cases these recommendations originate from Best Practices findings, but are presented below because they apply to the whole program, not only to the on-site Audit delivery.

Remote Audit Implementation Recommendations

Use marketing or follow-up strategies to improve customer utilization of the CD-ROM Audit tool

- The CD-ROM audit is linked to strong program effects, but Study findings indicate 75 percent of CD-ROM Audit recipients do not install or run the software. Efforts to improve customer utilization of the CD-ROM tool would improve overall performance. This might include a timely phone call to recipients from the IOU's prompting them to use the tool.

Program-Wide Implementation Recommendations

Outreach efforts to small customers should emphasize remote Audits.

- All delivery mechanisms are well received by very small customers, though there is a marginally greater preference for on-site delivery. Further, all delivery mechanisms lead to greater high efficiency equipment adoption, higher levels of energy efficiency knowledge, and greater willingness to consider high efficiency options in the future.

Moreover, evidence indicates that among very small customers remote audits are comparable to on-site audits in terms of measurable program effects and customer satisfaction. Although we do not have Audit cost data, it is reasonable to assume that remote audits are less costly than on-sites. Thus, the program cost effectiveness would be enhanced by a shift from on-site audits to remote audits especially among the very small customer class where the need for customization and also the rate of measure recommendation uptake is lower than in the other, larger, customer classes.

- It is important to note that the on-site audit should remain an important equity component of the Audit program efforts. Hard-to-reach facilities are probably less likely to make the time to complete a remote audit. In such cases, an on-site audit designed to reduce participant burden, should remain as an equity vehicle.

Program goals should be set to motivate HTR audits, enhance follow-up, and to generate kWh savings.

- Goals can be modified to enhance program delivery to achieve a variety of objectives. More specifically, goals based on numbers of audits, or more directly, number of HTR audits, will draw attention to small and very small customers. Goals based on kWh and therm savings will turn the focus to larger customers. Utility representatives performance incentives should mirror the objectives being set through corporate goals. For example, if performance incentives for IOU representatives are based on completing a certain number of Express Efficiency and SPC applications, this then serves to motivate post-audit follow-up activities with participating Audit customers.

Emphasize low-cost and no-cost recommendations in Audits directed at small and very small customers, such as the online audit and the door-to-door onsite audit.

- Online Audits have a particularly strong impact on conservation measures. The program also shows a stronger impact on conservation measures among very small customers than other customer size categories. As found in the best practices assessment and shown in Exhibit 1-22 above, low cost and no cost recommendations should be a primary emphasis of audit reports directed to small customers.

Market the Audit program to previous years' Express Efficiency participants.

- Express Efficiency participants have already expressed an interest in energy efficiency, as well as willingness to respond to IOU program offerings. Thus, these customers may be more receptive to Audit marketing efforts, as well as the resulting Audit recommendations.

With the exception of SoCalGas, all other IOUs should increase Audit emphasis on the gas appliance end-use category.

- The 2002 Evaluation found that only SoCalGas was very effective with gas appliance recommendations and had measurable customer follow-through. It appears that significant improvement by the other IOU's in this area has not yet been made.

1.7 PROGRAM TRACKING SYSTEM IMPROVEMENTS

All the IOUs should be commended for their effective and timely response to the 2002 Evaluation recommendations regarding improvements to tracking systems. There has been real and substantive movement toward a more complete statewide tracking system. Complete tracking systems are a critical component to many EM&V efforts, and important to program design and implementation as well. Of critical importance to many evaluation techniques are customer account numbers, resulting in accurate customer size data and access to billing histories. Customer contact information is also of central importance, particularly for follow up efforts and customer surveys.

Each delivery mechanism presents unique tracking system challenges. However, as stated throughout this Study, for each delivery mechanism there is at least one IOU that is successfully maintaining key data in the tracking system. Thus, we believe it is possible to achieve comprehensive statewide tracking of all the critical data fields, including a site or account number, and customer contact information. Of course, each IOU faces a unique set of administrative and procedural circumstances, rendering progress more difficult in some areas. Nonetheless, IOUs with gaps or inconsistency in their tracking systems should seek guidance from successful IOUs in the event that, with time, they can replicate successful strategies. That is, a best practices standard for program tracking should be developed for each delivery mechanism.

1.8 EVALUATION SUGGESTIONS

Evaluation suggestions for the 2004/2005 Program Studies emphasize quantitative and statistical methods. While it is recommended that future evaluations continue to implement qualitative process and implementation related research, we recommend the application of more rigorous quantitative techniques, particularly in the measurement of gross and net program impacts.

Gross Impact Assessment

A statistically adjusted engineering (SAE) billing model approach will provide a more comprehensive gross impact assessment. This will greatly improve the precision of program impact measurement, and provide the first set of quantifiable program impacts in the 'other' miscellaneous equipment category. However, there are some important confounding factors to consider in using this approach.

- A key concern will be that (as observed here and in the 2002 evaluation) there is a differentiated time lag between audit and installation among lighting, HVAC and process measures. Lighting equipment is typically installed within 6 months of the audit, whereas HVAC lags slightly, with installation occurring about a year after the audit, and process equipment and system upgrades require two years or more for completion.
- Medium and larger customers are likely to undergo expansions, contractions and other year-to-year productivity changes that substantially affect customer utility bills and reduce the likelihood that the SAE model will successfully converge on the correct impact result.

For these reasons, we recommend using an SAE billing model for the small and very small customer segment only, allowing between 1 and 2 years to pass after the audit for installation to occur. For the medium and large segment, on-site assessments by professional engineers and in-depth interviews are recommended to better assess the impacts stemming from participation in the Audit program. These interviews should take place 2 years after Audit participation in order to better understand industrial process program impacts, similar to the timing of the telephone interviews conducted for this evaluation.

Follow-Up Evaluation

As noted above, during 2003 all four IOUs measurably increased follow-up efforts. At the same time, program effects appear stronger in some areas and more consistent in 2003 than those found in 2002. Research is warranted to assess the impact of various follow-up methods and to quantify program follow-up impacts as well as identify best practices in follow-up procedures.

- The SAE analysis proposed above can be extended to measure the incremental program effects of follow-up efforts for small and very small customers. Depending upon data availability, the analysis may be able to differentiate the effects of various types of follow-up services.
- For medium and large customers, the on-site assessment and interview approach could be used to measure effects of follow-up services by comparing segment results.

Net-to-Gross Evaluation

It would be beneficial to perform a more rigorous net-to-gross analysis for all customer size categories. A logit model can help differentiate the effects of competing influences on energy efficiency actions, and quantify the portion of activity attributable to the Audit program. This is an objective way of separating program effects from other effects and allows self-report data analysis to serve as a secondary and complimentary information source.

- Since logit modeling does not depend on consistent monthly billing data, this approach can be applied to all customer size classes.
- Furthermore, it is possible that the effects of follow-up services on the probability that a given customer takes an energy efficient action may also be measurable using this logit choice modeling.

Customer Perceptions of Audit Usefulness

Further research on customer perception of Audit usefulness is recommended, given the mixed reviews in this and the 2002 Evaluations.

- This research would, at minimum, include a set of telephone survey questions measuring customer satisfaction, and recording self-reported reasons for satisfaction with Audit usefulness. However, the research should also go beyond this by linking audit characteristics to satisfaction with usefulness. More specifically, statistical correlations or perhaps a factor analysis can be used to better understand the impact of

key Audit characteristics on customer satisfaction with Audit usefulness. These characteristics might include any or all of the following:

- follow-up services (this may include differentiation by type of follow-up, data permitting.)
- a list of measure installation service providers,
- estimates of measure-specific energy savings,
- estimates of measure cost,
- Express Efficiency or SPC rebate information
- a partially filled out Express Efficiency or SPC application.

Market Effects Research

The 2002 and 2003 evaluations measure key indicators of program effects using self-report methods. Market effects considered most pertinent to the Audit program include changes to energy efficiency knowledge and intentions to purchase or willingness to consider energy efficient alternatives in the future. Again, we recommend supplementing these finding by approaching the same questions with a more objective, quantitative approach in the 2004/2005 evaluations.

- Energy efficiency knowledge can be measured through the administration of a carefully designed battery of test questions. A comparison of results across various customer segments will provide a measure of program market effects. Ideally, this test could be administered to participants *prior* to their Audit participation. In certain cases this may be feasible, for example, by having participants fill-out a questionnaire when signing-up to receive a CD-ROM audit tool. In general, however, nonparticipants will have to serve as a control group, representing pre-Audit participant knowledge.
- A near-term objective to consider might be to measure program effects by surveying participant purchase behavior after a long period of time has passed, such as four years. This would reveal whether longer-term attitudinal program effects are present four years after the Audit. This could help determine whether lasting effects exist, and whether a more elaborate evaluation technique is warranted to better understand these effects.

2. INTRODUCTION

The 2003 Statewide Nonresidential Audit Program Evaluation presented in this report offers both retrospective examination and prospective guidance in maximizing the value of the current Nonresidential Audit Program for all stakeholders. The program itself provides free energy management services and information to nonresidential customers using a survey of customers' energy using equipment, resulting in a 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 (SCG) and San Diego Gas and Electric (SDG&E).

This section provides an overview of the audit program, 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 its 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 ensuing 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 size segment, 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 is 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 customers, particularly in segments offering substantial energy savings such as Industrial facilities. Though medium and large 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 provides a door-to-door audit service directed to small customers, and PG&E offers a quick checklist audit also directed to small customers. Efforts aimed at smaller customers are mainly 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 in answering 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, an online tool is available. Information regarding energy use and energy using equipment is entered by the customer during a visit to a utility website, and a printable list of recommendations is generated instantly.
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, the emphasis on customization, and the emphasis on measure recommendations. These differences are analyzed and presented in detail in Chapter 6, Best Practices Assessment.

2.1.1 The 2003 Nonresidential Audit Program

The IOUs moved in several new directions with the 2003 Nonresidential Audit program—trends that have continued in 2004. These trends include following up with audit participants, utilizing new technology to enhance data capture and audit reporting, and changes to program delivery.

Following up with customers. In 2002, PG&E was the only IOU doing follow up. By 2004, all the IOUs follow up with customers that receive audits, either in person or by telephone. Follow up efforts are concentrated on helping customers follow through with the rebate programs. IOU representatives make a special effort to follow up with large customers, often returning to a customer site for a face-to-face conversation. The IOUs use different methods for following up with customers—telephone contact by auditor or Call Center, or face-to-face. SCE provides customers with a partially completed Express Efficiency application based on the audit recommendations and furnishes a list of service providers (such as lighting vendors) to implement the recommended measures.

Wireless audit innovation. SCE is leading the way with wireless on-site audits for small customers. With the new wireless technology, an auditor takes a hand-held computer device to a site, enters pertinent site information, and is able to generate an Audit report instantly. SCE rolled out wireless audits in 2003. Other IOUs are following suit by testing wireless devices. This approach has multiple advantages. First, the customer receives the report immediately, taking full advantage of the customer's focus on energy efficiency, rather than waiting until a later date when the customer may be very involved with other things or has forgotten about the Audit. In addition, the processing and administrative time are reduced, because the wireless audit requires only a single stop at a customer site. SCE has found that the wireless on-site audit results in more Express Efficiency applications than their previous on-site approach.

Changes to program delivery. The IOUs have been experimenting with door-to-door delivery methods (with the exception of SDG&E, who stopped doing door-to-door audits). A 'door-to-door' delivery consists of an auditor canvassing small businesses, offering to perform an energy audit for free. In addition, the IOUs are moving away from the use of contractors for these audits, relying instead on IOU representatives. PG&E introduced door-to-door Checklist audits for small customers in 2003. PG&E's new Checklist audit offers a quick assessment for small customers focusing on equipment replacement opportunities under the Express Efficiency program.

2.1.2 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
PY 2003 Nonresidential Audit Program
Survey Accomplishments*

	Q4 Accomplishments	Goals
PG&E		
On-Site	4,370	3,200
Phone	1,303	1,000
Mail	1,649	900
CD-ROM	2,515	700
OnLine	2,150	700
HTR	9,059	3,500
Total	11,865	6,500
SCE		
HTR	3,936	2,840
Total	8,533	7,100
SDG&E		
On-Site	886	700
Phone	1,720	1,200
Mail	567	1,300
CD-ROM	1,283	1,300
OnLine	607	500
HTR	2,621	800
Total	5,063	5,000
SCG		
On-Site	1,314	1,200
Phone	1,039	1,000
Mail	852	800
CD-ROM	521	500
OnLine	557	500
HTR	475	400
Total	4,283	4,000

With regard to the fourth quarter report-based statistics, PG&E and SCE substantially exceeded Audit goals and the Sempra utilities comfortably met their goals. Furthermore, each of the utilities far exceeded their HTR goals. PG&E and SDG&E had particularly outstanding performance relative to HTR goals, with PG&E completing 9,059 (with a goal of 3,500) and SDG&E completing 2,621 (with a goal of 800.) With the exception of SDG&E, the IOUs increased their HTR goals by an average of 80 percent relative to the program year 2002 goals.

2.1.3 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, and newsletters. Exhibit 2-4 presents IOU marketing accomplishments that were obtained from the fourth quarter program status reports submitted to the CPUC.

*Exhibit 2-4
PY 2003 Nonresidential Audit Program
Marketing Accomplishments*

Utility and Marketing Efforts	Q4 Accomplishments
PG&E	
E-mail newsletter	37,000
Bill insert	1,250,000
Direct-mail outreach	3,000
Brochures	106,000
Direct-mail audit packages	30,000
Invitation to Audit training	25
Marketing materials to CBOs and Business Associations	525
Newsletter	47,000
SCE	
Direct-mail outreach	285,000
Press release	2
Brochures	46,300
Flyers and handouts	4,500
Outreach events	83
Direct-mail outreach	49,000
e-mail blasts	412,000
Newsletters	7,000
Chinese language signs	6
SDG&E	
CD-ROM	1,283
Direct-mail outreach	1,265
Direct-mail audit packages	60,163
Brochures	20,544
SCG	
CD-ROM	28
Bill inserts	230,000
Direct-mail audit packages	79
Flyers and handouts	733
Direct-mail outreach	98,042

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. For example, PG&E emphasized bill inserts in 2003, and SCE emphasized outreach event, appearing at over 80 different events. SDG&E focused their 2003 marketing effort on direct mail audit packages, and SCG relied primarily on bill inserts and mail outreach to recruit customers into the program.

2.2 STUDY OBJECTIVES

This Study is designed to support both impact-related and process-related objectives, and to provide guidance to optimize program value. There are five main study components, each with their own set of key objectives. These components and their individual objectives are shown below.

Impact Assessment

The Impact Assessment has two primary, distinct components. The first component is a first year program impact assessment that focuses on small and very small customers only. The second component is a second year program impact assessment for medium and large customers.

The first year impact assessment for small and very small customers provides program impact analysis results for small (20 – 100 kW) and very small (<20 kW) PY 2003 participating customers. Objectives include estimating energy and demand savings attributable to the program by a variety of significant program segments, including delivery mechanism and customer size. This Study component will document any energy efficiency (EE) actions participants take as a result of the Program. It will characterize the influence of the program on EE markets and the success of the current program design and audit delivery.

The second year program impact assessment for medium and large customers measures program-related energy efficiency actions taken over the first two years following the Audit. This study component measures participant impacts for medium (100 – 500 kW) and large (more than 500 kW) customers. It documents energy efficiency actions resulting from Audit participation over a two-year window for program year 2002 medium and large on-site Audit participants. The somewhat longer time period is allotted to the study of larger customers because the added complexity and project cost may increase the time required to complete audit-related retrofit projects. This assessment was deemed necessary given the results of the previous 2002 Nonresidential Audit Study, where it was found that more complex measures had yet to be installed.

Process Assessment

The process assessment includes both a tracking system assessment, and the evaluation of implementation-related program elements.

The **Tracking System Assessment** verifies program audit completes by delivery channel versus goals. The assessment evaluates both PY 2003 and initial PY 2004 records. There is an emphasis on changes and improvements in tracking systems relative to PY 2002, focusing on customer

contact information (contact name and phone number) and account numbers (or other unique premise identifiers).

The remainder of the **Process Assessment** centers on the evaluation of implementation-related program elements. The assessment investigates PY 2003 participant satisfaction with key program elements and suggestions for program improvement. It identifies relevant barriers and motivational factors in the decision to participate, as well as the decision to implement recommended measures. It explores how the Audit functions as a source of energy efficiency information, and how customers view the Audit relative to other sources of energy efficiency information.

Best Practices Assessment.

The **Best Practices** assessment centers on a review of current (program year 2004) on-site audit tools and reports. The assessment provides up-to-date, prospective recommendations for the best approach to on-site audits for various size classes of customers. It also identifies optimal on-site audit tools and strategies from the many variations currently offered across the state.

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 and Chapter 6 Best Practices Assessment* then follow, in accordance with the objectives listed above.

Chapters 3 through 7 end with a key findings summary.

Supporting study material is found in the appendices.

- Appendix A presents survey results for the small and very small customer surveys, including both participant and nonparticipant results.
- Appendix B present survey results for the medium and large customer surveys, including participant and nonparticipant results.
- Appendix C provides a detailed list of equipment adoptions reported by all customer classes falling into the 'other' miscellaneous equipment category.
- Appendix D provides a summary of program year 2002 statewide tracking data.

- Appendices E through I provide the survey instruments and interview guides that were used in the Study to collect data from participants, nonparticipants and program managers and implementers.
- Appendix J presents previous studies and publications referenced in this Study.
- Appendix K is a glossary of technical terms used in this Study.

3. STUDY METHODOLOGY

This section presents an overview of the Study approach, data collection activities and analysis methods.

- 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 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

As discussed in the *Section 2 Introduction*, the primary components of the study include an impact assessment, a process assessment, a tracking system assessment and an on-site audit best practices assessment. Each component has its own set of objectives and all components support the primary study objective of providing corrective and constructive program feedback.

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 telephone surveys differ by program year, customer size, and participation status. Note that small and very small customers are less than 100 kW or 50,000¹ therms per year, while Medium and Large are greater than these same thresholds.

- The PY 2002 Medium and Large Participant survey concentrates on impact-related objectives, but also includes a brief investigation of participant satisfaction and market effects;
- The Medium and Large Nonparticipant survey is used primarily as a control group for comparison with medium and large participants. However, this survey also collects some process and market effects information unique to nonparticipants, such as reasons that aware participants do not participate in the program;
- The PY 2003 Small and Very Small Participant survey examines impact and process-related topics including program procedures, market effects and participant satisfaction.

¹ In an account with both gas and electric service, kW is used to determine size.

- The Small and Very Small Nonparticipant survey is used primarily as a control group for the Small and Very Small participants, but also collects some market effects and process data unique to nonparticipants.
- Program Manager and Implementation Staff Interviews are used primarily to support the Best Practices Assessment (Chapter 6), to better understand various on-site audit procedures, tools and recent enhancements.

Customer size is an important theme throughout this Evaluation. For convenience Exhibit 3-1 shows the corresponding kW and therm ranges for each size category. Note that if a customer has electric *and* gas accounts, electricity is used to determine the customer size.

*Exhibit 3-1
Customer Size kW and Therm Ranges*

Size Category	kW	Therms
Very Small	less than 20	less than 10,000
Small	20 - 100	10,000 - 50,000
Medium	100 - 500	50,000 - 250,000
Large	Greater than 500	Greater than 250,000

Exhibit 3-2 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 3-2
Data Collection and Analysis Design
for the Statewide Nonresidential Retrofit Energy Audits Program Evaluation

Study Objectives	Existing Data Sources				Data Collection				
	Program Tracking Data	Program Tracking Data	Program Tracking Data	Audit Tools, Reports, and Other Materials	Medium/Large P Survey	Medium/Large NP Survey	Small/Very Small P Survey	Small/Very Small NP Survey	Interviews with Program Mgrs and Implementers
Program Year	2002	2003	2004	2004	2002	-	2003	-	2004
Survey Completes	-	-	-	-	84	86	259	261	5
Tracking System Assessment									
Verify program audit completes		•							
Assess tracking improvements and content	•	•	•						
Impact Assessment									
kW/kWh savings resulting from program	•	•			•	•	•	•	
Process Assessment									
Program Awareness/Sources of Awareness					•	•	•	•	
P EE intentions and knowledge					•		•		
Audit Express Link					•		•		
Factors in participant measure uptake					•		•		
Usefulness of Audit					•		•		
Factors in participation decision					•	•	•	•	
P satisfaction							•	•	
Best Practices Assessment									
Review Audit process and techniques				•					•
Review Audit tools				•					•
Review Audit reports				•					•
Review cross-program referral practices				•					•

3.2 SAMPLE DESIGN

As discussed above, to support the study objectives four distinct surveys were completed. Two are participant telephone surveys and two are nonparticipant telephone surveys. Interviews with program managers and implementation staff were also completed, supporting the Best Practices Assessment.

The sample frame and number of completed surveys is shown below in Exhibit 3-3. This is followed by a separate discussion of each survey sample design below.

Exhibit 3-3
Data Collection Overview

Study Data Collection	Sample Frame	Survey Completes
PY2002 Medium and Large Participant Survey*	Utility Program Tracking Data	84
Medium and Large Nonparticipant Survey*	Customer Information Systems Data	86
PY2003 Small and Very Small Participants**	Utility Program Tracking Data	259
Small and Very Small Nonparticipants**	Customer Information Systems Data	261
PM/Implementation Staff Interviews	Lists provided by IOUs	5

*Small and Very Small Customers are less than 100 kW or 50,000 Therms per year

**Medium and Large Customers are more than 100 kW or 50,000 Therms per year

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 small and very small customers surveys, followed by the medium and large customer surveys and finally, the program manager and implementation staff interviews.

3.2.1 Small Customer Participant Survey Sample Design

Exhibit 3-4 below summarizes 2003 Audit program accomplishments by delivery mechanism. Nearly half (44 percent) of 2003 Audits were conducted on-site. The remaining delivery channels account for between 13 and 16 percent of the total.

The sample design approach is to survey all five delivery channels, but to emphasize the areas that were under-represented in the 2002 Study—CD-ROM and Online audits. The 2002 Study presents well documented results for mail, phone and onsite audits. One hundred and twenty points are allocated to mail, phone and onsite to verify the 2002 results. These sample points are equally divided among the 3 delivery mechanisms, 40 to each. The remaining 140 sample points are devoted to CDROM and online—70 each. Sample points were allocated across IOU service territory proportional to total participation. This approach fills in gaps left in the 2002 Study, while also verifying past Study results and ensuring fair representation across IOU service territories.

Exhibit 3-4
Summary of Program Year 2003 Accomplishments
From IOU Tracking Systems

	SCE	SDG&E	PG&E	SCG	TOTAL
Mail	608	567	1,649	962	3,786
Phone	231	1,698	1,304	984	4,217
CDROM	440	1,270	2,515	600	4,825
Onsite	6,658	880	4,478	1,308	13,324
Online	596	577	2,150	515	3,838
Total	8,533	4,992	12,096	4,369	29,990

As discussed above, the small and very small participant survey is focused on customers with demand of less than 100 kW. However, definitive size information is not available for all IOU/Delivery mechanism categories. Limiting surveys to participants with known size and contact information would significantly narrow the available points. While the points of known size were prioritized over those of unknown size, both were included in the sample frame and the final survey completes².

Contact information was available for most, but not all participants. Exhibit 3-5 shows the distribution of participants with contact information. The table shows that 18 of the 20 cells are well populated. However, there are zero in SDG&E Online and PG&E Online.

Exhibit 3-5
Program Year 2003 NRA Participants with Contact Information

	SCE	SDG&E	PG&E	SCG	TOTAL
Mail	222	504	293	309	1,328
Phone	230	1,659	612	348	2,849
CDROM	425	1,139	2,174	480	4,218
Onsite	5,345	718	3,948	701	10,712
Online	322	-	-	346	668
Total	6,544	4,020	7,027	2,184	19,775

² Thus, it is possible that small and very small customer survey completes may include interviews with medium and large customers. However, the distribution of self-reported facility size and number of employees is similar among participants and nonparticipants.

Exhibit 3-6 below shows the final sample design, which best meets the goals discussed above, adjusted to accommodate available contact information. The medium/large customer survey sample design is discussed below, in Sections 3.2.3 and 3.2.4.

*Exhibit 3-6
Small Customer Participant Survey Sample Design*

	SCE	SDG&E	PG&E	SCG	TOTAL
Mail	7	6	17	10	40
Phone	2	16	13	9	40
CDROM	6	18	36	9	69
Onsite	20	3	13	4	40
Online	35	0	0	35	70
Total	70	43	79	67	259

3.2.2 Small Customer Nonparticipant Survey Sample Design

Two hundred and sixty survey completes were targeted for the small and very small customer nonparticipant survey. The sample design ensures that the nonparticipant survey serves as an accurate control group from which to measure participant program impacts. The segments considered in the sample design are business type, customer size and IOU service territory.

Although the participant population has more very small (0 – 20 kW) than small (20 – 100 kW) participants, the sample design has an even distribution across size segments. The small customers are more likely to have larger impacts than very small customers, and the planned sampling by size increases the precision of impact measurements among these customers.

Business type distribution is an important characteristic of the participant group (to be mimicked by the nonparticipant survey), reflecting different usage patterns, adoption rates, and segment specific economic effects. However, adding business type category quotas on top of 4 IOU territories and two size categories is not a workable solution with a total of just 260 surveys. To resolve this issue the nonparticipant sample frame was constructed to mimic the participant population business type distribution. Providing each point is equally likely to become a survey complete, the result is a survey distribution that is similar to the participant population by business type. The data collection performed ensures this premise holds by giving each sample point significant time and effort in the call center system before moving on to the next. Quotas were set by customer size and IOU service territory as shown in Exhibit 3-7 below.

Exhibit 3-7
Small Customer Nonparticipant Survey Sample Design

	SCE	SDG&E	PG&E	SCG	TOTAL
Small	37	21	53	19	130
Very Small	37	22	52	19	130
Total	74	43	105	38	260

3.2.3 Medium/Large Customer Participant Survey Sample Design

The medium/large participant survey supports primarily impact assessment objectives, but also supports some process-related research. This survey targets 100 companies with billing demand in excess of 100 kW that participated in one of the specialized large company on-site audit programs during the 2002 program year. There are two such specialized on-site programs, the SCE MCD audit program and PG&E's large company audit program.

Exhibit 3-8 below shows the distribution of 2002 large customer on-site audit participants by size, business type and IOU service territory. The distribution is skewed towards industrial customers, with almost 50 percent of participating sites. There is also notable representation in the 'Office' and 'Other Commercial' segments. The sample design is shown in the right hand column. The design is specified by business type and size and is proportional to the participant population.

Exhibit 3-8
2002 Medium and Large Participant Audit Survey Sample Design

	Business Type	PG&E	SCE MCD	Total	Total Percent Distribution	Sample Design
Large	Agriculture	1	7	8	1%	1
	Restaurant/Grocery	1	2	3	0%	
	Industrial	18	254	272	34%	34
	Institutional	4	32	36	5%	5
	Office	5	63	68	9%	9
	Retail		14	14	2%	2
	Commercial Other	8	63	71	9%	9
	Total		37	435	472	59%
Medium	Agriculture		8	8	1%	1
	Restaurant/Grocery		36	36	5%	4
	Industrial	1	111	112	14%	14
	Institutional		26	26	3%	3
	Office		71	71	9%	9
	Retail		18	18	2%	2
	Commercial Other		57	57	7%	7
	Total		1	327	328	41%
Total		38	762	800	100%	100

3.2.4 Medium/Large Nonparticipant Survey Sample Design

The medium/large nonparticipant survey sample design targeted an equal number of completes as the participant survey. The sample design strategy is to mimic the participant population as closely as possible according to the characteristics responsible for the greatest differentiation in energy-related behavior. Business type and customer size are among the most important differentiating characteristics. Quotas are set by these two dimensions in proportion to the distribution of participating sites. Although PG&E makes up less than 20 percent of the 2002 program, 20 nonparticipant sites were targeted in order to ensure meaningful nonparticipant results in that service territory. Exhibit 3-9 below shows the nonparticipant survey sample design by IOU service territory, business type and size.

*Exhibit 3-9
Medium/Large Nonparticipant Survey Sample Design*

Medium/Large Nonparticipant Survey Sample Design				
	Business Type	PG&E	SCE	Total
Large	Agriculture	-	1	1
	Restaurant/Grocery	-	-	-
	Industrial	10	24	34
	Institutional	2	3	5
	Office	3	6	9
	Retail	-	2	2
	Commercial Other	4	5	9
	Total		19	40
Medium	Agriculture	-	1	1
	Restaurant/Grocery	-	4	4
	Industrial	1	13	14
	Institutional	-	3	3
	Office	-	9	9
	Retail	-	2	2
	Commercial Other	-	7	7
	Total		1	40
Total		20	80	100

3.2.5 Program Managers and Utility Staff Interviews

QC professional staff conducted five structured interviews with program managers in support of the best practices assessment, and completed informal meetings with program managers as needed.

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, 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 survey question and are presented in Appendices A and B. Appendix A presents tables of the small and very small customer surveys, and Appendix B presents the medium and large customer surveys. These tables also serve as the basis for many of the report exhibits. Medium and large customer survey responses for each question are tabulated as shown in Exhibits 3-10a and 3-10b below. Small and very small customer survey responses for each question are tabulated as shown in Exhibit 3-11.

Medium and large survey responses are reported by size and selected business types. Participant and nonparticipant responses are tabulated similarly, but separately. Participant

and nonparticipant responses to similar questions are presented next to each other in Appendix B.

Exhibit 3-10a
Medium and Large Customer Survey Results Reporting Template
PY 2002 Program Participants

C1. Since January 2002, did you make any changes related to cooling at this location, including air conditioning units, programmable thermostats, HVAC controls or window film?	2003 Large Customer On-Site Audit Participant Survey Results						
	Results are Shown in Percent						
	Total	Segment Description					
Industrial		Office	Institutional	Other Commercial	Large	Medium	
Yes	45.6	32.3	51.2	96.8	50.0	46.7	44.0
No Change	54.4	67.7	48.8	3.2	50.0	53.3	56.0
N	84	47	11	7	12	52	32

Exhibit 3-10b
Medium and Large Customer Survey Results Reporting Template
Nonparticipants

C1. Since January 2002, did you make any changes related to cooling at this facility, including air conditioning units, programmable thermostats, or HVAC controls?	2002 Large Customer Nonparticipant Survey Results						
	Results are Shown in Percent						
	Total	Segment Description					
Industrial		Office	Institutional	Other Commercial	Large	Medium	
Yes	27.1	23.4	22.0	37.6	33.9	33.4	18.2
No Change	70.8	76.6	78.0	48.4	59.8	66.6	76.7
Don't know	2.1	-	-	14.0	6.3	-	5.1
N	86	39	18	8	16	49	37

Small and very small surveys are reported by delivery mechanism and customer size. Participants and nonparticipants are included in the same table.

Exhibit 3-11
Small and Very Small Survey Results Reporting Template
PY 2003 Participant and Nonparticipants

C1. Since January 2003, did you make any changes related to cooling at this location including air conditioning units, programmable thermostats, or HVAC controls?	2003 Small and Very Small Customer Survey Results										
	Results are Shown in Percent										
	Total	Participant Segment						Nonparticipant Segment			
		Mail	Phone	CD ROM	On-Line	On-Site	Small	Very Small	Total	Small	Very Small
Yes	24.0	22.5	20.0	20.8	30.9	24.9	21.5	25.1	12.2	17.2	10.5
No	75.2	77.5	80.0	79.2	69.1	73.2	78.5	73.7	86.5	81.7	88.0
Don't know	0.8	-	-	-	-	2.0	-	1.2	1.4	1.1	1.5
N	259	51	50	34	71	53	69	190	261	132	129

3.3.2 Survey Dispositions and Analysis Weights

This section describes each survey's accomplishments in key program segments and presents the techniques used to develop analysis weights, and the resulting analysis weight values.

PY 2003 Small and Very Small Participant Survey

Small and Very Small participant survey weights are designed to adjust survey results to more accurately reflect the PY 2003 participant population. The population and the survey respondents are divided into key segments, and then weights are created such that the weighted portion of survey completes in each key segment mimics the population. In general this is done by dividing the segment population by the segment survey completes.

Weight development for the Small and Very Small survey had some unique challenges, relating to a significant number of audits with customers of unknown size. In fact, almost 40 percent of completed audits in 2003 are with customers of unknown size. Ultimately, a decision was made to group the unknown-size audits with the small and very small audit group, and create weights by IOU service territory and delivery mechanism.

Online Audits are treated specially also, due to missing contact information from PG&E and SDG&E. Without contact information, no survey completes were achieved. Without merging segments, the resulting segment weights would be zero, distorting the total program results so that it would not accurately reflect the relative importance of online audits. For this reason the SDG&E and PG&E online audits were allocated to the SCE and SCG online audit cells, proportionally. That is, if SCE had twice as many online audits as SCG then SCE would get two-thirds of the combined SDG&E and PG&E online audit completes, and SCG would get one-third. In reality, SCE and SCG had almost the same number of online audits, so the SDG&E and PG&E audits were virtually split between the two utilities. This approach ensures a total program result that accurately represents the proportion of online audits completed in PY 2003.

Exhibit 3-12 provides the distribution of small and very small participant audits completed in PY 2003. These numbers include all audits of unknown size.

*Exhibit 3-12
Program Year 2003 Audits Program
Small, Very Small and Unknown Size*

Utility*	Audit Delivery Mechanism				
	CDROM	Mail	Online	Onsite	Phone
PG&E	2,319	1,627	2,150	4,119	1,203
SCE	421	604	596	5,675	225
SCG	600	960	515	1,116	968
SDG&E	1,270	567	577	795	1,688

*Note: IOU accomplishments include audits of customers of unknown size.

Recall from the Sample Design section above, that the small and very small survey sample design concentrates in Online and CD-ROM audits. The survey effort was successful in reaching online audit goals, but had more challenges with CD-ROM audits. CD-ROM participants had a somewhat higher rate of refusals³ to complete the survey. Among those that were willing to complete the survey, there was a higher rate of respondents not recalling their participation⁴ than among other delivery mechanisms. Finally, and perhaps most significantly, 75 percent of those that did recall receiving the CD-ROM, did not install or run the software on their computer. These respondents were asked why they did not install the software, and by far the most common response was that they were too busy or didn't have enough time.

³ The refusal rate was 36 percent for CD-ROM, and ranged between 22 and 33 percent for other delivery mechanisms.

⁴ The rate of respondents not recalling audit participation was 43 percent for CD-ROM, and ranged between 30 and 39 percent for other delivery mechanisms.

Exhibit 3-13 below shows the distribution of small and very small participant survey completes by IOU and delivery mechanism.

*Exhibit 3-13
Small/Very Small Participant Survey Completes*

Utility	Audit Delivery Mechanism				
	CDROM	Mail	Online	Onsite	Phone
PG&E	26	23	0	18	18
SCE	1	9	33	27	1
SCG	1	11	38	4	12
SDG&E	6	8	0	4	19

As described above the approach used to calculate the analysis weights was to divide the segment population by the segment survey completes. Recall also, that the online population segments were adjusted so the overall result would better represent the true portion of online audits, while not changing the online-specific results. Exhibit 3-14 below shows the final analysis weights used in the analysis of the small and very small participant survey results.

*Exhibit 3-14
Small and Very Small Participant Survey Weights*

Utility	Audit Delivery Mechanism				
	CDROM	Mail	Online	Onsite	Phone
PG&E	89	71		229	67
SCE	421	67	61	210	225
SCG	600	87	47	279	81
SDG&E	212	71		199	89

Note that when presenting actual survey results, self-report data was used to categorize all respondents into small and very small categories. The self-report data used to categorize facilities includes square feet and number of employees⁵. These two measures are a good determinant of size among facilities of known size.

Small and Very Small Nonparticipant Survey

Nonparticipant survey weights are created using a method similar to that used for the participant weights. The goal of the weighting method is to adjust nonparticipant results to best represent the participant distribution. This maximizes the usefulness of the nonparticipant

⁵ Facilities of less than 5,000 square feet or that have less than 10 employees are categorized as very small. Facilities of more than 5,000 square feet and with more than 10 employees are categorized as small.

surveys as a control or comparison group for the participants. Differences between the groups can be attributed to program participation with more confidence than if there were major differences in size, business type and IOU service territory distribution.

Recall from the sample design section that the nonparticipant sample was pulled to represent the participants' business type distribution. Thus, weights are not required in this dimension—nor are they truly accessible given the survey sample size. Segmentation used for the nonparticipant survey weights include customer size and IOU service territory. In order to calculate a participant size distribution, audits of unknown customer size are allocated to small and very small categories proportionally. Including audits of unknown size in the distribution preserves the relative importance of the IOUs in the overall figures. Exhibit 3-15 below shows the size distribution by IOU of the PY 2003 small and very small audits.

Exhibit 3-15
PY 2003 Small and Very Small Participant Distribution by Size

Utility	Size		
	Total	Small*	Very Small*
PG&E	11418	2606	8812
SCE	7502	2270	5232
SCG	4158	1443	2715
SDG&E	4897	638	4259

* Audits for customers of unknown size are allocated to small and very small categories proportionally

Exhibit 3-16 shows the distribution of small and very small nonparticipant survey completes, which adheres very closely to the sample design.

Exhibit 3-16
PY 2003 Small and Very Small Nonparticipant Survey Completes

Utility	Size		
	Total	Small	Very Small
PG&E	105	53	52
SCE	75	38	37
SCG	40	19	21
SDG&E	41	22	19

As described above, weights are calculated by dividing the segment population by the segment survey completes. This ratio results in the final set of analysis weights shown in Exhibit 3-17 below.

*Exhibit 3-17
PY 2003 Small and Very Small Nonparticipant Survey Weights*

Utility	Size	
	Small	Very Small
PG&E	49	169
SCE	60	141
SCG	76	129
SDG&E	29	224

PY 2002 Medium and Large Participant Survey

The approach used to develop analysis weights for the medium and large participant survey is similar to that used for both small and very small surveys. Again, the purpose of the weights is to adjust results to more accurately reflect the population of participants. The population of PY 2002 medium and large on-site audits is presented in detail in the sample design section above, and so is not presented here.

Exhibit 3-18 shows the PY 2002 medium and large customer survey completes by business type, customer size and IOU service territory. The available sample did not support all 100 planned completes. Thus, ultimately a census of available sample points was conducted, with a result of 84 surveys, as shown in the table below.

Exhibit 3-18
PY 2002 Medium and Large Participant Survey Completes

Size	Business Type	PG&E	SCE	Total
Large	Agriculture		1	1
	Restaurant/Grocery	1		1
	Industrial	6	27	33
	Institutional	2	2	4
	Office	1	5	6
	Retail		1	1
	Commercial Other	2	4	6
	Total	12	40	52
Medium	Agriculture		1	1
	Restaurant/Grocery		1	1
	Industrial		14	14
	Institutional		3	3
	Office		5	5
	Retail		2	2
	Commercial Other		6	6
	Total		32	32
Total		12	72	84

Although the survey completes adhere very closely to the sample design, some segments just did not have enough points to support survey completes. For this reasons, segments with positive population values but zero survey completes are combined with similar segments that achieved a positive number of survey completes. For example, for PG&E no completes were achieved among large agriculture or medium industrial, so these are folded into the large industrial segment. For SCE, no surveys were completed in the large restaurant/grocery segments, so these points are combined with the medium restaurant/grocery segment for the purposes of creating weights. Exhibit 3-19 below shows the final resulting analysis weights applied to the PY 2002 medium and large participant survey.

Exhibit 3-19
Medium and Large Participant Weights

	Business Type	PG&E	SCE
Large	Agriculture		7.0
	Restaurant/Grocery	1.0	
	Industrial*	3.3	9.4
	Institutional	2.0	16.0
	Office	5.0	12.6
	Retail		14.0
	Commercial Other	4.0	15.8
Medium	Agriculture		8.0
	Restaurant/Grocery**		38.0
	Industrial		7.9
	Institutional		8.7
	Office		14.2
	Retail		9.0
	Commercial Other		9.5

* For PG&E Large Agriculture, Large Industrial and Medium Industrial segments are combined, due to zero surveys completes in 2 of these segments.

** For SCE Medium and Large Restaurant/Grocery segments are combined, due to zero survey completes within the large segment/

Medium and Large Nonparticipant Survey

This section describes the survey disposition and analysis weights developed for the medium and large customer nonparticipant survey. Nonparticipant survey weights are created using the same method as described above for small and very small. Again, the goal of the weighting method is to adjust nonparticipant results to best represent the participant distribution. The relative proportion in key segments is adjusted to mimic the participant population group. The key segments for this survey include business type, customer size and IOU service territory. Exhibit 3-20 below shows the distribution across these key segments of the nonparticipant survey completes. Again, the participant population is presented in detail in *Section 3.2 Sample Design* above, and thus is not presented here.

Exhibit 3-20
Medium and Large Nonparticipant Survey Completes

Size	Business Type	PG&E	SCE	Total
Large	Agriculture	-	-	-
	Restaurant/Grocery	-	-	-
	Industrial	10	14	24
	Institutional	2	3	5
	Office	3	6	9
	Retail	0	2	2
	Commercial Other	4	5	9
	Total	19	30	49
Medium	Agriculture	-	-	0
	Restaurant/Grocery	-	2	2
	Industrial	1	14	15
	Institutional	-	3	3
	Office	-	9	9
	Retail	-	1	1
	Commercial Other	-	7	7
	Total	1	36	37
Total		20	66	86

Some segments that are populated in the participant population are un-sampled in the nonparticipant survey. This is due to very low participation in these segments and limited total survey size. Using the same method as the participant survey weight development, similar segments are combined so that all participant population points are represented in the final weighting scheme. For PG&E, large agriculture and large industrial are combined, due to a lack of survey completes in the large agriculture segment. For SCE the medium restaurant/grocery and large restaurant/grocery are combined due to no surveys being completed with large restaurant/grocery customers. The resulting medium and large nonparticipant analysis weights are presented in Exhibit 3-21 below.

Exhibit 3-21
Medium and Large Nonparticipant Survey Analysis Weights

Size	Business Type	PG&E	SCE
Large	Agriculture		
	Restaurant/Grocery		
	Industrial*	1.9	18.6
	Institutional	2.0	10.7
	Office	1.7	10.5
	Retail		7.0
	Commercial Other	2.3	12.6
Medium	Agriculture		
	Restaurant/Grocery		19.0
	Industrial	1.0	8.5
	Institutional		8.7
	Office		7.9
	Retail		18.0
	Commercial Other		8.1

*For PG&E and SCE, Large Agriculture and Large Industrial are combined due to zero survey completes in the Large Agriculture segment.

**For SCE Large Restaurant/Grocery and Medium Restaurant/Grocery are combined due to zero survey completes in the Large segment.

3.4 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 (for small and very small customer) and 2003 (for medium and large on-sites). The approach presented in this section was applied to derive the gross impact results for the 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 after the summer of 2004, the actions taken reflect, on average, more than a one-year period following the audit for very small and small participants, and just over two years for medium and large participants. The larger lag between audit and survey for the larger participants is by design, allowing additional time for customers to install more complex cooling measures, as well as process systems updates among industrial participants.

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.

3.4.1 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, 259 PY2003 Participant surveys were completed with small and very small customers and 84 PY2002 surveys with medium and large customers. Surveys were used 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 survey completes were then used to derive average impacts per Audit.

3.4.2 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 day-types, 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.⁶

⁶Although 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 3-22; an excerpt from 2003 PG&E Workpaper filings submitted to the CPUC.

*Exhibit 3-22
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 3-23 presents coincident diversity factor results for the indoor lighting end-use, representing the probability of fixture operation coincident with the system peak hour.

*Exhibit 3-23
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 3-24 presents mean electric HVAC energy adjustment factors by business type, which 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 3-24
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 3-25 presents mean HVAC summer on-peak demand adjustment factors by business type, representing the peak hour HVAC interactive adjustment to lighting impacts.

Exhibit 3-25
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 3-26 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 3-26
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 3-27 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 3-27
Per-Unit Change in Connected Load and Deemed Savings for the Lighting Measures*

Lighting Technology Description	Units	Per-Unit Change in Connected Load (kW)	Per-Unit Demand Savings (kW)	Per-Unit Annual Energy Savings (kWh)	Estimate Source
CFL exit sign	lamp	0.020			PG&E Workpapers, Study 404A
LED exit sign	lamp	0.036			PG&E Workpapers, Study 404A
Install reflectors/fluorescent lamp removed	lamp	0.043			PG&E Workpapers, Study 404A
18 W CFL	lamp	0.057			PG&E Workpapers, Study 404A
2-lamp 2' T8/T5	lamp	0.011			PG&E Workpapers, Study 404A
2.5-lamp 4' T8/T5	lamp	0.009			PG&E Workpapers, Study 404A
2-lamp 8' T8/T5	lamp	0.010			PG&E Workpapers, Study 404A
Electronic ballast	lamp	0.007			PG&E Workpapers, Study 404A
Occupancy sensors	sensors		0	827	1996 PG&E CEMS Evaluation
Photocells	photocells		0	99	1996 PG&E CEMS Evaluation
Time clock	time clocks		0	439	1996 PG&E CEMS Evaluation

3.4.3 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.

Selected Per-Unit Cooling End-Use Results

A summary of per-unit cooling impacts is presented in Exhibit 3-28 for measures that were adopted by Audit participants, according self-reports from the surveys. These impacts reflect a typical installation, without differentiation by business type. Furthermore, these impacts are diversified estimates, reflecting typical customer behavior.

Exhibit 3-28
Per-Unit Impacts for the Cooling End-Use

Cooling Technology Description	Units	Per-Unit Summer Demand Impact (kW)	Per-Unit Annual Energy Impact (kWh)	Per-Unit Annual Natural Gas Impact (therm)	Estimate Source
Direct evaporative cooler	tons	0.714	1,075	0	PG&E 2004/5 Express Program Proposal
Reflective Window Film	sqft	0.002	14	0	PG&E 2004/5 Express Program Proposal
Reflective Window Film	sqft	0.003	16	0	PG&E 2004/5 Express Program Proposal
Setback programmable thermostat	thermostat	0.000	1,181	274	(Adjusted) Utility 2004/5 Express Program Proposals
Split system air conditioner <65,000 Btuh	ton	0.165	224	0	PG&E 2004/5 Express Program Proposal
Packaged air conditioner <65,000 Btuh	ton	0.193	263	0	PG&E 2004/5 Express Program Proposal
Packaged air conditioner <65,000 Btuh	ton	0.254	620	0	SCE 2004/5 Express Program Proposal
Split system air conditioner <65,000 Btuh	ton	0.217	529	0	SCE 2004/5 Express Program Proposal
Packaged air conditioner 65,000 to 135,000 Btuh	ton-delta EER	0.081	109	0	PG&E 2004/5 Express Program Proposal
Split system air conditioner 135,000 to 240,000 Btuh	ton	0.115	281	0	SCE 2004/5 Express Program Proposal
Packaged Terminal Air Conditioner	unit	0.119	162	0	PG&E 2004/5 Express Program Proposal
Packaged Terminal Air Conditioner	unit	0.157	383	0	SCE 2004/5 Express Program Proposal
0.60 kW/ton water-source chiller	tons	0.100	300	0	ASHRAE 90.1
Adjustable speed drive	horsepower	0.000	753	0	SCE 2004/5 Express Program Proposal

3.5 KEY FINDINGS

Tracking system records provided for this evaluation have improved since 2002 but were nonetheless incomplete. Sample designs and weighting methods applied in this evaluation are the best that could be achieved, given data-driven compromises. Some of the resulting issues include the possibility that medium and large customers may have inadvertently been included in the small and very small participant survey completes. It is recommended that tracking data be improved to support a complete participant size, business type and billing record analysis.

4. IMPACT ASSESSMENT

This section presents the results of the 2003 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 end-use, customer-size and delivery mechanism. 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 estimates and algorithms.
- Explore the influence of audits on customers' likelihood to adopt energy efficiency measures and undertake conservation actions beyond those of a comparison non-participant group.

4.1 PARTICIPANT MEASURE AND PRACTICE ADOPTION

In this section measure and practice adoption data are presented to characterize the impact of the program on energy efficiency actions. As discussed in previous sections, two distinct participant surveys were fielded to collect detailed information regarding the adoption of equipment and energy saving practices. Two similarly distinct nonparticipant surveys were also fielded to serve as comparison groups for the measurement of program impacts. The first participant survey is of small and very small-sized¹ PY 2003 participants, and includes all five Audit delivery mechanisms. The second participant survey is of medium and large-sized² PY 2002 on-site audit participants. The two nonparticipant surveys are focused on similar sized customers and designed to mimic participant populations by size, IOU service territory and business type.

As discussed in Chapter 2, the decision to survey large customers in the PY 2002 participant population originated from the PY 2002 Evaluation finding that more complex, higher cost measure adoptions are associated with greater time gaps/lead times between the audit and equipment adoption. Medium and large on-site audit customers, particularly industrial customers, are more likely to receive complex, higher-cost measure recommendations. To explore this finding further, and to more accurately measure the impacts of the audit program on medium and large customers, we allowed *two* years to pass after the time of the audit before measuring impacts. In light of these specialized objectives, the medium and large customer

¹ 'Very Small' is energy demand of less than 20 kW or 10,000 therms per year. 'Small' is between 20 and 100 kW, or between 10,000 and 50,000 therms per year.

² "Medium" is energy demand of 200 to 500 kW or 50,000 to 250,000 therms. "Large" is greater than 500 kW or more than 250,000 therms per year.

surveys include a section on industrial process measure adoptions, which is not included in the small and very small customer surveys.

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

The data are displayed using two primary segmentation schemes. The first presents results for the small and very small customer groups, and includes delivery mechanism and size. The second presents results for the medium and large customer groups and includes selected business types (with sufficient numbers of points for presentation) and size.

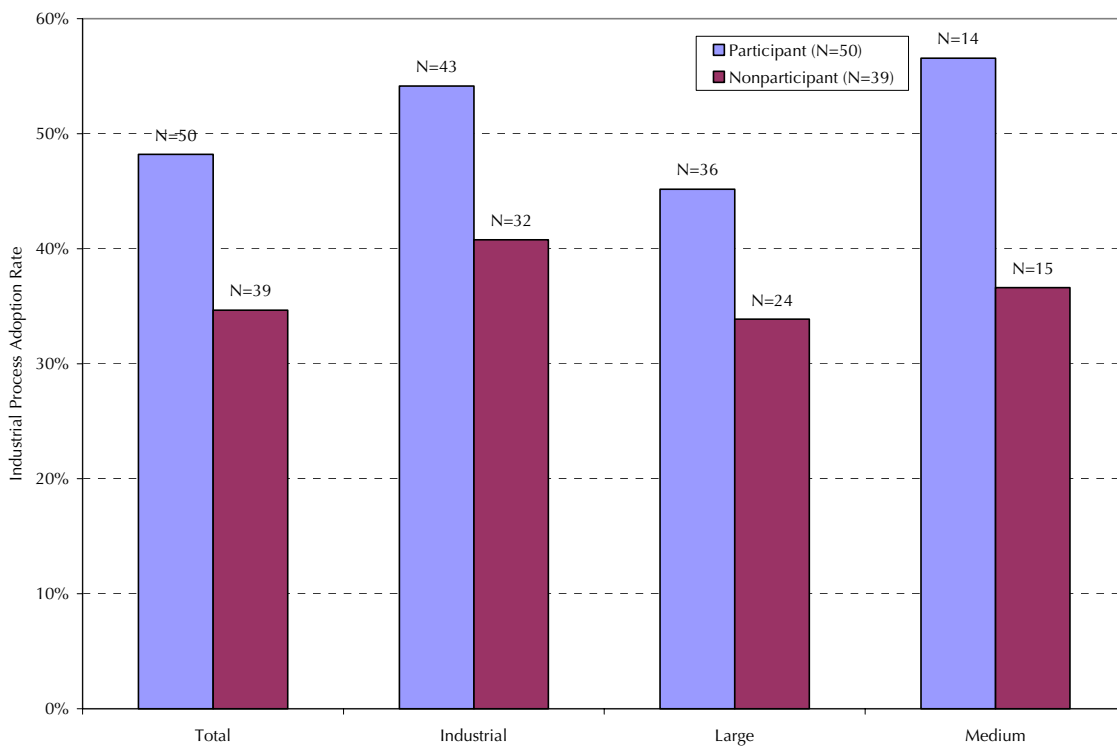
4.1.1 Industrial Process Adoptions

This section discusses the adoption of industrial process measures by PY 2002 medium and large on-site audit participants during the two years following their audit. These adoptions are compared with a similar group of medium and large nonparticipants to reveal program effects over a baseline.

The industrial process end-use category shows very strong evidence of program effects – rivaling lighting as the most significant source of program impacts for medium and large company participants. The findings shown here support the 2002 Evaluation finding that longer periods of time are required before more complex equipment adoptions can take place, such as industrial process adoptions.

Exhibit 4-1 below shows the adoption rates for industrial process equipment by size and business type. Industrial process adoption questions were asked of customers that had processing equipment at their facility, which results in a smaller number of respondents than other end-use categories. Fifty of the 84 participants that were interviewed had industrial process equipment, and 39 of the 86 nonparticipants interviewed had this equipment. The exhibit shows that participant adoption rates are at least 10 percentage points higher among participants than nonparticipants in every segment. Of course, it is important to keep in mind the small sample sizes and interpret results with caution.

Exhibit 4-1
Medium and Large Company Industrial Process Adoption Rates
PY 2002 Participant versus Nonparticipant



Not only are adoption rates notably higher, but participants are adopting a greater number of measures than nonparticipants. Among those that adopted industrial measures, the average number of industrial process measures installed is 1.8 among participants versus 1.5 among nonparticipants. Combining the rate of adoption, with the average number of measures per adoption, an average number of adoptions per survey respondent is calculated. These numbers are shown in Exhibit 4-2 below by segment. Using this method the participant adoption rate is over 40 percent higher than the nonparticipant rate.

Exhibit 4-2
Number of Industrial Process Adoptions per Respondent
Medium and Large Customers

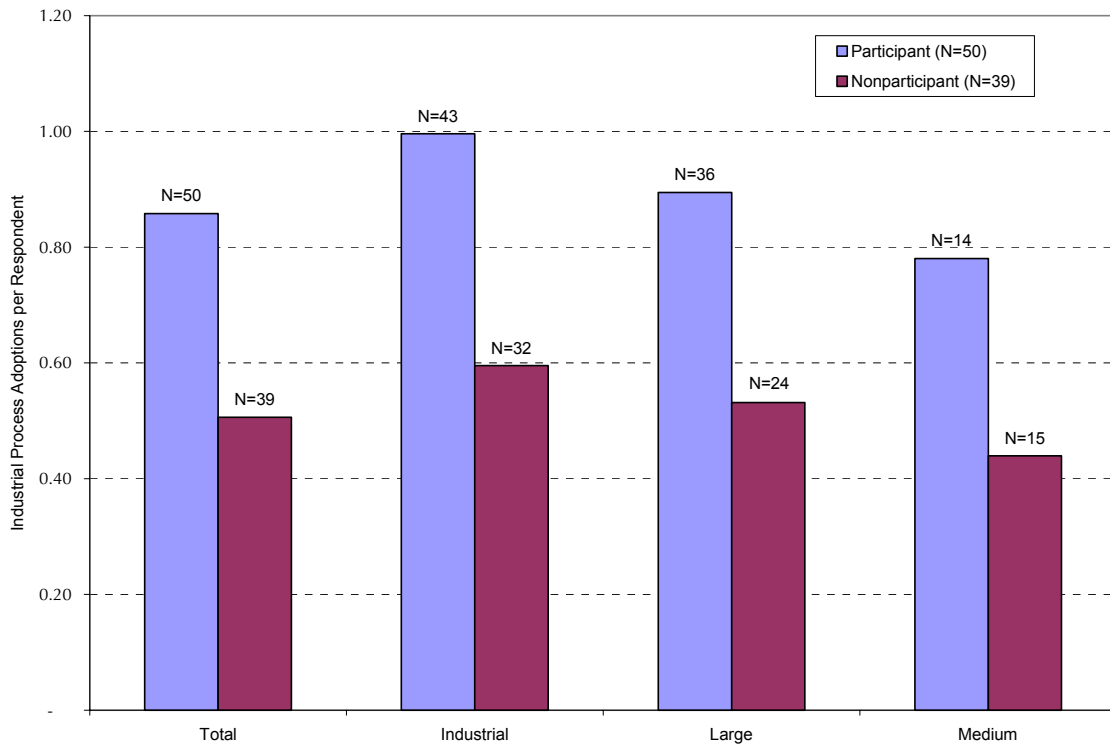


Exhibit 4-3 below presents the self-reported descriptions of each adoption reported by participant respondents, including quantities and self-reported efficiency levels. There are 46 adoptions of industrial process equipment reported by the participant survey respondents. High efficiency adoptions include a significant number of variable frequency drives, compressors, and furnaces/boilers. Nonparticipant adoptions are more concentrated in motors and machines, as shown in Exhibit 4-4, following the presentation of participant equipment adoptions.

Exhibit 4-3
Medium and Large Participant Industrial Process Adoptions

Technology Category	Self-Reported Measure Description	Self-Reported Efficiency*	Quantity*
Variable Speed Drives	Replaced Hydraulic 100 HP Motor with Variable Frequency 40 HP	High	1
	Variable Frequency Drive - 100 HP for Compressors	High	1
	Variable Frequency Drive - 5 HP Motors	High	7
	Variable Frequency Drive for Air Compressor	High	1
	Variable Frequency Drive on Water Transfer Pump	High	1
	Variable Speed Drive for Compressor	High	1
	Variable Speed Drive on a Fan	High	1
	Variable Speed Drive on Air Compressors	High	1
	Variable Speed Drive on Air Compressors - 300 HP	High	2
Compressors	Air Compressor - 75 HP	High	1
	Air Compressors, 75 HP	High	2
	Compressors - 100 HP	High	5
	Replaced Air Compressor - 125 HP	High	1
	Smaller Compressor for Evenings/Weekends - 35 HP	High	1
Motors	Blender with 2 10 HP Motors	Don't Know	1
	DC Drive Boxes	High	7
	Destaged 2 Pumps and Changed Piping to Reduce Friction Losses	High	2
	Injection Pump was Destaged and Piping Realigned		
	Added a Vacuum Chamber - 15 HP	Don't Know	1
Heating	Electric Furnaces	High	3
	Furnaces 1.5 Million BTUH	Don't Know	4
	Installed New Gas Fired Rotary Kilns	High	
	Replace Furnace Combustion System	High	4
	Replace Heating Tanks	High	1
	Small Electric Boiler for Processing		1
Machines	Water Boilers	High	3
	Lathes - Metal Cutting	Don't Know	3
	Verticle Turning Lathes	Don't Know	2
	Added a New Packaging Line	High	1
	Added Saddle Stitcher	Don't Know	1
	Hydraulic Presses	Don't Know	2
	New Printing Press	Don't Know	2
	Dye Casting Mills	Don't Know	6
	Dye Casting Machines, 400 - 650 tons		5
Finish Mill		1	
Manufacturing Equipment	Roller Mill for Cement	High	1
	Added Sterilization Chambers for Processing	Don't Know	2
	Re-tooled Manufacturing Equipment	Don't Know	
	Electric Smoothing Equipment/Capacitors	High	5
	Reconfigured Manufacturing Equipment		
Cooling Equipment	Changed Fans in Blast Tunnel System		
	Tunnel Freezer	High	1
	Clinker Cooler		1
Food Processing	Refrigerated Air Dryers		
	Chiller for the Dough Mixer	High	1
	Pasta Processing Equipment	High	1

*Missing quantities or efficiency means respondents did not provide any information.

Exhibit 4-4 below presents the nonparticipant self-reported descriptions of industrial process adoptions, including quantities and self-reported efficiency levels. There are 17 adoptions of industrial process equipment reported by nonparticipant survey respondents.

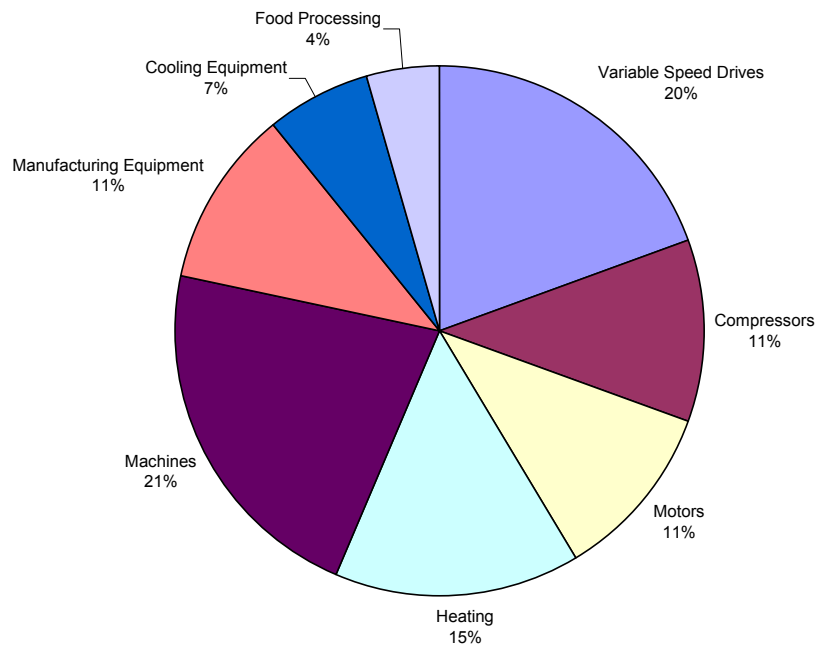
Exhibit 4-4
Medium and Large Nonparticipant Industrial Process Adoptions

Self-Reported Technology Category	Self-Reported Measure Description	Self-Reported Efficiency	Quantity*
Variable Speed Drive	Variable Frequency Drive to Blower	High	1
	Variable Speed Drive for Compressor - 75 HP	High	1
Cogeneration	Cogeneration Plant for Heating	High	2
	Cogeneration Plant	High	1
Machines	Computer Controls, Lathe or Mill	Don't Know	
	Color Pressers and Dye Cutters	High	7
	Added Milling Machines	High	2
	Added Large Mixer	Don't Know	1
	Replaced Old Machines	High	2
Manufacturing Equipment	New Resin Processing Lines, Bigger and More Efficient	High	
	Improved Galvanizing Process	High	1
	Machines	High	3
Motors	Added Motors 20 to 40 HP	Don't Know	15
	Replaced Motors with Variable Frequency Drive Motors with Vector Inverters	High	
	Adjustments in HP, Replacements of Worn Motors and Drives.	High	
	Changed Control Power System From DC to AC Motors	High	1
Safety Measures	Guards and Light Sensors	N/A	

*Missing quantities means respondents did not provide any information.

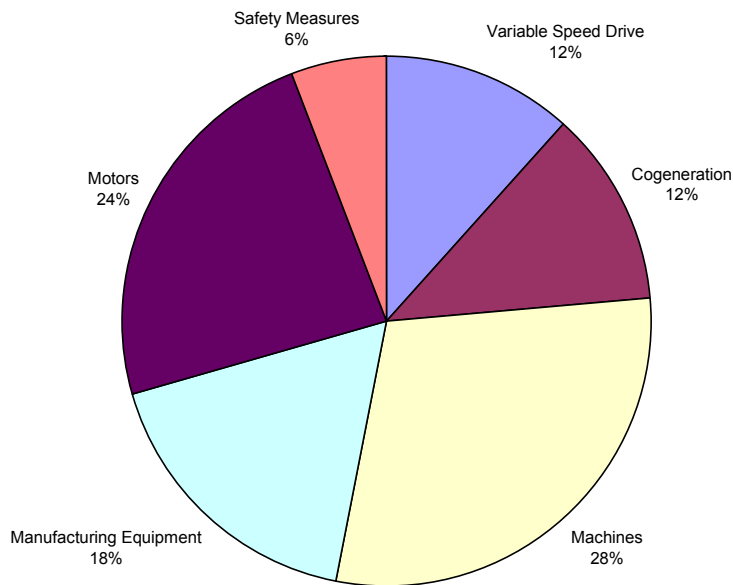
Exhibit 4-5a below shows the technology distribution of medium and large participant industrial process adoptions. The distribution is diversified, with the maximum percent of adoptions in any one category at 21 percent. As stated above, variable speed drives, compressors and furnaces/boilers are primarily high efficiency and make up almost half of all process equipment adoptions.

Exhibit 4-5a
Participant Industrial Process Equipment Adoptions
Technology Group Distribution



The technology distribution of nonparticipant industrial process equipment adoptions is shown in Exhibit 4-5b below. There are fewer adoptions of variable speed drives and compressors, but large portions made up by motors, machines and manufacturing equipment.

*Exhibit 4-5b
Nonparticipant Industrial Process Equipment Adoptions
Technology Group Distribution*



In general, audit participants install a greater quantity of process equipment than their nonparticipant counterparts, and a more diverse group of measures.

4.1.2 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. Similar to the 2002 Evaluation findings, the lighting end use provides the strongest evidence of program impacts. As demonstrated below, energy efficient lighting activity in the participant population is consistently greater than is found among nonparticipants.

Exhibit 4-6 compares PY 2003 small and very small participant and nonparticipant lighting adoption rates. Participant adoption rates are nearly twice as high as nonparticipant rates. Impacts among small participants are somewhat higher than among very small participants. Adoption rates by delivery mechanism are consistent, suggesting all delivery mechanisms are successful in motivating lighting equipment retrofits.

Exhibit 4-6
Lighting Equipment Adoption Rates
Small and Very Small Customers

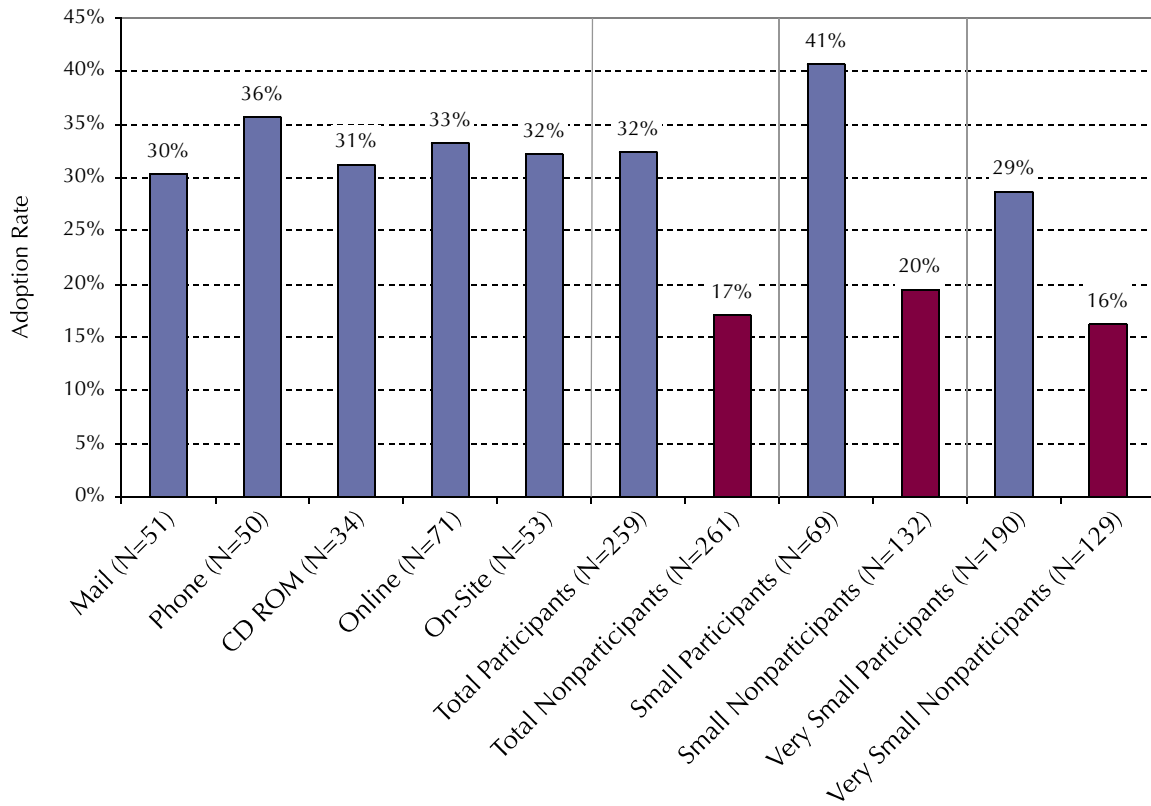
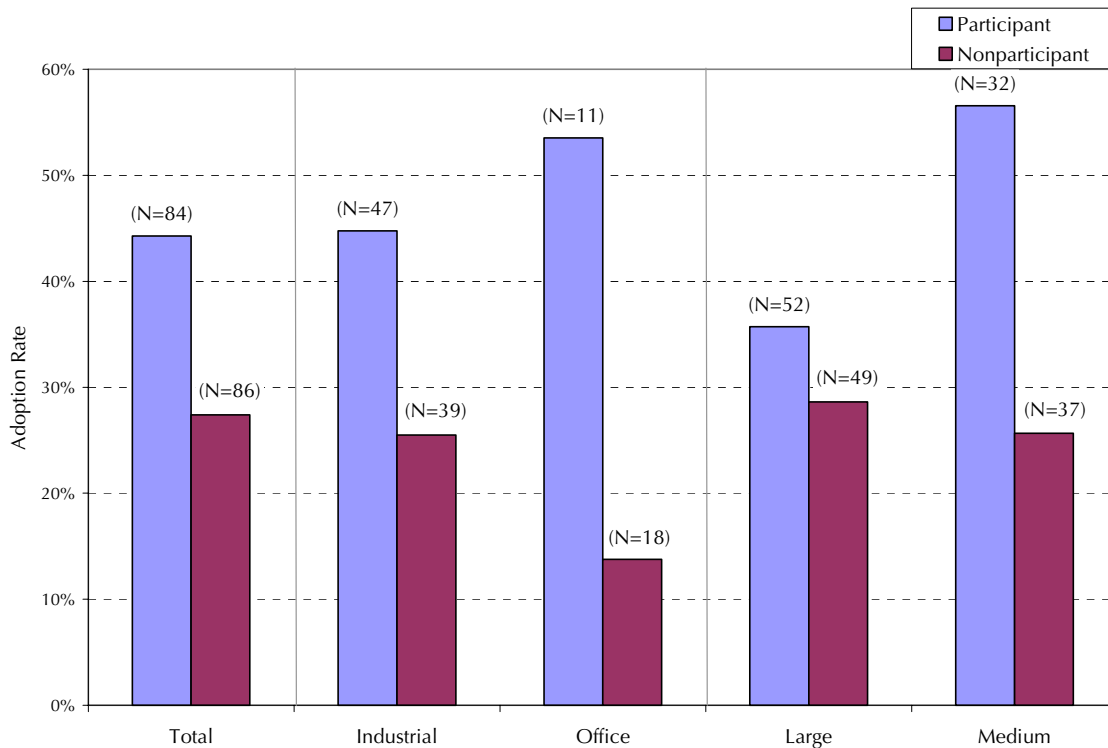


Exhibit 4-7 compares lighting adoption rates for PY 2002 medium and large participants and similarly sized nonparticipants. Again, strong evidence of program effects is revealed in the exhibit, although not quite as dramatic as those shown for small and very small customers. The medium-sized customer segment demonstrates greater impacts than large. The office³ segment, where lighting is a significant portion of energy use, shows a striking effect. However, the samples in these segments are not large, so the segment differences should be interpreted with caution.

Exhibit 4-7
Lighting Adoption Rates
Medium and Large Customers



³ Although there are a total of 35 commercial participant survey completes, only 7 contribute to the Institutional business type and 17 are miscellaneous, consisting of restaurant/grocery, retail and other commercial. Due to the relatively small Institutional sample size and the heterogeneity of this miscellaneous group, the only commercial business type result presented in this report is Office. Refer to the appendix tables for additional commercial segment results.

Next, the pattern of lighting technology adoptions is examined for both participants and nonparticipants. Exhibit 4-8a shows the PY 2003 small and very small customer lighting technology adoption distribution and Exhibit 4-8b shows the corresponding nonparticipant adoption distribution. These exhibits reveal that not only are participants adopting lighting technologies more frequently, they are somewhat more likely to adopt high efficiency technologies than nonparticipants. The standard efficiency T10 and T12 fluorescent tubes, incandescent and halogen adoptions comprise 8 percent of participant adoptions, while they make up 15 percent of nonparticipant adoptions. Participants are installing more electronic ballasts than nonparticipants, 21 versus 7 percent.

These results are similar to the 2002 Evaluation results, with no relative change in the portion of T8/T5 adoptions, somewhat fewer CFLs (29 versus 34 percent) and somewhat more electronic ballasts (21 versus 14 percent) in 2003.

Exhibit 4-8a
PY 2003 Participant Lighting Adoptions by Technology
Small and Very Small Customers

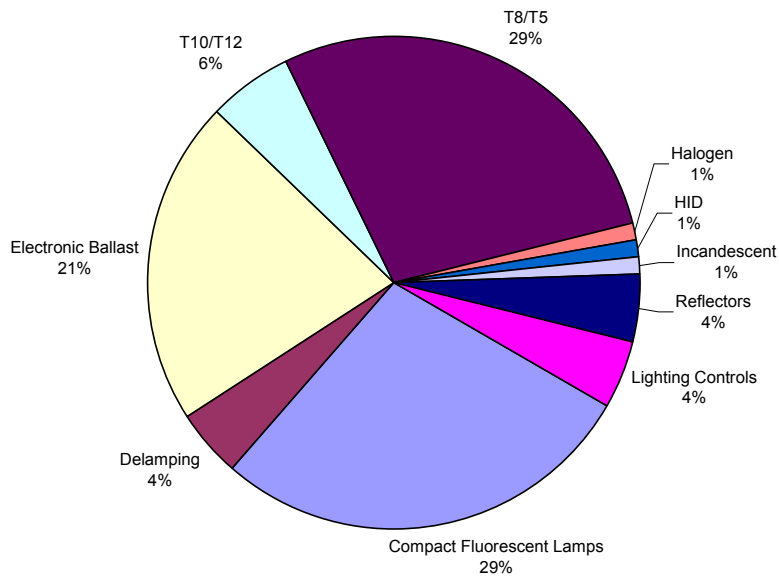
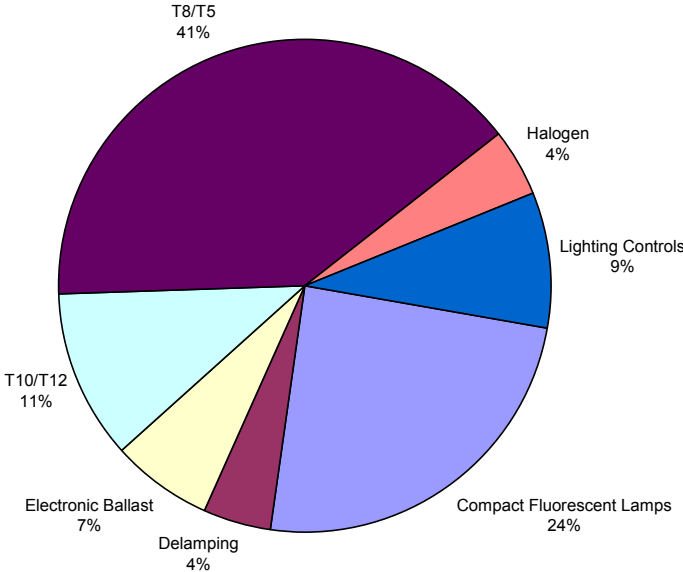


Exhibit 4-8b
Nonparticipant Lighting Adoptions by Technology
Small and Very Small Customers



Next, we examine the pattern of lighting technologies adopted by medium and large customers. Exhibit 4-9a shows the PY 2002 medium and large participant technology distribution and Exhibit 4-9b shows the corresponding nonparticipant distribution. Again, participants are more likely to adopt high efficiency technologies than nonparticipants. The standard efficiency T10 and T12 fluorescent tubes and magnetic ballasts comprise 5 percent of participant adoptions, while they are 9 percent of nonparticipant adoptions. Participants are installing more lighting controls than nonparticipants, 25 versus 6 percent.

Exhibit 4-9a
Medium and Large Participant Lighting Adoptions by Technology

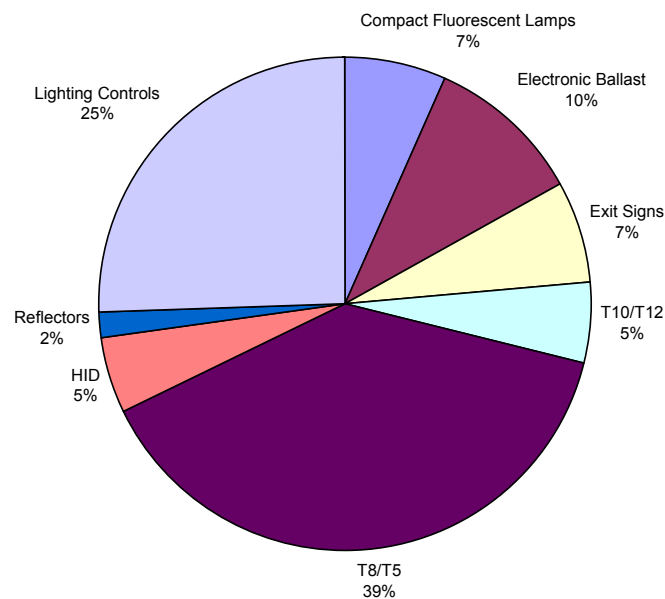
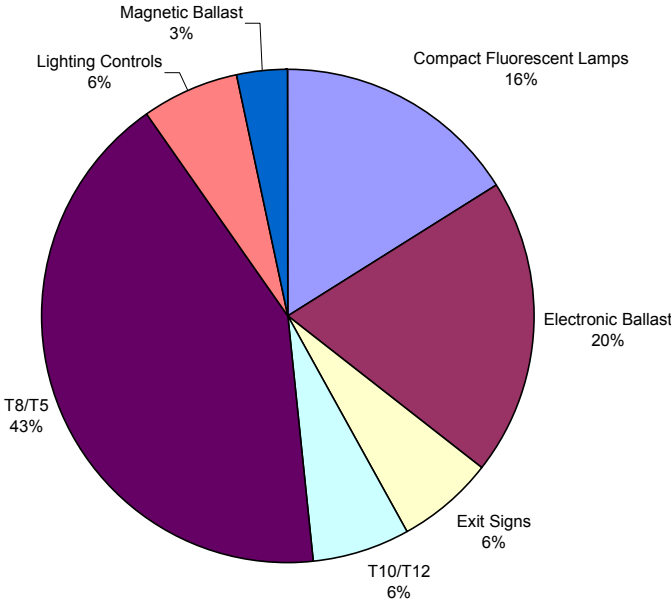


Exhibit 4-9b
Nonparticipant Lighting Adoptions by Technology
Medium and Large Customers



Another essential characteristic of participant lighting impacts is the average size of lighting installations. Exhibit 4-10 below shows the average size of installations made in the participant and nonparticipant populations for the most commonly installed technologies. Participants are making much more substantial installations of T8's than nonparticipants with an average installation size of 131 fixtures, calculated across 24 different installations. The average nonparticipant T8 installation size is just 26 fixtures. With the exception of CFLs, participants are installing significantly larger numbers of all the lighting technologies. However, participant adopters tend to have larger facilities than nonparticipant adopters. Thus, the number of items installed per square foot is comparable for most technologies, with the exceptions of electronic ballasts, delamping, and CFL's. Nonetheless, the greater number of adoptions occur in the participant population, combined with a larger or comparable installation size. These two factors results in measurable program impacts among small and very small customers within the lighting end use.

Exhibit 4-10
Average Size of Lighting Installations
Reported by Participants and Nonparticipants
Small and Very Small Customers

	Small and Very Small Participants				Small and Very Small Nonparticipants			
	Average Install Size	N	Average Sq. Feet	Average Per 1,000 Sq Foot Install *	Average Install Size	N	Average Sq. Feet	Average Per 1,000 Sq Foot Install *
CFL	35	25	17,809	5.9	41	10	15,183	12.4
T8/T5	131	24	27,925	4.7	26	13	13,069	4.9
Electronic Ballast	41	18	19,696	4.9	13	3	44,564	0.3
Lighting Controls	20	3	75,959	1.1	5	4	10,772	1.7
Reflectors	58	3	6,370	7.3	-			
Delamping	37	3	7,497	6.4	13	2	7,614	3.5

*Average per square foot installation is the mean of the ratio of the number of items to facility square feet, where both square feet and number of items are populated.

Exhibit 4-11 below shows the average size of installations made in the medium and large PY 2002 participant and nonparticipant populations for the most frequently installed technologies. Participants are installing much larger numbers of electronic ballasts, exit signs and CFLs. On a per square foot basis, only the exit signs and CFLs are greater among the participants. Nonparticipants report larger installations of T8s. Particularly among nonparticipants, there are some technology type results shown in this table with very small contributing samples sizes. For example, results for lighting controls are clearly not robust enough for direct comparison with participants. The data are shown to give the reader a more detailed characterization of the reported lighting installations.

Exhibit 4-11
Average Size of Lighting Installations
Reported by Participants and Nonparticipants
Medium and Large Customers

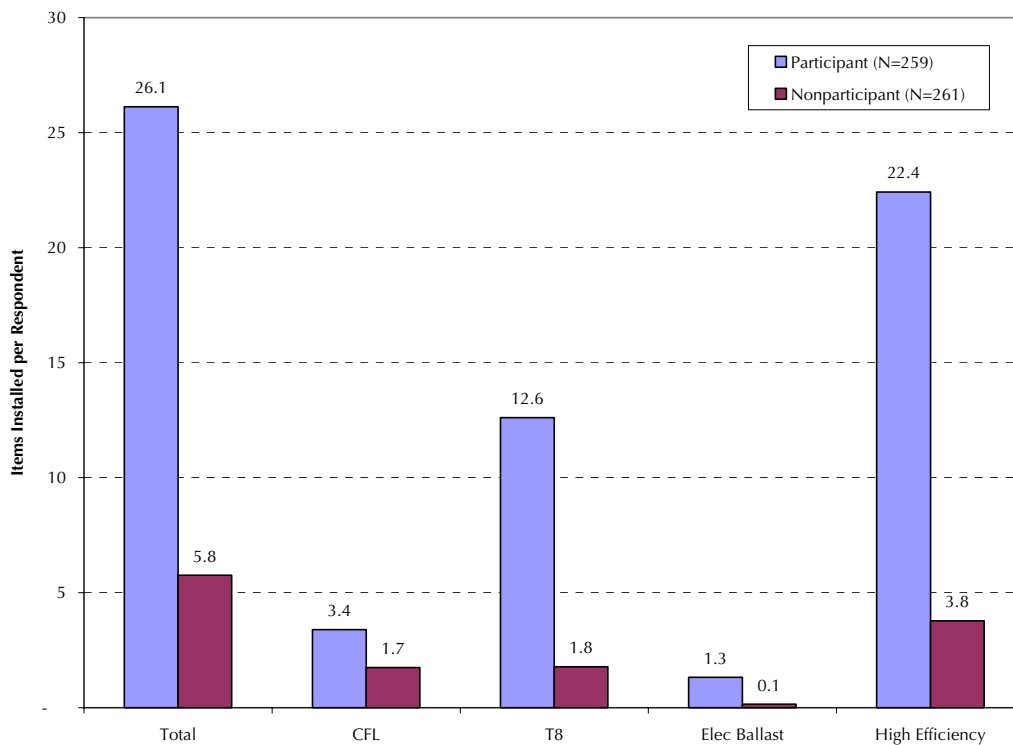
	Medium and Large Participants				Medium and Large Nonparticipants			
	Average Install Size	N	Average Sq. Feet	Average Per 1,000 Sq Foot Install *	Average Install Size	N	Average Sq. Feet	Average Per 1,000 Sq Foot Install *
CFL	996	4	76,517	13.3	151	4	58,811	1.5
T8/T5	311	20	90,784	3.7	663	12	62,102	6.8
Electronic Ballast	490	6	71,309	6.8	158	5	23,937	9.8
Lighting Controls	22	7	94,842	0.2	50	1	110,000	0.5
Exit Signs	350	3	96,146	3.2	4	1	75,000	0.1

*Average per square foot installation is the mean of the ratio of the number of items to facility square feet, where both square feet and number of items are populated.

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 4-12 provides a normalized comparison of activity in the two small and very small customer participant and nonparticipant populations. The difference between lighting adoption activity in the two populations overall is dramatic, with an average number of high efficiency items installed per respondent of 22 versus 3.

The technology-specific results reveal that the program impact is generated primarily in T8 installations. This finding is in contrast to the PY 2002 Evaluation, which found that most of the lighting impacts were from CFL installations. The 2002 Evaluation revealed an installation rate of 5 CFLs per respondent versus just 2 among nonparticipants. As shown below the nonparticipant installation rate is stable relative to 2002, but the participant rate drops to 3 per respondent. At the same time there is a three-fold increase in the T8 installations per participant respondent, at 4 in 2002 versus 12 in 2003. Of course some variability is expected given small sample sizes,⁴ but these changes are substantial and do indicate trends in the market. There is a slowing down in CFL installations among participants, perhaps relating to a degree of market saturation or changes in marketing efforts. Similarly, the increase in T8 installations may reflect a trend toward more substantial investments in energy efficiency or changes in IOU marketing efforts.

Exhibit 4-12
Average Number of Items Installed per Respondent
Small and Very Small Participants



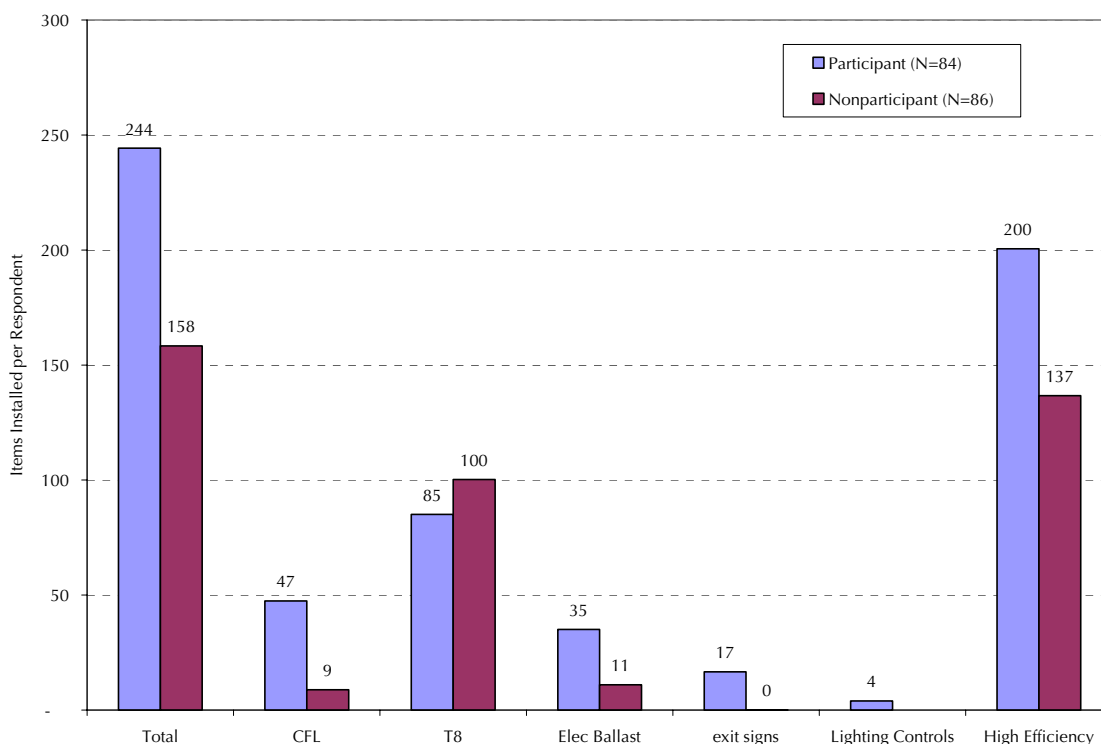
*Fixtures, lamps, ballasts, etc. calculated as percent of population that adopted lighting x percent of lighting adopters who adopted each technology x average installation size = average install per customer.

**Efficient equipment includes T8's, CFL's, electronic ballasts, lighting controls, reflectors, delamping and exit signs.

⁴ Recall there are 25 T8 installations and 24 CFL installations in the 2003 sample. In 2002 there were 16 T8 installations and 48 CFL installations.

Exhibit 4-13 below, is similar to Exhibit 4-12 above, providing a normalized comparison of lighting adoption activity in the medium and large customer populations. Activity within the participant population is greater for every technology category except T8s. Overall, there is clearly a solid and substantial program impact in the lighting end use among medium and large customers. The majority of the lighting impacts are generated from installations of CFL, electronic ballast and exit sign installations.

Exhibit 4-13
Average Number of Items Installed per Respondent
Medium and Large Participants

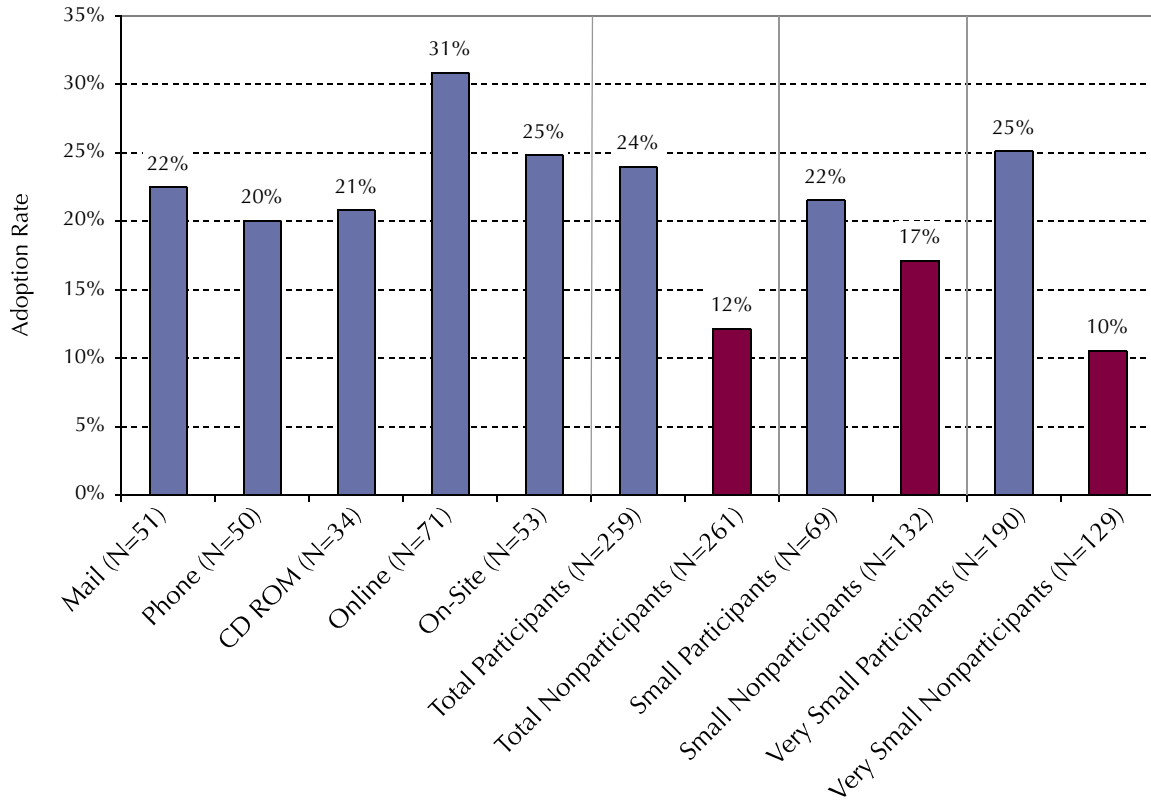


The lighting program effects revealed in Exhibit 4-13 are larger on an absolute scale than those found in the small and very small population, as shown in Exhibit 4-12. The estimated program impact in the medium and large population is 73 lighting items per participant, versus 19 items among small and very small participants. This finding is further illuminated in the Section 4.2 impact assessment. On the other hand, impacts measured in the percent difference between participants and nonparticipants is much greater among small and very small customers. Among small and very small customers participant activity is 7 times greater than nonparticipant activity. Among larger customer, participant activity is about 1.5 times nonparticipant activity. Ultimately, the program shows success in both markets.

4.1.3 Cooling Equipment Adoptions

As shown in Exhibit 4-14 participants adopt cooling equipment at twice the rate of nonparticipants. The bulk of the difference is generated among the very small participant segment, where the adoption rate is a remarkable 25 percent.

Exhibit 4-14
Cooling Equipment Adoption Rates
Small and Very Small
Customers

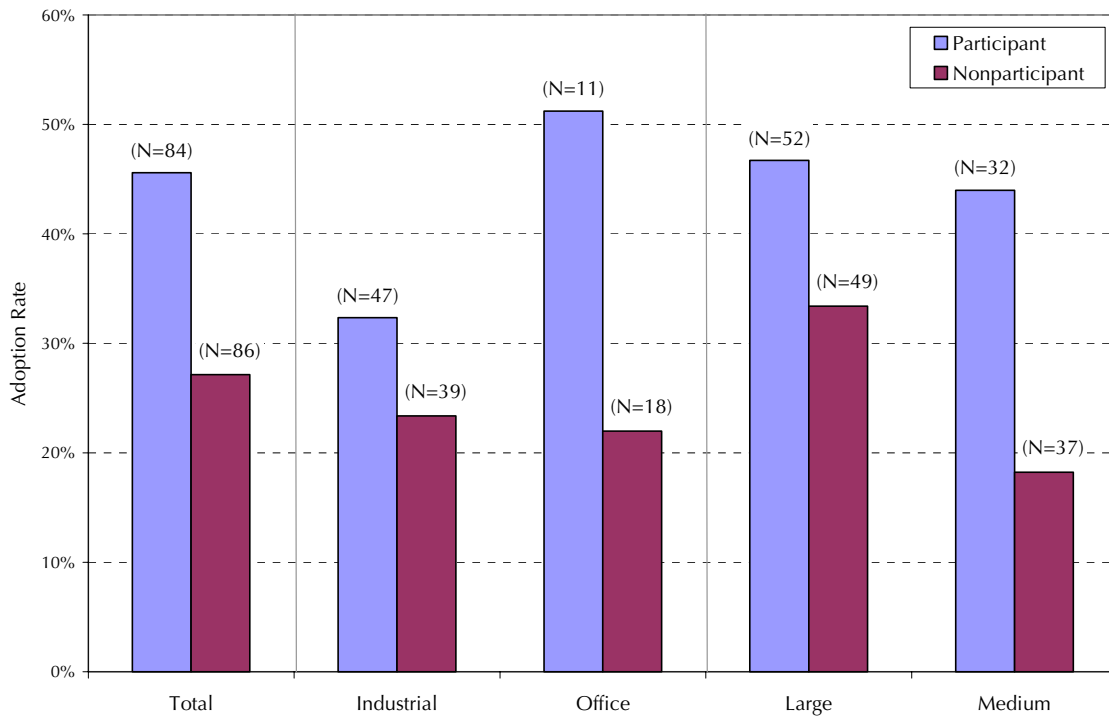


Surprisingly, online audits show the highest adoption rate, at 31 percent. This result is also associated with the largest sample size by delivery channel (71). The evidence shown here and throughout this report indicates online audits are an effective tool that produces measurable program effects in the participant population. On-site audits also are associated with high cooling equipment adoption rates, at 25 percent. The remaining delivery mechanisms range from 20 to 22 percent. –In fact, all delivery channels have solid rates of adoption, and the rate measured in each channel is substantially higher than either small or very small nonparticipant cooling equipment adoption rates.

Exhibit 4-15 below shows medium and large customer cooling equipment adoption rates. These are also very high, with an overall adoption rate among participants of 46 percent. Activity among participants is, again, substantially higher than activity among nonparticipants.

By comparison, the nonparticipant adoption rate is just 27 percent. Participant adoption rates are higher in every segment shown in the exhibit below, but seem to be more pronounced among medium customers than larger, and more pronounced among offices than industrial facilities. Larger facilities, particularly industrial facilities, have less cooling as a major energy end-use. As a result, industrial processes and other equipment may get more attention in the audits. Only in food processing and a select few NAICs will cooling be important. This may account for the lessened impact among larger industrial customers in the cooling category.

Exhibit 4-15
Cooling Equipment Adoption Rates
Medium and Large Customers



Next the types of cooling equipment adopted by technology are examined among participants and nonparticipants. Exhibits 4-16a and 4-16b below shows the distribution of cooling technologies within the respective small and very small participant and nonparticipant samples. The exhibits show participants are much more likely to install HVAC controls than nonparticipants. As is shown later, the greatest program impacts are generated from HVAC controls and packaged systems, the latter due to significantly larger installation size rather than higher adoption rates.

Exhibit 4-16a
Participant Cooling Adoptions by Technology
Small and Very Small Customers

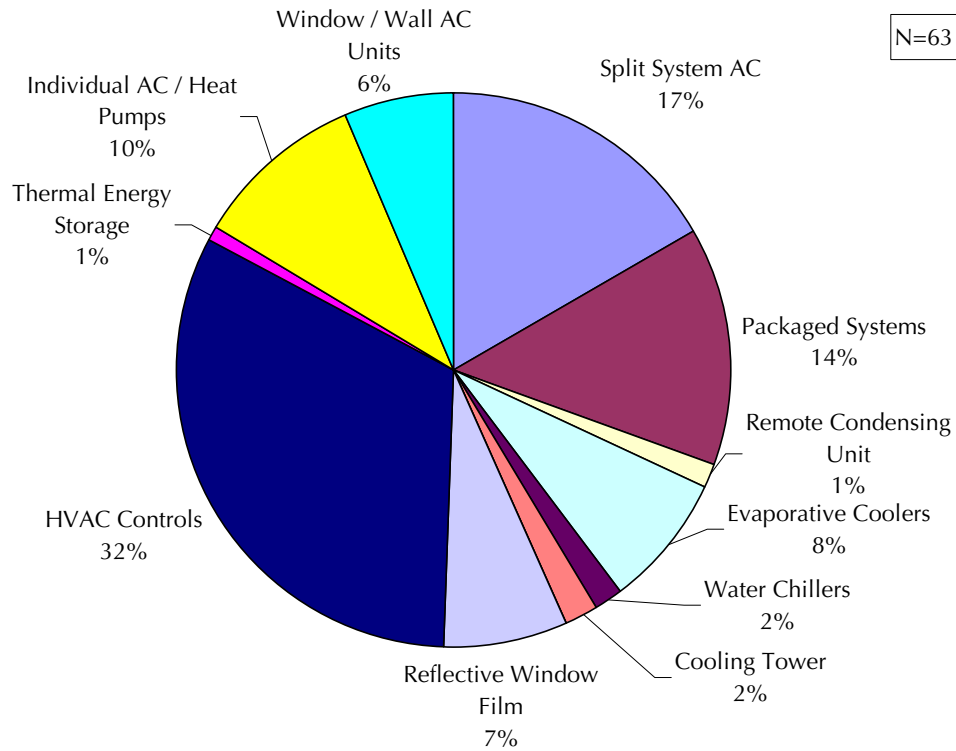


Exhibit 4-16b
Nonparticipant Cooling Adoptions by Technology
Small and Very Small Customers

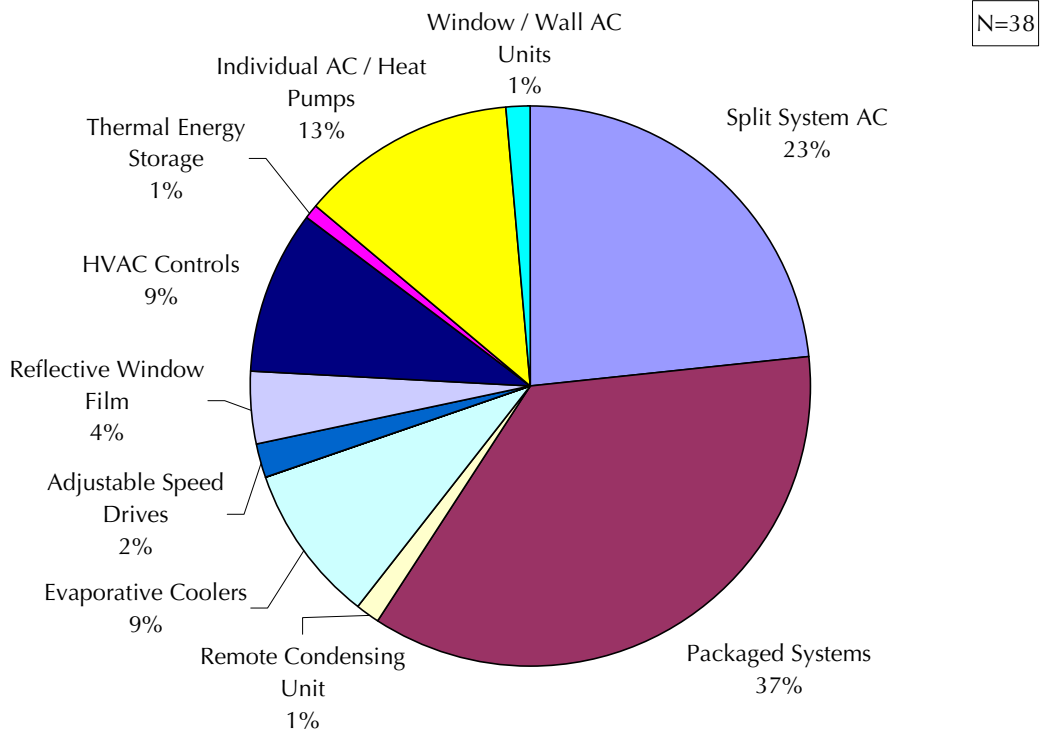


Exhibit 4-17a and 4-17b below show the distribution of cooling technologies among medium and large customers in the PY 2002 participant and nonparticipating populations. In contrast to the small and very small customers, the exhibits show a smaller presence of HVAC controls among the participants versus nonparticipants. Instead, there are greater portions of substantial equipment, such as water chillers, TES systems, and energy management systems. There are also more adjustable speed drives being installed on cooling systems by participants than nonparticipants.

Exhibit 4-17a
Medium and Large Participant Cooling Adoptions by Technology

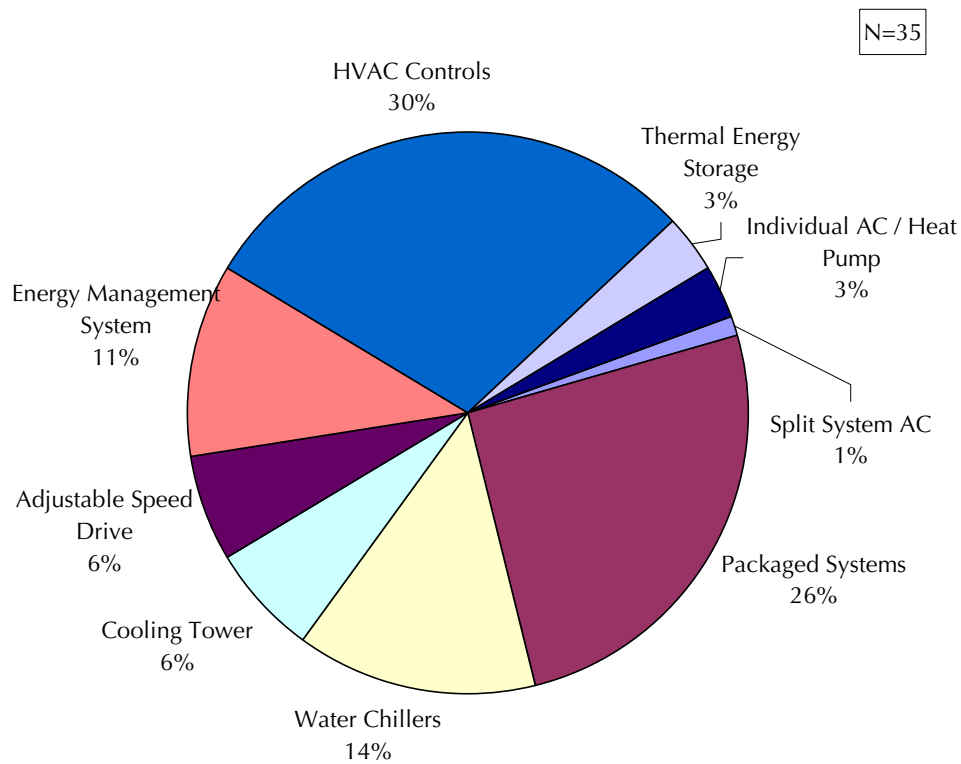
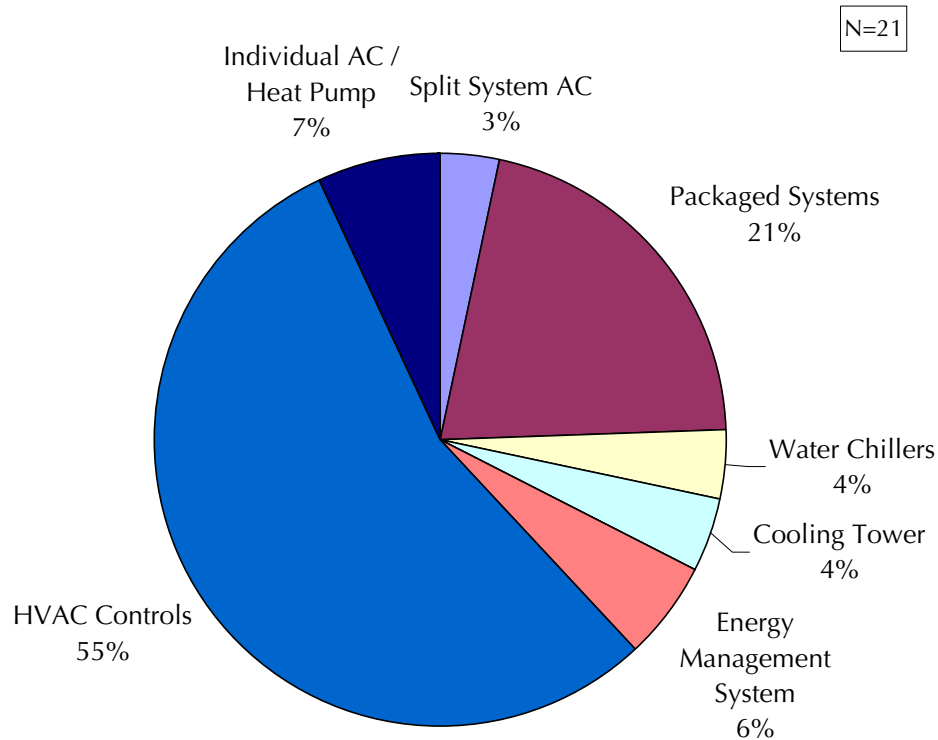


Exhibit 4-17b
Medium and Large Nonparticipant Cooling Adoptions by Technology



The exhibits shown above characterize overall cooling equipment adoption activity, but they don't isolate the efficiency level of adopted equipment. Exhibits 4-18 and 4-19 present adoption rates of high efficiency cooling equipment among the small/very small and medium/large populations.

Exhibit 4-18 below shows high efficiency cooling equipment adoptions for small and very small customers. The exhibit shows, again, that very small participants and those using the Online Audit delivery channel are adopting high efficiency cooling equipment at a much greater frequency than in the nonparticipant population. The on-site audit segment also shows a particularly significant program effect. The small customer segment shows a negative program effect, but it is minimal, and overwhelmed by activity in the very small customer segment. Recall from the lighting section earlier, that small customers adopted lighting equipment at an astounding rate (41 percent) and this activity may have displaced some adoptions in the cooling equipment area.

Exhibit 4-18
High Efficiency Cooling Equipment Adoption Rates
Small and Very Small Customers

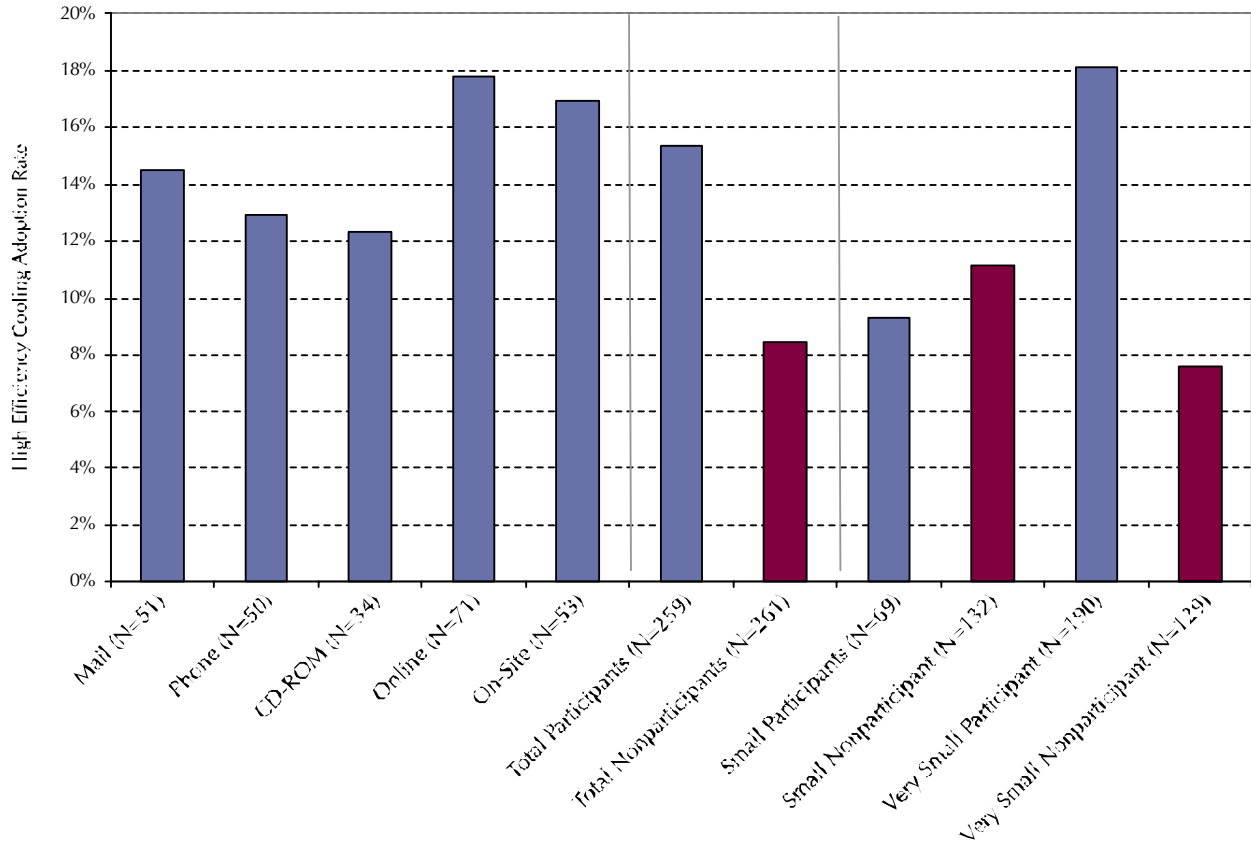
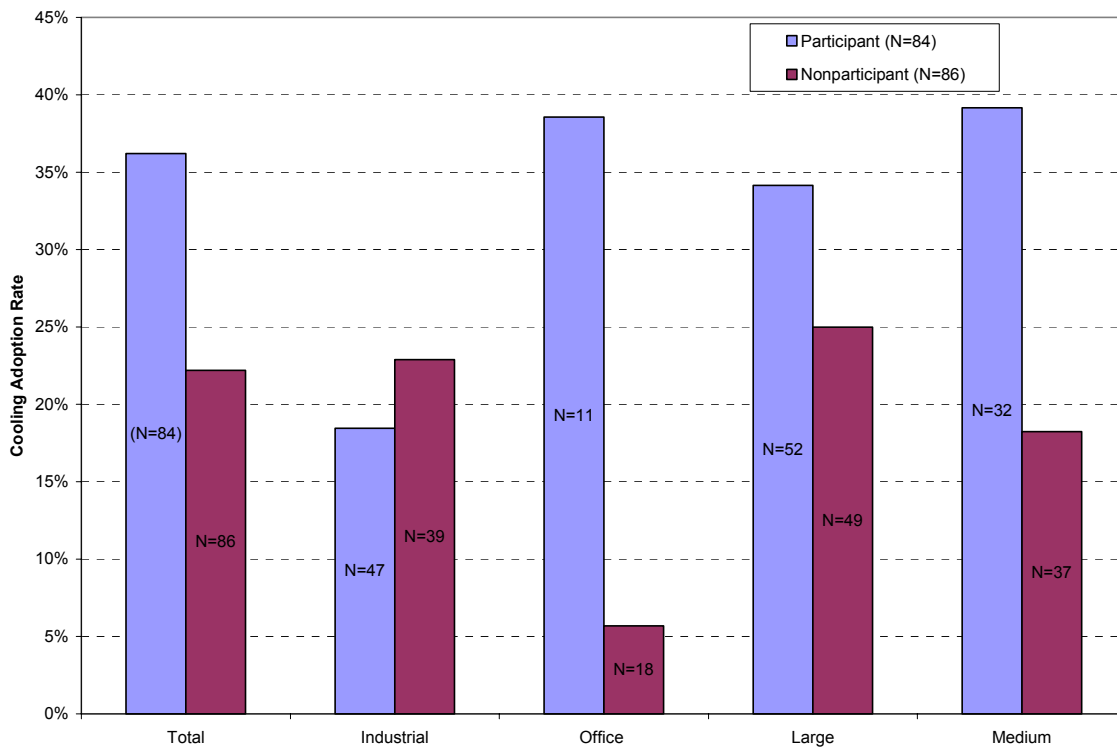


Exhibit 4-19 below shows high efficiency cooling equipment adoptions for medium and large customers. With the exception of the Industrial segment, all the medium and large customer participant segments outperform their nonparticipant counterparts in the adoption of high efficiency cooling equipment by a sizable margin. The exhibit confirms that program effects are concentrated in the medium size and office segments.

Exhibit 4-19
High Efficiency Cooling Equipment Adoption Rates
Medium and Large Customers



Next, the average size of installations occurring in the participant and nonparticipant populations is explored. Exhibit 4-20 shows the average size of installations for some key technologies. The average installation sizes for both split and packaged systems are larger among participants, while installations of HVAC controls are larger among nonparticipants. Installations per square foot are comparable in the two populations for most technologies, although reflective window film is greater among participants.

Exhibit 4-20
Average Size of High Efficiency Cooling Equipment Installations
Small and Very Small Customers

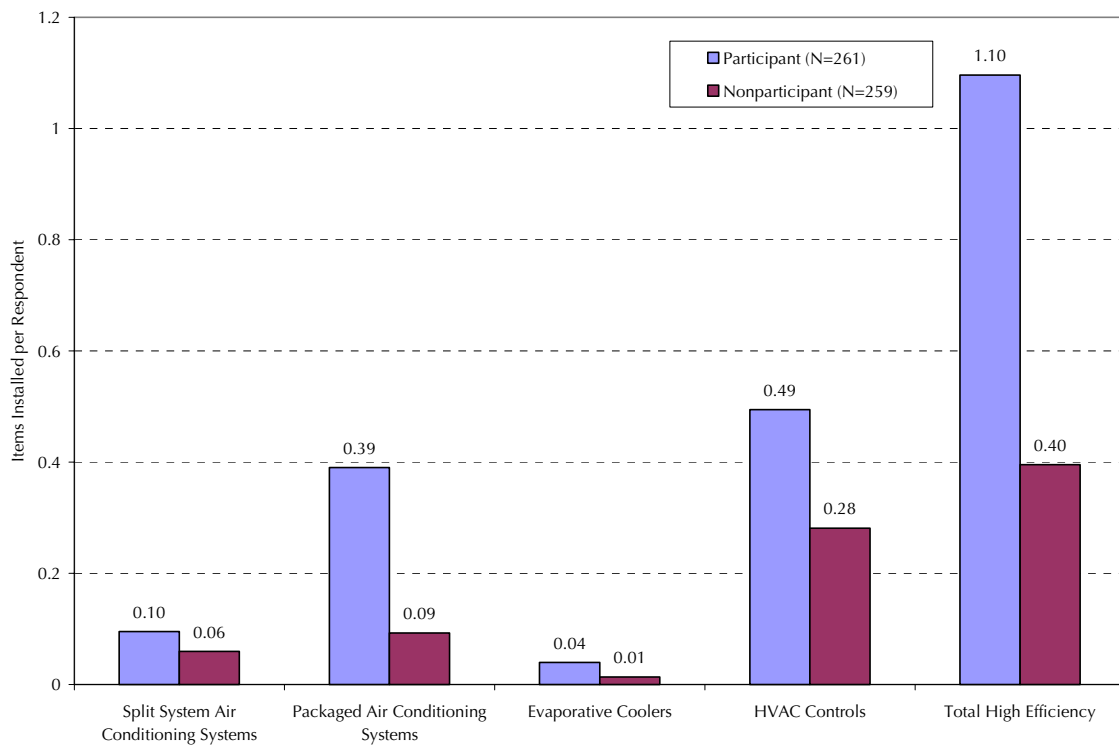
	Small and Very Small Participants				Small and Very Small Nonparticipants			
	Average Install Size	N	Average Sq. Feet	Average Per 1,000 Sq Foot Install *	Average Install Size	N	Average Sq. Feet	Average Per 1,000 Sq Foot Install *
Split system air conditioners	6	4	62,384	0.3	2	7	18,844	0.2
Packaged air conditioning systems	11	9	21,723	0.4	3	7	11,927	0.5
Evaporative (swamp) coolers	2	5	10,069	0.4	1	3	2,305	0.5
HVAC Controls	7	18	40,237	0.7	12	6	26,378	0.4
Reflective Window Film	128	6	4,374	34.6	563	2	75,000	7.5

*Average per square foot installation is the mean of the ratio of the number of items to facility square feet, where both square feet and number of items are populated.

Medium and large customers are more difficult to compare. The small sample sizes and the wide array of technologies leave most technology categories without enough data to estimate a meaningful average.

Combining the average size of high efficiency installations with adoption rates results in a measure of average adoptions per respondent within the participant and nonparticipant populations. Exhibit 4-21 presents these results for small and very small customers, showing adoptions per respondent for key cooling technologies and high efficiency equipment overall. Participants show a greater level of activity in each technology segment, as well as for overall high efficiency adoptions. The greatest impact is seen in the packaged air conditioning technology.

Exhibit 4-21
Average Number of High Efficiency Items Installed per Respondent¹
As Reported by Small and Very Small Customers



¹. Calculated as the total number of high efficiency installations divided by the number of survey respondents.

Again, small sample sizes and significant variability across both technologies and installation size adoptions render the average medium and large cooling adoption insufficient to produce meaningful comparisons here.

4.1.4 Gas Equipment Adoptions

This section examines the fourth major end-use, gas equipment. Note that in the medium and large customer surveys, those who were asked the industrial process equipment adoption battery were not asked the gas equipment battery. This was done to keep the survey to a reasonable length for all respondents. Thus, only 33 participant survey respondents and 47

nonparticipant survey respondents were asked the gas equipment battery. All small and very small customers were asked the gas equipment adoption battery.

Exhibit 4-22 below shows small and very small customer gas equipment adoption rates by key segment. Although the small customer segment shows a positive program effect, the overall rates are equivalent in the two populations. The evidence shown here of program effects within the gas equipment end-use is minimal. However, as we discuss below, there is supportive evidence of program effects when examining *high efficiency* gas equipment adoptions, as opposed to all gas equipment adoptions shown in Exhibit 4-22.

Exhibit 4-22
Gas Equipment Adoption Rates
Small and Very Small Customers

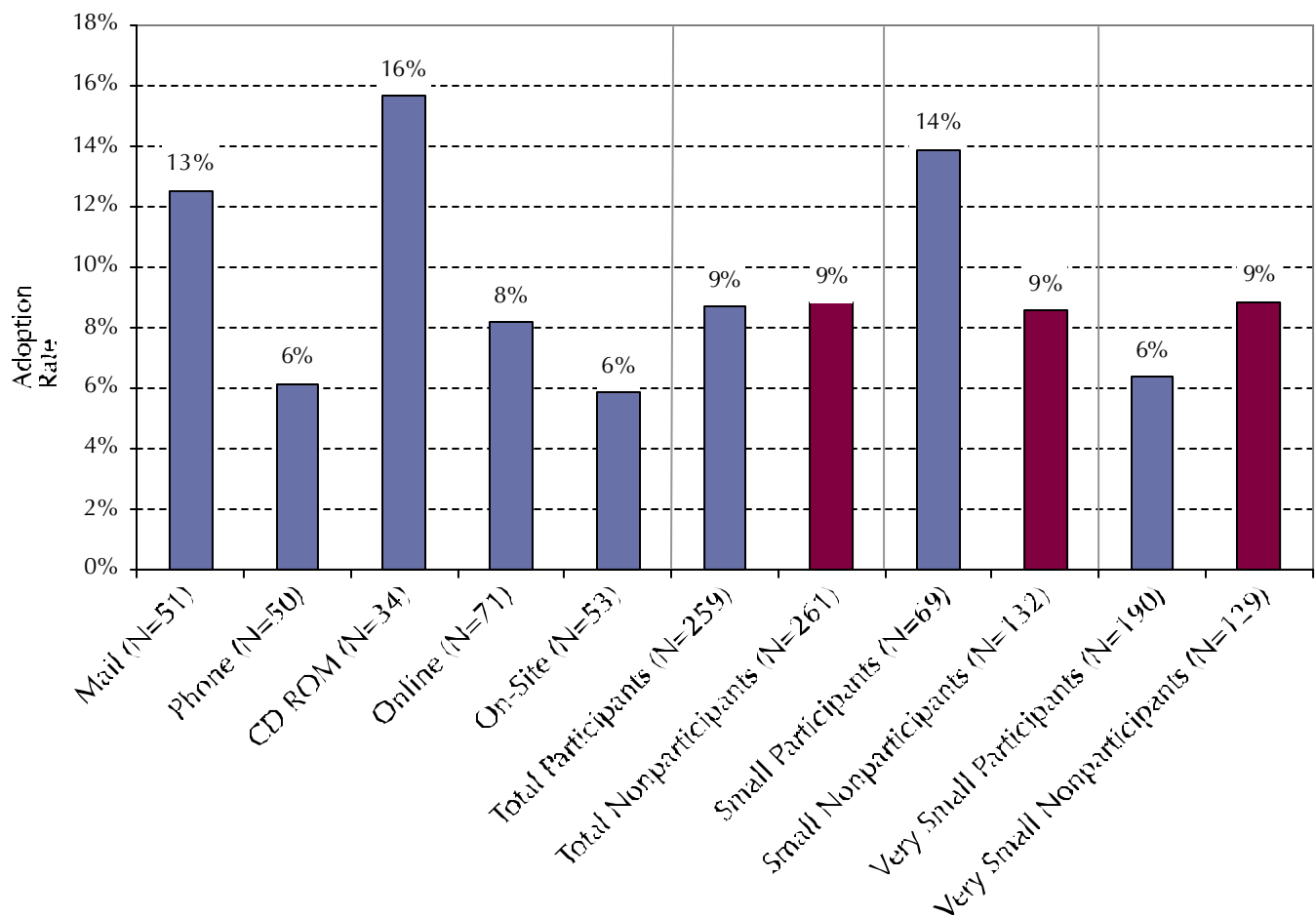
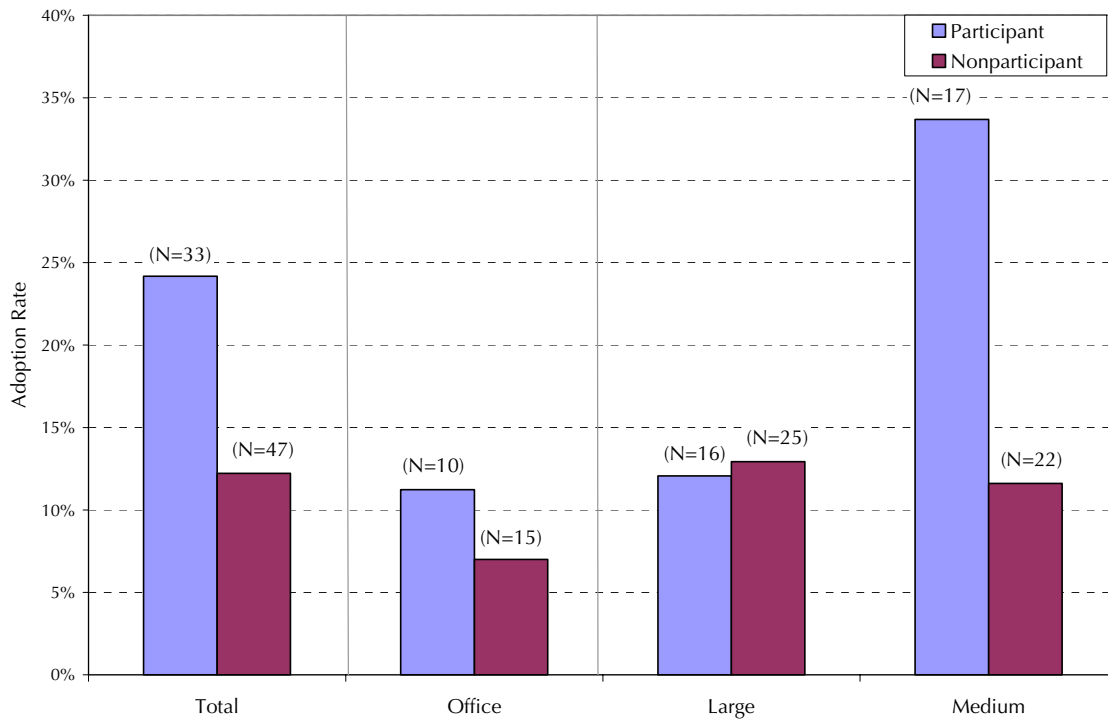


Exhibit 4-23 below shows medium and large customer gas equipment adoption rates by key segment. The medium-sized customer and the office segments show a positive program effect, as do the total population results. Similar to small customers, the story is quite different when

examining only high efficiency adoptions. As is discussed below, *high efficiency* gas adoptions reveal a program effect among large customers but not among medium-sized customers, although the overall program effect remains positive.

Exhibit 4-23
Gas Equipment Adoption Rates
Medium and Large Customers



The types of gas equipment adopted by participants and nonparticipants are presented in Exhibit 4-24 below. The exhibit shows small and very small customer results, as well as medium and large customer results. Note the small numbers of adopters in all customer samples, leaving no valid conclusions to draw from comparisons. The data is presented to give the reader a more detailed characterization of the types of gas equipment adoptions occurring in the two populations.

By far the most common gas installations among small and very small participants are water heaters, at 72 percent, followed by cooking equipment at 14 percent. Water heaters are also the most common among the nonparticipant installations, but at just 39 percent, they are less common. Furnaces and heaters capture another 33 percent of the nonparticipant installations.

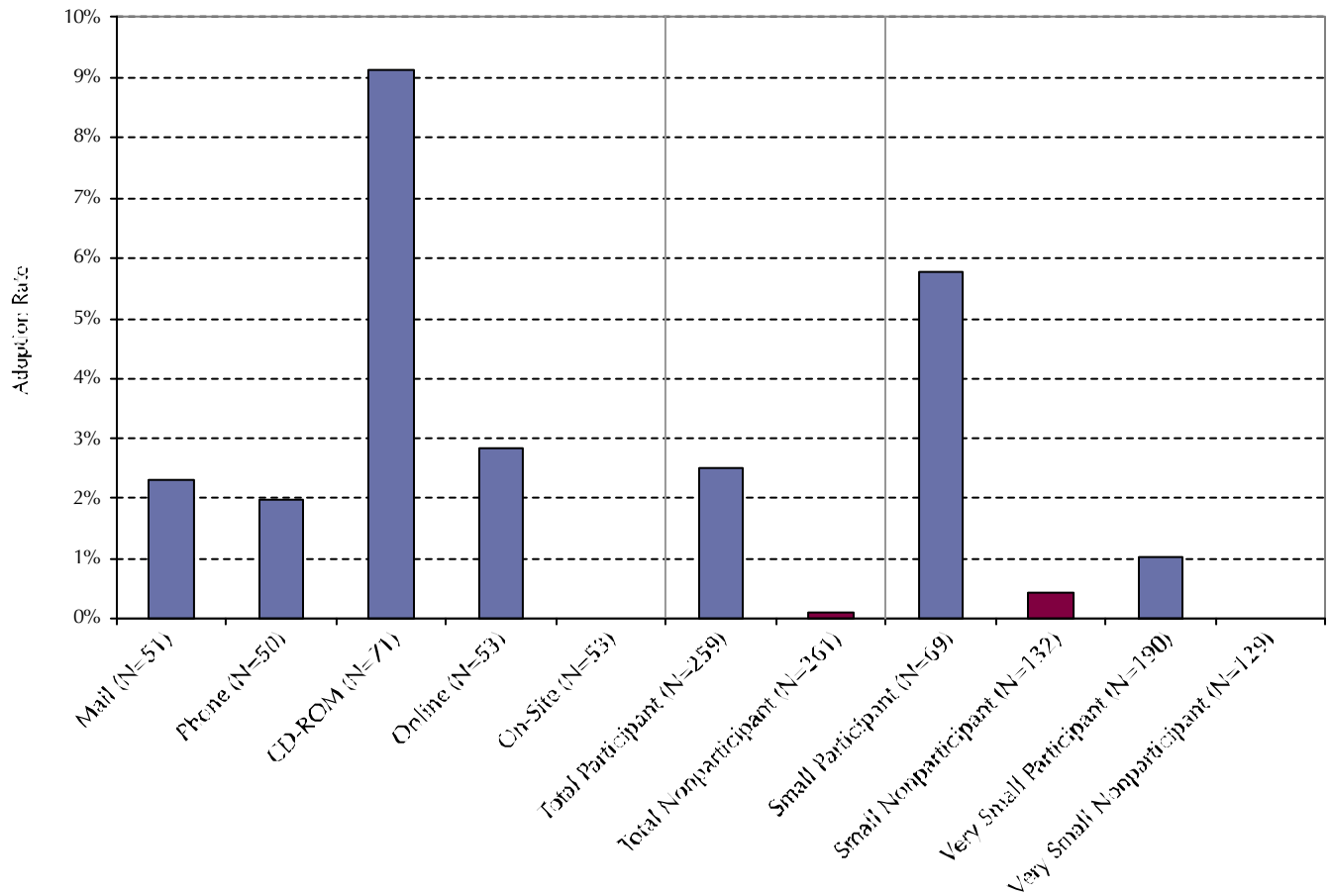
Medium and large customers are also installing primarily water heaters, followed by boilers and furnaces/heaters. Interestingly, both groups of participants complete more cooking equipment installations and fewer gas heaters than their corresponding groups of nonparticipants.

Exhibit 4-24
Gas Equipment Adoptions by Technology
Participant versus Nonparticipant

	Small and Very Small Customers		Medium and Large Customers	
	Participant	Nonparticipant	Participant	Nonparticipant
Boiler	3%	3%	29%	22%
Water Heater	72%	39%	38%	55%
Furnace/Heater	3%	33%	8%	18%
Gas Booster for Dishwasher	0%	1%	4%	0%
Cooking Equipment	14%	9%	14%	5%
Washer / Dryer	3%	9%	8%	0%
Other	6%	6%	0%	0%
N	21	23	6	6

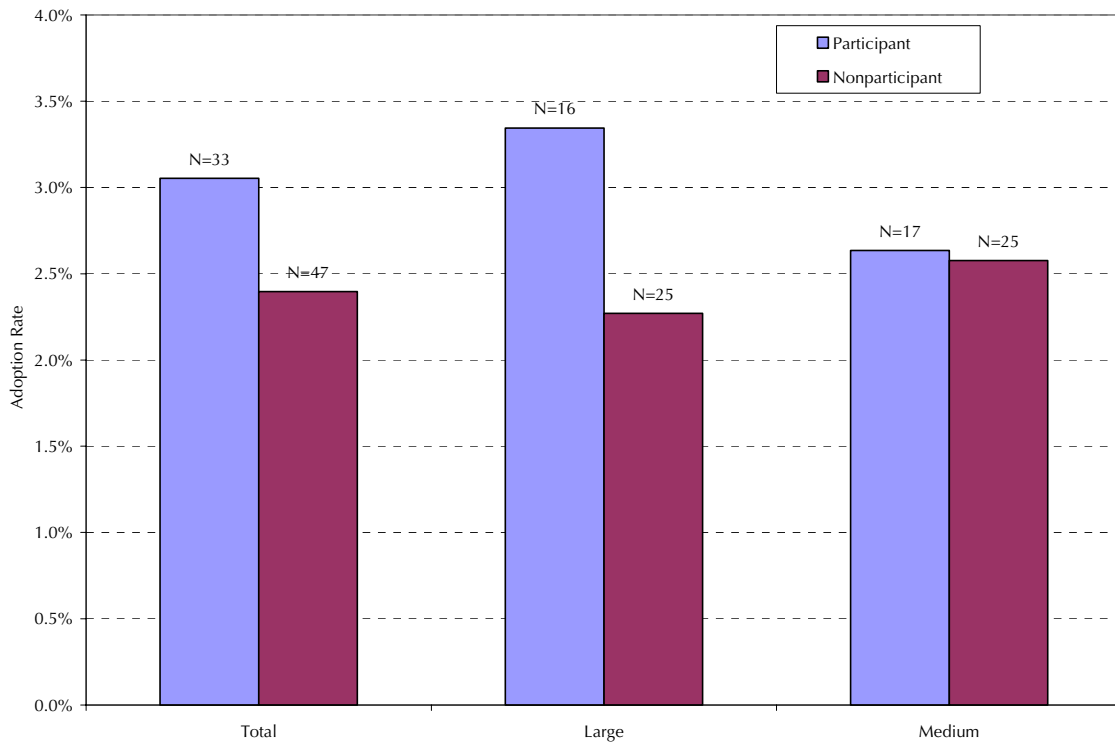
Participants and nonparticipants were asked if their new gas equipment was energy efficient. Exhibit 4-25 below shows the rate of self-reported high efficiency gas equipment adoptions for small and very small customers. The exhibit shows a positive program effect, with measurably higher rates of participant high efficiency gas equipment adoptions relative to nonparticipants. This is in contrast to the PY 2002 Evaluation finding, where participants reported a lower frequency of installing high efficiency gas equipment than nonparticipants. The reader should note the scale of the exhibit, however, as the absolute rates of adoption are very low. High efficiency gas equipment adoptions have the lowest adoption rate of the five end-uses examined in this impact analysis.

Exhibit 4-25
High Efficiency Gas Equipment Adoption Rates
Small and Very Small Customers



As shown in Exhibit 4-26 below, medium and large participants have a low overall rate of high efficiency gas equipment adoptions, at just 3 percent. This is in excess of the nonparticipant rate, which is just 2.4 percent. Although this does not disprove the presence of program effects in this end-use, the sample sizes and the margins are too small to draw valid conclusions. In addition, many of the audits did not stress gas equipment recommendations, and turnover for gas measures is relatively low.

Exhibit 4-26
High Efficiency Gas Equipment Adoption Rates
Medium and Large Customers



4.1.5 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.

Exhibit 4-27 shows the rate of ‘other’ equipment adoptions for small and very small participants and nonparticipants. The exhibit shows a significant number of adoptions are occurring among participants, with an overall adoption rate of 20 percent. This is well in excess of the nonparticipant adoption rate of 12 percent. There is quite a bit of variability in adoption rates across delivery mechanisms, with CD-ROM at the top with 34 percent of respondents adopting measures.

Exhibit 4-27
Other Equipment Adoption Rates – Participants versus Nonparticipant

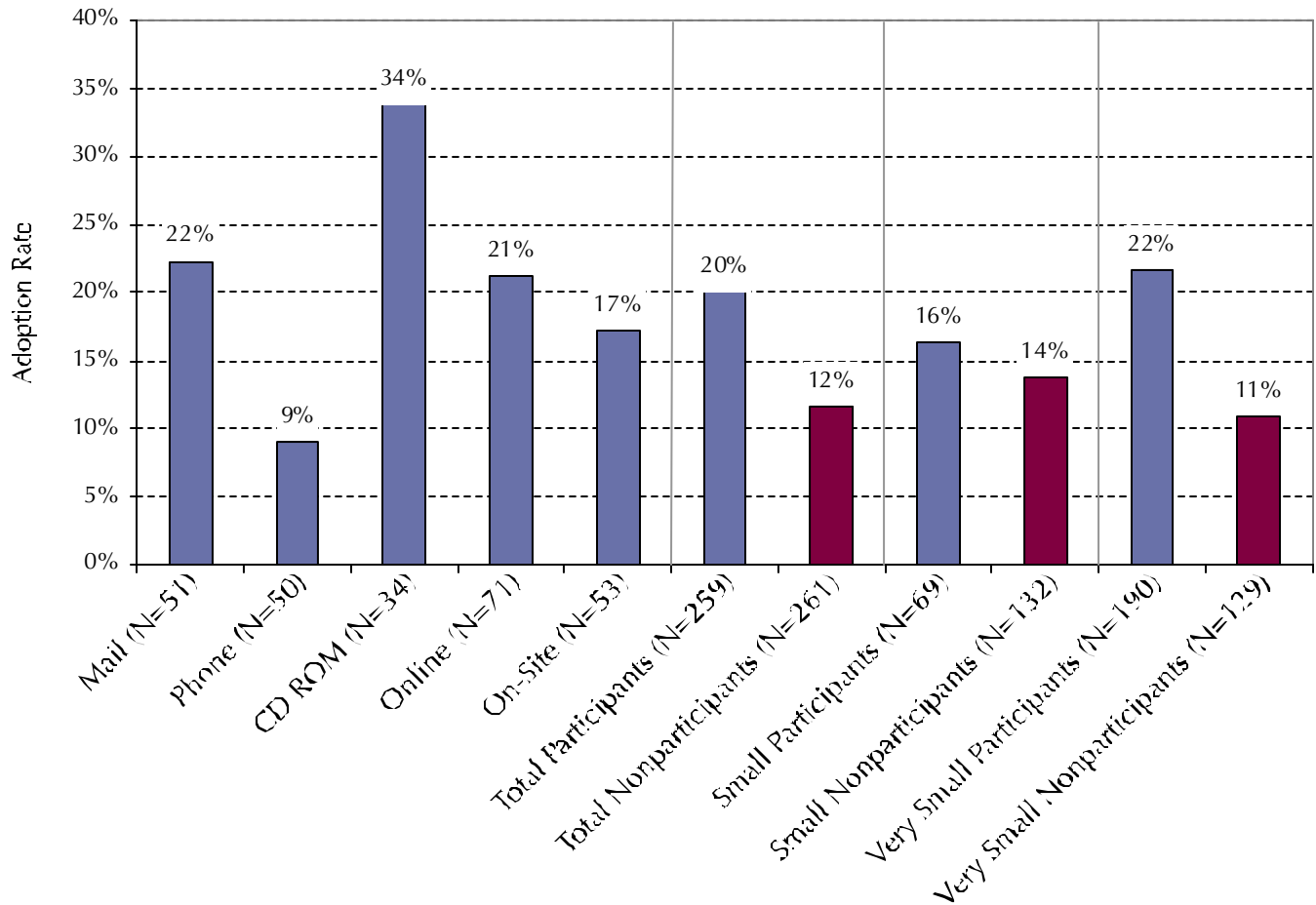


Exhibit 4-28 presents 'other' equipment adoption rates for medium and large customers. Nonparticipant adoption rates are higher in all but the medium size customer segment, as well as overall. However, the overall difference is small, at 10.5 versus 12.0 percent. Medium and large participants show significantly higher adoption rates in industrial process, lighting and cooling technologies, as well as a somewhat higher rate of gas equipment adoptions. These may have displaced some of the other technology adoptions that might have occurred.

Exhibit 4-28
Other Equipment Adoption Rates by Utility and Delivery Mechanism

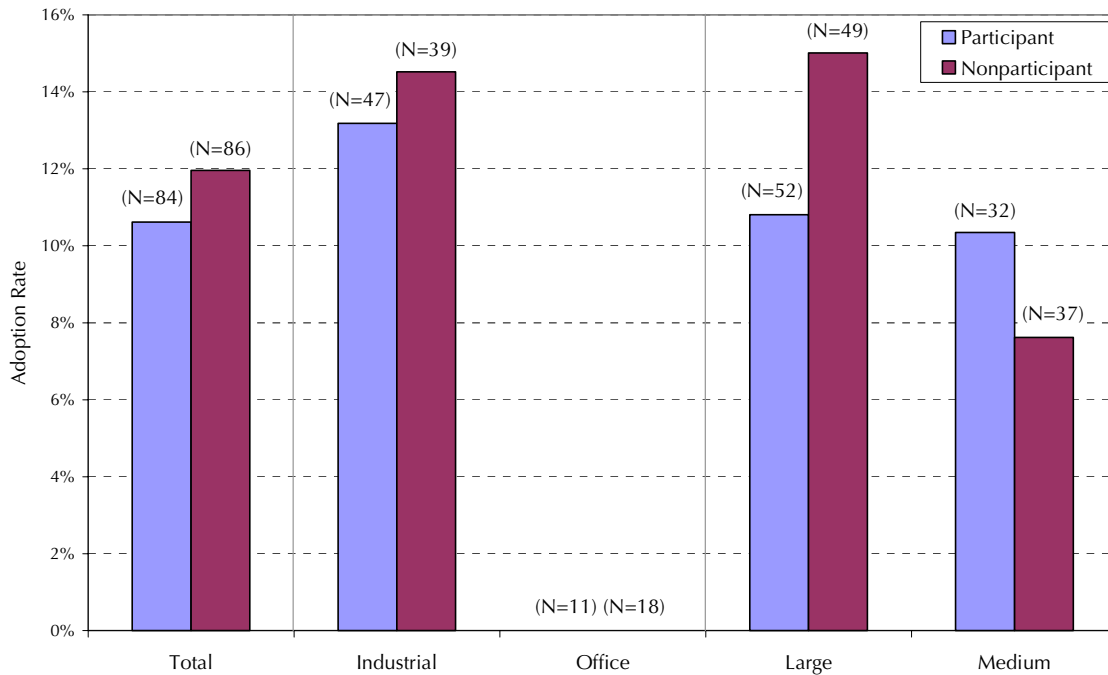


Exhibit 4-29 below shows the technology distribution of the other equipment adopted by participants and nonparticipants. Small and very small customers are doing primarily refrigeration, washer/dryers, and outdoor lighting. Medium and large customers are doing food service equipment and water heating equipment. Much of the medium and large company adoptions are unique, and so fall into the 'other' category.

Exhibit 4-29
Other Equipment Adoptions by Technology

	Small and Very Small Customers		Medium and Large Customers	
	Participant	Nonparticipant	Participant	Nonparticipant
Food Service Equipment	5%	14%	25%	8%
Water Heating Equipment	7%	6%	23%	18%
Outdoor Lighting Equipment	14%	10%	0%	12%
Refrigeration Equipment	22%	36%	0%	10%
Motors	7%	5%	12%	0%
Office Equipment (copier)	12%	17%	10%	0%
Washer / Dryer	18%	7%	0%	0%
Windows	0%	0%	6%	0%
Controls	9%	0%	0%	0%
Other	6%	7%	19%	40%
N	49	34	11	11

The rates of high efficiency 'other' equipment adoptions are higher among participants than nonparticipants. Survey respondents were asked to describe the efficiency of their 'other' equipment purchases. This data was used to categorize purchases as high or standard efficiency⁵. Nine percent of small and very small participants reported purchasing high efficiency 'other' equipment, while the nonparticipant rate is just 4 percent. Among medium and large companies, the effect is not quite as pronounced, with a high efficiency adoption rate of 7 percent among participants versus 5 percent among nonparticipants.

'Other' equipment adoptions are quite diverse, spanning such items as electric fork lifts to photovoltaic panels, high efficiency windows, fryers, refrigerators and more. The interested reader is referred to Appendix C for a detailed list of self-reported 'other' equipment adoptions by participants and nonparticipants of both size categories.

4.1.6 Energy Conservation Rates

This section explores the rates of conservation measures, i.e. no-cost actions that save energy, occurring in the participant and nonparticipant populations. This section also explores the types of conservation activities going on in the two populations.

Exhibit 4-30 below shows the rate at which small and very small customers incorporate energy conservation into their daily routine. The exhibit shows that the majority of both participants and nonparticipants are engaging in conservation practices. Participants consistently report

⁵ If efficiency data is missing or inconclusive, standard efficiency is assumed.

greater rates of conservation than nonparticipants, and have an overall rate that is 8 percentage points higher than nonparticipants, 71 versus 63 percent. CD-ROM recipients report the highest levels of conservation, at 81 percent. Very small customers have a somewhat greater propensity to practice energy conservation than small customers, among both participants and nonparticipants.

Exhibit 4-30
Conservation Rates- Participants versus General Population

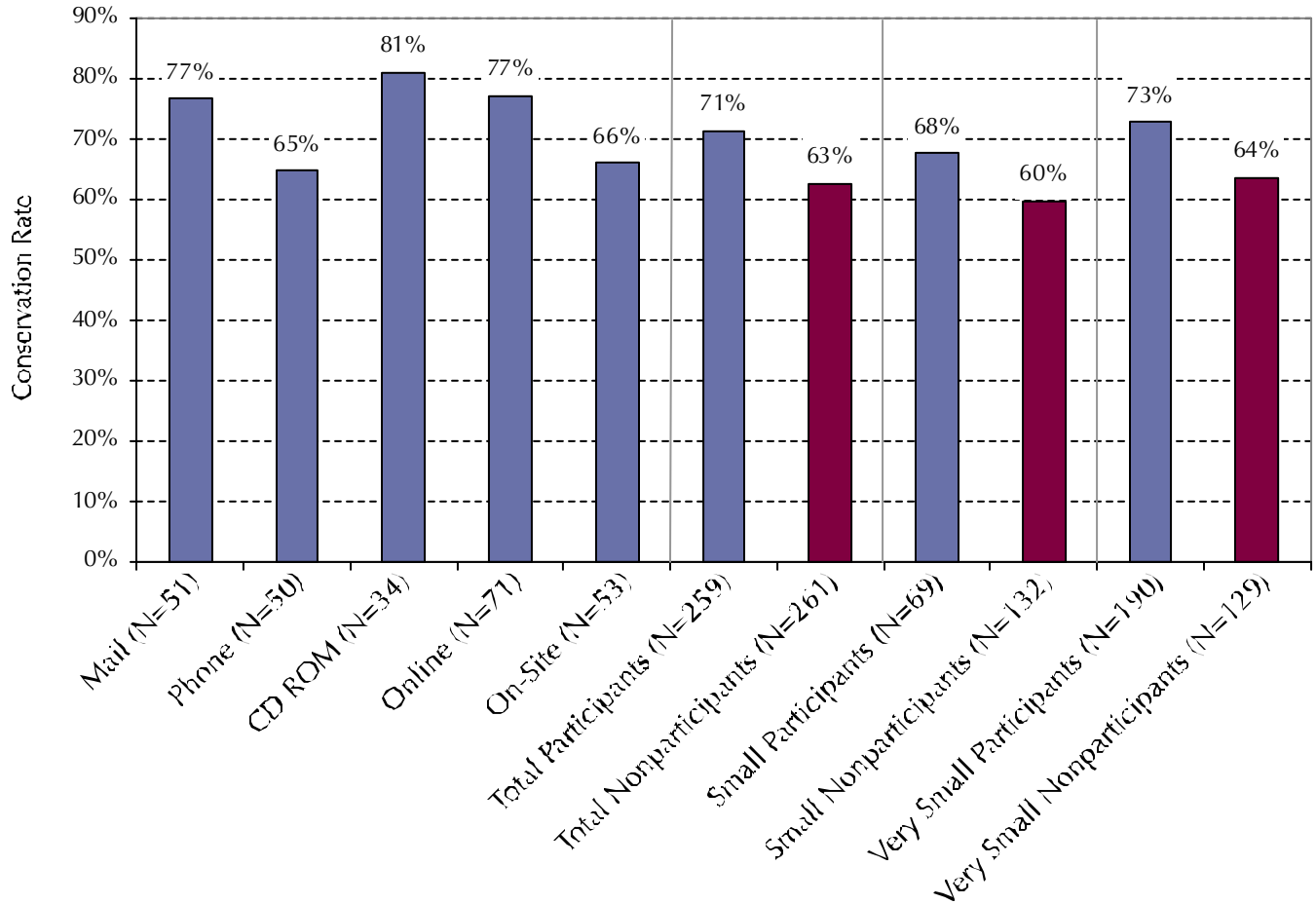


Exhibit 4-31 shows the rates of energy conservation practices among medium and large customers. While these medium and large participant rates are comparable to the small and very small participants, the nonparticipants are quite a bit less efficient, with a conservation rate of just 55 percent. Participants in office, industrial and medium-sized segments show a much greater propensity to conserve relative to their nonparticipating counterparts.

Exhibit 4-31
Conservation Practice Adoption Rates by Delivery Mechanism and Utility

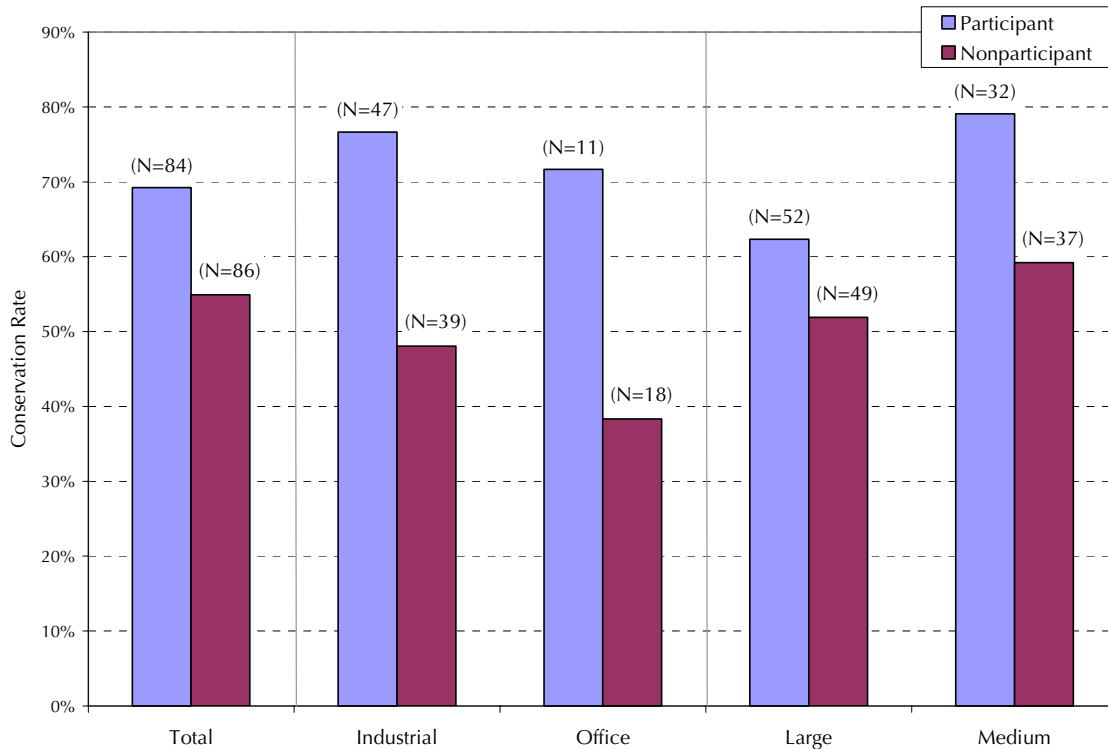
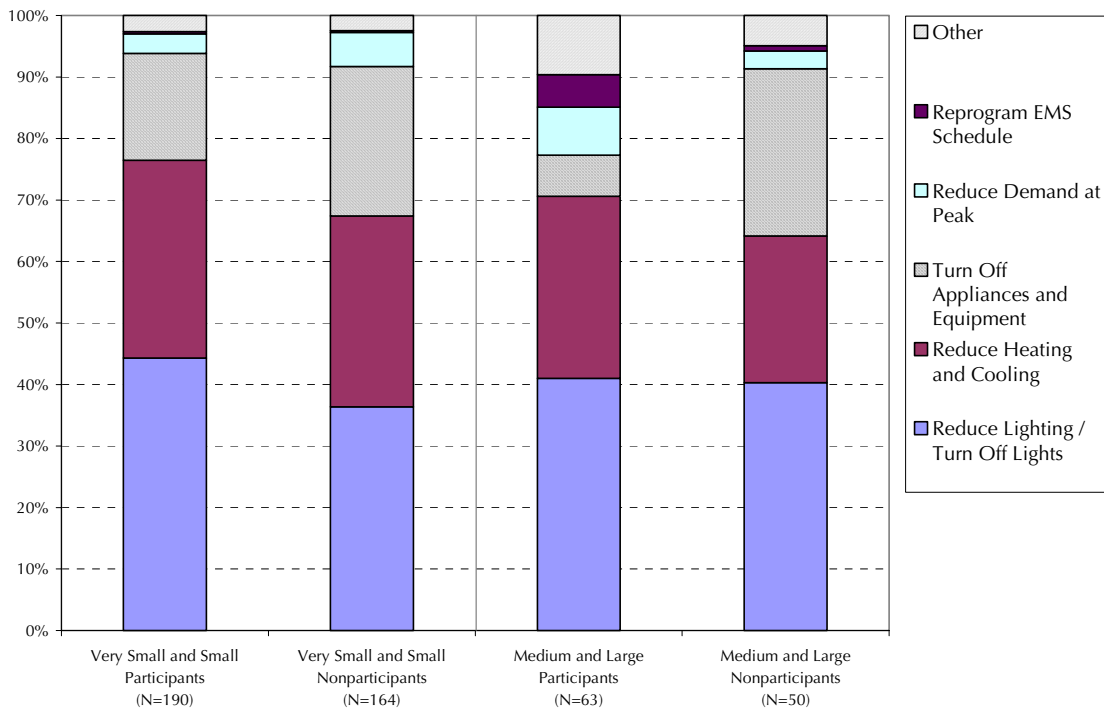


Exhibit 4-32 displays the specific types of conservation practices participants and nonparticipants are doing in both size categories. The practices shown below are grouped for presentation. (To see more detailed distributions, refer to Appendix A.) The resulting distributions for small and very small participants and nonparticipants are very similar. Among medium and large companies, there is a notably greater frequency of reprogramming energy management systems than there is among nonparticipants. The most common practice is to turn lights off, at about 40 percent of each group.

In contrast to the findings in the PY 2002 evaluation, the evidence provided by Exhibits 4-30 through 4-32 indicate that the audit program *is* galvanizing participants to conserve more than the general population. PY2002 results may have been affected by “lingering civic duty” in the general population, to reduce energy use following the energy crisis. This suggests that the general population may have already lost touch with the important lessons learned during the energy crisis.

Exhibit 4-32
Types of Conservation Practices – Participants versus General Population



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

4.1.7 Adoption Rate Section Conclusions

Some of the adoption trends reported above for the lighting and cooling end uses will be illustrated in greater clarity following the presentation of gross impacts in Section 4.2 below. For example the larger magnitude of lighting installations in the medium and large customer

segments leads to much greater impacts in medium/large versus small/very small. However, it was not possible, within the scope of this evaluation, to fully quantify the energy use impacts associated with the many market effect indicators presented above.

The forthcoming gross impact assessment is relegated to an assessment of lighting and cooling measure impacts alone, as self-reported measure data from the surveys only support deemed savings and algorithm-based impact analysis for these two end uses. For this reason, it is recommended that consideration be given in future studies to evaluating the full impacts of the program, across all end uses and measures, using billing regression models to perform a “M&E protocol-compliant” statistically adjusted engineering (SAE) analysis. This approach could be used to tease-out a more comprehensive set of program impacts by delivery channel, customer size, end-use and measure.

4.2 AUDIT PROGRAM GROSS IMPACTS

In this section gross impact results for the Nonresidential Audit Program are presented using the methods described in *Section 3.5*. The gross impacts presented reflect (self-reported) customer energy efficiency actions taken after the audit. Impact results were prepared for very small and small 2003 participants spanning each program delivery channel, and also for medium and large 2002 on-site audit participants. Because the survey was completed after the summer of 2004, the actions taken reflect, on average, more than a one-year period following the audit for very small and small participants, and just over two years for medium and large participants.

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.

4.2.1 Lighting and Cooling Gross Impacts

Based on the 2003 Survey, which consisted of 259 completed interviews with small and very small program participants, there were 112 lighting and 80 cooling equipment installations reported. Also, based on the 2002 Survey, which consisted of 84 completed interviews with medium and large program participants, there were 64 lighting and 51 cooling equipment installations reported. The first step in impact analysis was to identify those actions involving high efficiency technologies, resulting in impacts that could potentially be attributable to the Nonresidential Audit Program.

Of the 112 **lighting measures reported by very small and small respondents** 16 had insufficient information describing the technology installed (to estimate program impacts), 8 technologies were classified as standard rather than high efficiency, and 18 measures were said to be installed before the audit. This left a total of 70 lighting measures for which impacts were calculated.

Likewise, of the 64 **lighting measures reported by medium and large respondents** 5 had insufficient information describing the technology installed, 6 technologies were classified as

standard rather than high efficiency, and 6 measures were said to be installed before the audit. This left a total of 47 lighting measures for which impacts were calculated.

Similarly, of the 80 **cooling measures reported by very small and small respondents** 17 had insufficient information describing the technology installed, 3 technologies were classified as standard rather than high efficiency, and 13 measures were said to be installed before the audit. This left a total of 47 cooling measures for which impacts were calculated.

Lastly, of the 51 **cooling measures reported by medium and large respondents** 20 had insufficient information describing the technology installed, 2 technologies were classified as standard rather than high efficiency, and 5 measures were said to be installed before the audit. This left a total of 24 cooling measures for which impacts were calculated.

Exhibit 4-33 presents the distribution of the 117 lighting and 71 cooling measures installed by technology and audit delivery mechanism.

Exhibit 4-33
Survey-Reported Gross Participant Installations
by End-Use, Technology Group and Delivery Mechanism

End-Use and Technology Group	Gross Number of Participant Installations					
	2003 Very Small/Small					2002 Medium/Large
	On-Line	CD-ROM	Mail	Phone	On-Site	On-Site
Lighting						
Compact Fluorescent Lamps	8	3	3	4	4	3
Efficient Ballast Changeouts	5	2	-	3	3	5
T-5 and T-8 Lamps and Electronic Ballasts	3	6	4	6	6	19
Delamp Fluorescent Fixtures	-	-	1	3	1	1
Controls	1	1	-	1	1	15
Other Measures	-	-	-	1	-	-
Exit Signs	-	-	-	-	-	4
TOTAL LIGHTING	17	12	8	18	15	47
Cooling						
Direct Evaporative Coolers	1	-	3	-	-	-
Set-Back Programmable Thermostats	4	2	2	1	5	8
High Eff. Packaged Units, PTAC's and Window/Wall AC's	6	5	4	6	3	10
Reflective Window Film	3	1	-	-	1	-
Adjustable Speed Drives	-	-	-	-	-	3
Water Chillers	-	-	-	-	-	3
TOTAL COOLING	14	8	9	7	9	24

Exhibit 4-34 presents the resulting gross annual electric energy impacts for the survey respondents. The lighting impacts are the most concentrated in the compact fluorescent T-5/T-8 and exist sign technologies, and the cooling impacts are most concentrated among chillers, unitary equipment and, surprisingly, direct evaporative coolers⁶.

Exhibit 4-34
Survey-Reported Gross Annual Electric Energy Impacts
by End-Use, Technology Group and Delivery Mechanism

End-Use and Technology Group	Gross Participant Annual Electric Energy Impacts (kWh)					
	2003 Very Small/Small					2002 Medium/Large
	On-Line	CD-ROM	Mail	Phone	On-Site	On-Site
Lighting						
Compact Fluorescent Lamps	158,042	21,250	11,208	41,810	45,631	859,685
Efficient Ballast Changeouts	31,647	1,687	-	1,957	11,734	165,721
T-5 and T-8 Lamps and Electronic Ballasts	12,961	12,923	24,110	60,284	11,577	774,250
Delamp Fluorescent Fixtures	-	-	4,019	48,905	3,872	43,833
Controls	16,540	18,608	-	4,962	20,675	304,925
Other Measures	-	-	-	8,816	-	-
Exit Signs	-	-	-	-	-	522,804
TOTAL LIGHTING	219,189	54,468	39,336	166,734	93,489	2,671,219
Cooling						
Direct Evaporative Coolers	32,246	-	253,667	-	-	-
Set-Back Programmable Thermostats	12,988	36,523	2,361	1,181	53,132	67,300
High Eff. Packaged Units, PTAC's and Window/Wall AC's	16,711	3,978	5,755	15,617	2,655	95,473
Reflective Window Film	6,752	14	-	-	2,822	-
Adjustable Speed Drives	-	-	-	-	-	90,360
Water Chillers	-	-	-	-	-	159,375
TOTAL COOLING	68,697	40,515	261,783	16,798	58,608	412,508

⁶ The direct evaporative cooler impacts are driven upwards by one installation of a 220 ton unit.

Exhibit 4-35 presents the resulting gross annual natural gas energy impacts for the survey respondents. High efficiency lighting equipment retrofits require a greater use of natural gas (for space heating), due to a reduction in internal gains. The lighting segments with the largest negative gas impacts are those with the largest positive electric impacts. For cooling measures, all natural gas impacts are associated with set-back thermostat installations, with, most activity in the on-site audit delivery channel.

Exhibit 4-35
Survey-Reported Gross Annual Natural Gas Energy Impacts
by End-Use, Technology Group and Delivery Mechanism

End-Use and Technology Group	Gross Participant Annual Natural Gas Energy Impacts (Therms)					
	2003 Very Small/Small					2002 Medium /Large
	On-Line	CD-ROM	Mail	Phone	On-Site	On-Site
Lighting						
Compact Fluorescent Lamps	-11	-1	-2	-18	-13	-318
Efficient Ballast Changeouts	-4	0	-	-1	-2	-60
T-5 and T-8 Lamps and Electronic Ballasts	-2	-3	-10	-8	-3	-73
Delamp Fluorescent Fixtures	-	-	-1	-14	-2	0
Controls	-6	-7	-	0	-9	-53
Other Measures	-	-	-	-2	-	-
Exit Signs	-	-	-	-	-	-137
TOTAL LIGHTING	-24	-12	-13	-42	-28	-641
Cooling						
Direct Evaporative Coolers	0	-	0	-	-	-
Set-Back Programmable Thermostats	3,011	8,468	548	274	12,319	15,604
High Eff. Packaged Units, PTAC's and Window/Wall AC's	0	0	0	0	0	0
Reflective Window Film	0	0	-	-	0	-
Adjustable Speed Drives	-	-	-	-	-	0
Water Chillers	-	-	-	-	-	0
TOTAL COOLING	3,011	8,468	548	274	12,319	15,604

Exhibit 4-36 presents the gross summer demand impacts for the survey population. Summer demand impacts are the most concentrated in the same segments as electric energy impacts.

Exhibit 4-36
Survey-Reported Gross Summer Demand Impacts
by End-Use, Technology Group and Delivery Mechanism

End-Use and Technology Group	Gross Participant Summer Demand Impacts (kW)					
	2003 Very Small/Small					2002 Medium /Large
	On-Line	CD-ROM	Mail	Phone	On-Site	On-Site
Lighting						
Compact Fluorescent Lamps	20.4	3.8	2.3	6.8	7.8	183.8
Efficient Ballast Changeouts	6.0	0.3	-	0.4	2.1	35.5
T-5 and T-8 Lamps and Electronic Ballasts	2.5	2.6	5.0	11.4	2.2	147.1
Delamp Fluorescent Fixtures	-	-	0.7	9.9	0.6	7.8
Controls	0.0	0.0	-	0.0	0.0	0.0
Other Measures	-	-	-	1.3	-	-
Exit Signs	-	-	-	-	-	63.1
TOTAL LIGHTING	29.0	6.7	7.9	29.8	12.7	437.2
Cooling						
Direct Evaporative Coolers	21.4	-	168.4	-	-	-
Set-Back Programmable Thermostats	0.0	0.0	0.0	0.0	0.0	0.0
High Eff. Packaged Units, PTAC's and Window/Wall AC's	8.5	2.2	2.8	9.2	1.5	39.8
Reflective Window Film	1.3	0.0	-	-	0.5	-
Adjustable Speed Drives	-	-	-	-	-	0.0
Water Chillers	-	-	-	-	-	39.8
TOTAL COOLING	31.2	2.2	171.2	9.2	2.0	79.6

The resulting impacts shown in Exhibits 4-33 through 4-36 above 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 customer size category, based on the 2003 very small/small survey and the 2002 medium/large survey, Exhibit 4-37 presents impacts on a per-audit basis.

Exhibit 4-37
Per-Audit Gross Impacts
by End-Use and Customer Size

End-Use	Gross Participant Per-Unit Impacts by Size	
	2003 Very Small/Small	2002 Medium/Large On-Site
Number of Survey Completes		
-	259	84
Gross Per-Audit Annual Electric Energy Impacts (kWh)		
Lighting	2,213	31,800
Cooling	1,724	4,911
TOTAL	3,937	36,711
Gross Per-Audit Summer Demand Impacts (kW)		
Lighting	0.3	5.2
Cooling	0.8	0.9
TOTAL	1.2	6.2
Gross Per-Audit Annual Natural Gas Energy Impacts (therms)		
Lighting	0	-8
Cooling	95	186
TOTAL	95	178

Given the relatively small number of completes by very small/small delivery channel, it was determined that the resulting per-unit impacts by delivery channel do not adequately support expected impacts on a per-audit basis. But, by collapsing very small/small results across delivery channel, the results provide a reasonable estimate of expected savings per audit. These savings estimates are well in-line with impacts derived in the 2002 NRA evaluation⁷.

Also shown are gross per-audit impacts for medium and large customer on-sites. These results clearly show that much greater levels of impact can be obtained through audits completed with larger customers.

⁷ The 2002 Evaluation estimate of gross impacts per audit is 3,251 kWh, representing all size categories and delivery channels.

4.2.2 Audit-Influenced Impacts

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 4-38 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 4-38
Per-Audit Influence-Adjusted* Impacts
by End-Use and Customer Size

End-Use	Audit-Influenced Per-Unit Impacts by Size	
	2003 Very Small/Small	2002 Medium/Large On-Site
Number of Survey Completes		
-	259	84
Influence-Adjusted* Per-Audit Annual Electric Energy Impacts (kWh)		
Lighting	1,399	24,621
Cooling	1,379	4,082
TOTAL	2,779	28,703
Influence-Adjusted* Per-Audit Summer Demand Impacts (kW)		
Lighting	0.22	4.25
Cooling	0.70	0.79
TOTAL	0.92	5.04
Influence-Adjusted* Per-Audit Annual Natural Gas Energy Impacts (therms)		
Lighting	0	-5
Cooling	67	160
TOTAL	66	154

* 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 the 1 to 10 scale.

This influence-adjusted result suggests that roughly 70 to 80 percent of impacts are attributable to the program, and no less than 60 percent of impacts, in the case of lighting measures among very small and small participants. 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.

4.2.3 Gross Impact Section Conclusions

As discussed above, a more comprehensive gross impact assessment should be considered in future studies using an SAE billing model approach. In the evaluation industry it is acknowledged that this approach would be most successfully applied using small/very small participant and nonparticipant (control group) populations. Larger customers are more likely to undergo expansions, contractions and other year-to-year productivity changes that affect customer utility bills and the likelihood that the SAE model will successfully converge on the correct impact result.

For this reason, consideration should be given to performing detailed on-site investigations among adopting medium and large participants, in order to verify self-reported accomplishments and provide for more rigorous engineering models using on-site collected model inputs. This would allow, for example, an expansion of engineering analysis from lighting and cooling to industrial process measures.

In future evaluations it would also 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 PY 2003 small and very small participants and PY 2002 medium and large participants. This report shows strong evidence of program effects in the lighting, industrial process and cooling end-uses, as well as conservation measures. There are also indications of program effects in some areas of the gas and other equipment end-uses. It is important to consider that the majority of audit customers sought out their participation in the program. This may indicate a greater rate of predisposition to high efficiency actions among participants. This is not to say that the audit is not providing an invaluable service, even to those predisposed customers. For these customers the Audit can optimally direct customers to energy efficiency opportunities and accurately provide the desired information. This section investigates the influence of the audit on participant decisions to install high efficiency equipment.

It is reasonable to assume most adoptions occurring within a year or two of the audit are influenced to some degree by the Audit program. After all, when making a purchase, all information pertaining to the equipment is weighed and incorporated into the decision-making process. In the participant surveys, respondents were asked whether their equipment purchases were specifically recommended 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 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.

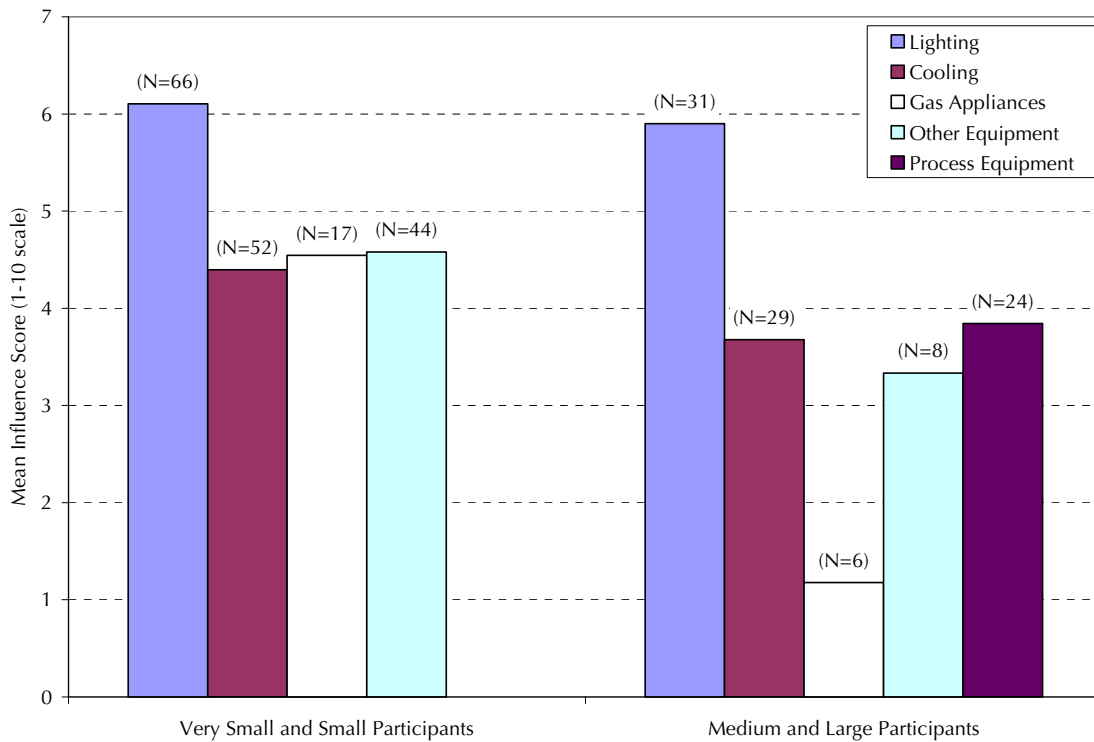
4.3.1 Self-Reported Influence of Audit on Equipment Adoptions

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 4-39 below for each end-use. Results are shown for both small and very small participants, and medium and large participants

Similar to the PY2002 Evaluation finding, Exhibit 4-39 shows that lighting recommendations have the greatest influence on participants, and this is true for both size groups. In general, the influence of the audit is a bit higher among small and very small customers than it is among medium and large customers.

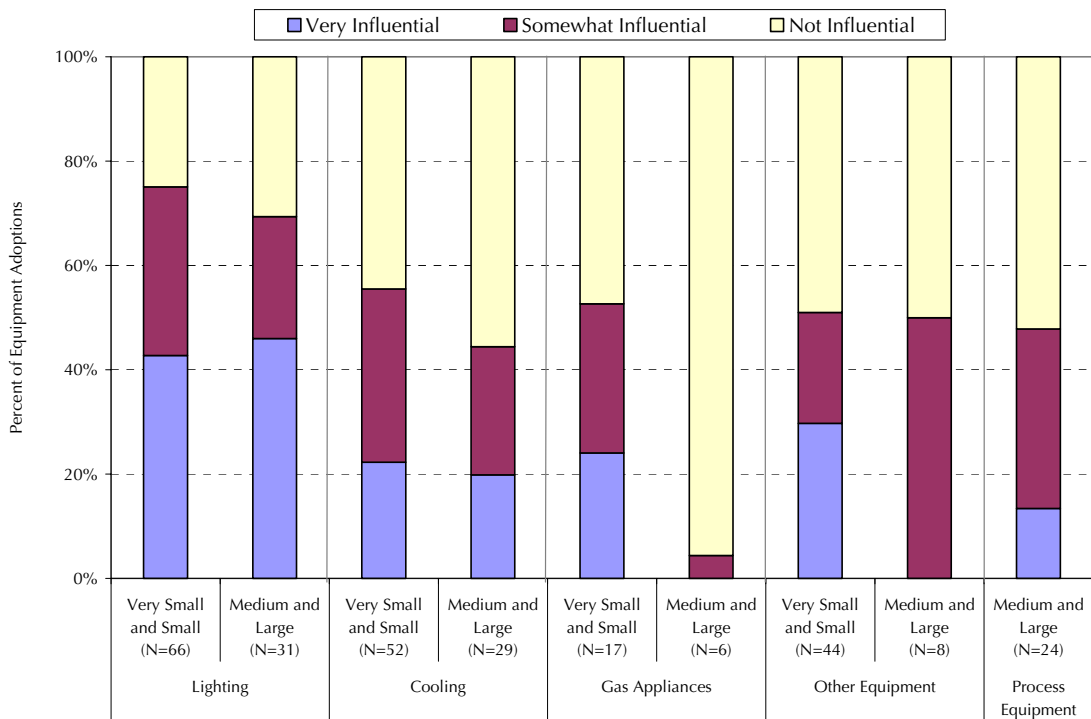
These findings strengthen the evidence and confirm the findings presented in the adoption rate analyses shown in *Section 4.1*. Lighting effects are very strong for both size groups. Among small and very small customers, all the end uses have solid mean influence scores, providing evidence of program effects in all four cases. Medium and large customers report solid influence scores for lighting, industrial process and cooling end uses. Influence data provided by the small number of gas equipment adopters confirms previous findings that Audit impacts are limited in this area for medium and large customers. Interestingly, while the adoption rate analysis shown previously revealed program effects of similar caliber from the lighting and industrial process end uses, the exhibit below suggests that the effects within the lighting end-use are stronger.

Exhibit 4-39
Audit Influence on Equipment Adoptions by End-Use
Mean Influence Score



For purposes of presentation, numeric influence ratings are grouped in the presentation that follows. Ratings from 1 to 3 are not at all influenced, ratings from 4 to 7 are 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 4-40. The strength of the Audit influence is more clearly shown in this presentation. The exhibit shows that about 50 percent of adoptions in every end-use category except gas appliances, are reported by participants to have been influenced by the Audit.

Exhibit 4-40
Influence of Audit on Equipment Adoptions
Categorical Presentation

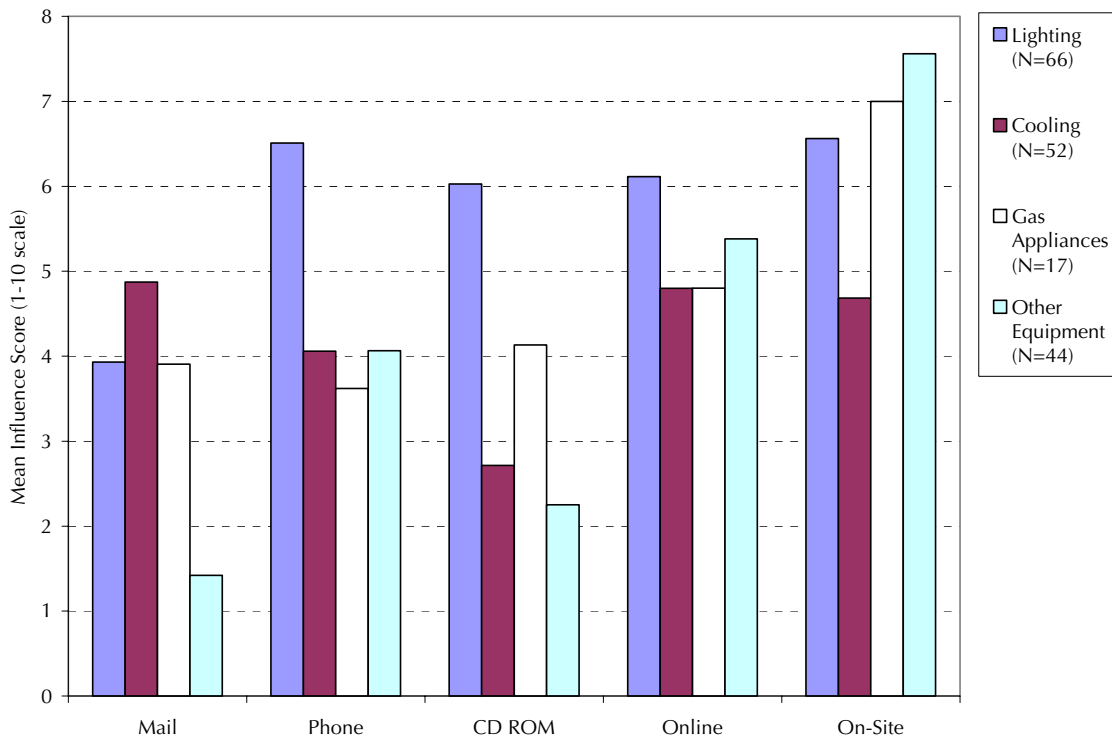


*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Exhibit 4-41 presents the mean participant self-reported influence for each end use by delivery mechanism for small and very small customers. The exhibit confirms that online audits are very successful, although on-site audits are the most effective delivery mechanism using this measure. Results for the mail audit trail the others moderately.

Compared with other delivery channels, On-sites are more effective in influencing the adoption of Other miscellaneous equipment, an important area of differentiation in adoption rates for participants and nonparticipants. On-site audits are better able to address custom equipment needs such as food service equipment, motors, compressors and refrigeration systems. Depending upon the business type, custom equipment can be an important component of overall energy use. Among commercial customers in even the warmest California climates, refrigeration rivals cooling in the end-use distribution of annual electric usage⁸, although lighting remains the largest overall percent⁹.

Exhibit 4-41
Influence of Audit on Equipment Adoption by Delivery Mechanism
Mean Influence Score



⁸ Pacific Gas and Electric, 1999 Commercial Building Survey Report.

⁹ The Desert/Mountain climate zone results are 21 percent for cooling and 17 percent for refrigeration. Lighting is 27 percent.

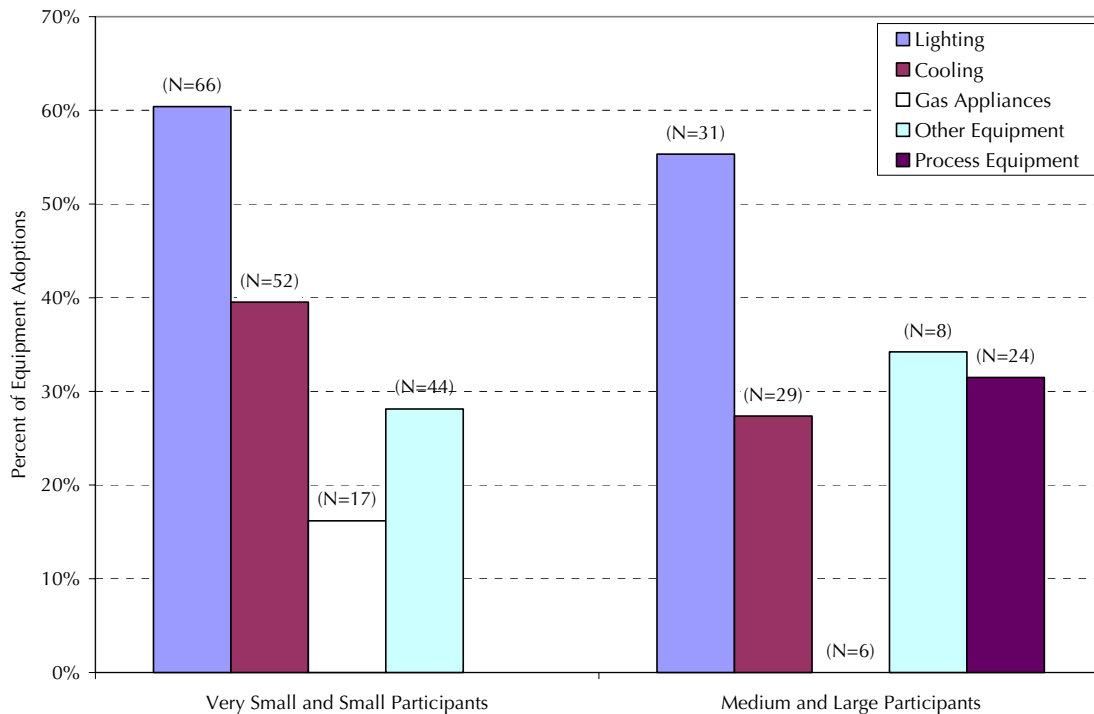
4.3.2 Percent of Adoptions Specifically Recommended in Audit Report

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 4-42— 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 customer size category.

The results are quite striking. The exhibit shows that substantial portions of adoptions occurring in all end-use categories relate specifically to a recommendation in the Audit report. The results shown here generally support and confirm findings from section 4.1. There are clear positive effects in lighting cooling and other equipment among small and very small customers. There are also clear positive effects in lighting, cooling and industrial process end-uses among medium and large customers.

One difference between these findings and section 4.1 is the indication here of a program effect within the other equipment end use among medium and large customers, while there was no measurable difference in adoption rates between participants and nonparticipants. The sample may simply be too small for meaningful interpretation at that level of detail.

Exhibit 4-42
Percent of Adoptions Specifically Recommended in Audit Report

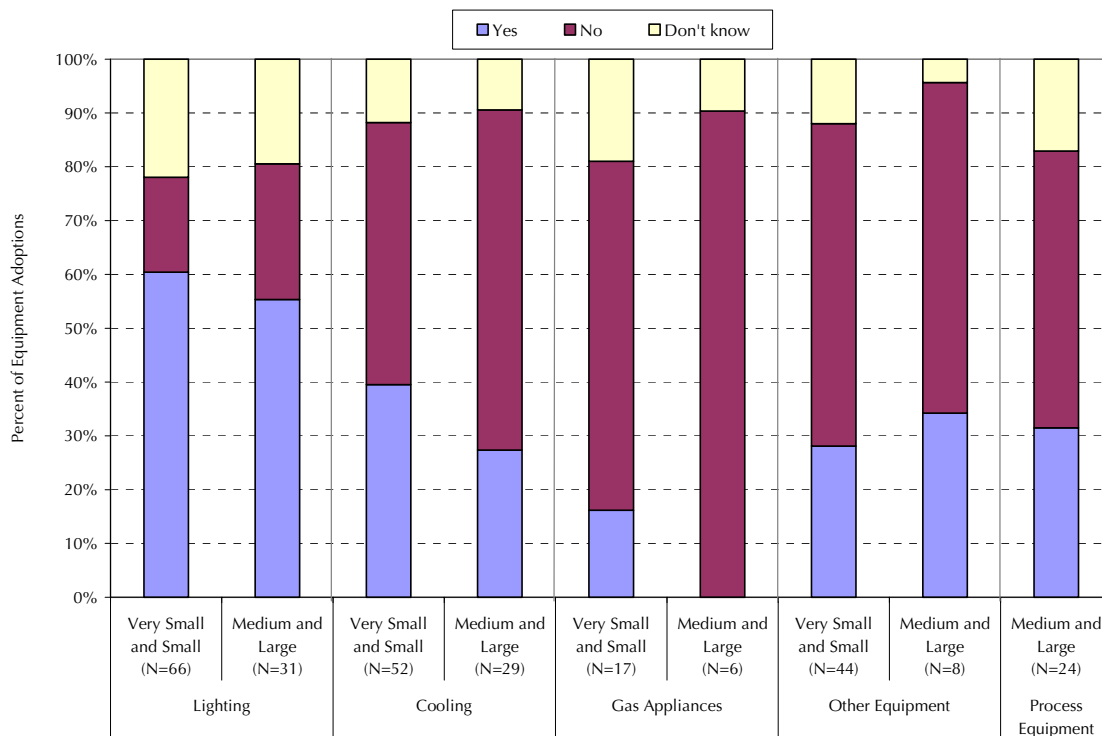


*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Similar to the PY2002 Evaluation findings, Exhibit 4-42 again confirms lighting as the end use with the greatest rate of customer follow-through in both customer size categories. Among small and very small customers, cooling follows lighting as the next most effective recommendation category. Forty-percent of small and very small participant cooling adoptions were specifically recommended in the report. Among medium and large customers, industrial process recommendations have a very strong result, with nearly one-third of adoptions specifically recommended in the Audit report.

Exhibit 4-43 shows the percent of equipment adoptions recommended in the audit report by end-use, using a slightly different format. The segments of the stacked bars represent the percent that said, “yes, the equipment was recommended in the report,” those that said “no, the equipment was not recommended in the report,” and also includes those that could not remember. Less than 20 percent of small and very small participant lighting adopters said their new technology was not recommended in the audit report.

Exhibit 4-43
Percent of Equipment Adoptions Specifically Recommended in the Audit Report

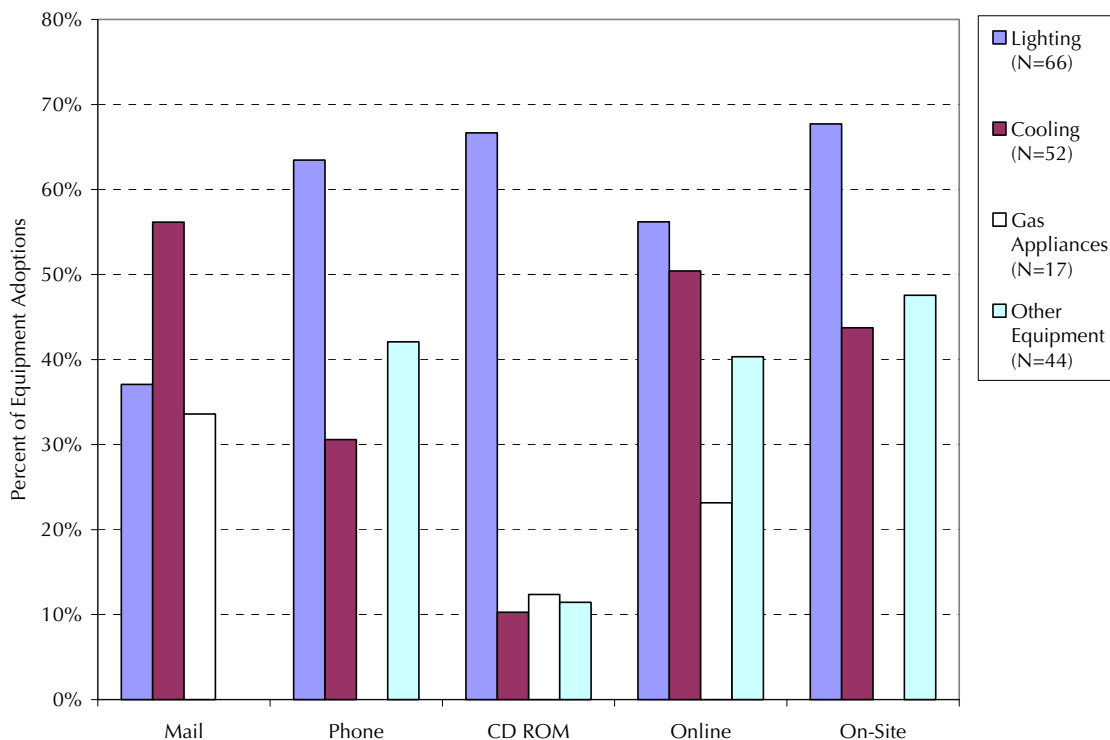


*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Exhibit 4-44 shows similar data for only small and very small customers, 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, CD-ROM and phone, while the mail audit lags behind a little. Cooling, however, is highest among mail audit recipients and lower for the phone. The CD-ROM results lag substantially behind the others for all end-uses other than lighting.

Exhibit 4-44
Percent of Equipment Adoptions Recommended in Audit Report
By Delivery Mechanism



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 Audit participants are practicing conservation measures at a greater rate than nonparticipants.

Exhibit 4-45 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 small and very small customer segments. About 45 percent of the conservation measures currently in practice by participants were self-reported to be a direct result of the audit recommendations. This result is consistent across the segments, with an outstanding result in the online segment of 65 percent.

Exhibit 4-45
Percent of Conservation Measures Begun as a Result of the Audit

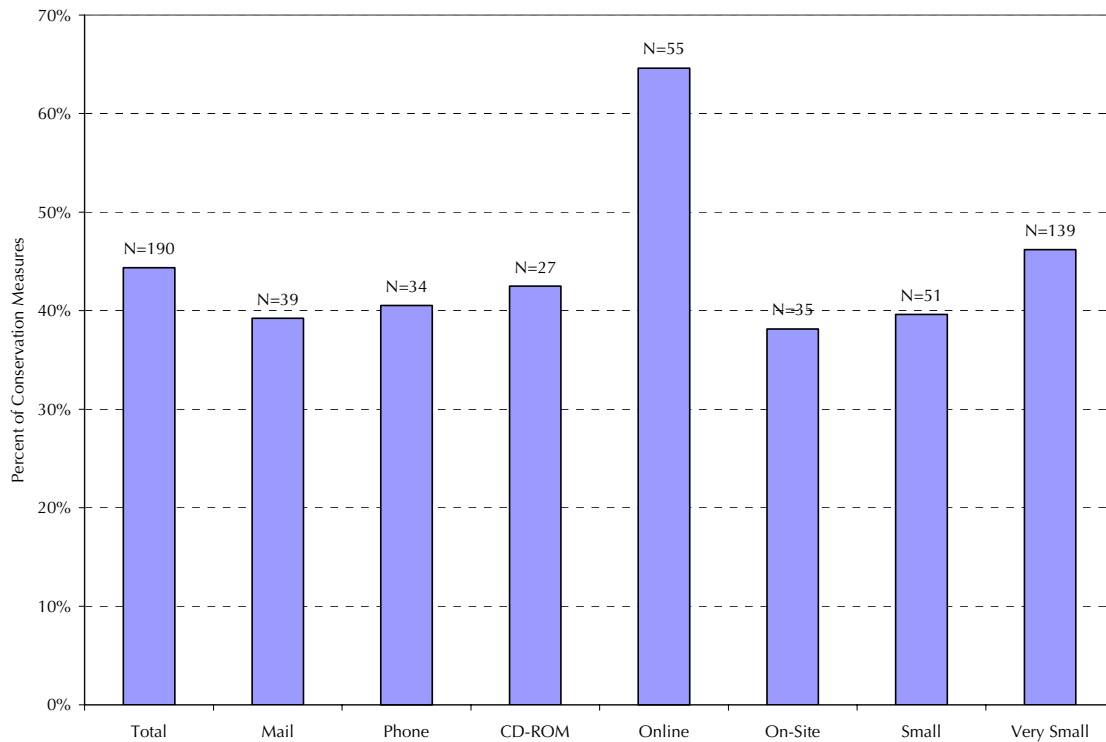
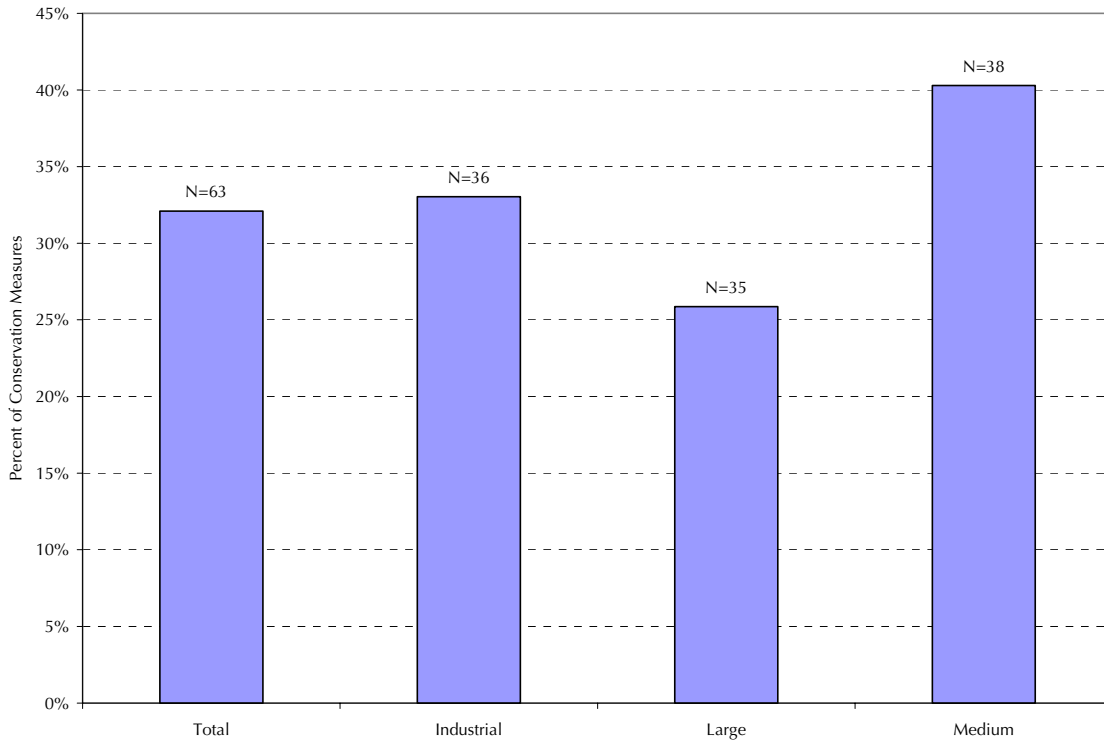


Exhibit 4-46 below shows the same data for the medium and large customer segments. About one-third of all the conservation practices currently in practice in the population of medium and large participants were begun as a result of the Audit. Results are consistent across segment, although somewhat higher among medium sized customers than large.

Exhibit 4-46
Percent of Conservation Practices Begun as a Result of the Audit



4.4 KEY FINDINGS

The Impact Assessment presented in this Chapter shows strong evidence of program effects in the lighting, industrial process and cooling end-uses, as well as for conservation measures. There are also indications of program effects in some customer segments of the gas and other equipment end-uses. Those indications of program effects were further illuminated in the *Section 4.2 Gross Impact Analysis*.

- Small and very small customers are adopting recommended lighting measures at a dramatic rate. Self-reported levels of Audit influence are also very high for the lighting end-use. Furthermore, program impact estimates are largest for the lighting end-use.
 - Thirty two percent of participants installed lighting measures between January of 2003 and October of 2004. Seventeen percent of nonparticipants installed lighting measures during the same time period.
 - Sixty percent of the lighting adoptions installed by small/very small participants were measures specifically recommended in the Audit report. Seventy five percent of installations were self-reported as having been influenced by the Audit, and 40 percent were self-reported as highly influenced by the Audit program.
- High efficiency cooling adoptions are also measurably higher among participants than nonparticipants, and a sizeable number (40 percent) of small/very small were recommended in the Audit reports and 55 percent of adoptions were self-reported to have been influenced by Audit program participation.
- There is also evidence suggesting substantial program effects in the ‘other’ equipment category, with higher adoption rates and measurable self-reported influence, especially among small and very small participants.
- Rates of conservation practice are higher among participants, and about one-third of these were self-reported to have been a direct result of Audit program participation.

Medium and large participants show significantly more activity within the industrial process and lighting end-uses. There is also convincing evidence that there are cooling program effects.

Results by delivery mechanism indicate that all the delivery mechanisms are strong. Online audits show a particularly strong relationship to conservation practice adoption.

As discussed above, a more comprehensive gross impact assessment should be considered in future studies using an SAE billing model approach. However, there are some important confounding factors to consider in using this approach.

- A key concern will be that (as observed here and in the 2002 evaluation) there is a differentiated time lag between audit and installation among lighting, HVAC and process measures. Lighting typically get installed within 6 months of the audit, whereas HVAC about a year after, and process closer to two years after the audit.

- Medium and larger customers are likely to undergo expansions, contractions and other year-to-year productivity changes that affect customer utility bills and reduce the likelihood that the SAE model will successfully converge on the correct impact result.

For these reasons, we recommend using an SAE billing model for the small and very small customer segment only, allowing between 1 and 2 years to pass after the audit for installation to occur. For the medium and large segment, on-site and in-depth interviews are recommended to better assess the impacts stemming from participation in the Audit program. These interviews should take place 2 years after Audit participation in order to better understand industrial process program impacts, similar to the timing of the telephone interviews conducted for this evaluation.

In addition, it would also be beneficial to perform a more rigorous net-to-gross analysis. A logit model could help differentiate the effects competing influences and quantify the portion of activity attributable to the Audit program.

5. PROCESS ASSESSMENT

This section presents the results of the 2003 Audit Program Process Assessment to review and evaluate the implementation-related aspects of the program. Research undertaken for the process evaluation component of this project includes telephone interviews with 520 small and very small customers¹, of which 259 are 2003 program participants and 261 are nonparticipants. In addition, process and satisfaction topics were investigated with 170 medium and large² customers, of which 84 are 2002 participants and 86 are nonparticipants.

The process assessment specifically seeks to:

- assess the quality of and improvements to statewide program tracking systems,
- explore the effectiveness of program delivery and marketing,
- determine what drives participation,
- assess participant satisfaction with key program elements, with an emphasis on the perceived usefulness of the audit,
- explore the role of the audit in meeting customer energy efficiency information needs, including the relation to and comparison with other information sources,
- identify possible program improvements,
- examine some indicators of program market effects, including changes in knowledge and energy efficiency intentions resulting from participation, and
- review the ability of the program to refer participants to IOU-sponsored rebate programs.

5.1 PROGRAM TRACKING ASSESSMENT

This section presents the results of the Tracking System Assessment. The objective of this assessment is to summarize the presence of key program variables in the IOU tracking systems by Audit delivery mechanisms. This Assessment arose from the 2002 Evaluation results, where

¹ Small customers are between 20 and 100 kW, or 10,000 and 50,000 therms per year. Very small customers are less than 20 kW or less than 10,000 therms per year. If a customer has both gas and electric accounts, electricity is used to determine size.

² Medium customers are between 100 and 500 kW, or 50,000 and 250,000 therms per year. Large customers are more than 500 kW or more than 250,000 therms per year. If a customer has both gas and electric accounts, electricity is used to determine size.

it was found that key variables were missing or incomplete in the tracking systems. The IOUs were alerted to the shortcomings in the 2002 tracking systems, and efforts have been made to improve program tracking. As discussed below, significant improvements have been made.

This assessment examines both 2003 and 2004 program tracking data, focusing on changes relative to 2002 data. The reason for including 2004 tracking data is to ensure the comments and recommendations resulting from this assessment apply to the most recent versions of the tracking systems.

The 2003 and 2004 tracking system summaries are presented in Exhibits 5-1 and 5-2 below. Readers interested in reviewing a summary of 2002 tracking system contents can refer to Appendix D or the PY 2002 Evaluation Report³. The tables below show the total number of records for each program component, as well as the frequency with which key variables are populated. Key variables include account number, customer name and customer phone number. The tables also show the number of unique customer accounts and the number of unique phone numbers, which are provided as an indication of the number of unique participants in each program delivery channel. The final column in the 2003 and 2004 tables presents the number of successful merges that were made to our in-house customer information system databases.

Good program tracking is crucial to many M&E efforts directed at enhancing program delivery and a valuable tool for tracking program accomplishments versus goals. 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 customers' billing data. These components allow for more flexible, sophisticated and useful sample design and analysis techniques. Other critical elements of the tracking systems include contact names and phone numbers for the individual that completed the Audit. These provide the best possible contact information for completing participant follow-up and telephone surveys.

Account number is generally the best identifier for linking a tracking system record to the customer information system; site identifiers (such as GNN ID for SCG) are also very useful. However, it is important that the identifier be unique to a site. For example, an identifier unique to a customer is not very useful. The customer may have several accounts, possibly spanning more than one site.

³ http://www.calmac.org/publications/2002_Statewide_Nonres_Audit_Report.pdf

Exhibit 5-1
Summary of 2003 Program Tracking System Contents
Statewide and by IOU

Audit Type	4th Qtr Report	Total Records	Records with Account Numbers	Records with Phone Numbers	Unique Accounts	Unique Phone numbers	Customer Contact Name	Account Numbers Successfully Merging to CIS
SCE								
Total OnSite	-	6658	6161	6492	6005	5345	6353	4767
BS	-	4088	4088	3942	3921	3288	3841	3079
MCD	-	1066	1066	1066	982	696	1066	916
FCI	-	500	380	496	366	489	496	319
ECC	-	500	500	499	493	490	500	360
VPC	-	504	127	489	117	429	450	93
Phone	-	231	231	230	231	230	231	140
Mail	-	608	96	222	96	222	315	45
CD-ROM	-	440	412	433	407	425	432	254
OnLine	-	596	237	382	176	322	530	81
Total	8533	8533	7137	7759	6820	6251	7861	5287
SCG								
Total OnSite	1314	1308	1308	791	1308	701	1308	1299
Phone	1039	984	984	360	979	348	984	955
Mail	852	962	962	312	957	309	962	954
CD-ROM	521	600	0	483	0	480	581	0
OnLine	557	515	4	357	4	346	436	4
Total	4283	4369	3258	2303	3228	2164	4271	3212
SDGE								
Total OnSite	886	880	707	824	702	718	757	659
Onsite Reg	-	711	707	706	702	628	653	659
Onsite Checklist	-	169	0	118	0	90	104	0
Phone	1720	1698	1697	1697	1697	1659	1698	1595
Mail	567	567	0	508	0	504	487	0
CD-ROM	1283	1270	0	1200	0	1139	1148	0
OnLine	607	577	3	0	3	0	0	0
Total	5063	4992	2407	4229	2402	4020	4090	2254
PG&E								
Total OnSite	4370	4478	4440	4265	4406	3948	4478	3763
Large Onsite	-	97	95	97	95	91	97	79
Md/Sm Onsite	-	1453	1439	1452	1439	1314	1453	1222
Checklist Onsite	-	2928	2906	2716	2906	2578	2928	2462
Phone	1303	1304	1303	1299	1303	612	1304	1143
Mail**	1649	1649	331	301	276	293	294	252
CD-ROM	2515	2515	2508	2263	2508	2174	2515	2263
OnLine	2150	2150	0	0	0	0	0	0
Total	11987	12096	8582	8128	8114	6652	8591	7421
STATEWIDE								
Total OnSite	-	13324	12616	12372	12421	10712	12896	10488
Phone	-	4217	4215	3586	4210	2849	4217	3833
Mail	-	3786	1389	1343	1329	1328	2058	1251
CD-ROM	-	4825	2920	4379	2915	4218	4676	2517
OnLine	-	3838	244	739	183	668	966	85
Total	29866	29990	21384	22419	20564	19087	24813	18174

**For PG&E mail audits, account numbers, phone numbers and customer contact names exist, and therefore could be provided by PG&E upon request.

Exhibit 5-2
Summary of 2004 Program Tracking System Contents
Statewide and by IOU

Audit Type	Total Records	Records with Account Numbers	Records with Phone Numbers	Unique Accounts	Unique Phone numbers	Customer Contact Name	Account Numbers Successfully Merging to CIS
SCE							
Total OnSite	2744	2276	2655	2245	2086	2739	1687
BS	2446	1978	2357	1950	1881	2441	1429
MCD	298	298	298	295	205	298	258
Phone	789	789	789	789	789	776	560
Mail	116	106	106	106	106	116	58
CD-ROM*	95	90	94	90	94	94	63
OnLine	81	37	0	37	0	0	1
Total	3825	3298	3644	3267	3075	3725	2369
SCG							
Total OnSite***	0	0	0	0	0	0	0
Phone	78	78	76	78	73	77	65
Mail	78	78	76	78	73	77	65
CD-ROM	73	73	73	73	72	73	71
OnLine	296	162	198	161	189	251	37
Total	525	391	423	390	407	478	238
SDGE							
Total OnSite	455	0	434	0	373	0	0
Phone	1713	875	789	874	784	1713	750
Mail	13	5	10	5	10	12	2
CD-ROM	420	201	413	201	409	374	174
OnLine	256	37	3	36	3	72	3
Total	2857	1118	1649	1116	1579	2171	929
PG&E							
Total OnSite	1932	1899	1917	4406	3948	1932	1430
Large Onsite	1	1	1	1	1	1	0
Md/Sm Onsite	431	426	430	426	405	431	326
Checklist Onsite	1500	1472	1486	1472	1456	1500	1104
Phone	968	966	968	966	492	968	823
Mail**	968	2	2	2	2	2	2
CD-ROM	1352	1341	1161	1341	1090	1352	1161
OnLine	225	0	0	0	0	0	0
Total	5445	4208	4048	8114	6652	4254	3416
STATEWIDE							
Total OnSite	5131	4175	5006	6651	6407	4671	3117
Phone	3548	2708	2622	2707	2138	3534	1638
Mail	1175	191	194	191	191	207	127
CD-ROM	1940	1705	1741	1705	1665	1893	1406
OnLine	858	236	201	234	192	323	41
Total	12652	9015	9764	12887	11713	10628	6952

**For mail audits, account numbers, phone numbers and customer contact names exist, and therefore could be provided by PG&E upon request.

***No 2004 OnSite Audit tracking data for SCG was received.

The remainder of this section focuses on the development of tracking systems for each IOU over the three-year period from 2002 through 2004, including an assessment of tracking system content, with an emphasis on improvements since 2002.

Southern California Edison

SCE made solid improvements to their tracking system between 2002 and 2004. In 2002, contact information in the tracking system was well maintained, with about 80 percent of the records having contact name and phone number. Account number was less well populated, at just about 40 percent of participant records. In 2003, 91 percent of tracking records have complete contact information (name and phone number) and 83 percent have an account number. That is a significant improvement in account number tracking. In 2004, there are further improvements. Ninety-five percent of the records have contact information and 87 percent have account number.

Particularly notable improvements were made for the Mail and Online audit delivery mechanisms. Both account numbers and contact information was absent for all mail and online audit records in 2002. In 2003 account numbers are present for about 40 percent of online audits and 15 percent of Mail Audit records. In 2004, online audits with account numbers rise to 46 percent, and the vast majority of the mail audits have account number (93 percent.) Contact information—completely absent in 2002—is present for a full two-thirds of online participants and one-third of Mail participants in 2003. In 2004, almost all mail audits also have contact information, but this is currently missing for the 2004 online audit records.

Southern California Gas Company

Improvements to tracking system contents are even more dramatic for the Sempra Utilities. SCG had account numbers for 30 percent of records in 2002, and contact information was incomplete for all records⁴. In 2003, 75 percent of records had account numbers and over half had complete contact information. In 2004, account number continues to be populated 75 percent of the time, but there are dramatic gains in contact information, with 81 percent of records having complete contact data.

⁴ Note that in 2002 SCG did keep contact name for close to 40 percent of records, and phone number for 4 percent of records; there were, however, no instances where both name and phone number were populated.

San Diego Gas and Electric Company

SDG&E had no account numbers in the 2002 tracking system, and complete contact information was available for just 2 percent of records. Phone number was populated 20 percent of the time, and name 5 percent of the time. In 2003, however, dramatic improvements are seen. Account numbers are populated for nearly half of all records, and complete contact information is available for 82 percent of records. Account numbers are still absent for mail, CD-ROM and online audits, but are well populated for On-Site and Phone audits.

In 2004, the only notable change relative to 2003 is that Mail audit records are beginning to show account numbers. Although there were only a handful of Mail Audits done at the time the tracking system was pulled in 2004 (13 Audits), 5 of the 13 records had account numbers.

Pacific Gas and Electric Company

PG&E had excellent tracking data in 2002 and it continues to be of the highest quality throughout the 2003 and 2004 period. There were only a few areas that could be improved in the 2002 tracking system. Specifically, in 2002 CD-ROM audits were missing contact name. In 2003 and 2004 this problem is completely corrected, with 100 percent of CD-ROM contact names present.

PG&E's online audits are missing account and contact information in all three years. This is an area where better tracking is difficult due to privacy and usability issues in the website interface. However, PG&E expects to begin tracking account and contact information for online participants using a customer-reported account number beginning in March or April of 2005.

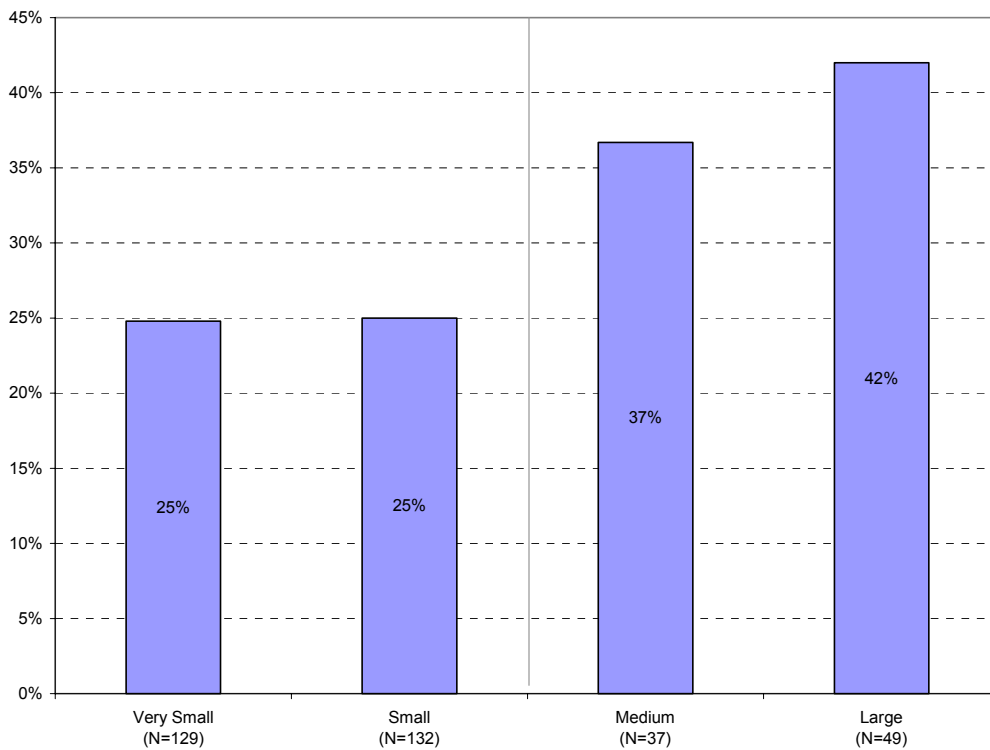
Conclusions - Tracking System Assessment

All four IOUs have shown measurable improvements in their tracking systems between 2002 and 2004. However, work still remains in order to bring the tracking of all IOU and delivery mechanism combinations to an equally high quality. Note that at least one IOU has an effective tracking system for each of the five delivery mechanisms. Thus, with time and guidance from successful IOUs, all tracking systems could become equally effective. An example of how this might work is found in some recent developments in the online Audit tracking systems. Currently, some southern California IOUs request participants enter account numbers during the online Audit. This information links to the customer information system (CIS), provides the customer historical billing information, and updates the Audit tracking system. PG&E will implement this feature in March or April of 2005, and it is expected to result in improved online tracking data.

5.2 PROGRAM AWARENESS AND SOURCES OF AWARENESS

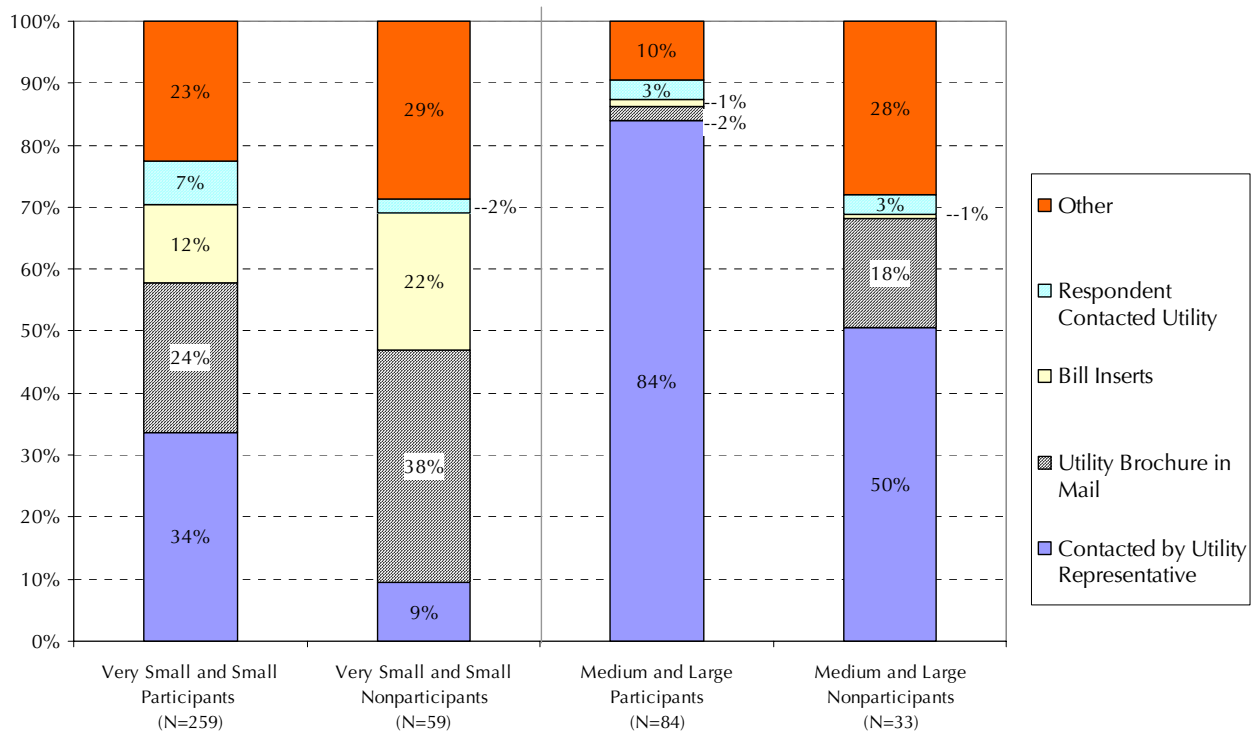
This section explores program awareness rates among the nonparticipant population and the ways in which customers become aware of the Audit program. The rates of awareness of the audit program are higher among the medium and large customer segments than among the small and very small customer segments, as would be expected. About one-quarter of small and very small nonparticipating customers report being aware of the Audit program. Thirty-seven percent of medium size customers and 42 percent of large customers report being aware of the program.

Exhibit 5-4
Rate of Audit Program Awareness in the Nonparticipant Population
by Customer Size



As shown in Exhibit 5-5, awareness of audits in the nonparticipant population is driven by the IOUs, who account for about 70 percent of awareness through bill inserts, brochure mailings and utility representatives. Contact with utility representatives is a significant source of awareness among participants, accounting for more than a third of small and very small participant awareness, and 84 percent of medium and large participant awareness. Notice that mail media (brochures and bill inserts) is much more effective among small and very small customers. Mail media account for over 50 percent of small and very small nonparticipant awareness, and 36 percent of participant awareness. In contrast, among medium and large companies mail media account for about 20 percent of nonparticipant awareness and just 3 percent of participant awareness.

Exhibit 5-5
Sources of Program Awareness



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Expanding upon the sources of participant awareness shown above, Exhibit 5-6 below shows the sources of awareness by delivery mechanism among small and very small participants. Not surprisingly, mail contact is quite effective for recruiting mail audit participation. Mailed brochures and bill inserts make up 77 percent of mail participant awareness. Mail contact is also effective for recruiting online participation, where it makes up 68 percent of participant awareness. On-site audit participants are differentiated from the other delivery mechanisms by a much higher portion of utility representatives recruiting participants into the program.

Exhibit 5-6
Sources of Small and Very Small Participant Awareness
by Delivery Mechanism

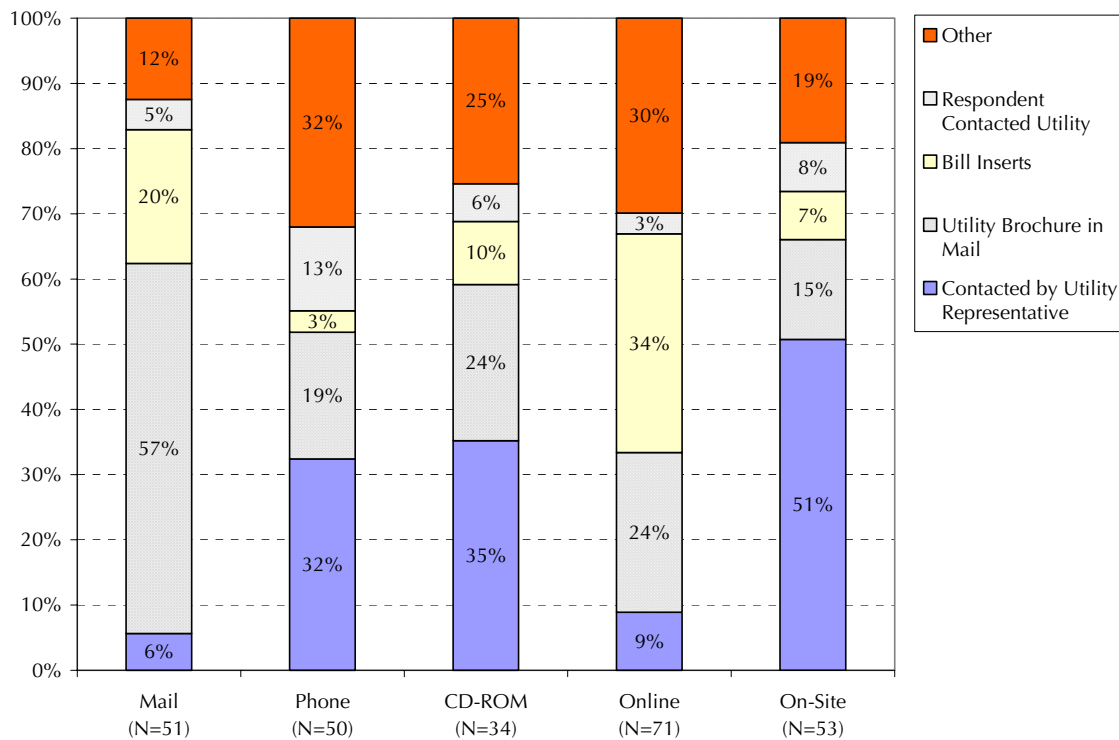


Exhibit 5-7 compares major sources of awareness among small and very small customers, focusing on the contrast between participants and nonparticipants. The comparison provides insight to the effectiveness of various sources of awareness in motivating customers to participate.

The exhibit shows utility representatives are very effective in moving customers to have their facilities audited. Mail contact (utility brochures, bill inserts) also is a highly effective tool for recruiting participants. This is good news, considering it's considerably lower cost than direct contact with representatives. Thirty-eight percent of the nonparticipant population became aware through mailed utility brochures, and this had a high rate of successful recruitment with 24 percent of the participant population learning about the program through a mailed brochure.

Exhibit 5-7
Comparison of Combined Small and Very Small Customer Sources of Awareness
PY 2003 Participant versus Nonparticipant

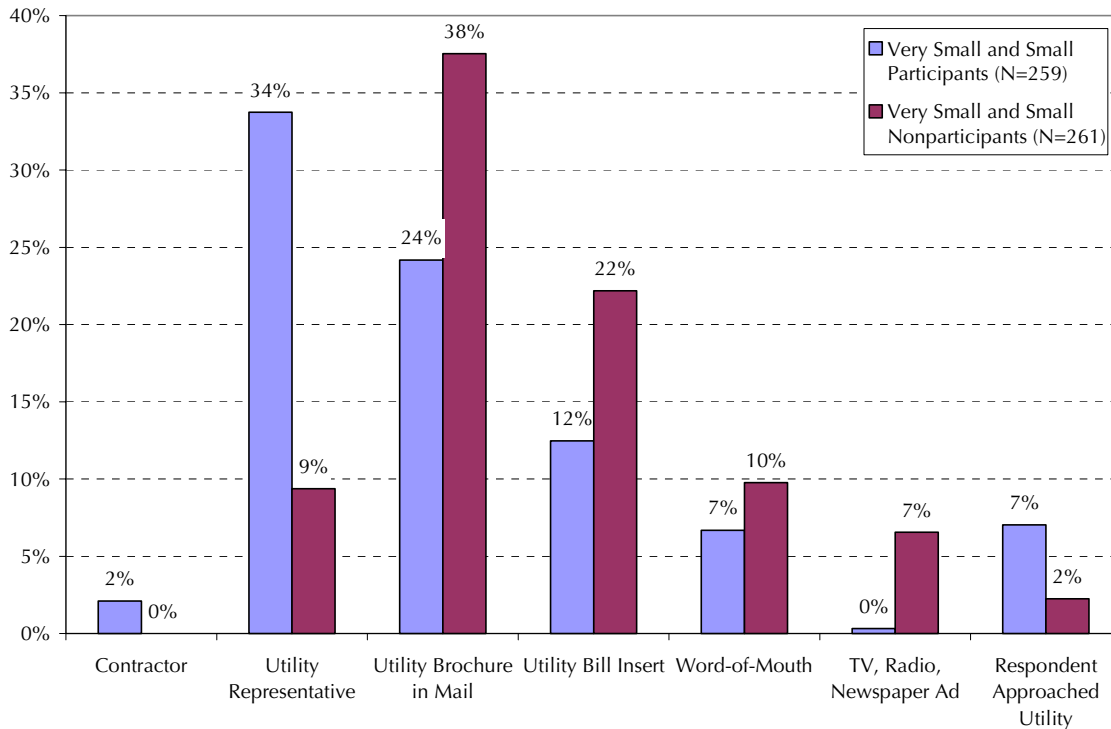
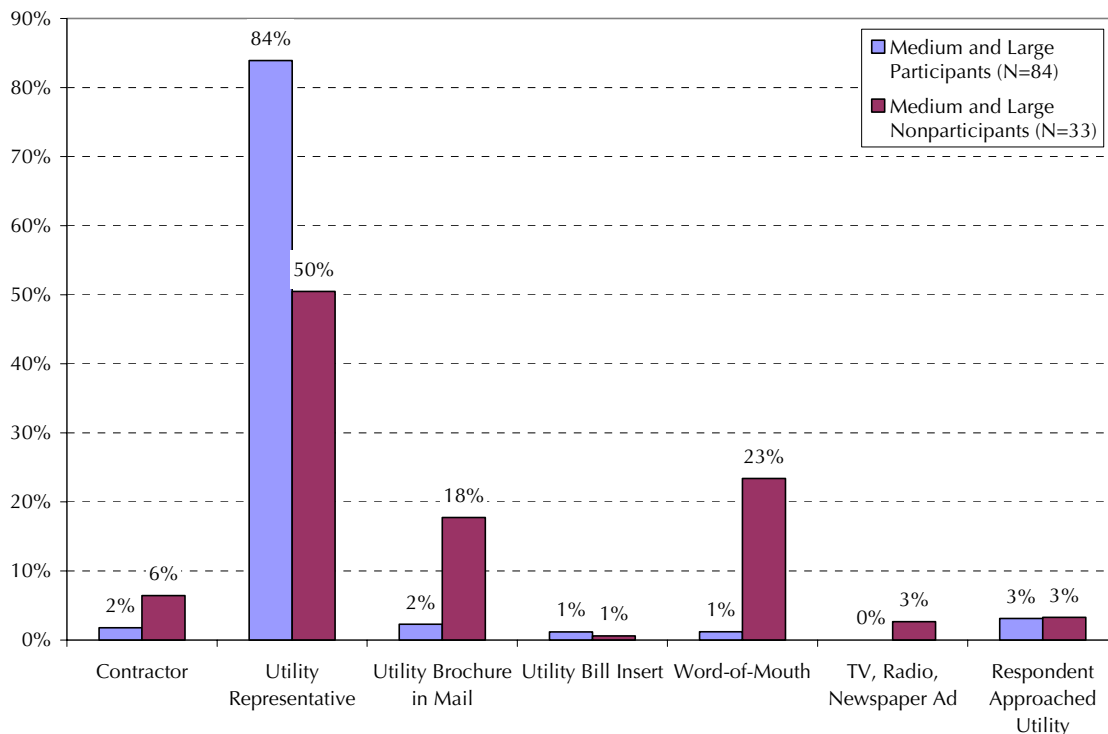


Exhibit 5-8 is similar to 5-7 shown above, but shows the results for the medium and large-sized customer segments. Large customers are quite different from smaller customers in the ways they become aware and recruited into the Audit program. The *only* significant source of participant awareness is contact with a Utility representative. Although a notable portion of nonparticipants became aware of the program through other means, no other marketing channels were successful in recruiting participation.

Exhibit 5-8
Comparison of Combined Medium and Large Sources of Program Awareness
PY 2002 Participant versus Nonparticipant



Conclusions - Program Awareness and Sources of Awareness

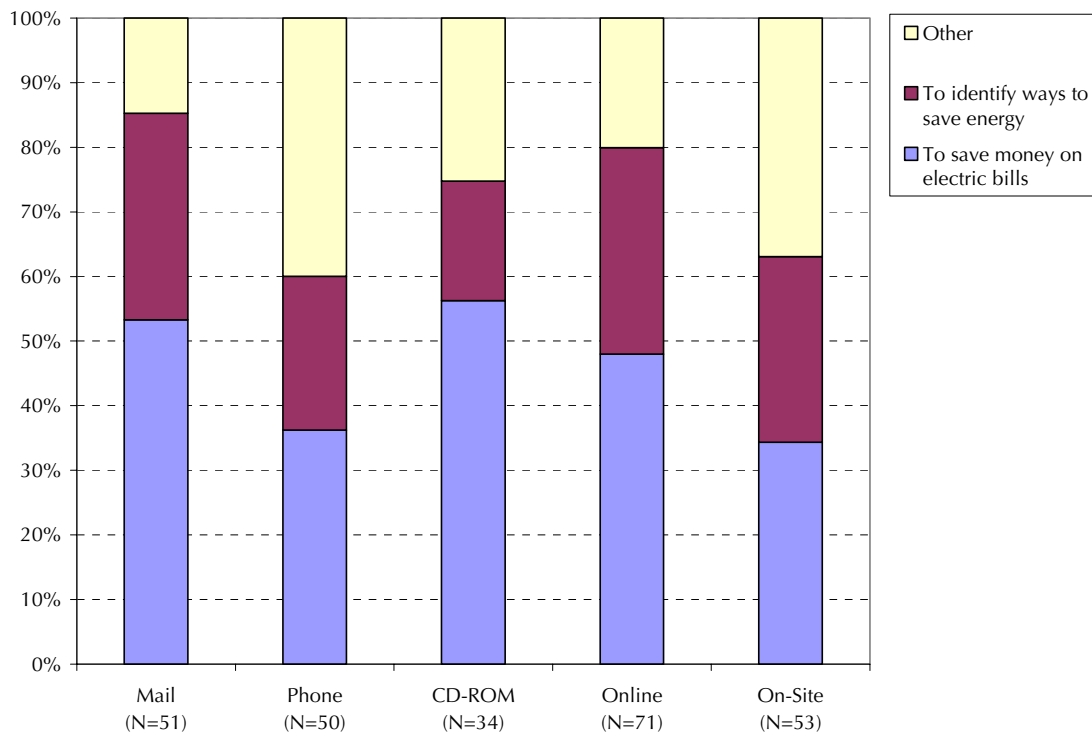
Awareness of the Audit program is strong in the nonparticipant population. About 25 percent of small and very small customers, and 40 percent of medium and large customers report being aware of the Audit program. Awareness of audits in the nonparticipant population is driven by the IOUs, who account for about 70 percent of awareness through bill inserts, brochure mailings and utility representatives. Utility representatives are very effective in recruiting customers into the Audit program, and particularly into the on-site delivery mechanism. Among medium and large companies, utility representatives appear to be the *only* effective participant recruiting method. Mail contact (utility brochures, bill inserts) is also a highly effective tool for recruiting small and very small customer into the Audit program, particularly into the mail and online Audit delivery mechanisms.

5.3 PARTICIPATION DRIVERS

This section explores the reasons for participation and reasons that nonparticipating customers who are aware of the program have not yet participated.

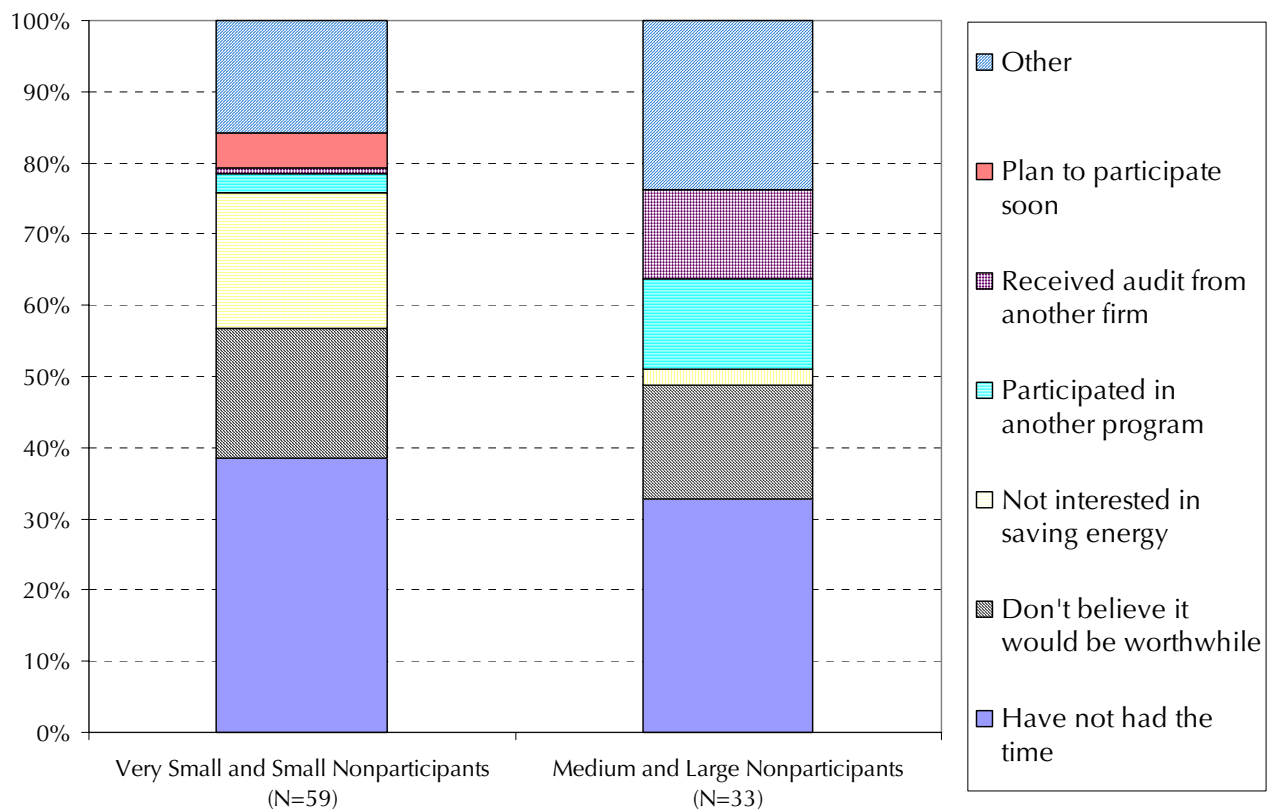
Exhibit 5-9 below presents the distribution of reasons for participation by delivery mechanism for small and very small customers. Participants cited saving money on electric bills (53 percent) and identifying ways to save energy (34 percent) as reasons they participated. Utility representatives also played a role in encouraging customers to participate; 6 percent mentioned a representative recommended the audit and another 6 percent said they had an audit because a representative showed up at their facility and offered to do the audit for free. A recommendation from a utility representative was more prominent among phone and onsite audit participants, with about 9 percent of those participants receiving a representative recommendation. Seven percent of online audit customers were motivated by promotions such as free movie tickets offered by utilities.

Exhibit 5-9
Reasons for Participation by Delivery Mechanism
Small and Very Small Participants



Nonparticipants that report being aware of the audit program were asked to report why they have not yet participated. Exhibit 5-10 shows the distribution of nonparticipant responses to that query. The exhibit shows small and very small customers on the bar on the left and medium and large customers on the right. In some respects the two distributions are very similar. Both sets of customers' primary reasons include "not having the time", or not believing it would be worth the time (which, in some respects are the same thing.) However, a very interesting difference between the two groups is that a significant portion—nearly 20 percent—of smaller customers cite a *lack of interest* in energy savings as the reason for their non-participation. Only about 3 percent of larger customers cite this reason. Lack of interest appears to be a significant barrier to Audit participation for small and very small customers, although not for medium and large customers. Another difference between the two size groups worth pointing out is that larger customers are much more likely to have received audit services from another firm—over 10 percent among medium and large customers versus less than 2 percent of small and very small customers.

Exhibit 5-10
Reasons that Aware Customers Have Not Yet Participated in the Audit Program



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Conclusions – Participation Drivers

Participants report saving money on electric bills and identifying ways to save energy as the primary reasons for participating in the Audit program. Nonparticipants report the primary reasons they have not participated include “not having the time”, or not believing it would be worth the time. In addition, nearly 20 percent of small and very small nonparticipants report a *lack of interest* in energy savings as the reason for their non-participation. About 10 percent of medium and large nonparticipants report they have already received audit services from another firm.

5.4 AUDIT PROGRAM SATISFACTION AND USEFULNESS

This section examines self-reported participant satisfaction levels and reasons for satisfaction with a variety of program elements. It also includes an assessment of program usefulness, including a participant-reported comparison of the audit to other sources of energy efficiency information. Much of this section focuses on small and very small participants, because a more in-depth satisfaction survey was conducted with these participants, as discussed in Chapter 3. Results for medium and large customers are shown where available.

Audit Program Satisfaction

Exhibit 5-11 below shows the satisfaction with the overall program and major program elements for small and very small customers. Sixty-five percent of participants are very satisfied with the program overall, providing a rating of 8 or higher on a scale of 1 to 10, and only 5 percent are unsatisfied, rating the program a 1 to 3. Satisfaction with the quality of the report and the credibility of recommendation is even higher, with nearly three-quarters of participants ranking these elements an 8 or higher. The area of least satisfaction is with the usefulness of the energy audit, with a little under half providing a ranking of 8 or higher, and 16 percent reporting dissatisfaction. This finding is consistent with the PY 2002 Evaluation results, which also found usefulness to be an area for improvement.

*Exhibit 5-11
Small and Very Small Participant Satisfaction⁵⁶*

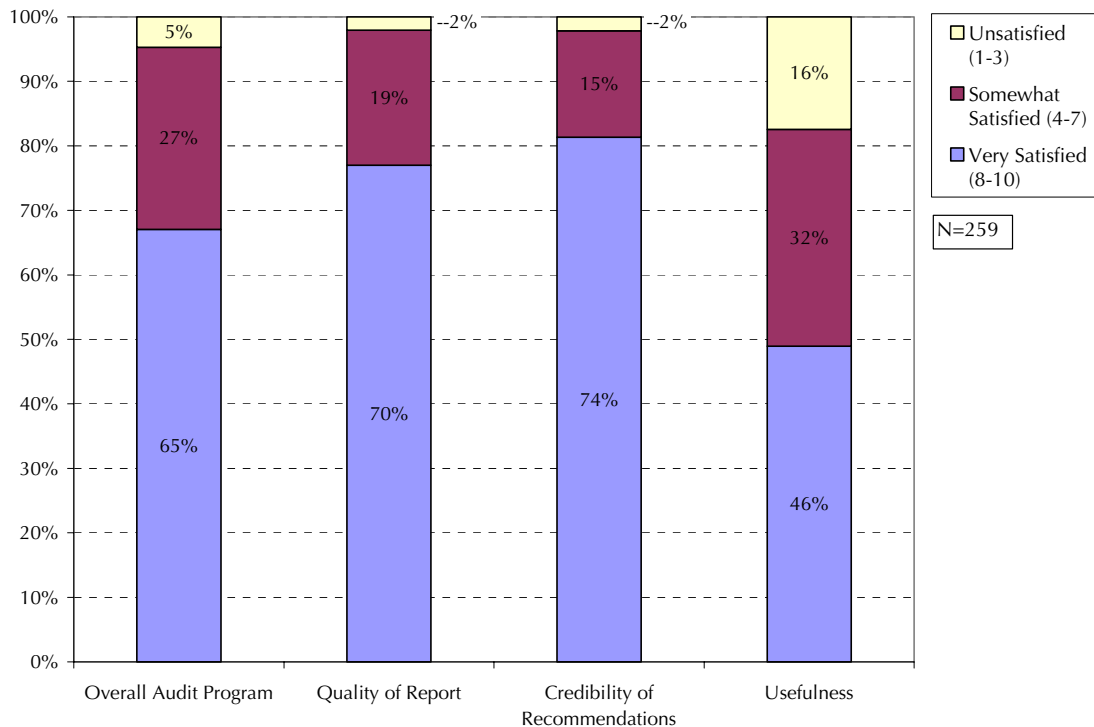


Exhibit 5-12 shows overall satisfaction with the program as well as major program elements by delivery mechanism for small and very small customers. Note that this exhibit presents mean satisfaction rating rather than the categorical presentation of satisfaction level shown in exhibit

⁵ Satisfaction with audit usefulness was collected from medium and large participants and is presented in the 'Audit Usefulness' section below.

⁶ Percentages shown may not add to 100 percent, due to "don't know" responses by some customers.

5-11 above⁷. Not surprisingly the exhibit shows the highest levels of satisfaction among on-site audit participants. The most interesting finding revealed in this exhibit is that the levels of satisfaction among CD-ROM and online audit participants are comparable to those of the other delivery mechanisms. Note that CD-ROM audit participants provided the highest mean satisfaction rating for the usefulness of the audit. CD-ROM and online audits require little to no IOU processing time, but nonetheless leave participating customers more or less equally satisfied relative to other delivery mechanisms.

Nonetheless it is important to keep in mind that there is a 'self-sorting' effect. That is, those customers that are comfortable with a web or CD audit interface are most likely to choose those delivery mechanism options. If fewer options were offered, there is little doubt mean satisfaction ratings for the remaining options would drop.

Exhibit 5-12
Small and Very Small Participant
Mean Satisfaction by Delivery
Mechanism

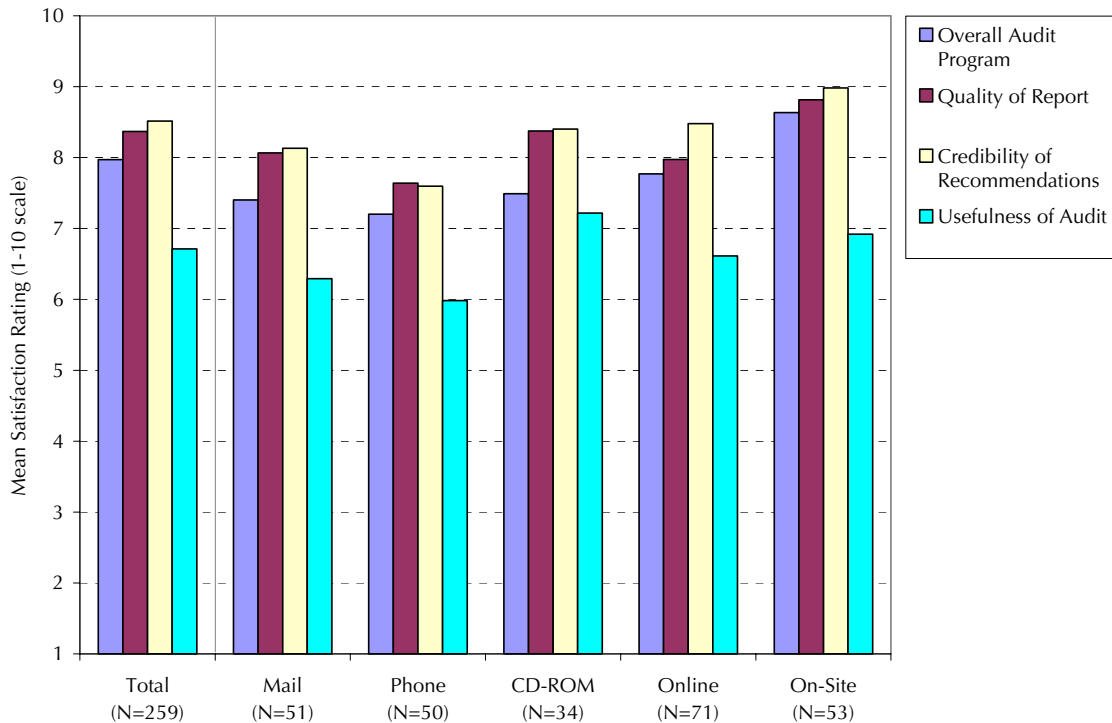


Exhibit 5-13 below explores in more detail small and very small participant satisfaction with the overall program. The exhibit shows the reasons for overall satisfaction rating by satisfaction level, with unsatisfied between 1 and 3, somewhat satisfied between 4 and 7 and very satisfied between 8 and 10. Recall that 65 percent of participants reporting being very satisfied, and the

⁷ This was done to avoid clutter and preserve clarity in the exhibit.

vast majority of these respondents said the audit was ‘helpful’ and ‘gave them all the information that they needed’, or simply, that they ‘learned a lot’⁸.

Those that were somewhat satisfied were more likely to find the information provided was ‘not customized or relevant enough’, that the recommendations were ‘difficult to follow’, or that there wasn’t enough time or money to implement recommended measures, so the program ultimately didn’t help them. Among unsatisfied participants (5 percent) customization and relevance was also a significant issue. Customization and relevance is explored in more detail in Exhibit 5 –14, which follows below.

Exhibit 5-13
Reasons for Satisfaction Rating of the Program by Satisfaction Level
Small and Very Small Participants

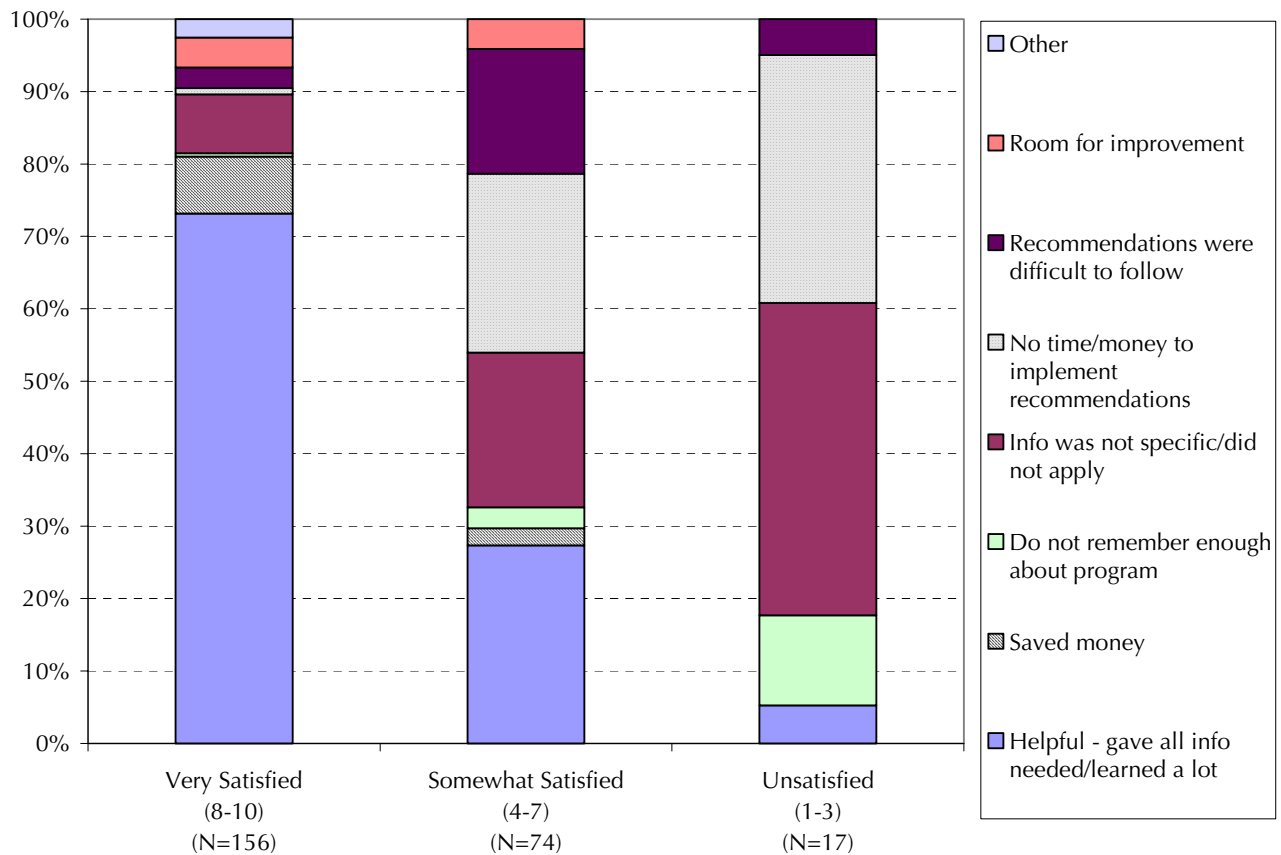


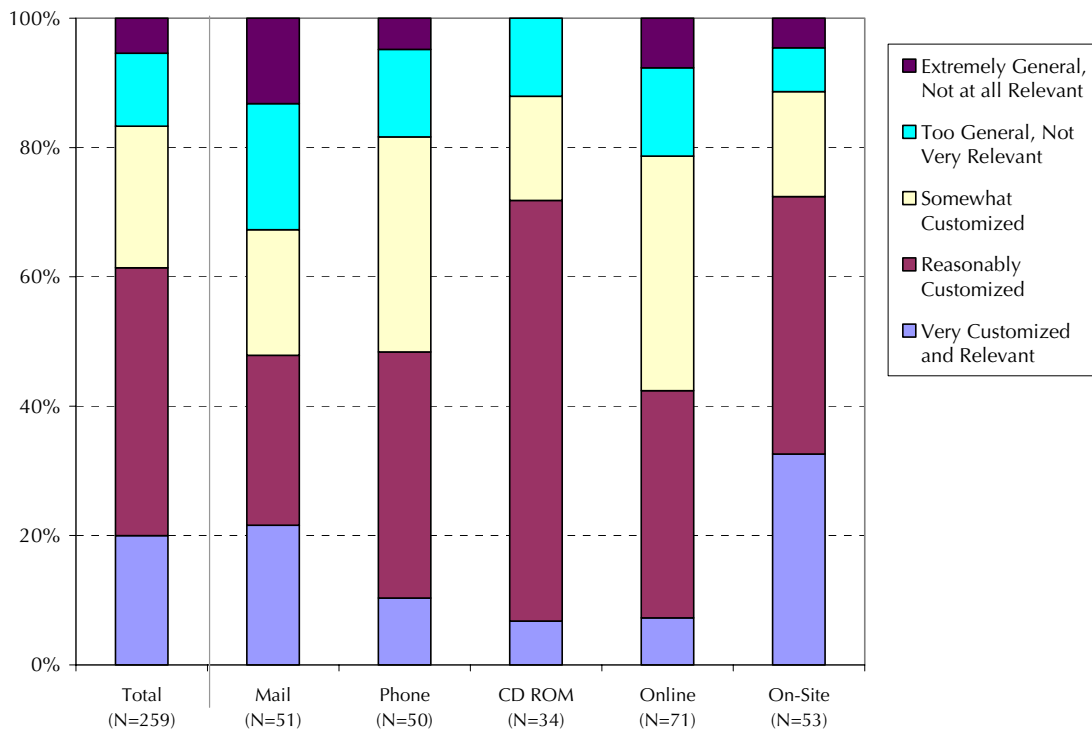
Exhibit 5-14 below shows small and very small participating customer assessments of the relevance and customization of audit recommendations. Respondents were asked, “Which of

⁸ The category ‘room for improvement’ mainly consists of people stating that the program wasn’t perfect, although it was very good. These customers could not provide a reason the program wasn’t perfect, despite prompting by the interviewer.

the following best describes the degree to which you found the recommendations customized and relevant to your particular needs?" and then were read a series of 5 statements shown in the legend of this exhibit. Over 60 percent of participants found the audit recommendations to be at least reasonably well customized. Not surprisingly, on-site audits have the highest proportion of customers stating the recommendations were 'very customized and relevant' at over 30 percent. The other delivery mechanisms have measurable lower portions of customers that are as highly satisfied with the customization of the audit, ranging from about 10 to 20 percent.

When considering customers that felt the audit was at least reasonably customized, the exhibit reveals another solid performance from the CD-ROM audit. This follows the finding in the previous discussion, that CD-ROM participants found the audit to be more useful than other remote audit participants reported. CD-ROM also has high levels of satisfaction with the program overall and major program elements, as shown in Exhibit 5-12 above. Thus, it seems, that the CD-ROM may be a very useful tool for those that install and use it. As discussed in Chapter 3, 75 percent of CD-ROM recipients we spoke to confirmed they received the disc but did not install or run the program on their computer.

Exhibit 5-14
Relevance and Customization of Recommendations
Small and Very Small Participants



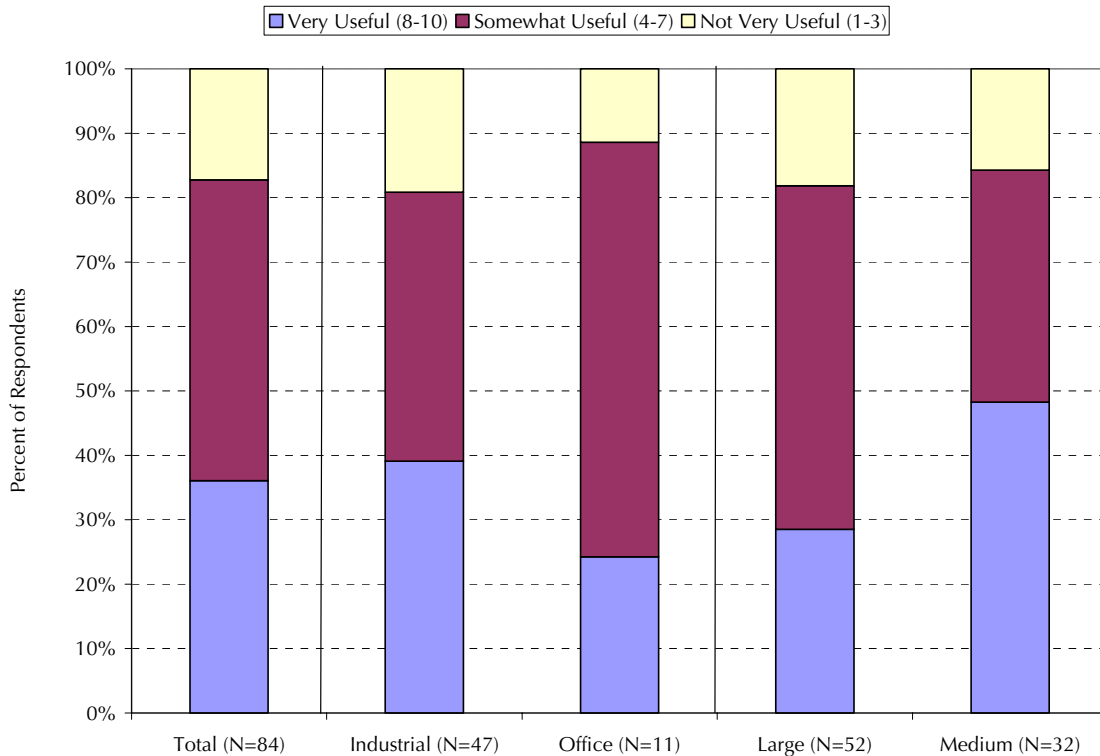
Assessment of Audit Usefulness

This section explores in more detail customers' assessments of audit usefulness, which is found to be an element with lower levels of satisfaction than other program elements in both the PY 2002 Evaluation and this Evaluation. Medium and large participant survey respondents were also asked about audit usefulness. Furthermore, medium and large customers were asked to expand on the topic by providing reasons for their satisfaction rating.

Medium and large customer self-reported satisfaction with audit usefulness is presented next. This is followed by a summarization of the reasons provided by medium and large customers for their satisfaction with audit usefulness. Finally, the section ends with a review a participant assessment of the usefulness of the audit relative to other sources of energy efficiency information. The objective of the latter is to provide the reader with some insight into what kind of information customers find most useful, and how the Audit fits into the spectrum of information sources.

Exhibit 5-15 below shows the distribution of satisfaction with the usefulness of the audit as reported by PY 2002 medium and large on-site Audit participants. Overall, the medium and large participants find the audit to be reasonably useful, but they are not overwhelmingly positive. About 37 percent of respondents provided a satisfaction rating of 8 or greater, indicating high levels of perceived usefulness. Another 45 percent found the Audit to be 'somewhat useful' giving it a rating between 4 and 7. Less than 20 percent find the audit to be 'not very useful' with a rating of 1 to 3. Industrial and medium-sized customers find the Audit somewhat more useful than offices⁹ and large-sized customers.

Exhibit 5-15
Satisfaction with Usefulness of Audit (1 – 10 Scale)
PY 2002 Medium and Large On-Site Audit Participants



⁹ Although there is a total of 35 commercial participant survey completes, only 7 contribute to the Institutional business type and 17 are miscellaneous, consisting of restaurant/grocery, retail and other commercial. Due to the relatively small Institutional sample size and the heterogeneity of this miscellaneous group, the only commercial business type result presented in this report is Office. Refer to the appendix tables for additional commercial segment results.

Medium and large participants were asked to provide reasons for their rating of satisfaction with audit usefulness. Exhibit 5-16 summarizes the remarks made by participants segmented by their level of satisfaction with audit usefulness. The most frequent negative comments made by less than fully satisfied customers include 1) a lack of new information, 2) too few recommendations, and 3) a complaint that the recommendations did not apply or were not feasible.

Exhibit 5-16
Reasons for Satisfaction with Audit Usefulness
PY 2002 Medium and Large Participant Survey Results

PY 2002 Medium and Large Customer Participant Survey Results			
	<i>Results are Shown in Percent</i>		
	S25. Usefulness of Audit (1-10 scale)		
	Very Useful (Rating 8 - 10) (36%)	Somewhat Useful (Rating 4 - 7) (46%)	Not Useful (Rating 1 - 3) (17%)
S25A. Why do you give that usefulness rating?			
Positive			
Made us aware of what we can do	50	20	-
Recommendations were helpful	12	6	29
Utility is consistent and helpful	6	-	-
Neutral			
Reinforced our prior decisions	7	18	10
No new info/would have made decision anyway	-	28	21
Negative			
Not many recommendations	-	9	14
Recommendations did not apply to us/not feasible	3	9	13
Other	18	9	12
Don't know	3	-	-
N	34	36	11

Next we explore how the Audit fits into customers' portfolio of energy efficiency information sources. That is, we examine what other sources of energy efficiency information participants use, and how those sources compare to the Audit in terms of usefulness. Participant survey respondents—both large and small—were asked what sources of energy efficiency information they regularly use and whether these sources are more, less or equally useful relative to the audit.

Exhibit 5-17 summarizes these data for small and very small PY 2003 participants. The left column lists the non-audit sources of energy efficiency information cited by participants. The remaining columns show the rate at which participants cited those sources. These columns are segmented by how customers reported other information source usefulness relative to the audit, i.e. more useful than the audit, less useful than the audit, or equally useful.

One quarter of small and very small participant respondents said the audit was more useful than other sources of energy efficiency information. About the same number stated that other sources were more useful; and nearly half stated they were equally useful. Other sources of energy efficiency information commonly used by small and very small participants include the utility websites, industry literature, energy bills and independent research by customers.

The distribution of sources across the three relative usefulness categories is not dramatically different. However, the exhibit does suggest that the audit is more useful than newspapers or television, and that information from contractors or vendors is more useful than the audit. Industry literature is mostly perceived to be equally useful relative to the audit, although a good portion feel the audit is more useful.

Exhibit 5-17
Other Sources of EE Information and Relative Usefulness
PY 2003 Small and Very Small Participants

PY 2003 Small and Very Small Participant Survey Results			
	<i>Results are Shown in Percent</i>		
S26a. Besides the energy audit, what other sources of information do you use to make informed energy management decisions?	Most Useful Source		
	Audit (25%)	Non-Audit (26%)	Same (49%)
Contractor/vendor	-	8	6
Consultant	4	-	3
Utility Representative	7	9	1
Utility Website	9	10	13
Other Utility Source	8	5	8
Industry literature	8	5	16
Organization / Association	2	3	1
Word-of-mouth	9	8	7
Independent Research by Customer	13	15	15
Manufacturer information	9	5	7
Energy Bill / Energy Use	10	15	12
Newspaper/TV	21	15	9
Other	1	2	1
N	37	48	82

Exhibit 5-18 shows similar data as those shown in exhibit 5-17, but corresponds to PY 2002 medium and large participant survey responses. About one-quarter of respondents felt the audit was more useful than other sources of energy efficiency information, 31 percent felt other sources were more useful, and the remaining 44 percent felt the differences were marginal. Medium and large participants rely heavily on Utility sources for energy information, including the website, representatives and other utility sources. Industry literature is also a prominent source.

Similar to small and very small customers, the chart shows that information from contractors and vendors is perceived to be more useful than the audit. Utility sources rival the audit in terms of usefulness, with roughly equal distributions across the three relative usefulness categories. In contrast to the smaller customers, larger customers generally find industry literature to be a more useful source of energy efficiency information than the audit, although many find them to be equally useful.

Exhibit 5-18
Other Sources of EE Information and Relative Usefulness
PY 2002 Medium and Large On-Site Audit Participants

Medium and Large Customer On-Site Audit Participant Survey Results			
	<i>Results are Shown in Percent</i>		
S26A. Besides the energy audit, what other sources of information do you use to make informed energy management decisions?	S27. Most Useful Source		
	Audit (25%)	Non-Audit (31%)	Same (44%)
Contractor/vendor	4	24	10
Consultant	-	3	5
Utility representative	13	10	10
Utility website/internet	19	14	9
Other utility source	4	1	12
Industry literature	5	16	23
Organization/association	21	-	5
Word of mouth - within company	8	4	4
Word of mouth - outside company	4	15	4
Independent Research by Customer	7	-	6
Manufacturer information	7	6	5
Energy Bill / Energy Use	4	8	2
Other	4	-	7
N	19	19	28

Conclusions - Audit Program Satisfaction and Usefulness

Participants report high levels of satisfaction with the Audit program, with 65 percent of small providing a rating of 8 or higher on a scale of 1 to 10, and only 5 percent rating the program a 1 to 3. Satisfaction with the quality of the report and the credibility of recommendation is even higher, and the area least satisfaction is with the usefulness of the energy audit.

The highest levels of program satisfaction are among on-site audit participants. However, there are not measurable differences in satisfaction across delivery mechanisms, and levels of satisfaction among CD-ROM and online audit participants are comparable to those of the other delivery mechanisms.

Levels of satisfaction with key program elements are strong among CD-ROM participants. The CD-ROM appears to be a very useful tool for those that install and use it. As discussed in Chapter

3, 75 percent of CD-ROM recipients we spoke to that confirmed they received the disc reported that they did not install or run the program on their computer. Strategies for improving the rate of recipient installation could be very beneficial, such as providing more marketing material with the CD-ROM or on the CD-ROM packaging to encourage installation. Other techniques to consider include phone calls to CD-ROM recipients or incentives, such as winning a grand prize.

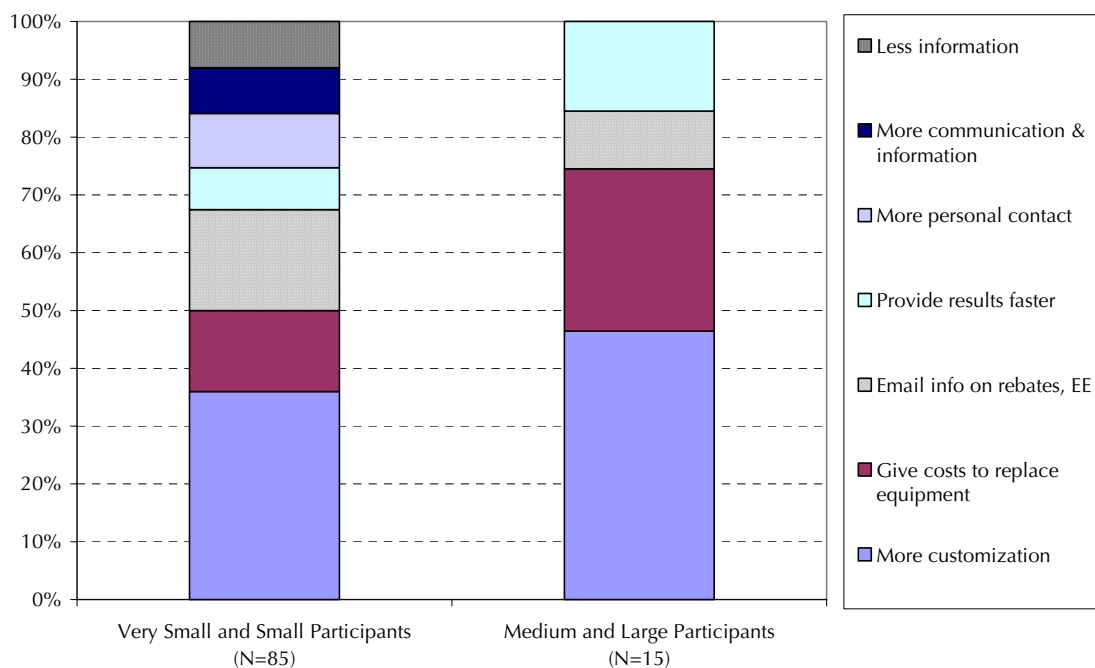
Overall, the medium and large participants find the audit to be reasonably useful, but they are not overwhelmingly positive. The most frequent negative comments regarding usefulness include 1) a lack of new information, 2) too few recommendations, and 3) a complaint that the recommendations did not apply or were not feasible.

Other sources of energy efficiency information commonly used by small and very small participants include the utility websites, industry literature, energy bills and independent research by customers. Our analyses suggest that small and very small customers find the audit more useful than industry literature, newspapers, or television. Further, information from contractors or vendors is perceived as more useful than the audit. Medium and large participants rely heavily on Utility sources for energy information, including the website, representatives and other utility sources. These customers find information from contractors, vendors and industry literature to be more useful than the Audit.

5.5 SUGGESTIONS FOR PROGRAM IMPROVEMENT

Participant survey respondents were asked to provide suggestions for program improvement. Only a small portion of respondents offered any suggestions, 32 percent of small and very small participants and 20 percent of medium and large participants. Their comments are summarized in Exhibit 5-19 below. Note that those who reported being unsatisfied with the program (provided a program satisfaction rating between 1 and 3) were 4 times more likely to offer a suggestion than a satisfied participant. About 20 percent of the small and very small customers that offered a suggestion for program improvement were unsatisfied with the program while just 5 percent of all participants reported being unsatisfied with the program. The most common request is for more customization in audit reports, followed by a desire for information on costs to implement recommended measures. Customers also expressed a desire to be e-mailed energy efficiency and rebate program information. Small and very small customers requested more personal contact from the utilities. Interestingly, about equal portions of smaller participants stated the audit provided 'too much' and 'too little' information.

*Exhibit 5-19
Suggestions for Program Improvement*



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

5.6 MARKET EFFECTS

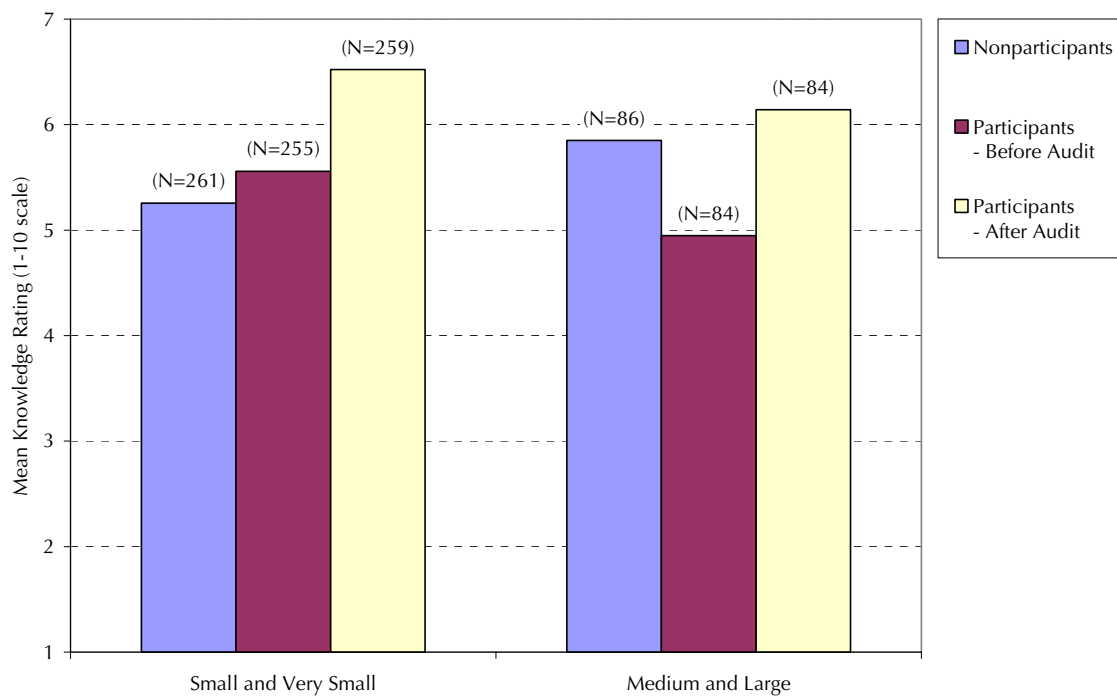
This section explores a couple key indicators of program market effects. Specifically, the self-reported change in customer energy efficiency knowledge and the likelihood of purchasing energy efficient equipment in the future. These indicators are important measures of program effects, given that the program is an information program.

Participants and nonparticipants were asked to rate their knowledge of energy efficiency on a scale from 1 to 10. Participants were also asked to rate their pre-audit knowledge of energy efficiency. The results are summarized in Exhibit 5-20 below, which presents mean self-reported levels of knowledge.

The small and very small participants show a marked change in knowledge. Further, nonparticipants report a similar knowledge to pre-audit participants, providing a nice validation of the participant data.

Medium and large participants show a similar pre- and post-audit change, but the pre-audit level is notably below the nonparticipant level. This is a curious result. One explanation is that nonparticipants already had energy efficiency information, which may also explain why they are nonparticipants. Nonetheless nonparticipant knowledge of and participation in the rebate programs is lower than participants'. This is evidenced in the self-reported awareness of rebate programs and the portion of purchases made through rebate programs, which are much higher among participants. Furthermore, willingness to consider energy efficiency is greater among participants¹⁰, purchases of high efficient equipment are more frequent¹¹, and energy conservation practices are more common¹². Thus, while medium and large nonparticipants may consider themselves fairly well informed regarding energy efficiency, this does not translate into comparable energy efficient choices, behaviors and attitudes.

Exhibit 5-20
Self-Reported Knowledge of Energy Efficiency
Participants Versus Nonparticipants



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

¹⁰ See Exhibit 5-22.

¹¹ See Exhibit 1-4.

¹² See Exhibit 1-7.

Exhibit 5-21 shows the self-reported change in energy efficiency knowledge among small and very small participants by delivery mechanism. The exhibit shows that all the delivery mechanisms are effective in increasing knowledge, and that CD-ROM and online are strong in that regard. Interestingly, CD-ROM customers—who report the highest level of satisfaction with the usefulness of the audit—also report the highest level of pre-audit knowledge. This is a strong statement about the quality of the CD-ROM audit, that it can be a useful tool to a relatively sophisticated portion of the small and very small customer population.

Exhibit 5-21
Self-Reported Knowledge of Energy Efficiency
PY 2003 Small and Very Small Audit Participants

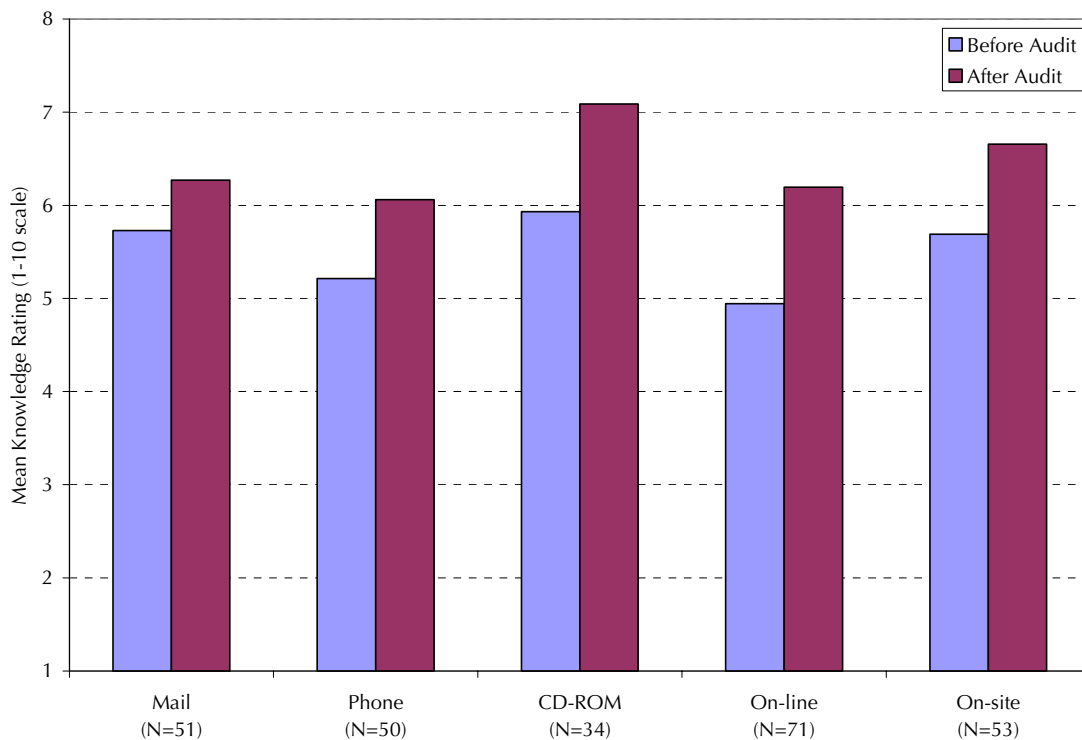
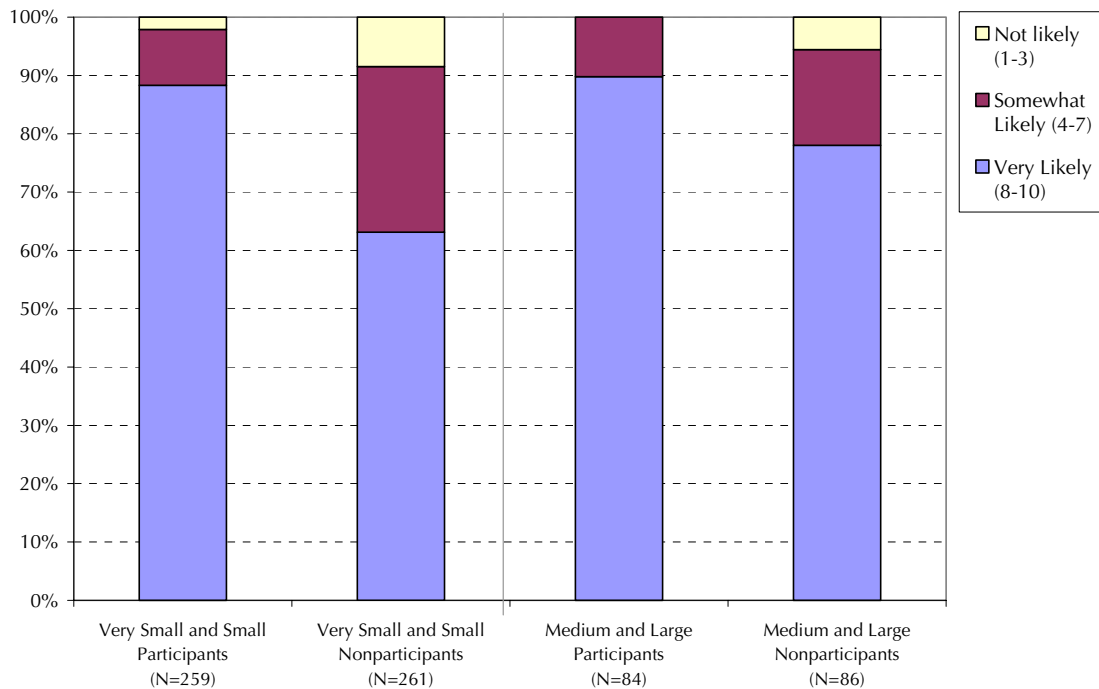


Exhibit 5-22 below shows the self-reported likelihood of purchasing energy efficient equipment in the future. The exhibit clearly shows a greater propensity to consider energy efficient equipment by participants relative to nonparticipants. Nearly 90 percent of small and very small participants consider themselves very likely to purchase energy efficient equipment in the future, while only 63 percent of nonparticipants make this claim. Among medium and large customers, participants are also more likely to purchase high efficiency equipment than nonparticipants, but the effect is a bit less pronounced, at 90 versus 78 percent respectively.

Exhibit 5-22
Likelihood of Installing Energy Efficient Measures in the Future
Participants versus Nonparticipants



*Medium and large participants are PY2002 and onsite; very small and small participants are PY2003 and include all delivery mechanisms

Conclusions - Market Effects

Participants report a measurable increase in energy efficiency knowledge as a result of Audit participation. Further, all the delivery mechanisms are effective in increasing knowledge, and the CD-ROM and online delivery mechanisms are strong in that regard. There is also a clearly greater propensity to consider energy efficient equipment by participants than nonparticipants.

5.7 CROSS- PROGRAM ELEMENTS

An important function of the Audit program is to funnel customers into the Express Efficiency and Standard Performance Contracting¹³ rebate programs. This section examines some indicators of the success of the Audit program in promoting these rebate programs. Specifically, we examine the rates of awareness and participation in these programs among Audit participants and compare these rates to nonparticipants. Similar analyses and results can be found in the 2002 Statewide Cross-Program Evaluation^{14,15}.

All customer surveys fielded for this evaluation¹⁶ included a battery of questions relating to awareness of IOU-sponsored energy efficiency programs. Respondents were asked to name all of the IOU-sponsored energy programs they were aware of. Regardless of which programs were mentioned, participants were also asked if the Audit program referred them to the Express Efficiency or SPC programs.

¹³ Express Efficiency provides rebates to less than 500 kW customers for prescriptive measures. SPC provides rebates for customized measures, and is directed to greater than 500 kW customers.

¹⁴ www.calmac.org. 2002 Statewide Nonresidential Cross-Program Evaluation, PGE0182.01 (SW066), 9/27/2004.

¹⁵ There are important differences in how awareness data was collected for the 2002 Statewide Cross-Program Evaluation and this Evaluation. The data presented in the two Evaluations are not directly comparable.

¹⁶ There were 4 surveys: a PY 2003 Small and Very Small Participant survey, Small and Very Small Nonparticipant survey, a PY 2002 Medium and Large On-site Audit Participant survey, and a Medium and Large Nonparticipant survey. Refer Chapter 3 for a more detailed discussion of the surveys and the sampling approach.

Exhibit 5-23 below shows the rates of awareness of Express Efficiency among participant and nonparticipant populations. The lower portion of each bar shows the unprompted rates of awareness. That is, it shows the portion of respondents that mentioned Express Efficiency among the IOU-sponsored energy programs they were aware of. Some participants that did not mention Express Efficiency unaided responded positively when asked if the audit provided a referral to the Express Efficiency program. This awareness is prompted because the interviewer mentions Express Efficiency by name and asks directly if the respondent was given a referral. These customers are reflected in the upper portion of the participant bars.

The exhibit shows rates of unaided awareness are notably higher among participants than nonparticipants, demonstrating a clear program effect. The majority of participant respondents in every size category are aware of the Express Efficiency program. Participant awareness ranges from a low 64 percent among very small customers to a high of 90 percent among medium customers.

Exhibit 5-23
Rates of Express Efficiency Awareness—Participants versus Nonparticipants

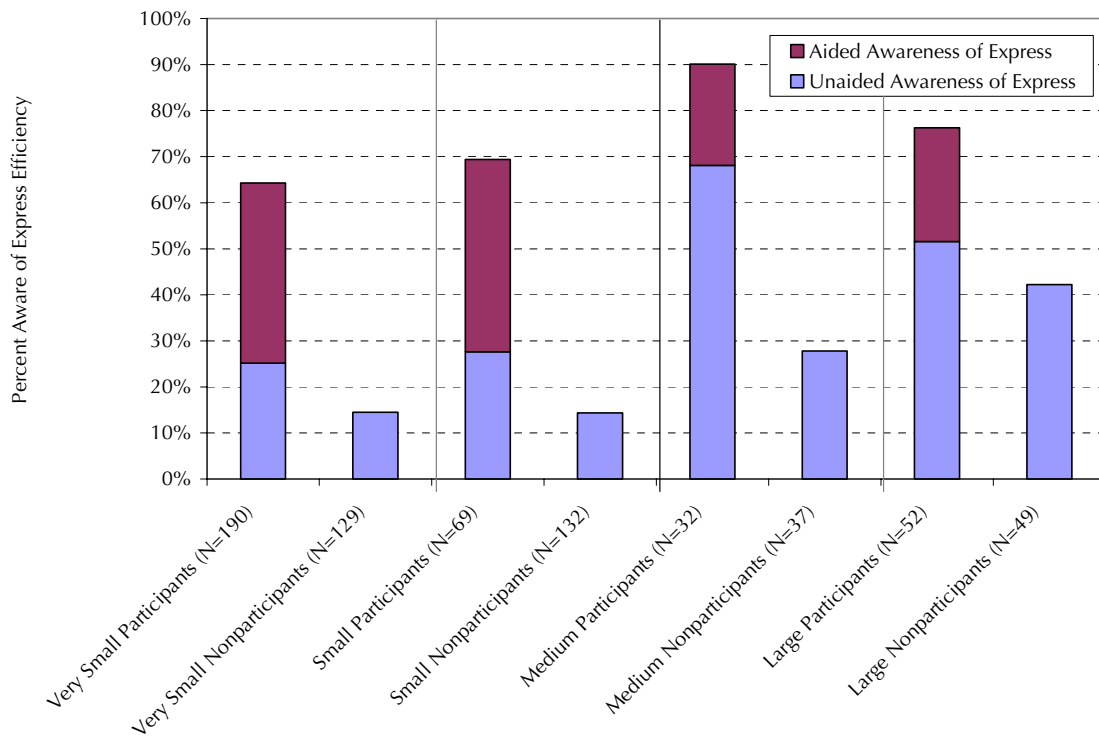
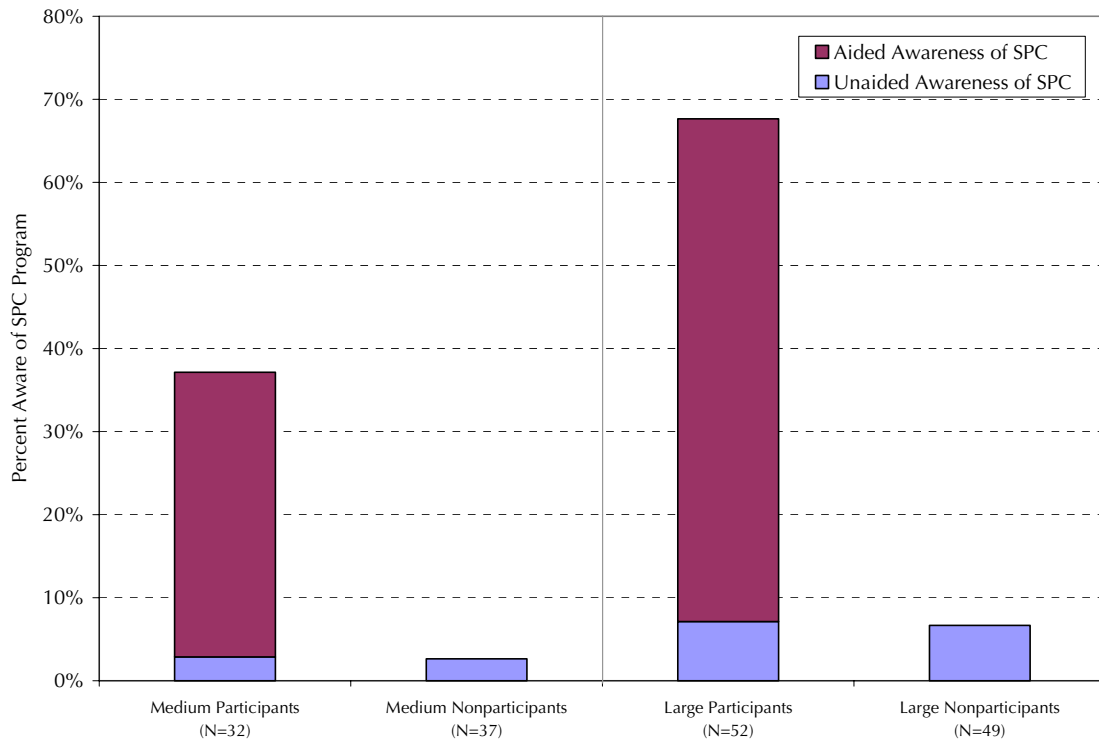


Exhibit 5-24 below shows rates of SPC awareness among medium and large¹⁷ sized participants and nonparticipants. Levels of unaided awareness of the SPC program are similar, and relatively low¹⁸, among participants and nonparticipants. However, when participants were asked specifically if the Audit had provided a referral to the SPC program, they were able to recall the program and the referral. Rates of awareness—prompted and unprompted together—are much higher among participants than nonparticipants. Large participants have substantially higher levels of awareness than medium sized participants, 67 versus 37 percent, respectively. Given the very high levels of Express Efficiency awareness among medium-sized customers, this difference may simply reflect a choice by the auditor to refer the customer to Express, given the needs and size of the particular customer.

Exhibit 5-24
Rates of SPC Program Awareness—Participants versus Nonparticipants



¹⁷ Small and very small participants are not shown below, due to the SPC program’s orientation toward larger customers.

¹⁸ Please note that 53 percent of participants and 24 percent of nonparticipants reported being aware of “rebate” programs. These generic responses were not included in the SPC awareness data, although undoubtedly *some* belong.

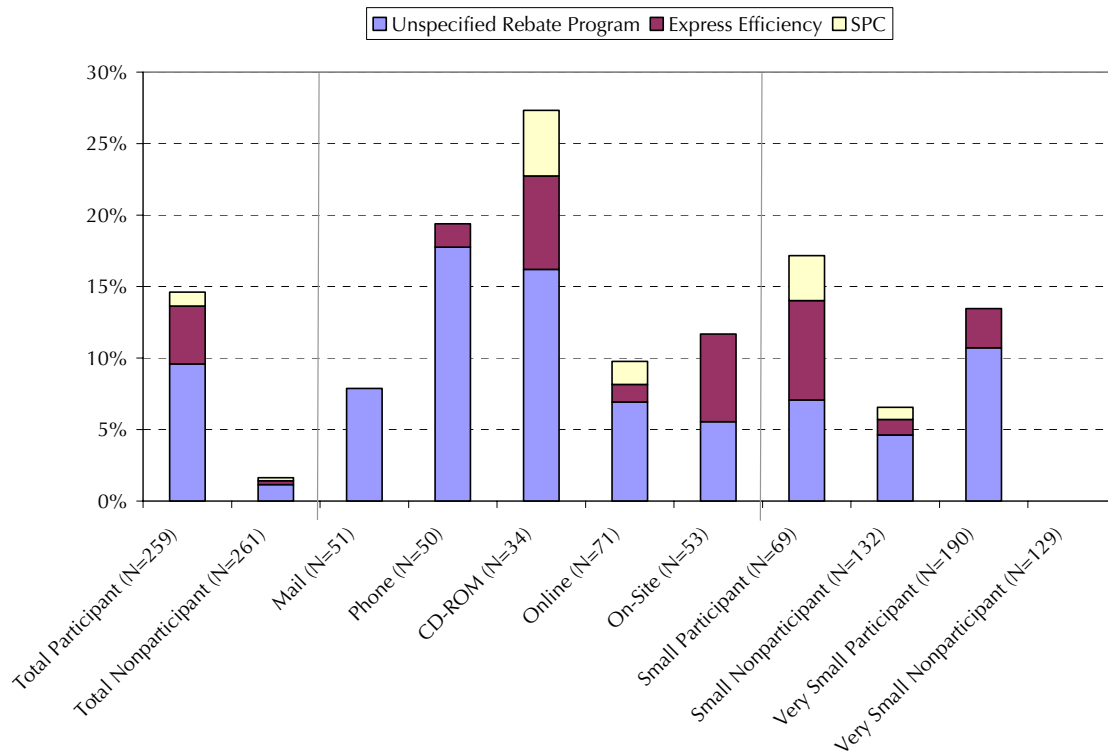
Next we examine rates of participation in rebate programs among participants and nonparticipants. Survey respondents were asked if they received a rebate for the equipment they reported purchasing. In a follow up questions, respondents were also asked whether the rebate was from the Express Efficiency or SPC program. Exhibit 5-25 below shows the rates of participation in rebate programs for small and very small customers. The lowest section of each bar reflects third party rebate program participation. These may also include manufacturer rebates. The dark segment of the bars shows the rebates reported as Express Efficiency, and the lightest section reflects SPC rebates.

The exhibit demonstrates strong program effects. Participants are purchasing rebated equipment at much higher rates than nonparticipants, 14.5 versus 1.5 percent¹⁹. Respondents that claimed to have received a rebate for equipment purchases were asked whether the rebate was through the Express Efficiency or Standard Performance Contracting (SPC) programs. Four percent of participants stated the rebate had been through the Express Efficiency program, versus just 0.2 percent of nonparticipants. Some of both participant and nonparticipant adopters claim to have received a rebate through the SPC program. Again, this rate is higher among participants, at 1 percent versus 0.2 percent among nonparticipants.

¹⁹ This result is similar to the 2002 Statewide Cross Program Evaluation result, which found 13 percent of Audit participants and 2 percent of the general population self-reported participation in Express Efficiency over a 1.5-year time period.

CD-ROM participants have the highest overall rebate program participation rate, at over 27²⁰ percent. The On-Site and CD-ROM Audits show strong ties to Express Efficiency, with participation at a little over 6 percent in each group. The difference between participants and nonparticipants is striking. Thirteen percent of very small participants report purchasing rebated equipment, while *none* of the very small nonparticipants reported receiving a rebate for equipment purchases.

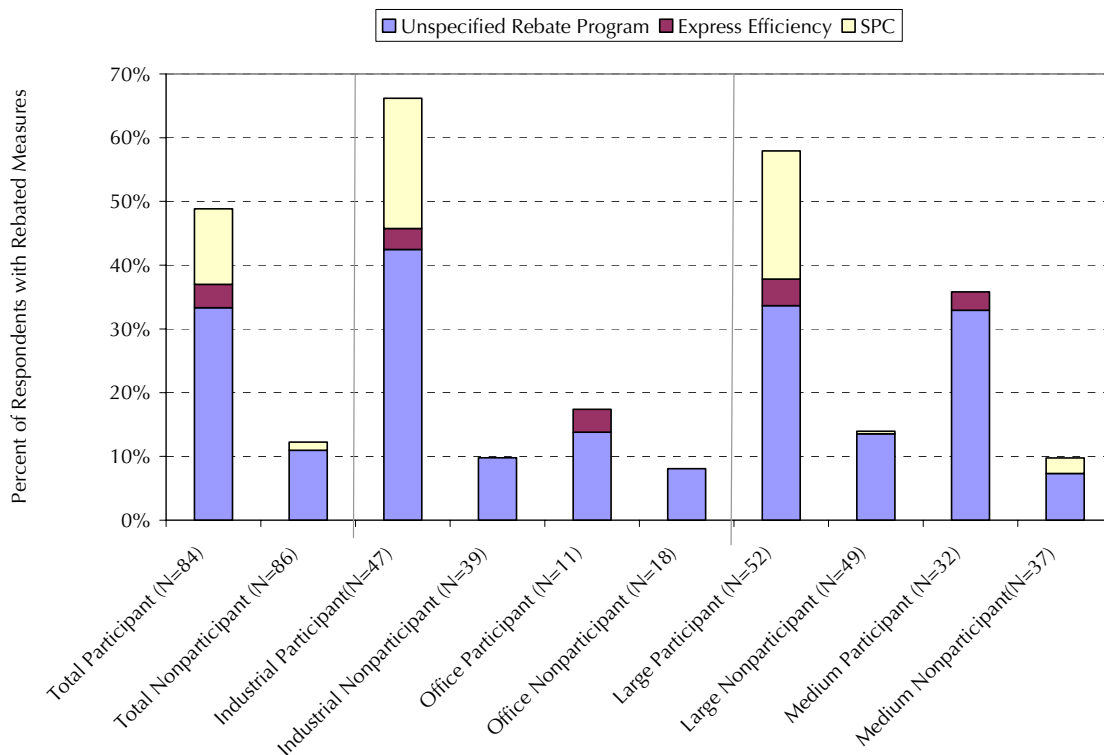
Exhibit 5-25
Rebate Program Participation—Small and Very Small Customers



²⁰ The CD-ROM tool does not include Express Efficiency or SPC program applications, nor is there significant advertising of these programs on the CD-ROM. Thus, the primary motivating factor is either the CD-ROM recommendations, or other factors such as customer predisposition to energy efficient purchases.

Exhibit 5-26 below shows the rates of rebate program participation among medium and large customers. The program effects are dramatic. Nearly half of all the medium and large Audit participants surveyed reported purchasing rebated equipment, while this rate is only 12 percent among nonparticipants. There is a particularly strong effect within the Industrial segment, which shows a total rebate program participation rate of nearly 70 percent. Further, 20 percent of the industrial segment adopters stated this rebate had been through the SPC program. Industrial Nonparticipants have a rebate program participation rate less than 10 percent, and none reported participating in the SPC program.

Exhibit 5-26
Rebate Program Participation—Medium and Large Customers



Conclusions - Cross Program Elements

Among small and very small customers, rates of Express Efficiency program awareness are much higher among participants than nonparticipants, demonstrating a clear program effect. The majority of participant respondents in every size category are aware of the Express Efficiency program.

Levels of unaided awareness of the SPC program are similar among participants and nonparticipants. However, when participants were asked specifically if the Audit had provided a referral to the SPC program, they responded positively. Large participants have substantially

higher levels of SPC awareness than medium sized participants, 67 versus 37 percent, respectively.

The Audit program is clearly successful in motivating customers to participate in rebate programs. Small and very small participants are purchasing rebated equipment at much higher rates than nonparticipants, 14.5 versus 1.5 percent. Nearly half of medium and large Audit participants reported purchasing rebated equipment, versus just 12 percent of nonparticipants. There is a particularly strong effect within the medium and large Industrial segment, which has a total rebate program participation rate of nearly 70 percent. Further, 20 percent of the Industrial segment adopters stated this rebate had been through the SPC program.

5.8 KEY FINDINGS

This section highlights the key findings presented in this Chapter.

- The tracking systems have improved dramatically relative to 2002, and continue to make some improvements in 2004.
- The assessment of program marketing revealed that medium and large customers appear to be responding only to utility representative recruitment, while small and very small customers respond well to both utility representatives and mail marketing, such as bill inserts or brochures.
- Nonparticipants are reluctant to participate in the Audit program because they are not convinced the effort is worthwhile. Small and very small customers may not believe energy efficiency is important.
 - Small and very small nonparticipants need to understand upfront the importance and potential benefits of improved energy efficiency. Perhaps an upfront demonstration of the significance of energy costs over time may help convince some nonparticipants.
 - Medium and large nonparticipants need to be convinced of the quality of the Audit process, as well as the potential benefits. These customers understand the significance of energy costs, but may not understand that the Audit program offers highly customized evaluation, including cost and savings information, and referrals to appropriate rebate programs.
- Satisfaction with key program elements is strong.
 - Small and very small participants are very satisfied with the overall program. Nearly 70 percent rated the program an 8 or higher on a scale from 1 to 10. There are no large fluctuations in satisfaction across delivery mechanisms reflecting a solid portfolio of offerings. It should be noted that the on-site audit does get somewhat higher marks from participants than other delivery mechanisms.
 - Similar to the PY 2002 Evaluation findings, satisfaction with audit usefulness is lower than other elements.

A major area of concern for medium and large participants was that the audit provided information they already had. Still, many others found the information was valuable in determining energy efficiency improvements.

- Participants show extensive information uptake, market effects, and, importantly, cross-program funneling to rebate programs.
 - Participants report increases in knowledge following the audit.
 - Participants are more likely than nonparticipants to install energy efficient measures in future purchases.
 - Small and very small participants are purchasing rebated equipment at a much higher rate than nonparticipants, 14.5 versus 1.5 percent.
 - Nonparticipants are largely unaware of the SPC program and participate at a very low rate.
 - Participants are both made aware of SPC during the audit and participate at a 20 percent rate in the target large customer population.

6. ON-SITE AUDIT BEST PRACTICE ASSESSMENT

In this chapter on-site audit best practice results are presented, based on a preliminary assessment designed to assist the California IOU's in optimizing program delivery. The best practices were identified through interviews with Nonresidential Audit program managers, and through use of previous studies of California non-residential markets and programs¹, as well as a recent national best practices study². The discussion focuses on how to enhance program effectiveness throughout each step of the on-site audit process, starting with the selection of customer outreach vehicles and ending with the use of the most appropriate customer follow-up channels. This chapter also addresses how best to match on-site audit offerings to a customer base with varied needs and capabilities to access and implement audit recommendations. Finally, this chapter identifies various programmatic and content-based practices that maximize post-audit energy efficiency measure uptake by participating customers.

This chapter focuses on the on-site audit best practices because of their importance as the most common delivery channel and the expectation of garnering substantial post-audit energy savings from the on-site delivery channel. Furthermore, although the audit program was transformed into a statewide program in 2002, on-site audits have not yet been standardized across the four Investor Owned Utilities (IOUs). The IOUs independently developed on-site audit tools and procedures, for both small and large customers, and continue to use a variety of reports and implementation approaches across the state. This variety in the implementation of on-site audits coupled with experience from over a decade of evaluating California's nonresidential programs and markets, provided fertile ground to identify best practices for the on-site audit delivery mechanism. For these reasons, the IOU on-site audit procedures and products were carefully reviewed and scrutinized to identify best practices and lay the groundwork for standardizing and refining the audit delivery process. In an effort to provide current program feedback, the assessment addresses the 2004 delivery channels and methods.

¹ Several relevant publications are available on the CALMAC.org website, including the following:

- a) 2002 Statewide Nonresidential Cross-Program Evaluation, PGE0182.01 (SW066), 9/27/2004.
- b) Individual 2002 statewide nonresidential evaluations for Audits, Express Efficiency and SPC; PGE0158.01 (SW066), PGE0162.01 and SCE0138.01; 2004.
- c) Statewide Study of Program Cost-Effectiveness: Targeting Small Versus Medium/Large Nonresidential Customers Phase I, PGE0155.01 (PGE-001.01), 4/21/2004.
- d) Statewide Small Industrial Customer Wants and Needs Study, CAL0008.01 (P1955-190), 7/2/2003.
- e) Statewide Small/Medium Nonresidential Customer Needs and Wants Study: Final Report, PGE0109.01 (3343), 12/1/2001.
- f) Large Customer Needs and Wants Study, SCE0105.01 (3530), 2/6/2000.

² Best Practices Benchmarking for Energy Efficiency Programs, <http://www.eebestpractices.com>.

By definition, Audit program best practices are those nuances in program delivery that lead to increased energy efficiency measure uptake.

The following sections are presented in this chapter:

- 6.1 Key Findings
- 6.2 Approach to Evaluating On-Site Audit Best Practices
- 6.3 Discussion of Current Practices
- 6.4 Best Practice Conclusions

6.1 KEY FINDINGS

Key findings stemming from an assessment of on-site audit best practices is summarized in Exhibit 6-1, showing recommended program delivery options in each stage of the audit delivery process. Of particular importance to the success of the on-site audit process, as exemplified in the exhibit, is the tailoring of program delivery by customer size. This is an essential element for accommodating the varied wants and needs of a very diverse nonresidential customer population.

Exhibit 6-1
Key Findings Stemming from a Best Practices Assessment
of the On-Site Audit Delivery Channel

Customer Size				
On-Site Audit Approach	Very Small (<20 kW)	Small (20 - <100 kW)	Medium (100 - <500 kW)	Large (>500 kW)
Program Outreach -- program goals should drive the focus of the outreach effort to obtain the desired mix of small, medium and large customers				
Set goals based on number of completed audits	●	●		
Implement audit outreach to Express Efficiency participants*		●	●	
Set goals based on energy saving targets			●	●
Site Visit -- for smaller customers all audit services should seek to maximize energy efficient equipment adoptions and Express Efficiency participation.				
Deliver the audit report during the site visit	●	●		
Provide an Express Efficiency application; filled-in where possible	●	●		
Furnish a list of qualified service providers	●	●	●	
Audit Report and Recommendations -- tailor audit products to customer wants and needs by customer size				
Smaller customers need educational information on relevant measures	●	●		
Smaller customers need measures ranked by the cost to the bottom line	●	●		
Larger customers need customized information relevant to their facility			●	●
Larger customers need measures ranked by ROI to justify investment			●	●
Audit Follow-up -- Motivate account representatives to follow-up using job performance incentives to achieve the desired mix of program savings and equitable program spending				
Track account rep. performance using completed Express applications	●	●		
Track in-depth follow-up efforts with larger customers to maximize savings			●	●

* Recommended outreach to Express Efficiency participants includes a telephone call and direct marketing package that addresses the audit program and provides energy efficiency information in the form of several technology one-pagers (or technical briefs). For very small customers, no such follow-up is recommended, as it is not cost-effective to carry-out direct marketing to very small customers, especially given that those customers must then still act. Overall, a direct install program is a preferable no-hassle vehicle to bringing energy efficiency to the under 20 kW market.

** It is recommended that follow-up for very small customers be delegated to a call center, to ensure the cost-effective use of program funds.

In general, the recommended best practices identify how program delivery should differ for small versus large customers. Small customer needs and therefore delivery should be similar to the very small segment, while medium customers generally fall in-line with their larger counterparts. There are, however, exceptions to these rules, particularly with regard to the very small customer class. For example, very small customer delivery requires careful scrutiny of delivery cost versus the probability that the very small customer class will take energy efficiency actions, and thereby provide society with the desired program benefits. For very small customers the following additional considerations are needed to ensure the audit program is providing cost-effective on-site audit services:

- Overall, a direct install program may be a preferable delivery channel for bringing energy efficiency to the under 20 kW market. Direct install programs are effective because they greatly reduce the hassle-burden for this generally time-constrained and disinterested segment of the nonresidential population. Also, while delivery of energy efficiency to very small customers is less cost-effective than delivery to larger customers, this relatively expensive delivery channel deserves special consideration, given that energy efficiency equity is sought for this “hard-to-reach” customer class. This type of ‘turnkey’ approach for very small customers has been shown to be effective in third party programs in San Francisco, the East Bay and elsewhere.
- At a minimum, providing a turnkey program alternative that combines Express and Audit services may improve program results for very small customers. These additional services are needed because very small customers have expressed the need for Audit follow up services and have lower measure uptake rates than larger customers. Very small customers also have more limited resources to devote to energy saving projects.
- While on-site audits are available to all customers, the remaining portfolio of “remote” delivery mechanisms offered by the Audit program are considered a more cost-effective product for the very small customer class. On-site audits on their own, without considerable linking to the Express Efficiency program, installation contractors, loans and so forth, is considered a cost-ineffective approach for delivering energy efficiency services to very small customers.

On the other hand, large customers have been shown to be willing and able to take considerable energy efficiency action following information delivery via audit services. Best practices for these customers’ consists of a few specialized audit delivery practices to maximize the energy saving return that results from the societal investment in those audit services.

6.2 APPROACH TO EVALUATING ON-SITE AUDIT BEST PRACTICES

The objective of the best practices assessment is to identify optimal on-site audit tools and strategies from the many variations currently offered across California. The rationale for this effort is to assist with the refinement of the on-site audit delivery channel and to ultimately help business owners make appropriate energy efficiency decisions. Special attention was paid to:

- how the IOUs tailor their audits to the needs of different sized customers (i.e. very small and small (<100kW) versus medium and large customers). Evaluations have shown that small and medium customers often lack technical knowledge and depend heavily on

vendors for making equipment-related decisions, whereas large customers are knowledgeable to begin with and instead seek justification for specific energy efficiency projects.

- what are audit best practices and what should be emphasized in the delivery of audits to small versus large customers.

The key to a successful assessment of on-site audit best practices is thorough knowledge of the various audit tools and procedures being used in the Statewide program (and elsewhere). For this reason, an important data source contributing to the best practices assessment is a series of interviews that were conducted with the program managers. Program managers were asked to describe the nuances of on-site audit delivery by customer size³, building a platform of knowledge from which to compare and contrast delivery across the IOU's. This led to a set of best practices, in some cases as a direct result of these interviews, and in other cases through more careful consideration of past study findings and results.

The next section presents a generic on-site audit process flowchart, followed by a current practice summary table for Audits in 2004. The process flow chart in Exhibit 6-2 summarizes the steps involved in conducting an on-site audit, from initial customer contact to follow-up after the audit is complete. This flow chart sets the stage for the discussion in *Section 6.3 Discussion of Current Practices*, which follows the order of the flow chart, addressing each step of the audit delivery process and corresponding best practices; both as they exist today and from a "future program" perspective.

³ Please see Appendix I of this Report for the Program Manager Interview Guide used for this Best Practices Assessment.

**Exhibit 6-2
Process Flow Diagram**

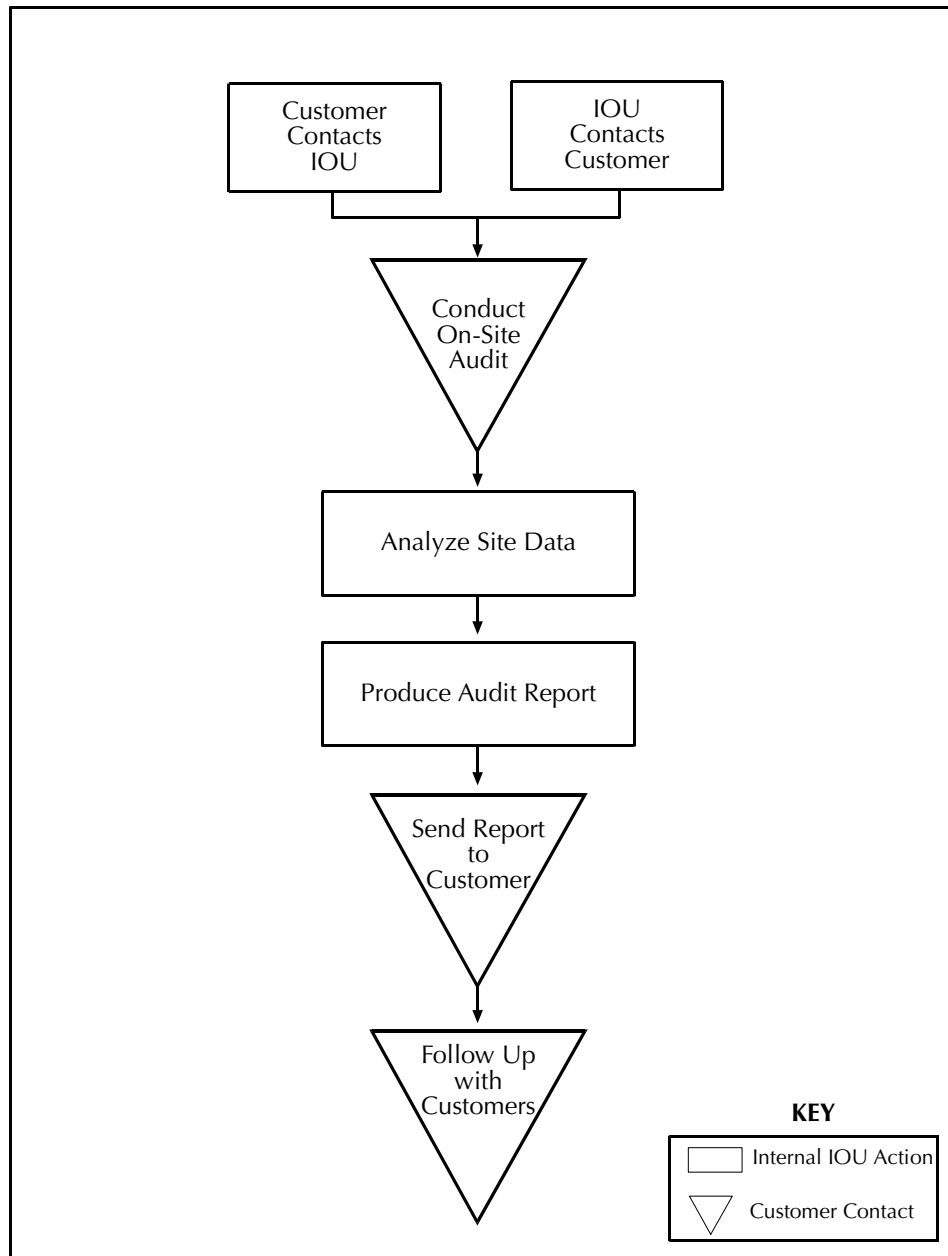


Exhibit 6-3 presents a summary of current practices in the Statewide Audit program, showing distinct program delivery steps and the approaches used in delivering on-site audit services. Also shown (as columns in the exhibit) are the various on-site audits tailored by customer size that are being offered by each IOU in 2004. While all four IOUs offered on-site audits in 2004, only PG&E and SCE promoted variations tailored to the needs and wants of a particular size of customer.

Exhibit 6-3
IOU Delivery Approach
by Customer Size-Tailored On-Site Audits Offered in 2004⁴

Program Delivery Step and Approach	PG&E			SCG	SDG&E	SCE	
	Checklist	BEST	Large*			Small Business Solutions	Large MCD
Types of Audits Offered							
Audit is tailored to:							
large customers			•				•
medium customers		•				•	
small customers	•					•	
Audit Outreach							
Primary audit delivery approach:							
Customer contacts IOU				•	•		•
IOU reaches out to customer	•	•	•	•		•	•
Site Visit							
Audit is conducted by:							
account representative	•	•	•	•	•	•	•
consultant			•				
Pitch programs/distribute program literature onsite	•	•	•	•	•	•	•
Information collected with:							
pen/paper	•	•	•	•	•		•
electronic device						•	
photographs			•	•			
Audit Report							
Cover letter				•			
Customer utility bill information used:		•	•	•		•	•
Primary analysis tools used:							
Express Efficiency workpapers	•	•		•	•	•	•
engineering algorithms		•		•	•	•	•
simulation tools and models			•				
Turnaround time for report delivery:							
on the spot	•					•	
within two weeks		•		•	•		•
Audit Recommendations							
Recommendation summary page	•	•	•	•	•	•	•
Information sheet on measures		•	•				
Low/no cost measures vs. capital investments		•		•			
Estimate potential savings in terms of:							
dollars saved (\$)	•	•	•		•	•	
energy saved (% of total)		•		•			
energy saved (kWh of therms)	•	•	•	•	•	•	
Estimate project cost		•	•		•	•	
Payback period	•		•		•	•	
Rebate amount available	•	•				•	
Estimates of non-energy benefits					•		
Ranking of recommendations by ROI							

*Information from a 2004 audit report prepared by KEMA-Xenergy

⁴ While SCE offers an MCD audit to larger customers, there is little specialization, and the level of detail in most large MCD audit reports is comparable with that provided in the smaller Business Solutions audits. Most MCD reports are 1-2 pages in length.

6.3 DISCUSSION OF CURRENT PRACTICES

This section presents the current practices employed in the Statewide Audit program, based on interviews conducted with the program managers. The discussion includes the implications of differences in delivery for programmatic best practices, which are presented in greater detail under the *Section 6.4 Best Practice Conclusions*.

This section includes the following sub-sections:

- On-Site Audit Offerings
- On-Site Audit Outreach
- Site Visit Description
- Audit Report Preparation and Content
- Audit Follow-Up Practices

At the end of each sub-section best practice observations are presented.

6.3.1 On-Site Audit Offerings

On-site audits are acknowledged to be the most accurate, high-quality type of audit available to customers. They also involve more resources, especially in terms of IOU labor, than online, CD-ROM, mail or phone audits.

The IOUs do not drive customers to a particular type of audit. While on-site audits are more expensive, the IOUs do not exclude any customers from participating, including very small customers. As one program manager indicated, “We send someone out to any customer that contacts us and wants a real, in-depth audit.”

Exhibit 6-3 above presents the types of on-site audits being offered by the IOU’s in 2004, including several delivery approaches that are tailored by customer size. While all four IOUs offered on-site audits in 2004, only PG&E and SCE promoted variations tailored to the needs and wants of particular size customers.

Although SCG uses outreach efforts to provide on-site audit services to small customers, SCG’s audits are one-size fits all.

SDG&E typically does a simplified, scaled-down version of its audit— including only lighting and programmable thermostat recommendations—for very small facilities. In 2003, as part of their door-to-door audit effort SDG&E used a one-step, one-sheet audit that allowed some <20kW customers to receive the audit report on the spot. However, they did not offer this Audit in PY2004—the year selected for the best practice assessment. The door-to-door effort stopped in January of 2004 due to the high volume of customer requests for on-site audit appointments. SCE and PG&E conduct different types of audits for smaller and larger customers. SCE large customer audits focus on a specific system instead of an entire customer

facility. PG&E currently offers three distinct on-site audits tailored to small, medium and large customers as described next.

- **PG&E Checklist audit.** About 80% of PG&E's audits are quick assessments for very small and small customers that identify equipment replacement opportunities under the Express Efficiency program. This checklist serves as a tool to recruit customers to the Express Efficiency rebate program.
- **PG&E BEST audit.** The BEST (Business Energy Survey Tool) audit targets small, medium, and some large customers. This audit differentiates itself from the Checklist audit by integrating information on a wider array of energy efficiency opportunities and programs, including demand response (DR), Self-generation and renewable technologies. The report is typically 5-10 pages long and offers more information about equipment replacement opportunities than the small customer Checklist report.
- **Large engineering audits.** PG&E uses both in-house personnel with engineering expertise and professional third-party engineering consultants to provide comprehensive technical audits for over 500kW customers. PG&E does not market these audits, but performs them upon customer request.

The bulk of on-site audits are performed by IOU representatives⁵; only PG&E used contractors in 2004 to perform a portion of the large customer audits. Typically, an IOU representative schedules an appointment with a customer that requests an audit. In addition, the four IOUs cold call customers, especially smaller customers, by going door-to-door⁶.

Best Practice Observations: Customize Audit Product by Customer Size

- It is important to segment the participant population and deliver products that are appropriate, given different customer wants and needs by size. For example, small customers generally need technical background information on energy efficiency measures, while larger customers require solid return on investment data and supporting calculations before making an investment. Also, audits feed customers into the small/medium customer Express and large customer SPC rebate programs; customers have unique needs for each.
- Audits that are tailored to customers depending on their size, or knowledge-based disposition, are more useful to customers than generic, one size fits all audits.
 - Small customers need more information about energy efficient products (what is the technology, how does it work?). One goal might be to provide adequate information regarding a given technology/measure so that customers feel comfortable securing contractor services and are adequately empowered to be successful. Alternatively, the utilities could host an information hotline for customers to call and obtain third-

⁵ Using IOU representatives to perform on-site audits is a significant change in program delivery for SCE; the majority of SCE's 2002 on-site audits were performed by subcontractors rather than in-house utility representatives.

⁶ SDG&E conducted some door-to-door audits in 2003 only.

party corroboration on an installation contractor's proposal. This would be similar to a California State Automobile Association service that provides second opinions on services being recommended by a car mechanic. Prospective services like this would provide greater comfort to customers in making the most appropriate and well-informed energy efficiency decisions.

- Larger customers tend to understand more about energy efficiency measures, but need a solid business case for investing in energy efficiency. In addition, larger sites demand a more comprehensive technical audit because larger facilities use more complex equipment and systems.

6.3.2 On-Site Audit Outreach

Audits happen one of two ways: either the IOU contacts a given customer, or the customer contacts the IOU.

Customer request. Customers sometimes initiate contact with the IOUs by calling to request an audit. In most cases, however, some form of utility marketing helps lead customers' to contact the IOU.

IOU outreach. Utilities reach out to customers in two basic ways: *mass marketing* (i.e. bill stuffers, program brochures and *direct marketing* (cold calls and field representative visits). Audit programs usually begin with marketing, as the IOUs make customers aware of their services.

A large customer often enters the program as a result of direct marketing by an IOU, such as marketing to large customers through contact with representatives assigned to large accounts. For example, recruiting for PG&E's large customer energy audits is through PG&E account managers, who are assigned to larger customers.

IOUs have found that they must make special efforts to reach out to small customers, who rarely ask for audits. These customers are either unaware that the Audit program exists, do not realize its benefits, or lack the time and motivation to act. For example, SCG reaches out to small customers in a variety of ways (i.e. bill inserts, mailers, community events, e-mail) because SCG has found that smaller customers need to be informed of audits. Therefore, SCG contacts smaller customers, whereas large customers usually call SCG for an audit. SCG's program manager estimates that SCG takes the initiative to reach out to complete about 80% of all audits, mostly those provided to smaller customers.

SDG&E also acts proactively to reach HTR customers, but stopped initiating door-to-door audits with <20kW customers in 2004 because adequate program participation already exists.

SCE and PG&E reach out to small customers by cold calling businesses, such as strip malls.

Best Practice Observations: Focus on large customers for energy savings; reach out to small for equity reasons

- Program goals should drive the focus of IOU outreach efforts—a mix of small customers and large customers.

- By focusing the program on comprehensive technical audits for large customers, greater energy savings are achieved.
- To achieve equity objectives, small customer audits are needed, especially door-to-door cold calls that generate one-on-one contact with customers.

6.3.3 Site Visit Description

Audits are conducted by IOU representatives, with few exceptions⁷. All auditors pitch the rebate programs during the walk-through and leave program collateral that is relevant to the customer (i.e. Express, SPC or SCG's Nonresidential Financial Incentive Program (NRFIP))⁸. SDG&E program staff have found that large customers usually have a firm understanding of the programs and what they offer, whereas smaller customers' are not as well informed.

The scope of a walk-through audit and the time involved are different for large and small customers. The technical analysis performed on larger sites is generally more complex and often more comprehensive. For example, a chilled water system requires more sophisticated analysis than a packaged air conditioning unit because it is more complex and more difficult to model.

Each IOU uses standardized forms to collect data from customer facilities. There is a unique set of forms for each type of on-site audit shown in the columns of Exhibit 6-3 above.

Auditors have traditionally relied on pen and paper to collect information for small and medium customers during a walk-through audit. Large customer audits use pen, paper, laptops and/or photographs. Pictures are useful for more complex systems, often found at larger customer sites.

SCG uses pen and paper to provide on-the-spot audit reports for small customers. SCG staff have found that on-the-spot audit reports for small customers are more likely to result in customers' taking the recommended actions. In addition, SCG maintains an inventory of each customer site. SCG's audit protocol calls for the representative to look up the customer's equipment on the computer system, verify old and new equipment during the walk-through, then update the customer record⁹.

SCE is leading the way with wireless audits for small customers. SCE rolled out wireless audits in 2003. Other IOUs are following suit by testing wireless devices. SCE's wireless data collection system has a hardware and software component. SCE auditors use a handheld PDA

⁷ PG&E relies in-part on engineering consultants to conduct audits for large customers, usually 60-100 a year. The walk-through site visit offers the most important time to sell the Express Efficiency and SPC programs.

⁸ However, many on-site audit participants do not recall being informed of Express Efficiency and SPC through the audit. Little more than half of the <100kW PG&E and SCE customers surveyed remember being informed of Express Efficiency and SPC rebates during the audit process. Large customers displayed far better recall of SPC; two-thirds of >500kW customers remembered SPC rebates, compared with a third of medium-sized customers.

⁹ From an energy efficiency perspective, the costs and benefits of maintaining this system have not been independently examined in this evaluation.

with a data line, display and keyboard. The PDA is equipped with customized software that captures a customer's equipment inventory and building characteristics (i.e. square footage). The information is communicated to the host, which analyzes the data and returns an audit report within seconds. The auditor immediately prints the electronic audit file into a personalized color report using a portable InkJet printer. The auditor explains the findings to the customer, talks about Express program, prints a partially completed Express Efficiency application based on the audit, and furnishes a list of service providers (such as lighting vendors) to implement the recommended measures.

SCE has found that wireless audits offer faster turnaround, (reports are printed on-site), increased staff productivity (a single stop at a customer site), and that this results in more Express Efficiency applications. SCE program staff have seen more cross-selling with audit recommendations showing up in Express Efficiency rebate applications¹⁰.

Turnaround time between a site visit and report delivery varies.

- SDG&E delivers audit reports in less than a week after visiting a site.
- SCG audits are completed in 15-30 days.
- SCE and PG&E deliver audits to small customers on the spot.
- PG&E's BEST audits for small and medium customers typically have a 48-hour turnaround.
- Large audits, done by PG&E's engineering consultants, are completed in 2-3 Months. These audits involve monitoring, calibrated modeling and time-intensive analysis and reporting of complex equipment and systems.
- SCE delivers audits to large customers in 10 days.

Best Practice Observations: Deliver on-the-spot Results for Maximum Impact

- For very small customers consider delivery of a direct install program in lieu of on-site audits.
 - Direct install programs are effective because they greatly reduce the hassle-burden for this generally time-constrained and disinterested segment of the nonresidential population. Also, while delivery of energy efficiency to very small customers is less cost-effective than delivery to larger customers, this relatively expensive delivery channel deserves special consideration, given that energy efficiency equity is sought for this "hard-to-reach" customer class. This type of 'turnkey' approach for very small customers has been shown to be effective in third party programs in San Francisco, the East Bay and elsewhere.

¹⁰ The costs and benefits of this system have not been independently examined in this evaluation. Evidence of cross-selling, for example, is based upon program manager self-report. Therefore, further study is recommended in the 2004/2005 evaluation.

- At a minimum, providing a turnkey program alternative that combines Express and Audit services may improve program results for very small customers. These additional services are needed because very small customers have expressed the need for Audit follow up services and have lower measure uptake rates than larger customers. Very small customers also have more limited resources to devote to energy saving projects.
- While on-site audits are available to all customers, the remaining portfolio of “remote” delivery mechanisms offered by the Audit program are considered a more cost-effective product for the very small customer class. On-site audits on their own, without considerable linking to the Express Efficiency program, installation contractors, loans and so forth, is considered a cost-ineffective approach for delivering energy efficiency services to very small customers.
- Capitalize on the walk-through with a one-stop audit report for <100kW customers. The most important opportunity to sell the program is when the auditor is on-site; there is no substitute for one-on-one customer contact. Putting audit results in customers’ hands at the time of the audit, along with rebate program information, is an important opportunity to capitalize upon. The one-stop audit report sequence greatly improves IOU staff productivity and enables the IOU representative to discuss the results and recommendations in light of rebate opportunities to implement those recommendations. The one-stop audit tightens the link between information and the rebate programs, helping to move customers to adopt energy efficient measures¹¹. Since implementing wireless audits, SCE reports growth in cross-selling audit recommendations and Express rebate applications, validating IOU staff claims that on-the-spot audits for small customers help close the deal.
- Provide an Express Efficiency application; partially filled-in is preferable.
- Furnish a list of qualified service providers. While the IOUs have traditionally been reticent to furnish contractor referrals due to deep-pocket liability concerns, SCE is now doing so.

Creating a “one-stop shop,” especially for smaller customers, that combines face-to-face contact with immediate audit results, a rebate application and a list of qualified service providers to implement recommendations, provides the customers with all the necessary elements to make energy efficiency improvements.

6.3.4 Audit Report Preparation and Content

Audits—both the site visit and report—are done by the same person, so the customer typically deals with a single individual. Customers are likely to prefer a single contact throughout the audit delivery process, although an adequate comparison group was not available to quantify and support or dispel this conclusion. A small engineering team often generates reports for

¹¹ The costs of directing customers to the rebate programs should be more carefully studied in future evaluation studies. For example, directing customers to the rebate programs may inadvertently generate free-ridership among a group of customers that would have implemented the measure anyway, in a absence of the rebate program.

PG&E's large customers; those customers may correspond with one or two outside engineers as well as an IOU representative.

Audits usually make use of a customer's utility bill information. One exception is PG&E's Checklist audit for small customers, which involves a door-to-door cold call that results in an on-the-spot audit that is left with the customer.

Most analysis is performed in-house. Auditors collect information on-site and enter the information into customized databases—SQL database or an Excel spreadsheet developed by engineering staff—with specialized tools for calculating savings estimates. However, analysis of PG&E's small customer and large customer audit data proceeds differently. PG&E Checklist audits use Express Efficiency workpapers to immediately calculate savings and rebates *at the customer site*. For large customers, engineering consultants use simulation tools and different models developed internally or by DOE (i.e. MotorMaster, AIRmaster, technical analysis for equipment and systems, building simulations). Even SCE's PDA calculations are transmitted wirelessly to a customized host database and calculation tool.

The audit reports contain economic information on the measure recommendations to help participating customers make appropriate energy efficiency investment decisions, such as cost and savings information on individual measures recommended in the audit. Exhibit 6-3 above shows that bottom line information—project cost and dollars saved—are not provided by every IOU.

One IOU provides non-energy benefits — namely, the amount of pollution that is reduced by implementing energy efficient measures — but this information is presented in a detailed and fairly complex manner and, although no data are available to support or reject this assertion, is probably only useful to a small fraction of participants. If this type of information is needed for regulatory purposes or to support certain projects that are designed to reduce pollution as well as save energy, then we recommend that the information be provided in a format that is as useful, accessible and simple as possible.

Audits typically summarize recommendations in a summary page or table. A summary table allows a reader to get key information in a quick glance. An example of a good summary table is presented in Exhibit 6-4 below.

Exhibit 6-4
Audit Report Summary Tables
Best Practice Example 1

Customer Energy Usage and Cost Summary		
Energy Use Component	Total Annual	Potential Savings (%)
Electric Usage	4,755,756 kWh	7%
Maximum Peak Demand	1,051 kW	5%
Electrical Usage Cost	\$666,000	9%
Natural Gas Usage	14,213 Therms	15%
Natural Gas Usage Cost	\$12,886	15%

Combined Estimated Savings of all Measures					
kWh Savings	kW Savings	Therm Savings	Cost Savings	Measure Cost	Incentives
346,300	50	2,200	\$59,600	\$13,700	\$4,000

However, IOU reports do not always place this summary information at the front of the report. It is recommended that a high-level summary table be placed at the front of the audit report.

Only PG&E offers an informational page on each measure that describes the technology.¹² Information programs are designed to educate customers, and information is especially important for small businesses, that are less aware of energy-saving technologies than larger customers.

Some IOUs distinguish between low/no cost measures and energy efficiency investments in their reports, a distinction that is useful for customers to quickly spot inexpensive measures that they could more easily implement.

Best Practice Observations: Technical Report for Large Customers, Quick Turnaround for Small

- Larger customers value comprehensive technical reports.
- Less specialized, prescriptive reports that readily link to Express Efficiency measures are most appropriate for smaller customers.

¹² Other utilities include marketing collateral to audit participants, which may serve the same purpose.

Best Practice Observations: Offer Information that Customers Need

- Audit reports should provide small customers with savings in terms of dollars and energy as well as project cost. Program managers contend that the most important items in an audit report depend on the size of the customer. As one program manager explained, small customers are most interested in how much they will save—in dollars (“How much lower will my bill be if I do this?”). According to that program manager, when an IOU shows a customer how much energy they can save, the small customer often responds by asking: “What’s it going to cost me?”
- Reports to medium-sized customers should include the payback period for measures, dollar savings, energy savings and project cost. Program managers indicated that medium-sized customers are interested in measure payback as well as savings. One program manager noted a retrofit project must be within a customer’s budget and the investment must be paid back within two years.

Best Practice Observations: Present Clear Information to Customers

- The audience is important. Chief engineers and maintenance people are practical, hands-on people. To get a favorable response from this audience, reports should:
 - Be concise. Minimize verbage. Use bullets, not paragraphs.
 - Include tables.
- Provide recommendations that are easy to understand and implement.
- Give savings numbers, not just percentages. Percentages alone do not mean much to the customer (who may ask, “10% of what?”). Report \$1000-2000 and possibly 10-20% savings.
- Quantify cost savings estimates in tens or hundreds. Quantifying savings to the penny cannot be justified and the report loses credibility in the customer’s eyes.
- Present a clean, readable summary table on the first page of the report that lists measures, their associated savings (in dollars and kWh and/ortherms), payback, and project cost.

6.3.5 Audit Follow-Up Practices

All the IOUs follow-up with customers that receive audits, either in person or by telephone.

Follow-up is not a protocol requirement at SCG, but account executives do have therm-savings goals. Thus, it is in the account executives' interest to promote the programs so they meet their personal goals. Typicall they call or visit interested customers two weeks after the audit, provide them with a rebate application and work through the process. SCG does not track its follow-up efforts or conduct a follow-up interview using a script.

SDG&E's small customer audit is a turnkey effort by a single person who goes on-site, creates a report, mails it, and places a follow-up phone call. SDG&E does follow-up with large customers face-to-face, returning to the site to meet with engineering staff, those in charge of finances and other interested parties. The SDG&E program manager reports that face-to-face contact works very well, allowing the account executive to read customers value judgments and answer their questions.

PG&E followed up with all large customers and about half of its medium-sized customers that received audits in 2004. Account representatives follow-up with small customers at their discretion. The program manager noted that PG&E account representatives are motivated to follow an audit lead, because their performance plans have savings goals under Express as well as a certain number of audits. Follow-up is also conducted by PG&E's Business Call Center with a script.

Tracking data indicates that SCE follows up with nearly 80% of large customers. A telephone script is used to measure customer recall of the audit, whether or not the customers recalls receiving a report, whether or not the customer found the report to be useful, customer satisfaction with the audit and report, and the likelihood of customers' to take action. Small SCE customers are also re-contacted by telephone using a similar script. Follow-up is not usually initiated by the representative responsible for a given audit.

Best Practice Observations: Focus on Following up with Large Customers

Representatives should always follow up with large customers, who represent more potential savings than small customers. Small customer follow-up, on the other hand, while important to drive energy efficient adoptions, could be delegated to a call center, as these customers do not offer as much potential savings. While data analysis and statistics are not available to back these recommendations completely, the approach discussed is sensible.

Best Practice Observations: Motivate Account Representatives to Follow-Up using Job Performance Incentives

Job performance incentives are being used to encourage representatives to follow-up with customers. Individual performance milestones can be tied to energy savings, volume of audits, or Express applications. If milestones emphasize energy savings, representatives will spend time with large and/or medium customers, neglecting smaller customers. If milestones focus on completed audits and Express applications, representatives will direct their attention to small customers.

6.4 BEST PRACTICE CONCLUSIONS

This section presents best practices in nonresidential audits, beginning with setting IOU goals, targeting small customers and the elements of a good audit report. These best practices are designed to encourage the delivery of energy information audits that maximize the energy savings achieved and downstream benefits realized by society.

Setting Goals

Program goals should be set to motivate HTR audits, enhance follow-up, and to generate kWh savings. Goals can be modified to enhance program delivery to achieve a variety of objectives. More specifically, goals based on numbers of audits, or more directly, number of HTR audits, will draw attention to small and very small customers. Goals based on kWh and therm savings will turn the focus to larger customers. Utility representatives performance incentives should mirror the objectives being set through corporate goals. For example, if performance incentives for IOU representatives are based on completing a certain number of Express Efficiency and SPC applications, then this serves to motivate post-audit follow-up activities with participating Audit customers..

Reaching Smaller Customers

Reaching smaller businesses is a challenge, for they rarely ask for audits—they are either unaware that the Audit program exists, don't realize its benefits or don't have the time or inclination to participate. How can utilities reach out to HTR customers in a way that is both cost-effective and generates savings?

- **Market the Audit program to previous years' Express Efficiency participants.** Express Efficiency participants have already expressed an interest in energy efficiency, as well as willingness to respond to IOU program offerings. Thus, these customers may be more receptive to Audit marketing materials, as well as the resulting Audit recommendations. Recommended outreach to Express Efficiency participants includes a telephone call and direct marketing package that addresses the audit program and provides energy efficiency information in the form of several technology one-pagers (or technical briefs). For very small customers, no such follow-up is recommended, as it is not cost-effective to carry-out direct marketing to very small customers, especially given that those customers must then still act. Overall, a direct install program is a preferable no-hassle vehicle to bringing energy efficiency to the under 20 kW market.
 - Direct install programs are effective because they greatly reduce the hassle-burden for this generally time-constrained and disinterested segment of the nonresidential population. Also, while delivery of energy efficiency to very small customers is less cost-effective than delivery to larger customers, this relatively expensive delivery channel deserves special consideration, given that energy efficiency equity is sought for this "hard-to-reach" customer class. This type of 'turnkey' approach for very small customers has been shown to be effective in third party programs in San Francisco, the East Bay and elsewhere.
 - At a minimum, providing a turnkey program alternative that combines Express Efficiency and Audit services may improve program results for very small customers. These additional services are needed because very small customers have

expressed the need for Audit follow up services and have lower measure uptake rates than larger customers. Very small customers also have more limited resources to devote to energy saving projects.

- **Wireless audits maximize efficacy of cold calling to small customers.** In an effort to address the above concerns the IOUs should continue to experiment with wireless audit delivery to very small and small customers. Wireless audits offer a promising strategy for cost-effectively converting disinterested small customers into interested participants because (1) wireless improves IOU staff productivity, making it possible for staff to cover more territory, (2) wireless enables the IOU representative to spend more face time with the customer instead of crunching numbers off site, (3) wireless offers results instantly, giving the customer all the information needed to make a decision on the spot. According to the SCE program manager, wireless audits have helped SCE representatives convert audits to Express Efficiency participation. The 2004/05 evaluations should seek to validate these cross-program claims.

Key Parts of an Audit Report

The basics of a good audit report are: 1) a summary table (as discussed above), 2) a summary of measure recommendations and 3) a customer size-appropriate description of each recommended measure. Each of these three best practice items are discussed in greater detail below.

(1) Summary Table:

A table, such as the example presented above (Exhibit 6-4) summarizes energy savings (in terms of kWh, kW, therms), cost savings (in dollars), cost of the measures, and financial incentives.

(2) *Summary of Measures:*

A table that itemizes recommendations (unlike the aggregate summary table that shows overall savings and cost in Exhibit 6-4) offers information that allows customers to assess the cost and benefits of adopting a particular measure. Exhibit 6-5 below is an example of such a table.

- A clear demonstration of cost, savings and ROI (payback) is most important for larger customers. Ideally, the table ranks measures accordingly.
- For small customers, the table should rank recommendations by project cost because small customer decisions to adopt energy efficiency measures are more likely to be driven by out-of-pocket (bottom line) project costs.

Exhibit 6-5
Summary of Energy Efficiency Measures

Recommended Audit Measures							
This section contains descriptions of the opportunities evaluated by IOU during this detailed investigation phase. A summary of the measures investigated is presented in the following table, followed by a brief description of each recommendation.							
Energy Efficiency Measure Number	Measure Description	Demand Savings (kW)	Energy Savings (kWh)	Gas Savings (therms)	Cost Savings (\$/yr)	Implementation Cost (\$)	Pay Back (Years)
1	M1-Refrigeration Room Exhaust Fan Control	2.0	18,600	-	\$26	\$2,000	0.8 yr
2	M2-Rooftop Bathroom Exhaust Fans, East and	2.0	15,000	-	\$21	\$100	0.1 yr
3	M3-Sixth Floor Local Exhaust Fan	0.3	\$2,300	-	\$3	\$100	0.3yr
...							
11	Change condenser water supply temperature	10.0	14,500	-	\$2,000	\$100	0.1 yr
TOTAL		130.0	346,300	2,200	\$59,600	\$13,700	0.3 yr

(3) Description of Recommendation:

A description of each recommendation briefly tells customers what the recommendation is about in a single page or less.

Small customers. The report should provide small customers with an educational one-pager, because they tend to be less knowledgeable about energy-using equipment and energy efficiency opportunities than their larger counterparts. Exhibit 6-6 offers an example of an informational piece describing T8 lamps and electronic ballasts, a frequently recommended measure. This sort of generic information is unnecessary for larger customers, for example, who are usually familiar with T8s.

*Exhibit 6-6
Description of Recommendation – Small Customers*

BEST
Business Energy Survey Tool


**Save with lighting:
T8 lamps and electronic ballasts**

Savings and Payback

T8 lamps and electronic ballasts typically create 20-25% savings with a 2-3 year payback.

PG&E recommends that you replace your existing fluorescent lamps and ballasts with T8 premium lamps and electronic ballasts.

Tubular fluorescents are the workhorses of commercial lighting. T12 lamps (with a diameter of 12/8ths, or 1.5 inches) have been used since the 1920s. More efficient T8 lamps (with a diameter of 8/8ths inch) and electronic ballasts were introduced in the 1980s. T8 systems can be installed in old fixtures, which makes this upgrade highly cost effective. T8 lamps and electronic ballasts typically pay for themselves in utility bill savings within three years, by reducing energy use by 20-25%. Manufacturers have recently developed premium (800-series) lamps that have 20% longer life and better color rendition.



Here's what you save:

Number of Fixt(s)	12
Fixture Type(s)	Multiple
Hours Per Year	1,720
ANNUAL SAVINGS	
kWh	902
kW	0.56
Dollars	\$138.91
Potential Rebate	\$180.00

PG&E offers rebates for these retrofit options, so contact the Business Customer Center at (800)468-4743 for more information.

6

Large customers. Large customers find more value in more customized information (i.e. specific to the application in the customer’s building). Exhibit 6-7 is a good example of a report that briefly describes useful findings and resulting recommendations from a walk-through.

Exhibit 6-7
Description of Recommendation – Large Customers

2.2.6 M6 – Schedule Relief Fans on Floors 1 thru 6 for Proper Operating Hours

SUMMARY OF RESULTS

System:	HVAC
Subsystem:	Relief fans
Energy Usage Savings	= 23,700 kWh/yr
Energy Usage Penalty	= 0 Therms
Total Cost Savings	= \$ 3,300 /yr
Implementation Cost	= \$ 500
Simple Payback	= 0.2 Yr

DESCRIPTION OF FINDINGS

The floors each have 2 relief fans that appear to operate twenty-four hours seven days a week based on measurements from the first, second, and third floor. Exhibit 2.4 shows the location of relief fans from the loading dock. The first floor has only one fan. A fan on the sixth floor was included in another measure so they were not included in this savings calculation.




Exhibit 2.4: Relief Fans Opening

RECOMMENDATIONS

Adjust fan schedule for proper operation during occupancy only.

Additional savings can be realized by operating these fans in conjunction with the building outside air fans located on the roof.

This measure will also contribute to savings in energy from the unnecessary exhaust of preconditioned air both heated and cooled.

Areas for Future Study

It should be noted that many of the best practices presented in this section are preliminary findings. While results are based on 1) extensive experience surrounding California’s nonresidential programs and the markets in which these programs operate and 2) opinions expressed by the Audit program managers and their rationale for directions the programs have taken and are currently taking, the findings presented and opinions expressed are preliminary. For this reason it is recommended that future evaluation efforts further corroborate these findings by developing quantitative evidence that either supports or rejects the findings and recommendations developed in this chapter.

This concludes the Best Practices chapter and the 2003 non-residential audit program evaluation report. Detailed result tables and relevant study documentation follows in the appendices.