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2004-2005 Statewide Nonresidential Standard Performance Contract Program Measurement and Evaluation Study

Impact, Process and Market Evaluation – Final Report

04-05 Program ID#s 1121, 1177, 1240, 1347, 1507

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Executive Summary

In this report, we present results from the impact, process and market evaluation activities conducted for California's Nonresidential Standard Performance Contract Program (SPC) for program years 2004 and 2005 (PY2004-2005). The PY2004-2005 evaluation scope includes process, market, and impact evaluation components, all three of which are addressed in this report.

The impact evaluation results address verification findings, ex-post energy savings estimates, gross savings realization rates,[1] and the net-of-free-ridership ratio (NTFR). This evaluation was more comprehensive than in PY2002-2003, due primarily to a larger budget for the gross impact savings analysis.

A summary of customer and energy-efficiency service provider participant experiences with the PY2004-2005 SPC program is also provided. In addition, findings related to energy efficiency behaviors and program awareness is presented for the general population of nonparticipating customers.

Historically, the SPC has fulfilled a critically important role in the portfolio of nonresidential energy-efficiency programs by supporting complex and comprehensive energy-efficiency projects that offer large, and often very cost-effective, energy savings and peak demand reductions from projects that would otherwise not be captured through prescriptive approaches. The Program has gone through several very significant changes since its inception in 1998, particularly with respect to measurement and application requirements. These changes have been made in response to evaluation findings, program administrators' self-assessment of market needs, and changes in CPUC energy efficiency policy goals. Significant strides have been made to streamline the application process, standardize calculation methodologies, and simplify the review process.

In this report, we suggest several ways that energy savings estimates in this program might be further improved. Most of these changes should be relatively easy to address and are

[1] Realization rates are developed for each site and the program as a whole and are defined as the ratio of program ex-post savings estimated by the evaluation team divided by the ex ante savings.

aimed at increasing the certainty of the program's resource value without unduly increasing the burden of participating in the program. Recommendations in this report related to pre- and post-measurement of savings must be considered within the context of the current program and the diminished use of the measured savings path currently. This report also offers an extensive set of recommendations for reducing free ridership, most of which were made in previous evaluations and are still relevant. For further perspective, readers may also be interested in *Volume NR5 – Large Comprehensive Nonresidential Programs* of the *National Energy Efficiency Best Practices Study*, in which the features of the California SPC program are compared to programs targeted at similar markets around the country (Quantum, 2005).

ES.1 Summary of Gross Realization Rate and Net-of-Free Ridership Results

The impact evaluation results are based on a sample of 114 projects (representing 17.7% of all ex ante savings) out of a 2004-2005 SPC program population of 2,642 unique applications. A site-specific engineering approach was utilized that included measurement and in-depth engineering analyses. The key steps involved in developing the overall savings estimate for the program were to independently verify reported measure installation records, develop ex-post estimates of the energy savings for each project in the sample, and statistically apply those findings to the full participant population.

The overall weighted program gross and net realization rates (weighted by energy savings) and the associated confidence intervals are shown in Table ES-1. The overall weighted gross impact realization rate for Source Btu is 0.79 with a 90 percent confidence interval of 0.69 to 0.89.[2]

[2] This value includes the effect of misreporting of early retirement savings in the utilities' tracking systems as lifetime savings instead of single-year savings. The effect of this misreporting was reduced somewhat due to corrections made by some utilities to these values in their EEGA filings. That is, for those cases in which corrections were made in EEGA, we corrected the tracking database extracts using the EEGA values, and carried the corrected data in our analysis. We emphasize, however, that correction in EEGA, without correction in the tracking data used as the basis for this evaluation, was suboptimal and added considerably to the time necessary to complete the study. The delay occurred because the IOUs did not bring the inconsistency to the evaluation team and Energy Division's attention until after submission of the draft report for this evaluation. Even though the utilities made an effort to replace lifetime savings with first year savings in their EEGA filings, these corrections did not address all misreported impacts for early retirement projects. The effects of those sampled cases that were not previously corrected in EEGA remain a part of the final realization rate for this evaluation.

Net-of-Free Ridership (NTFR) ratios are also shown in Table ES-1. The CPUC's adopted ex-ante value for the 2002 through 2005 SPC programs included upward adjustments for potential Self-Report bias (+0.10) and Participant Spillover (+0.05). The value adopted in the policy manual was based on a multi-year analysis (for PY1998 through PY2001) that took into account limitations in the free ridership method utilized and other factors such as participant spillover. In accordance with CPUC policy for the PY2004-2005 evaluations, these upward adjustments for Self-Report bias (+0.10) and Participant Spillover (+0.05) are to be excluded, therefore, the weighted value for the net-of-free ridership ratio for PY2004-2005 is 0.57. For these reasons, this value is 0.13 less than the ex-ante value of 0.70 adopted by the CPUC in 2002 for this program category.

Table ES-1: Overall Program Gross Impact Realization and Net-of-Free Ridership Rates

Gross Impact Realization Rate	0.79
90 Percent Confidence Interval	0.69 to 0.89
Net-of-Free Ridership Rate	0.57
90 Percent Confidence Interval	0.52 to 0.63
For Comparison Only: 2004-2005 CPUC Ex-Ante NTG Ratio Including Adjustments for Self-Report Bias and Participant Spillover (NTFR + 0.15)	0.70

ES.2 Verified Gross and Net Realization Rates by Utility

Table ES-2 below summarizes the final verified program savings. The program-claimed NTGR were obtained from the E3 calculators posted on the EEGA web site in December 2005-January 2006. All other values are evaluation-based.

Table ES-2: Verified Gross and Net Realization Rates by Utility

	Net Electric Savings†		Net Gas Savings†	Total Net Energy Savings
Utility	kWh/year	Avg. peak kW	Therms/year	Millions Btu/year*
PG&E				
Verified Results (Net)	150,371,281	16,694	7,639,157	2,303,567
Evaluation Gross Realization Rate	82%	64%	82%	82%
Claimed NTGR[x]	74%	77%	72%	74%
Evaluation NTFR	67%	65%	67%	67%
Evaluation Net Realization Rate‡	56%	42%	50%	54%
SCE				
Verified Results (Net)	182,514,253	24,267	-	1,868,763
Evaluation Gross Realization Rate	77%	79%	-	77%
Claimed NTGR[x]	70%	70%	-	70%
Evaluation NTFR	51%	51%	-	51%
Evaluation Net Realization Rate‡	39%	37%	-	39%
SDG&E				
Verified Results (Net)	16,735,567	2,423	571,096	228,465
Evaluation Gross Realization Rate	94%	111%	94%	94%
Claimed NTGR[x]	70%	70%	70%	70%
Evaluation NTFR	43%	50%	43%	43%
Evaluation Net Realization Rate‡	37%	57%	50%	40%
TOTAL PROGRAM				
Verified Results (Net)	349,621,102	43,384	8,210,253	4,400,796
Evaluation Gross Realization Rate	79%	74%	79%	79%
Claimed NTGR[x]	71%	72%	74%	72%
Evaluation NTFR	57%	56%	57%	57%
Evaluation Net Realization Rate‡	45%	40%	50%	46%

* Conversion rates obtained from *2001 Energy Efficiency Standards for Residential and Non-residential Buildings*, California Energy Commission, June 2001:
1 kWh = 10,239 Btu source energy
1 therm = 100,000 Btu source energy

[x] E3 Report Date December 2005-January 2006.

† Actuals and commitments for all three IOUs based on tracking data extracts dated December 2007-January 2008.
Comittments represent 0% of impacts for PG&E, 11% for SCE and 17% for SDG&E, for a total of 7% of program impacts.

‡ Not equal to the product of RR and NTFR due to the compounding effect of applying strata-specific RR and NTFR to the population.

As the table shows, evaluated gross realization rates of source energy range from 77% to 94%, depending on the utility. (An evaluated gross realization rate of 100% would indicate evaluated gross savings which are identical to claimed gross savings.) Another finding is that there are fairly significant differences between claimed and evaluated NTGRs. The primary source of this difference is the exclusion of the +0.15 adjustment in the Evaluation NTGR in accordance with CPUC policy for PY2004-2005.

ES.3 Summary of Qualitative Impact-Related Findings

In developing the ex-post savings estimates, a significant effort was put into reviewing the SPC application files with respect to project documentation and the technical review

conducted by the program administrators and their support contractors. In Section 8, we provide a discussion of the issues developed from our review. These issues are briefly summarized below:

- **Wide Range in the Quality of Applications and Supporting Documentation**. There continues to be a wide range of quality and/or completeness in the submitted calculations and documentation supporting the energy and demand savings. Some applications reflect very high quality submittals, while others have inadequate documentation of savings estimates.

- **Unverified and Undocumented Assumptions Used as Inputs for the Savings Calculations for Many Applications.** As in PY2002-2003, we found a number of cases where the assumptions for the program calculations were unverified and undocumented.

- **Rigidity of Assumptions in SPC Calculator.** We also found that frequently, energy savings calculations based on the SPC calculator are less reliable than customized calculations. This is largely due to the rigidity of the inputs. This rigidity yields incorrect ex-ante savings estimates in cases where data on actual operating conditions is available. Note that the SPC calculator was neither recommended nor required, but is convenient for applicants and thus, has been frequently used.

- **Lack of Pre- and Post-Retrofit Monitoring.** Workpapers indicate that post-retrofit monitoring is done for only a small fraction of projects. Of the 114 sites that were evaluated in PY2004-2005, post retrofit system monitoring was conducted at only three sites. One utility had no M&V sites in the sample. It may be appropriate to consider requiring M&V for a minimum percentage of applicants undertaking certain types of projects, particularly those that are large or complex.

- **Wide range in the Quality of Application Reviews.** In general, the comprehensiveness of application reviews by program administrators and their proxies varied widely. Some of the applications had very thorough reviews, including documented inquiries to the project sponsor requesting supporting information. However, it appeared that many of the applications intentionally received only a cursory review and post installation inspection was very limited and inconclusive.

- **Tracking System Data Entry Quality is Inconsistent.** The review of paperwork pertaining to the 114 on-site projects revealed that the tracking databases do not always contain the correct information about savings. For example, for early retirement measures, the tracking system should have reflected first-year savings, but for several projects, measure life savings from the SPC calculator was entered instead. The utilities did make an effort to replace lifetime savings with first year savings in their EEGA filings. However, these corrections did not address all misreported impacts for early retirement projects. In addition, EEGA-only corrections, as compared to correcting both the tracking data and EEGA, are

suboptimal as they create inconsistencies and leave unfixed the population databases that are used to draw and extrapolate evaluation samples. Another example is that net savings estimates for projects were entered erroneously instead of gross savings. We also found examples where efforts to standardize measure information led to errors in the claimed NTGRs.

ES.4 Summary of PY20004-2005 Participant and Nonparticipant Survey Findings

ES.4.1 Customer Participant Findings

In general, PY2004-2005 customer participants interviewed reported that they were highly satisfied with the program and gave it very positive overall satisfaction ratings. Over three-fourths of respondents reported being very satisfied with the program. As would be expected, by far the most common strength mentioned was the direct financial value of the incentives. The SPC program's ease of applying and qualifying was next most frequently mentioned, which testifies to the efforts made to streamline the application and M&V processes over the nine-year history of the program. Complaints about the SPC program's weaknesses have escalated since 2003. Despite the high overall level of satisfaction with the program, over half of PY2004-2005 participants offered various complaints about the program, compared to only 20 percent in 2003. The most common area of complaints concerns administrative hassles associated with participating. Other complaints mentioned were various timing-related problems (8 percent of respondents), and incentive policies or practices (5 percent of respondents). Concerns over the program's M&V requirements, a major problem area in 2003, were only expressed by 4 percent of respondents. This illustrates the streamlining and process improvement of the program and the move away from the M&V approach towards the calculated approach that have taken place, all of which have occurred to satisfy customer needs.

Most customers also reported a very good experience with program and support staff as well as with third-party energy service firms. Nearly three-quarters of PY2004-2005 respondents rated their experience with the program staff as "Excellent," up from 64 percent in 2003. Many respondents provided additional positive comments characterizing their SPC contact as helpful, informative, professional, knowledgeable, responsive, timely, or efficient. Almost 15 percent specifically praised their assigned account representative. Of the 51 percent of respondents that interacted with the SPC program's technical support contractors, 93 percent rated their experience with the technical contractors as "Excellent" or "Good". Nearly three-fourths of respondents reported the various tools offered through the program (the savings calculator and the program website) to be at least somewhat helpful. Customers also found the services of third-party firms to be valuable. Nearly 70% of those who used EESP

sponsors rated their contribution as either very or somewhat significant in their decision to implement their SPC projects. Third-party firms also play a significant role in self-sponsored projects, i.e., those that do not involve an Energy Efficiency Service Provider. Of those projects which are self-sponsored, nearly three fourths involve third-party contractors and their contributions are perceived to be valuable.

Findings also indicate that, utility representatives are by far the customers' main source of initial information about the SPC program. Nearly 90 percent of respondents also said that the financial incentives were influential in their decision to implement projects. The PY2004-2005 SPC program participation experiences also have a strong influence on participants' plans to implement any additional energy efficiency measures elsewhere in their facility in the future, with nearly three-fourths of respondents expressing their intent to do so.

ES.4.2 Energy Efficiency Service Provider (EESP) Participant Findings

On balance, EESPs view the 2004-2005 SPC program very positively. The SPC program overall, the performance of the utilities, and, to a lesser extent, the performance of the engineering contractors, all received generally favorable ratings from EESPs. The focus of dissatisfaction tends to be program paperwork for the program overall, the difficulty of communicating with program staff for the utilities, and the perception that third-party reviews held up projects for the engineering contractors. EESPs strongly favor the calculated savings approach as being easier to use, involving less uncertainty, and more effectively using program resources. It is because of this that very few projects used the full M&V approach to estimating savings.

The performance of both utilities and their contractors, though satisfactory overall, was perceived to be uneven by participating EESPs, with several respondents reporting difficulty in working with individual utilities or contractors. There is somewhat of a dichotomy between how EESPs see the utilities and their technical consultants, who are perceived by some EESPs as obstacles to project completion. Nevertheless, more than 60% of respondents who had direct contact with the technical reviewers rated their experience with these contractors as good or excellent.

More than half (55%) of EESP respondents said the 2004-2005 SPC program had been very important to their business, and only 11% said it was not very important. Most EESPs said that the SPC program enabled them to incorporate the program incentives into their marketing approach, while those who said it was less important typically said they sold the project independent of any SPC incentive. When asked if they had any recommendations on how the SPC program could be modified to capture additional energy savings (without paying more for measures that would be installed anyway), a few EESP respondents were

able to offer specific examples of technologies with somewhat longer paybacks that could have been given higher incentive levels by the program. Several EESPs noted that caps on SPC project funding kept customers from adding more measures with somewhat longer paybacks, while others said the caps on lighting projects also had the effect of limiting the installation of other cost-effective measures. None of the EESPs expressed concerns the availability of incentive funds. This was a marked contrast to 2003, where such concerns were more commonly expressed because of limited funding.

ES.4.3 Customer Nonparticipant Findings

Interviews were also conducted with a representative sample of 357 large (> 500 kW) nonparticipating nonresidential firms in California. The primary objective was to obtain updated baseline information on topics relating to a variety of establishment and energy efficiency characteristics, behaviors and attitudes.

Energy Conservation[3] Actions. Results indicate that an overwhelming majority of firms are taking energy conservation actions on their own (i.e., outside of any utility or third-party programs). Over three fourths of respondents said that they are taking energy conservation actions to reduce overall energy use. For the most part, these are low-cost or no-cost tactics. Over half of respondents have always tried to conserve energy in these ways, while one-fifth started these actions within the past one to two years. Respondents in 2004-2005 estimate they are saving, on average, 7 percent of their annual energy requirements by taking these conservation actions. Respondents also believe they saved more energy in the past 12 months due to their conservation efforts, than in previous years. The vast majority of firms are motivated by the desire to reduce their energy bill. Nearly three-fourths of respondents said that they had taken or would be willing to take additional actions during power alert days, again due to a desire to reduce energy bills.

Greenhouse Gas Mitigation Policies and Procedures. One fourth of firms are currently subject to rules or policies that seek reduction in greenhouse gas emissions. Half of those surveyed indicated they have a greater interest in energy efficiency investments as a result of concerns over current or prospective greenhouse gas emissions rules or policies. Over one-fourth of respondents said that they are already planning more investments in energy efficiency as a result of these issues.

[3] Energy Conservation is defined as behavioral actions to reduce energy use. Such actions may, at times, reduce energy service (e.g., illumination levels, indoor temperatures); whereas, by contrast, efficiency actions are defined as technologies or practices that reduce energy use with no reduction in energy service levels.

Use of Non-Utility Electricity Suppliers. Just over one-third of firms continue to purchase from non-utility electricity purchases, a decrease from 2002. As was the case when such purchases were grandfathered, the largest users are the most likely to make such purchases.

Energy Efficiency[4] Actions. Over three-fourths of firms reported that they have taken actions to improve energy efficiency or conservation in the past year (i.e., June 2006 through May 2007), mainly by installing new equipment to replace older, inefficient equipment. The most common actions taken are installing efficient lighting, efficient motors or variable speed drives, and efficient HVAC/refrigeration equipment. Among those who have not done anything, the main reasons cited for inaction are related to competition for capital to finance these investments.

Organization's Energy Efficiency Policies. Almost 40 percent of firms have formalized specification policies for the selection of energy efficiency equipment. In some cases, these policies are tied to specific types of equipment (e.g., mandated installation of high performance T-8 fluorescent lighting, where applicable) while in other instances, there are more general requirements to consider the level of energy efficiency when making purchasing decisions.

Investment Criteria for Energy Efficiency Projects. Almost half of the firms interviewed use payback periods as their primary economic criterion for energy efficiency investments. Payback period requirements have relaxed somewhat since 2002. The mean payback period reported is 4.1 years.

Concerns Regarding Energy-Efficiency Improvements. Concerns about the trustworthiness of the energy efficiency service provider remain the most significant barrier for all firms, regardless of their size. Respondents rated their uncertainty of trustworthiness of the energy efficiency service provider as a 7.0 on a 0-to-10 point scale. The largest firms also expressed significant, uncertainty about equipment performance and achieved energy savings.

Efficiency Program Awareness and Participation. Nonparticipants' awareness of utility energy efficiency programs is fairly high; over two-thirds of firms are familiar with these programs, while less than one-third are not. Also, there is broad participation by SPC nonparticipants in utility-funded programs and related activities.

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[4] Energy Efficiency involves taking action to reduce the level of energy inputs required to maintain a given level of energy service, typically by replacing older, inefficient equipment with new, energy-efficient equipment, or adding measures such as controls or insulation to reduce the usage of existing equipment.

Demand Response Program Participation. About one-fifth of firms have participated in some type of demand response effort. Note that only about half of those who said they participated in a demand response program were able to clearly articulate a specific program or tariff by name (program names were not prompted), with the vast majority citing a generic "interruptible" tariff or program.

Familiarity With and Use of Energy Performance Contracting (EPC). Just over half of firms are either very or somewhat familiar with EPC. Only one-fifth of the respondents had received an offer from a performance contracting firm within the past year. This suggests that the level of private sector EPC marketing has been decreasing during the past few years.

ES.5 Summary of Recommendations

As a result of the PY2004-2005 findings and realization rate and net-of-free-ridership analyses, a set of recommendations were developed in the *PY2004-2005 SPC Impact Evaluation* report aimed at helping to improve the resource reliability of the program, while trying to remain sensitive to the need to keep the program implementation process from becoming overly complex or difficult (as was the concern in the early years of the program). The most important recommendations are repeated here and discussed in detail in Chapter 9 of the report.

- **Consider Increases in the Level of Technical Documentation Required for All Projects, especially the Largest, Most Complex Projects.** There is a balance between keeping the application process and forms from being overly complex and costly to navigate, while at the same time providing adequate levels of documentation for verification and savings analyses. The early SPC program year evaluations recommended simple forms and processes. However, application documentation should not be over-simplified given the complexity of measures and range of site-specific characteristics in this program. As noted in Chapter 8, better documentation is needed regarding pre-installation or pre-retrofit operating conditions. In particular, large complex projects should be required to submit a greater level of site-specific application data than smaller

- **Increase Pre- and Post-Installation Inspection Thoroughness.** During the pre-installation phases, information regarding model and serial numbers, hours of usage, EMS trend reports and records, submetered data, and other important parameters (ballast models, lumen levels, etc.) should be collected; particularly for medium and larger applications. Post-installation inspections should capture the same type of information. Energy estimates based upon a snapshot spot reading or even two week trending are not as accurate as those based on longer or multiple monitoring periods. Pre Installation data may not be available in later periods and is emphasized. We recognize that all of these actions may not always be cost effective for smaller

applications. We address this issue in a separate recommendation below regarding further integration of sample-based evaluation and program implementation.

- **Increase Pre-Installation Measurement for Very Large Projects with Highly Uncertain Baseline Conditions.** Savings cannot be reliably estimated for many types of projects on purely an ex-post basis, due to the number of variables that need to be quantified. Pre-installation measurements can significantly improve savings estimates for projects such as complex compressed air and industrial process retrofits. The program includes pre-installation inspection for all projects but only very limited amounts of pre-installation measurement. Consideration should be given to increasing the amount of pre-installation measurement for large, complex measures that cannot otherwise be reliably quantified with only ex-post data.

- **Further Standardize the Review Approach and Documentation Requirements for Recurring Complex Projects.** The utilities have made efforts to standardize savings estimates for measures addressed by the SPC calculator and provide guidance for complex measures such as compressed air, large refrigeration projects, etc. However, it appears that additional effort may be needed to increase the consistency of analyses required of applicants and carried out by program reviewers for these types of projects. This would include a more detailed and rigorous requirement for the supporting documentation and certain types of measurement (which could be carried out through the program evaluation function, if well coordinated). The main emphasis should not be on creating rigid tools but on creating guidelines that mandate minimum requirements.

- **Consider Providing or Requiring More Technical Support for Applicants for Complex Projects**. It may be beneficial to offer or require technical consultant assistance to participants to prepare the required documentation for complex projects, particularly for initial submittals that do not meet the level of increased requirements recommended above.

- **Improve Access to All Application Information.** The CPUC should require that the utilities and SPC Program administrators make all application information available to the evaluation team. This may, in some cases, involve review of project documents at the program administrator's offices. Program administrators should plan ahead for such evaluator review. The administrators should make increased efforts to provide the information quickly to the evaluators, and to forward any new information received for specific applications.

  It may be possible and desirable for the administrators to digitize or otherwise develop multiple copies of application files and supporting documents throughout the implementation process (e.g., including blueprints and other bulky documentation where applicable). This may apply to the entire application or only to technical documentation with the ex ante savings claims and their calculation process. That is, program administrators should not wait for evaluators' request to prepare copies of

such materials but should maintain such copies on all projects routinely, perhaps targeting the largest projects which have the highest savings contributions.

- **Improve Reviewer Documentation**. Require that reviewer calculations, which document the approved savings upon which the incentive is paid, be attached to the installation report. In some cases we found that documentation of energy savings was obvious for the approved application, but not for the final approved incentive which is usually based on the installation report. The basis of the incentive paid to the participant should be well documented and easy to ascertain with the project file. Initial Project Application Review Forms should always be included, completely filled out, and accessible to the evaluation team and program administrators. Also, 12 month (or longer) pre-installation energy billing and, where available, hourly or 15-minute interval data histories should be provided, since, they are extremely helpful.

- **Consider a Stronger Affidavit Statement for Technical Accuracy and Evaluation Access.** Included in the current affidavit is a release of liability for injury, violation of law, energy savings shortfall, performance and qualifications of project sponsor, and agreement to permit inspection and measurement of the project. As recommended in the PY 2003 evaluation, the utilities should consider an additional affidavit statement in the application concerning customer/sponsor-supplied information on operating hours and characteristics of equipment described in the application.

- **Consider Requiring M&V for a Minimum Percentage of Applicants.** This could apply to all projects or only certain types of projects (such as non lighting, industrial, refrigeration, compressed air, etc.). This would ensure that all utilities and all important end uses are evaluated. Requirements may also be differentiated by large versus small projects. As noted in a separate evaluation-related recommendation below, this may be addressed by the CPUC as the CPUC's evaluation process becomes integrated earlier into the program implementation process. Program administrators may want to assess their own measurement needs to determine whether they should supplement the CPUC's evaluation-based measurement requirements.

- **Allow, and At Times Require, Deviation from SPC Calculator or Itemized Approaches.** If the above recommendations are followed, and initial Project Application Review Forms are always included, completely filled out, and accessible to the program administrators, then it will be easier to determine when a deviation from Itemized incentive or SPC Calculator approaches is justified. A brief and transparent energy savings calculation or calculation input sheet reflecting actual conditions also needs to be provided. In addition, data on historical baseline energy use would be extremely useful for making sure that energy savings claims are reasonable.

- **Consider Independent Review of the Itemized Incentives and Itemized Measure Savings Worksheet.** Enhancements to the SPC Program in the 2004 and 2005

program years included the use of Itemized Measure Savings for common measures. This entailed the use of prescribed or deemed savings and incentives. Where possible, the basis of these measures was reviewed in the impact site reports. Typically, the basis is the Express Efficiency workpapers. Review under that program and within this SPC evaluation should guide the decision of when to include the itemized measure approach as appropriate for the SPC program and other larger commercial or industrial energy efficiency programs. The use of itemized incentives– based on a unit incentive per quantity installed – may not be reliable for programs with larger commercial industrial customers with highly-varying facility characteristics like SPC.

- **Prepare for Integration of CPUC Evaluators Early in the Program Process to Enable Pre-Installation Verification and Measurement for Sampled Projects.** Under the CPUC's 2006-2008 and 2009-2011 EM&V policies, it is important for the evaluation to be integrated into the program implementation process so that pre-installation verification and measurements can be made for large, complex projects and random samples of other projects (based on the evaluation research plans and associated uncertainty analyses). This will likely result in expanded data tracking requirements; along with greater interaction between the evaluation and implementation teams early in the project development cycle.

- **E3/Cost-Effectiveness Program Reporting.** The 2004-2005 E3 cost-effectiveness calculator allows entry of a net-of-free-ridership ratio, which all utilities have utilized. In most cases, the CPUC Policy Manual value of 0.70 was used for the SPC program; although one utility also used higher values for some measures. Utilities should use net-of-free-ridership values that are consistent with the latest CPUC policies and should consider also including a gross realization rate adjustment factor for the SPC program. The current E3 calculator does not include a separate field for the gross realization rate. In addition, the E3 calculator should be revised to accommodated lifecycle net present value analysis for early retirement measures.

- **Tracking System Improvements.** Entering correct measure data, savings and program-specific factors into the tracking systems is of utmost importance for all IOU programs. Tracking system-related recommendations are to:
  - Ensure that the tracking system data are consistent across projects and contain current values for gross first-year savings. Training of program personnel is crucial for ensuring high-quality data entry into the tracking systems.
  - Ensure that measure information sharing across programs does not extend to program-specific factors. Training of tracking system personnel is also crucial for ensuring that program-specific factors such as NTG are correctly entered into the tracking systems.

- **Consider Improving Program Administrative Processes,** by continuing to streamline the process of applying for incentive payments, improving communications with trade allies and EESPs regarding the availability of SPC

incentive funds, and minimizing turnover by using in-house staff rather than outside contractors to review and approve applications.

- **Consider Additional Programmatic Efforts to Reduce Free Ridership.** Suggestions for reducing free ridership in the SPC program were developed in the previously published process and market evaluation of the PY2002 SPC Program (Quantum, 2004) and are still relevant. Approaches to consider are discussed in Section 9 of this report and include increasing incentive levels for higher payback measures or emerging technologies, incorporating a payback floor, adopting a minimum payback threshold, setting a minimum percentage for incentive payments, providing bonus payments for first-time participants, and allowing and encouraging program administrators to exclude projects that are obvious free riders. Another strategy is to encourage greater participation by EESPs and other trade allies at the project identification stage.

1

Introduction

1.1 PY2004-2005 SPC Evaluation Objectives and Scope

In this report, we present results from a set of evaluation activities focused on California's Nonresidential Standard Performance Contract (SPC) Program for program years 2004-2005 (PY2004-2005). The PY2004-2005 evaluation scope includes process, market, and impact evaluation components. In the impact evaluation component of this PY2004-2005 evaluation, site visits and engineering analyses were carried out for a sample of projects. This report provides results on verification, ex-post energy savings estimates, gross savings realization rates,[5] the net-of-free-ridership ratios (NTFR), and participating customer and EESP experiences with the PY2004-2005 SPC program. In addition, findings from a survey of nonparticipants provide insight into the energy efficiency attitudes and behaviors of the target market for this program.

These evaluation activities were preceded and informed by evaluations of the nonresidential SPC program conducted for each of the program years from PY1998 through PY2003. This chapter provides a brief introduction to the SPC Program, the objectives and scope of the evaluation, the approach, and the guide to this report.

1.2 Summary of the 2004-2005 SPC Program Requirements

The statewide Nonresidential Standard Performance Contract (SPC) program offered by Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas and Electric Company is a pay-for-performance program that offers cash incentives for custom-designed, cost effective energy saving retrofits of existing business facilities. Designed primarily for large and medium businesses, small and very small businesses can also participate if the energy efficiency measures do not qualify for the statewide Express Efficiency program. Depending on the energy-efficiency measure installed, an itemized or calculated approach is used to estimate the energy savings and incentive. An itemized measure will be based on a pre-determined rate and no kWh savings calculation by the

[5] Realization rates are developed for each site and the program as a whole and are defined as the ratio of program ex-ante savings divided by the ex-post savings estimated by the evaluation team.

applicant is necessary. For all other measures not included as an itemized measure, the estimated payment will be determined by the quantity of kilowatt-hours (kWh) or therms of gas saved.

As in previous years, the 2004-2005 SPC Program was administered by Pacific Gas & Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E).

Under the 2004-2005 SPC Program, the program administrators offered fixed-price incentives to project sponsors for kWh energy savings achieved by the installation of energy-efficiency measures. The fixed price per kWh, performance measurement protocols, payment terms, and other operating rules of the program were specified in a standard contract. PG&E and SDG&E also offer incentives for energy efficient gas measures. The incentive rates for all qualifying measures remained the same as in 2003, except for the gas incentive rate, which was increased from $0.60/therm to $1.00/therm.

To qualify for the SPC, a project must produce a minimum level of energy savings; however, two or more projects may be aggregated within a given utility service territory to meet this requirement. The program is open to almost any equipment replacement or retrofit project for which the savings can be measured and verified with a useful life of greater than 5 years. A sample of eligible measures includes:

- Replacement of standard fluorescent lighting with high-efficiency fluorescent lighting
- Installation of variable-speed drives on electric motors
- Installation of lighting controls to reduce lighting operating hours
- Replacement of standard-efficiency air conditioning with high-efficiency equipment
- Industrial process equipment replacements or upgrades.

Projects that are not eligible include, but are not limited to:

- Any power generation or co-generation project
- Fuel substitution or fuel-switching projects
- New construction projects
- Recommissioning activities
- Any repair or maintenance project.

A number of important milestones must be completed as part of the project approval process. Readers unfamiliar with these milestones and other implementation details should review the program procedure manuals or program web sites for more information.[6]

1.2.1 Differences Between 2003 and 2004-2005 Programs

The PY2004-2005 SPC program was substantially the same as in PY 2003. The program continued the electric incentive rates and the comprehensive lighting retrofit requirement offered in PY2003. The gas incentive was increased to $1.00/therm. The program also made Express Efficiency measures eligible for large customers, thereby expanding their range of options.

The SPC program was revised in October 2004 to allow the eligibility of 4th generation T8 lamps for incentives. These premium lamps are more energy efficient than traditional T8 lamps, but do not meet the current standards for lumen output.

The 2004-2005 Program opened in January 2004 and applications were accepted until December 31, 2005 or until all of the utility administrator's SPC incentive funds were committed.

1.2.2 2004-2005 SPC Incentive Structure

The per-unit incentive levels for the 2004-2005 program are shown in Table 1-1. Electric incentives have remained the same for many years. Incentives for gas measures increased from $0.27/therm in 2000 to $1.00/therm in 2001, decreased to $0.45/therm in PY2002, and then increased again, to $0.60/therm for PY2003. In PY2004-2005 the gas incentive was again raised, to $1.00 per therm. The financial incentive cannot exceed 50 percent of the project capital cost.

[6] Additional programmatic details on the California nonresidential SPC Programs can be found at each utility's web site; PG&E: http://www.pge.com/biz/rebates/spc_contracts/2003_manuals_forms/index.html, SCE: http://www.sce.com/RebatesandSavings/LargeBusiness/SPC/PreviousYearsPublications/, SDG&E: http://www.sdge.com/business/specializedincentives_03.shtml.

Table 1-1: 2004-2005 Program Incentive Levels by Measure Type

Measure Type	Incentive per Unit of Savings
Lighting	$0.05/kWh
HVAC&R	$0.14/kWh
Motors/Other	$0.08/kWh
Gas	$1.00/therm

1.3 History of SPC Program Features and Evaluations

The statewide nonresidential SPC program has been evaluated every year since its inception in 1998. The focus of the program and emphasis of the evaluation have shifted over time in response to changing policy objectives, program modifications, and funding levels. Table 1-2 provides a summary of the evaluation history of the program. The evaluation context for the PY2004-2005 program reflects the stability in the program that has existed since PY2002.

Table 1-2: Summary of Nonresidential SPC Evaluation Projects: 1998 – 2003

Program Year	Evaluation Components	Evaluation ($000) (Total/Impact)	Regulatory Policy Context	Key Evaluation Findings	Key Program Features/Changes
1998	Market Effects, Process, NTGR	$374/$0	California Board for Energy Efficiency (CBEE) oversight, primary focus on market transformation	Limited market effects, low customer satisfaction, split EESP satisfaction, high costs and frustration associated with M&V and other requirements, moderately high free ridership, program under-subscribed	2-stage application: Basic (BPA) and Detailed (DPA), M&V required for all projects, 3 payments (at install and 1 and 2 years after install)
1999	Market Effects, Process, NTGR	$315/$0	California Board for Energy Efficiency (CBEE) oversight, primary focus on market transformation	Limited market effects, improving customer satisfaction, split EESP satisfaction, continued concern over M&V requirements, moderately high free ridership, program under-subscribed	2-stage application: Basic (BPA) and Detailed (DPA), M&V required for all projects, M&V simplified for lighting and motors, incentives decreased
2000 and 2001	Process, NTGR	$235/$0	Primary oversight by CPUC, focus shifts back quickly to resource acquisition during CA energy crisis	Strong customer and EESP satisfaction, positive response to calculated savings path, moderately high free ridership, program over-subscribed	2000: program separated into "Small" and "Large", peak demand bonuses 2001: 2-stage application changed to 1-stage, M&V optional or at IOU discretion, 1 payment at install if calculated, 2nd payment after 1 year if M&V, large and small components recombined, peak demand bonuses
2002	Impact, Process, Market Assessment, NTGR	$436/$175	Primary oversight by CPUC, continued focus on resource acquisition	Strong customer and EESP satisfaction, moderately high free ridership, program over-subscribed, 0.8 gross realization rate, need for targeted increase in savings measurement	Peak demand bonuses eliminated, lighting incentives < 30% of program, lighting part of comprehensive bundles
2003	Impact, Process, NTGR	$215/$125	Primary oversight by CPUC, continued focus on resource acquisition	Strong customer and EESP satisfaction, moderately high free ridership, 0.89 weighted realization rate for PY2003 and PY2002 combined, incentive budgets were adequate to meet demands	Gas incentive increased to $0.60/them, elimination of incentive for A/C economizers, Comprehensive lighting pertains only to retrofits where T12 fluorescent fixtures are replaced by T8 fixtures
2004-2005	Impact, Process, Market Assessment, NTGR	$1,530/$1,380	Primary oversight by CPUC, continued focus on resource acquisition	See this report's findings	See Section 1.2 of this report

1.4 Guide to This Report

A guide to each of the elements included in this final report is provided below:

1.4.1 Main Body

- **Executive Summary:** The Executive Summary provides a very short summary of the impact evaluation results.
- **Introduction (Chapter 1):** The Introduction includes a brief program overview, discussion of the overall objectives and scope of the project, evaluation tasks, and this report guide.
- **PY20004-05 Program Tracking Data Summary (Chapter 2):** This chapter summarizes the PY20004-05 tracking data by key segmentation variables used in previous SPC evaluations.
- **Methods (Chapter 3):** This chapter provides a summary of the sample and methods used in the impact evaluation.
- **2004-2005 Customer Interview and Free Ridership Results (Chapter 4):** This section presents results from the 113 customer participant interviews and summarizes the net-of-free-ridership findings.
- **2004-2005 Gross Impact Results (Chapter 5):** This chapter provides a summary of the site-specific results for PY2004-2005 impact evaluation sample. Full site reports are provided in Appendix A. It also presents the combined weighted realization and net-of-free-ridership ratios for the combined program years.
- **2004-2005 EESP Interview Results (Chapter 6):** This section presents results from the 42 energy-efficiency service provider participant interviews.
- **Nonparticipant Interview Results (Chapter 7**): This section presents results from the 357 interviews with nonparticipating customers.
- **Key Findings (Chapter 8):** This section presents the major findings from this study.
- **Recommendations (Chapter 9):** This section provides a set of actionable recommendations for program managers to consider, based on the study's findings.

1.4.2 Appendices

- **Net–of-Free-Ridership Findings (Appendix A):** This appendix provides the site-specific NTFR findings. Included is a table summarizing the verified NTFR for each

site, and a paragraph summarizing participating customer interview results and likely level of free ridership.

- **Impact Evaluation Reports (Appendix B):** This appendix includes the individual site level impact evaluation reports. There are 114 reports comprising the PY20004-05 evaluation.

- **Survey Instruments (Appendix C):** This appendix provides the survey instruments used for the participating customer and EESP interviews, the, nonparticipant survey, and the on-site surveys.

2

Summary of SPC Program Tracking Data

This section contains a program activity summary for the 2004-2005 SPC Program. The activity summary is based on tracking data extracts received in October and November 2006 from the databases maintained by PG&E, SCE and SDG&E. The data presented below include information on the program impacts and expenditures, as well as on the program participation, at IOU level as well as statewide level.

This section contains the following subsections: Summary of Program Activity; Composition of Applicants; and Statewide Participation Details.

2.1 Summary of Program Activity

Table 2-1 summarizes program activity for PY2004-2005, as reflected in the 2006 database extracts. There were 1,499 unique customers with 2,642 applications, representing $82.68 million in incentives statewide. A total of 1,028 GWh and 17.3 million annual therm impacts were claimed, which combined represent 12.25 trillion Btu of energy savings. Approximately 14% percent of the incentives were awarded for gas measures. The incentive structure paid on average $0.069/kWh across end uses and $0.694/therm.

Table 2-1: Summary of Program Activity (2004-2005 SPC)

Activity Level	Statewide	PG&E	SCE	SDG&E
Total unique customers	1,499	613	768	159
Total number of applications	2,642	1,136	1,281	225
Total unique third-party sponsors	338	77	212	59
Total incentive funds committed ($ million)	82.68	38.98	37.72	5.98
Incentive funds committed to electric measures ($ million)	70.69	27.86	37.72	5.11
Incentive funds committed to gas measures ($ million)	11.98	11.12	0.00	0.87
Total savings from active applications (Btu, trillions)*	12.25	5.72	5.89	0.65
Electric savings from active applications (GWh)	1,028.26	401.62	575.17	51.47
Gas savings from active applications (therms, millions)	17.26	16.08	0.00	1.19
Average incentives per kWh	$0.069	$0.069	$0.066	$0.099
Average incentives per therm	$0.694	$0.691	-	$0.731

* Conversion rates obtained from *2001 Energy Efficiency Standards for Residential and Non-residential Buildings*, California Energy Commission, June 2001:
1 kWh = 10,239 Btu source energy
1 therm = 100,000 Btu source energy

2.2 Composition of Applicants: Customer Self-sponsors vs. EESP-Sponsored Customers

Table 2-2 summarizes program activity and a variety of key indicators for self-sponsored and EESP-sponsored customers.

Table 2-2: Program Activity Summary (2004-2005 SPC)

	Self-Sponsored Applications	EESP-Sponsored Applications	Total
Statewide			
Activities			
Number of unique customers	1,128	500	1,804
Number of applications	1,802	843	2,642
Number of sites	1,786	1,171	2,883
Total incentive funds committed ($ 000's)	$57,832	$24,845	$82,677
Total Btu (trillions)	8.76	3.49	12.25
Total GWh	715	314	1028
Total therms (millions)	14.47	2.80	17.26
Comparative Indicators			
Applications per customer	1.60	1.69	1.46
Sites per application	0.99	1.39	1.09
Incentive $ per customer (000's)	$51.27	$49.69	$45.83
Incentive $ per application (000's)	$32.09	$29.47	$31.29
PG&E			
Activities			
Number of unique customers	527	111	613
Number of applications	845	294	1,136
Number of sites	739	319	1,031
Total incentive funds committed ($ 000's)	$29,738	$9,241	$38,979
Total Btu (trillions)	4.45	1.27	5.72
Total GWh	300	101	402
Total therms (millions)	13.72	2.35	16.08
Comparative Indicators			
Applications per customer	1.60	2.65	1.85
Sites per application	0.87	1.09	0.91
Incentive $ per customer (000's)	$56.43	$83.25	$63.59
Incentive $ per application (000's)	$35.19	$31.43	$34.31
SCE			
Activities			
Number of unique customers	525	330	768
Number of applications	821	460	1,281
Number of sites	910	725	1,591
Total incentive funds committed ($ 000's)	$24,404	$13,313	$37,717
Total Btu (trillions)	3.93	1.96	5.89
Total GWh	384	191	575
Total therms (millions)	0.00	0.00	0.00
Comparative Indicators			
Applications per customer	1.56	1.39	1.67
Sites per application	1.11	1.58	1.24
Incentive $ per customer (000's)	$46.48	$40.34	$49.11
Incentive $ per application (000's)	$29.72	$28.94	$29.44
SDG&E			
Activities			
Number of unique customers	104	65	159
Number of applications	136	89	225
Number of sites	137	127	261
Total incentive funds committed ($ 000's)	$3,690	$2,291	$5,981
Total Btu (trillions)	0.39	0.26	0.65
Total GWh	30	21	51
Total therms (millions)	0.74	0.44	1.19
Comparative Indicators			
Applications per customer	1.31	1.37	1.42
Sites per application	1.01	1.43	1.16
Incentive $ per customer (000's)	$35.48	$35.24	$37.62
Incentive $ per application (000's)	$27.13	$25.74	$26.58

As in recent prior program years, self-sponsored projects represent the majority of the program. Self-sponsored customers are those who contract directly with the utility administrators and who are the sponsors of record on their submitted applications. EESP sponsors, as defined in this analysis, are third-party sponsors, such as contractors, engineers, or energy services companies (ESCOs) who contract with the utility administrators on behalf of a host customer facility.

In 2004-2005, EESP-sponsored projects were responsible for 33 percent of the applications, 30 percent of the incentives, and 31 percent of the GWh savings. EESP-sponsored customers generally signed up more sites per application than self-sponsored customers.

Figure 2-1 presents the number of sites per customer for both self-sponsored and EESP-sponsored applications. The overwhelming majority of applications involved only one site, but 25 percent of the self-sponsored applications and 24 percent of the EESP-sponsored applications covered more than one site.

Figure 2-1: Number of Sites Per Customer for Accepted Applications (2004-05 SPC)

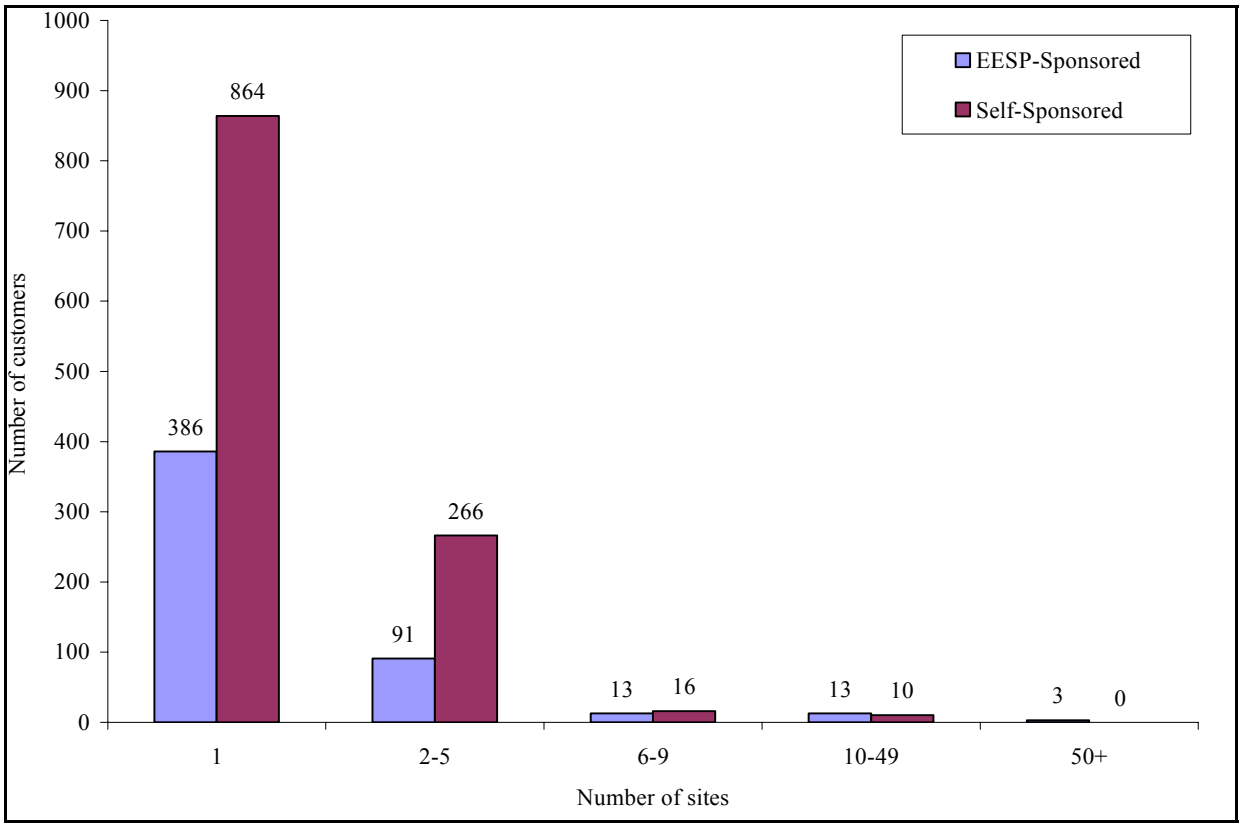


Table 2-3 shows that the percentage of total incentives paid to EESP-sponsored applications varied considerably by utility. The average percentage statewide was 30 percent.

Table 2-3: Percentage of EESP-Sponsored Incentives by Utility (2004-2005 SPC)

Utility	Percent (2004 2005)
PG&E	24%
SCE	35%
SDG&E	38%

2.3 Statewide Participation by End-User Segments

Figure 2-2 compares customer participants by end-user segment for the 2004-2005 SPC Program. Commercial customers form the largest percentage, with 48 percent of the total. Industrial customers account for the next largest segment, with approximately 46 percent.

Figure 2-2: Breakdown of Customer Participants by End-User Segment (2004-05 SPC)

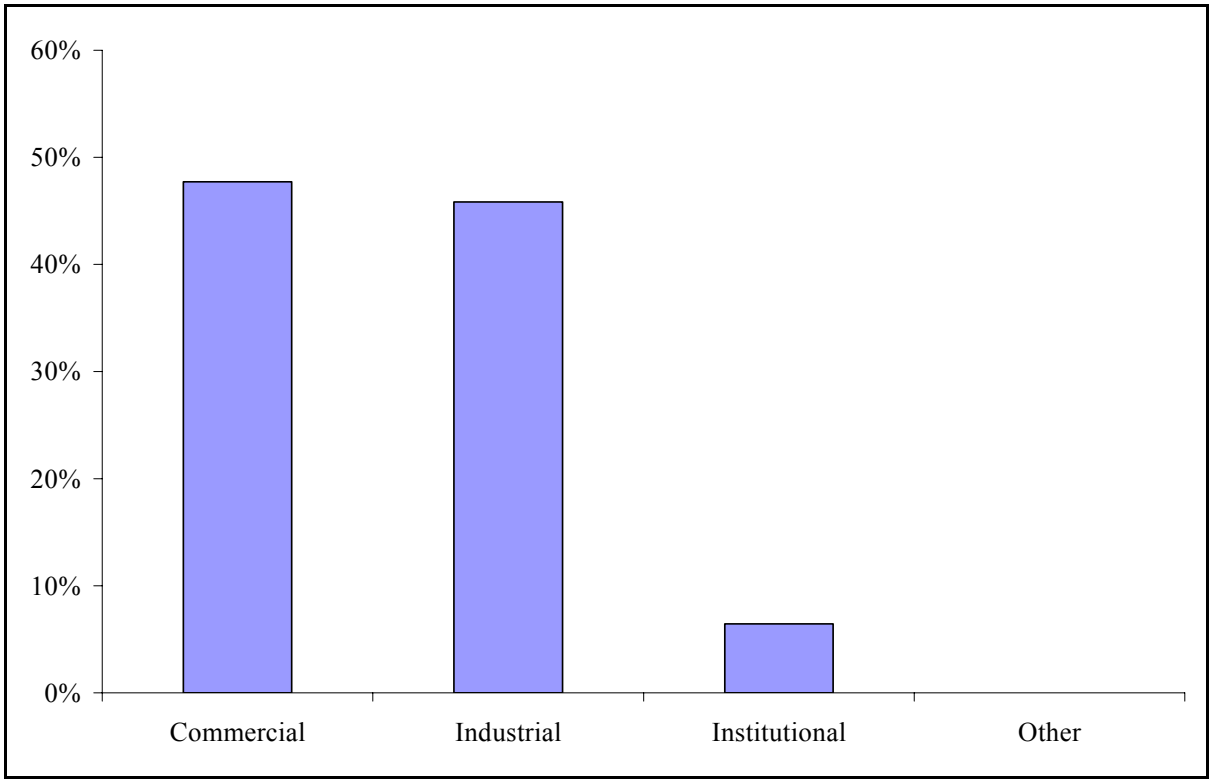


Table 2-4 shows the end-user segments and percent of incentives for active applications for the top 10 end-user participants (including both self-sponsors and EESP-sponsored customers) in 2004-2005. Eight of the top 10 end users were self-sponsored, and accounted for 15 percent of total incentives. The top 5 end users accounted for 9 percent of total incentives.

Table 2-4: Percent of Program Incentives for Top 10 End Users (2004-2005 SPC)

Rank	Sponsorship	Segment	% of Incentives	Cumulative %
1	EESP	Other	3%	3%
2	SELF	Industrial	2%	5%
3	SELF	Industrial	2%	6%
4	SELF	Commercial	2%	8%
5	EESP	Industrial	2%	9%
6	SELF	Industrial	1%	10%
7	SELF	Industrial	1%	12%
8	SELF	Industrial	1%	13%
9	SELF	Commercial	1%	14%
10	SELF	Industrial	1%	15%

Table 2-5 shows the end uses included in active applications in 2004-2005. Process accounts for the largest number of applications and amount of incentives, even without counting the Process measures included in applications with multiple measures. Please note that the data supplied by one IOU did not detail the incentives paid by measure. For this IOU, the breakdown of incentives by measure type is our best estimate.

Table 2-5: End Uses Included for Accepted Applications (2004-2005 SPC)

Sponsorship	End-use category	Number of applications	Total incentives ($ 000's)	Average incentives ($ 000's)	% of incentives	Total GWh	% of GWh
Statewide							
Self-sponsored	L	479	$8,386	$17.51	15%	158	22%
	H	386	$11,102	$28.76	19%	118	16%
	O	224	$10,831	$48.35	19%	95	13%
	P	550	$18,380	$33.42	32%	216	30%
	Multiple	163	$9,133	$56.03	16%	128	18%
	Total	*1802*	*$57,832*	*$32.09*	*100%*	*715*	*100%*
EESP-sponsored	L	238	$5,257	$22.09	21%	101	32%
	H	149	$5,045	$33.86	20%	54	17%
	O	88	$2,019	$22.94	8%	12	4%
	P	177	$4,697	$26.54	19%	60	19%
	Multiple	191	$7,827	$40.98	32%	88	28%
	Total	*843*	*$24,845*	*$29.47*	*100%*	*314*	*100%*
All	L	717	$13,643	$19.03	17%	259	25%
	H	534	$16,044	$30.05	19%	171	17%
	O	309	$12,832	$41.53	16%	107	10%
	P	726	$23,076	$31.79	28%	275	27%
	Multiple	356	$17,081	$47.98	21%	216	21%
	Total	*2642*	*$82,677*	*$31.29*	*100%*	*1,028*	*100%*

In the data for Figure 2-3 and Figure 2-4, the multiple-end-use applications were disaggregated into their component end uses. Figure 2-3 shows that in 2004-2005, Process measures received 75% more than (or 1.75 times) the incentives when compared to Lighting, but only 17% more (or 1.17 times) the incentives when compared to HVAC/R.

Figure 2-4 presents estimated savings in GWh by end use category. Therm savings are excluded from these exhibits, because they occur only in a restricted range of end uses. However, note that incentives for therm savings totaled approximately $ 11.98 million, or 14 percent of all incentives awarded.

Figure 2-3: End-Use Category Breakdown of Incentives (2004-2005 SPC)

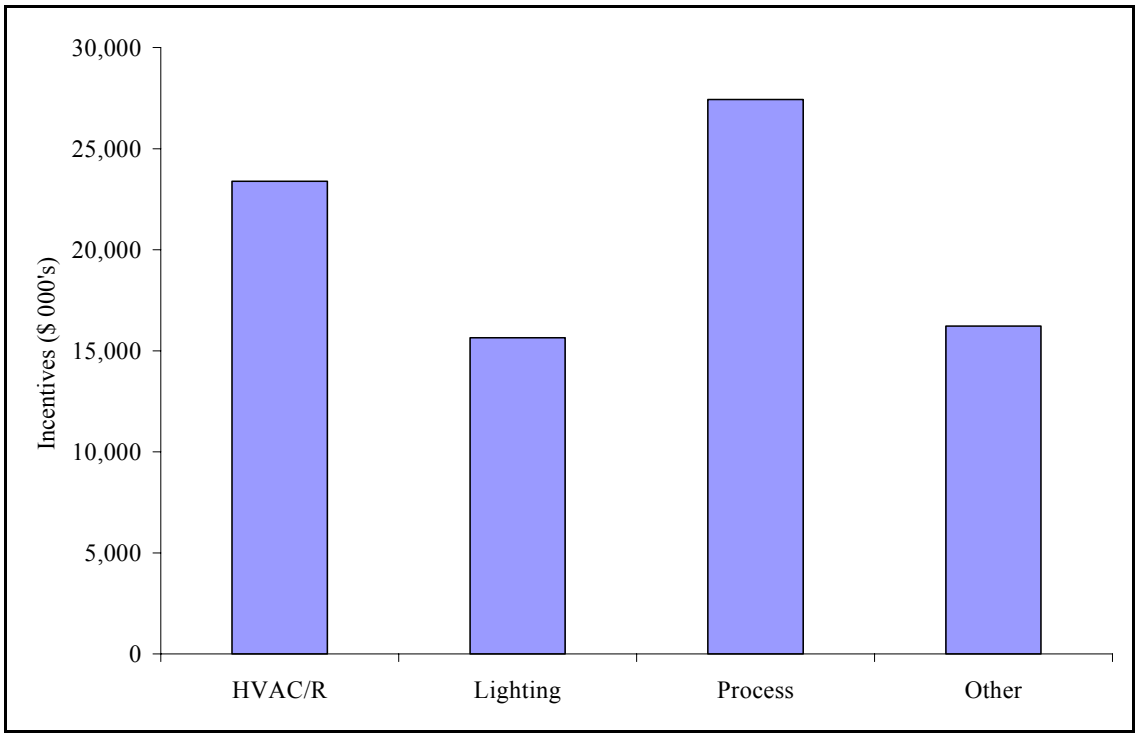


Figure 2-4: End-Use Category Breakdown of GWh (2004-2005 SPC)

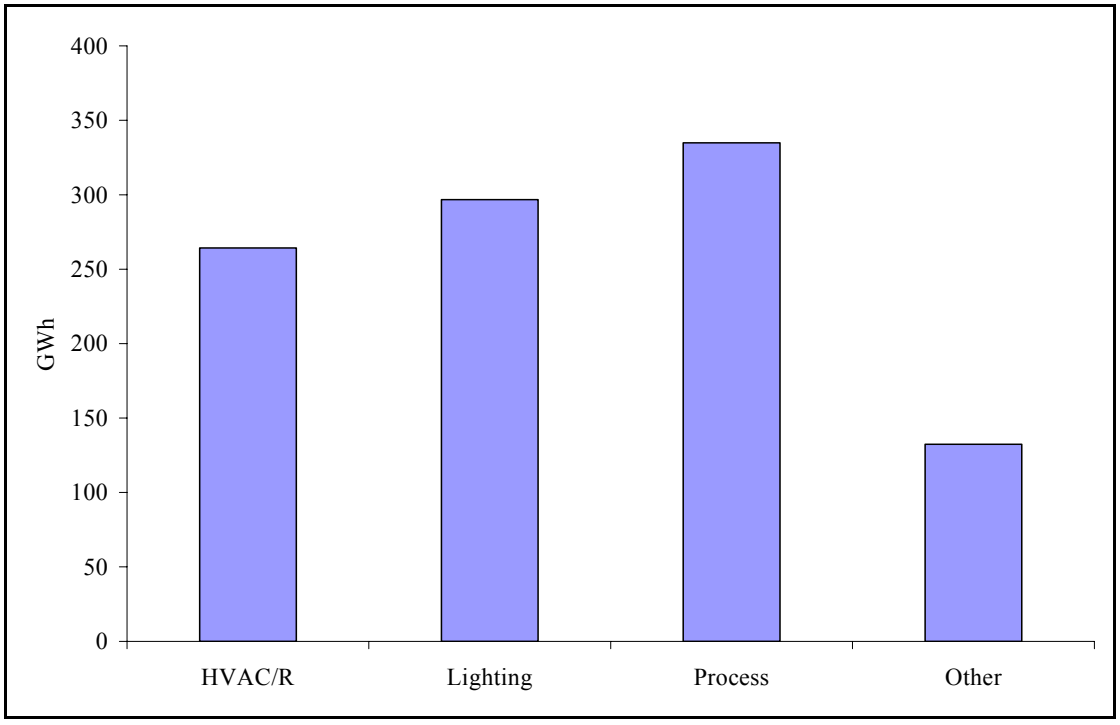
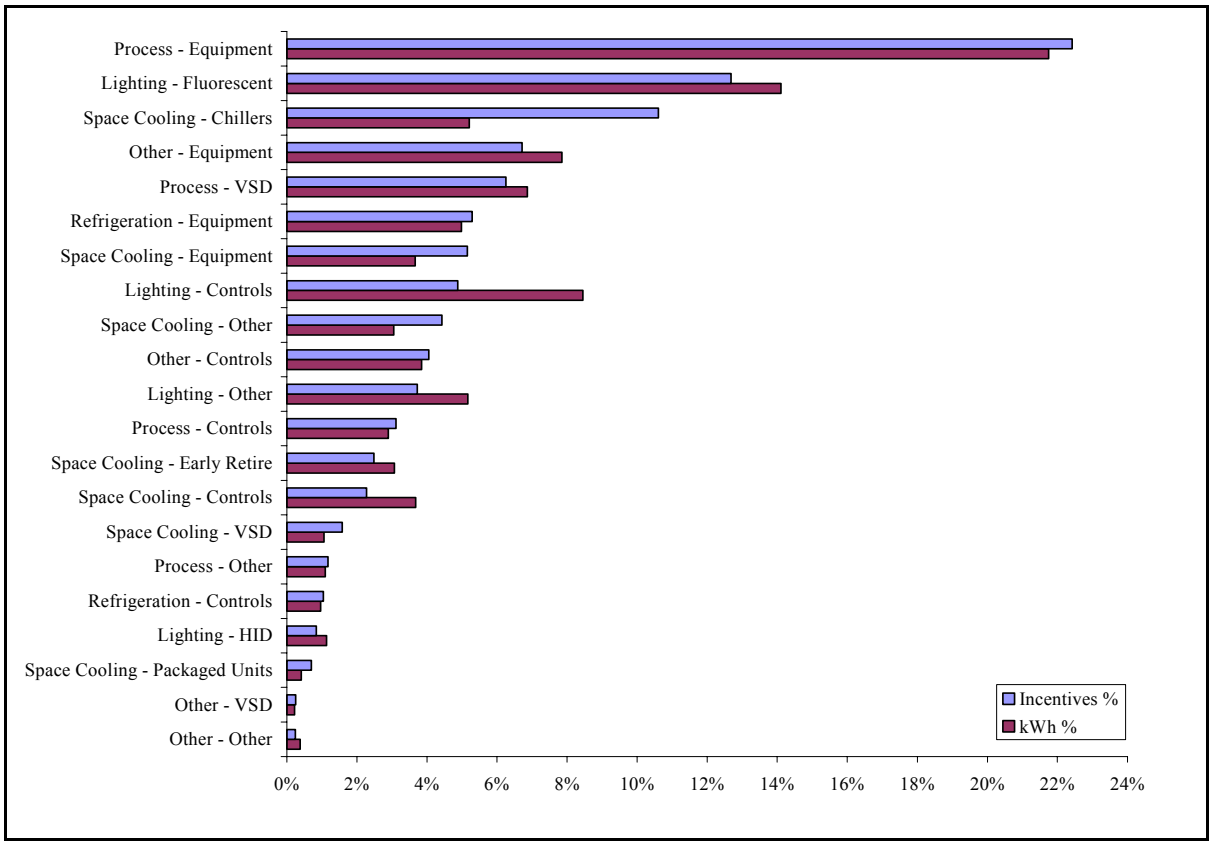


Figure 2-5 presents the incentives and kWh savings by end use. The ratios between the two are affected both by the level of incentives per kWh awarded under the program and by the fact that incentives were capped to 50 percent of total project cost.

"Process – Equipment" (including high-efficiency furnaces, process boilers, hot water measures, etc.) and "Lighting - Fluorescent" account for the highest percentages of kWh savings. These measures also account for the highest percentages of incentives awarded.

Figure 2-5: kWh and Incentives by End Use* (2004-05 SPC)



* Incentive figures relating to therm savings are excluded.

2.4 Project Installation Rates, October-November 2006

Table 2-6 and Table 2-7 summarize project installation rates by utility and program year, as specified in the tracking database extracts dated October-November 2006. As shown in these tables, only about half of the 2004-2005 SPC projects were marked as "installed" as of that date. In addition, a much higher proportion of 2004 projects (~80%) are installed as compared with 2005 projects (36%). This significant installation lag is consistent with what we have observed in previous SPC evaluations.

Table 2-6: SPC Project Installation Rates by Program Year and Utility as of October-November 2006 (2004-2005 SPC)

Status	Number of Applications				Gross MWh Impact			
	All	PG&E	SCE	SDG&E	All	PG&E	SCE	SDG&E
2004								
Completed and/or paid	864	276	493	95	349,668	129,257	196,979	23,433
Active, in various stages	240	75	154	11	121,783	29,640	86,460	5,682
Total	1,104	351	647	106	471,451	158,897	283,439	29,115
2005								
Completed and/or paid	553	294	184	75	104,257	51,006	39,503	13,747
Active, in various stages	985	491	450	44	452,548	191,717	252,226	8,605
Total	1,538	785	634	119	556,805	242,723	291,730	22,352
2004-2005								
Completed and/or paid	1,406	570	677	159	453,925	180,263	236,482	37,180
Active, in various stages	1,236	566	604	66	574,331	221,357	338,686	14,287
Total	2,642	1,136	1,281	225	1,028,256	401,620	575,169	51,467

Table 2-7: Percent of SPC Project Installation Rates by Program Year and Utility as of October-November 2006 (2004-2005 SPC)

Status	Percent of Applications				Percent of Gross MWh Impact			
	All	PG&E	SCE	SDG&E	All	PG&E	SCE	SDG&E
2004								
Completed and/or paid	78%	79%	76%	90%	74%	81%	69%	80%
Active, in various stages	22%	21%	24%	10%	26%	19%	31%	20%
Total	100%	100%	100%	100%	100%	100%	100%	100%
2005								
Completed and/or paid	36%	37%	29%	63%	19%	21%	14%	62%
Active, in various stages	64%	63%	71%	37%	81%	79%	86%	38%
Total	100%	100%	100%	100%	100%	100%	100%	100%
2004-2005								
Completed and/or paid	53%	50%	53%	71%	44%	45%	41%	72%
Active, in various stages	47%	50%	47%	29%	56%	55%	59%	28%
Total	100%	100%	100%	100%	100%	100%	100%	100%

2.5 Project Installation Rates, December 2007

Table 2-8 and Table 2-9 summarize project installation rates by utility and program year, as specified in a tracking database extract dated December 2007. As of that date, 79% of the 2004-2005 SPC projects were marked as "installed" in the tracking databases, and 15 percent were marked as "rejected", "cancelled" or "withdrawn". Again, a higher proportion of 2004 projects (83%) were installed, as compared with 2005 projects (75%). But the rejection rate was higher (19%) for the 2005 projects, as compared to 2004 projects (9%). Note that eight of the 13 cancelled projects from SDG&E were moved to the following program year (2006-2008). It is possible that some of the cancelled projects from the other two IOUs are in the

same situation. Also note that the total program impacts had decreased to 777 GWh (in completed and active projects), down 24% from the December 2006 value of 1,028 GWh.[7]

Table 2-8: SPC Project Installation Rates by Program Year and Utility as of December 2007 (2004-2005 SPC)

Status	Number of Applications				Gross MWh Impact			
	All	PG&E	SCE	SDG&E	All	PG&E	SCE	SDG&E
2004								
Completed and/or paid	944	299	550	95	358,753	115,379	220,542	22,831
Active, in various stages	57	0	46	11	32,580	0	26,897	5,682
Rejected or Withdrawn after 12/06	103	52	51	0	15,716	15,716	0	0
Total	1,104	351	647	106	407,049	131,095	247,440	28,514
2005								
Completed and/or paid	1,156	578	491	87	357,210	151,895	191,888	13,427
Active, in various stages	91	3	69	19	29,363	588	25,958	2,817
Rejected or Withdrawn after 12/06	291	204	74	13	80,753	75,595	0	5,157
Total	1,538	785	634	119	467,326	228,079	217,845	21,402
2004-2005								
Completed and/or paid	2,100	877	1,041	182	715,963	267,274	412,430	36,259
Active, in various stages	148	3	115	30	61,943	588	52,855	8,500
Rejected or Withdrawn after 12/06	394	256	125	13	96,469	91,311	0	5,157
Total	2,642	1,136	1,281	225	874,374	359,174	465,285	49,916
Completed and active as of 12/07	2,248	880	1,156	212	777,906	267,862	465,285	44,758

Table 2-9: Percent of SPC Project Installation Rates by Program Year and Utility as of December 2007 (2004-2005 SPC)

Status	Percent of Applications				Percent of Gross MWh Impact			
	All	PG&E	SCE	SDG&E	All	PG&E	SCE	SDG&E
2004								
Completed and/or paid	86%	85%	85%	90%	88%	88%	89%	80%
Active, in various stages	5%	0%	7%	10%	8%	0%	11%	20%
Rejected or Withdrawn after 12/06	9%	15%	8%	0%	4%	12%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%
2005								
Completed and/or paid	75%	74%	77%	73%	76%	67%	88%	63%
Active, in various stages	6%	0%	11%	16%	6%	0%	12%	13%
Rejected or Withdrawn after 12/06	19%	26%	12%	11%	17%	33%	0%	24%
Total	100%	100%	100%	100%	100%	100%	100%	100%
2004-2005								
Completed and/or paid	79%	77%	81%	81%	82%	74%	89%	73%
Active, in various stages	6%	0%	9%	13%	7%	0%	11%	17%
Rejected or Withdrawn after 12/06	15%	23%	10%	6%	11%	25%	0%	10%
Total	100%	100%	100%	100%	100%	100%	100%	100%

[7] The decrease in program impacts in December 2006-January 2007 is also due to impact corrections for some early retirement projects. These corrections were prompted by the fact that the tracking database extracts contained remaining life savings instead of first-year savings for some early retirement measures, but these savings were corrected outside of the tracking database prior to posting EEGA filings. We corrected the tracking databases based using the EEGA values and incorporated those data in the total impacts.

3

Methods

In this chapter we present the methods used in the impact evaluation. A summary of the sampling plan is provided, followed by an overview of the approach used for the site-specific impact evaluations.

3.1 Customer Participant Sampling and Precision Issues

In our past evaluations we drew samples that were representative of the participant population with respect to the distribution of savings by project size, end use, and type of sponsorship. Samples were also segmented by utility, but previous studies did not attempt to provide utility-specific estimates of ex-post realization rates due to limitations in budget and corresponding sample sizes. The primary sampling variable in the 2002-2003 SPC impact evaluation was electric energy savings (i.e., gas projects were not addressed). There are several important sampling-related differences between this 2004-2005 SPC evaluation and the previous evaluations. Key issues are robustness at individual IOU level, and allocation of sample points to support estimates of electric and gas impacts.

3.1.1 Relative Sampling Precision Estimation

In our proposal we provided an initial, rough sampling plan that suggested a significantly larger sample for 2004-2005 as compared with 2002-2003, as well as some increases in the amount of time allocated per site for the engineering portion of the impact evaluation work. To investigate the expected precision levels for the 2004-2005 impact evaluation, we revisited the precision level achieved for the combined 2002-2003 impact evaluation sample and carried out the precision estimation process laid out for ratio estimation-based samples in Chapter 13 of the *Evaluation Framework Study*. Specifically, we used the error ratio method and estimated the precision expected with alternative sample sizes, using the results from the 2002-2003 ratio estimation process.[8] Using the 2002-2003 sample data, we calculated an error ratio (*er*) of 0.35 using the following formula:

8 See Chapter 7 of Quantum Consulting, 2005. *2003 Statewide Nonresidential Standard Performance Contract (SPC) Program Measurement and Evaluation Study*, prepared by Quantum Consulting, Inc. for Southern California Edison Company, SCE Study ID: SCE0206.01, December.

$$\hat{er} = \frac{\sqrt{\left(\sum_{i=1}^{n} w_i \; e_i^2 / x_i^{\gamma}\right)\left(\sum_{i=1}^{n} w_i \; x_i^{\gamma}\right)}}{\sum_{i=1}^{n} w_i \; y_i}$$

where $\gamma = 0.8$, $e_i = y_i - \hat{B}\, x_i$, x is the tracking estimate of savings for each project, and y an estimate of the actual savings from the evaluation. Using case weights, the stratified ratio estimator of B, denoted $\hat{B}$, was calculated as follows:

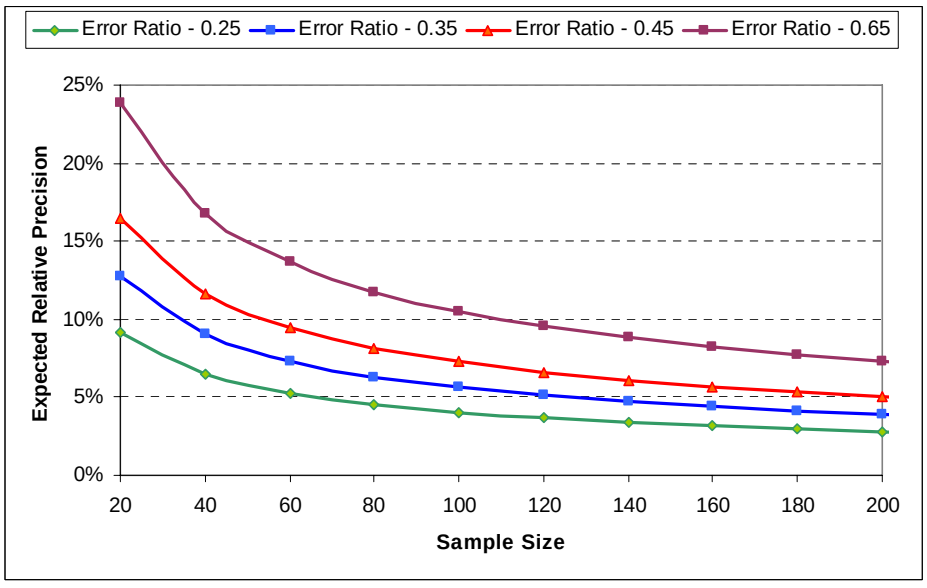
$$\hat{B} = \frac{\hat{Y}}{\hat{X}} = \frac{\sum_{i=1}^{n} w_i \; y_i}{\sum_{i=1}^{n} w_i \; x_i}$$

We then estimated relative precision, at the 90 percent confidence level, for alternative sample sizes for the new study using the equation below (which includes finite population correction):

$$rp = 1.645 \sqrt{1 - \frac{n}{N}} \frac{er}{\sqrt{n}}$$

The resulting precision levels for alternative samples are shown in Figure 3-1 below for the calculated *er* of 0.35 as well as several error ratios that might occur.

Figure 3-1: Expected Relative Sampling Precision Versus Sample Size with Stratified Ratio Estimation for Varying Error Ratios (Note: *er* of 0.35 was calculated from 2002-2003 SPC impact evaluation data)

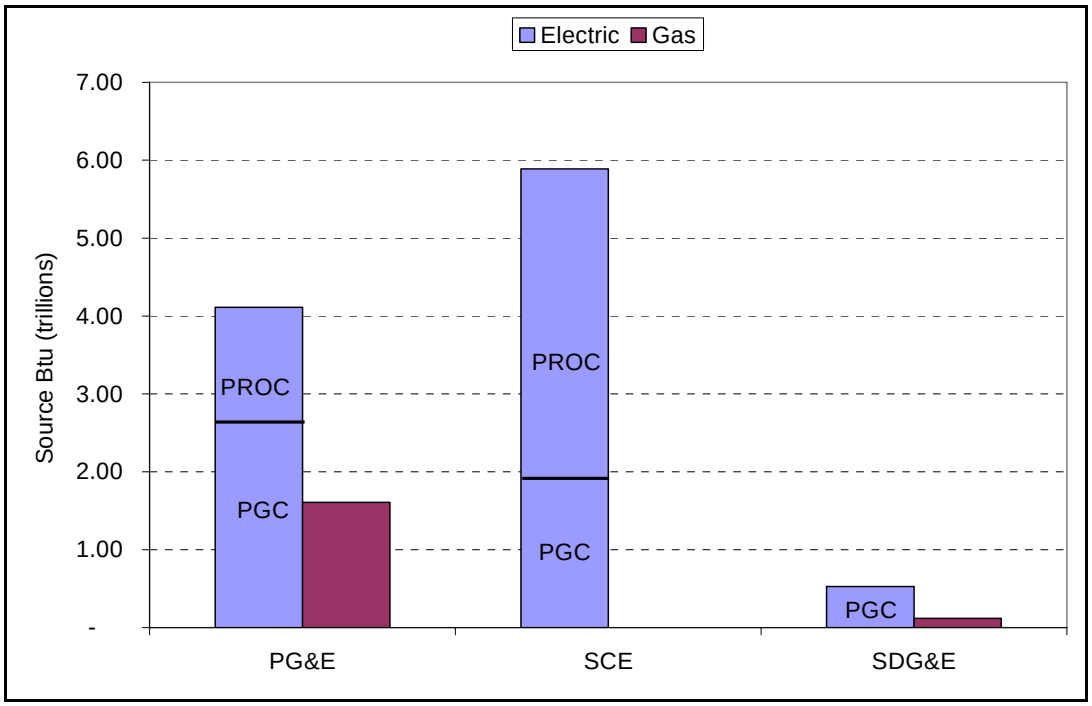


The figure is generally consistent with the example given in the *Evaluation Framework Study* and shows that precision levels are highly non-linear and diminish significantly above sample sizes of 40 to 60 points. (Note, for comparison purposes, that with a sample of 65 points for the combined 2002-2003 program impact evaluation, we achieved a relative sampling precision of 7.3 percent at the 90 confidence level on the overall program realization rate of 0.89.) This method provided error estimates for the base and optional sample sizes we provided in our research plan and discussions with the CPUC and IOUs.

3.1.2 Sample Allocation by IOU

In our original proposal we allocated 20% of the sample to SDG&E. However, as summarized in Chapter 2 and shown in Figure 3-2 below, SDG&E sites represent only 5% of statewide SPC total energy and electric tracking system savings when PG&E and SCE's procurement funded savings are included.. SCE and PG&E represent very similar percentages of the remaining 95% of total source energy savings. SDG&E's portion of source energy savings increases to 9% if only PGC-funded savings are included. PG&E and SCE represent relatively equal portions of source Btu savings when both PGC and procurement implementation funds are included. As a percent of only PGC implementation funds, however, PG&E savings are significantly higher than SCE's.

Figure 3-2: 2004-2005 Tracking System Savings by Utility, Fuel, and Funding Source



Another relevant consideration in determining utility-specific sample sizes is the contribution of each utility to the evaluation budget for this Study. According to the MECT's analysis of the IOUs' filed evaluation budget plans for 2004-2005 SPC, SDG&E contributed roughly 15% to this project's budget, all for and from PGC funds. PG&E and SCE contributed similar amounts to the remaining 85% of the PGC-funded budget, with SCE contributing slightly more (45% versus 39%).

After discussion with the CPUC ED and MECT, it was agreed that the SDG&E portion of the PGC-funded sample should be roughly proportional to their budget contribution. SCE chose to bolster the field sample by providing additional procurement-related evaluation funds for this Study, while PG&E indicated that it would not do so. Thus, the total sample that was pursued was the PGC-funded sample for PG&E and SDG&E, and the PGC plus procurement-funded sample for SCE.

3.1.3 Sample Allocation by Fuel Type

The 2004-2005 SPC tracking system savings include a moderate amount of gas savings that ranges widely across the three utilities as a percent of combined source energy savings in Btu. Gas savings as a percent of total combined gas and electric savings (including procurement) are 14% statewide, 28% for PG&E, 0% for SCE, and 18% for SDG&E. PG&E's gas savings represent 93% of gas savings, with SDG&E making up the remainder. As a percentage of statewide PGC-funded implementation, gas savings represent 25% of source energy savings. For PG&E, gas projects account for 38% of *PGC-funded* source energy savings.

One approach to the presence of both fuels in the program was to combine the gas and electric projects into a frame based on source Btu for both PG&E and SDG&E. In this approach, gas projects would be sampled proportional to their contribution to each utility's source energy savings. This approach would produce an overall program realization rate across the two fuels. The overall realization rate would then be applied to the tracking system savings for each fuel. If there were systematic bias between the true realization rates between the two fuels, this approach would produce a less accurate realization rate for each individual fuel. However, there was no reason to believe that there would be predictable systematic bias between gas and electric realization rates for the SPC program.

Another approach was to utilize two sampling frames, one for gas and one for electric; however, this would also raise the issue of whether the gas sample would then have to be statistically robust at the statewide or utility service territory levels. Doing so in the current funding for the study would require diluting the electric sample significantly and this was not desirable or feasible. Obtaining a statistically robust sample of gas projects would require 30

or more projects out of the PGC-funded portion of the sample, mostly from PG&E. This would not be possible given there were only 35 total sample points allocated to PG&E.

The final alternative was to ignore gas projects altogether and focus the impact evaluation only on electric projects.

This issue was discussed with the CPUC ED, MECT, and PAC and it was agreed that we should utilize the first approach, in which gas projects are sampled proportional to their contribution to total source energy savings, and the final realization rate is applied to both electric and gas projects.

3.1.4 Sample Stratification

Consistent with the Evaluation Framework Study's recommendations, we stratified our previous SPC impact samples by size of savings. In the previous evaluations we used 3 size strata; the Framework Study recommends five strata. In addition, we previously stratified by major end use since program incentive payments are different by end use (i.e., Lighting, HVACR, and Process/Other.) We previously sampled by end use proportional to each end use's contribution to program savings.

Following the recommendation of the Evaluation Framework Study, we used five strata for the 2004-2005 SPC sample. Adding additional size strata was beneficial given the increased size of the SPC program in terms of number of applications and total savings as compared with previous years. Formal end uses quotas were not necessary in the current study as the additional size strata resulted in a close correspondence between the distribution of applications and energy savings across end uses within a stratum. Table 3-1 through Table 3-4 summarize the population tracking data by strata (tier), as provided in the October-November 2006 tracking database extracts. These figures indicate the following:

- The first two size strata include the largest 100 electric applications, which represent 4% of total electric applications and 40% of electric energy savings.
- The rate of project installation is higher for the two smallest size strata than it is for the larger sized projects.
- Electric savings by stratum are fairly even across program years.
- Procurement-funded savings are more concentrated in the larger size stratum.

Table 3-1: SPC Energy Savings by Size Strata, End Use, and Installation Status, as of September-October 2006

Tier	Predominant End Use					Status			
	GWh				Therms (1,000s)	GWh		Therms (1,000s)	
	Total	Lighting	HVAC/R	Process		Complete	Incomplete	Complete	Incomplete
1	190	16.8	46.1	127.3	4,991.0	78.7	111.5	1,092.4	3,898.5
2	200	65.2	52.8	82.4	4,000.7	69.0	131.4	2,241.8	1,758.9
3	203	64.1	62.7	76.5	3,652.5	74.8	128.6	1,561.1	2,091.4
4	214	74.5	55.4	84.6	2,566.2	112.1	102.4	1,783.7	782.6
5	220	76.8	50.8	92.2	2,051.8	119.3	100.5	1,058.6	993.2
All	1,028	297.4	267.7	463.1	17,262.2	453.9	574.3	7,737.6	9,524.6

Table 3-2: SPC Energy Savings by Size Strata, Program Year, and Funding Source, as of September-October 2006

Tier	Program Year				Funding Source			
	GWh		Therms (1,000s)		GWh		Therms (1,000s)	
	2004	2005	2004	2005	PGC	PROC	PGC	PROC
1	97.5	92.8	0.0	4,991.0	45.1	145.1	4,991.0	0.0
2	94.1	106.3	2,037.0	1,963.7	83.6	116.8	4,000.7	0.0
3	88.2	115.1	848.6	2,803.9	109.9	93.4	3,652.5	0.0
4	96.4	118.1	964.4	1,601.8	124.9	89.6	2,566.2	0.0
5	95.2	124.6	600.9	1,450.9	131.8	88.0	2,051.8	0.0
All	471.5	556.8	4,450.9	12,811.3	495.4	532.9	17,262.2	0.0

Table 3-3: Applications by Size Strata, End Use, and Installation Status, as of September-October 2006

Tier	Predominant End Use					Status	
	Electric				Gas	Complete	Incomplete
	Total	Lighting	HVAC/R	Process			
1	24	3	6	15	8	11	21
2	79	26	21	32	13	36	56
3	163	49	52	62	28	74	117
4	364	124	95	145	40	219	185
5	1,843	558	465	820	179	1,146	876
All	2,473	760	639	1,074	268	1,486	1,255

Table 3-4: SPC Applications by Size Strata, Program Year, and Funding Source, as of September-October 2006

Tier	Program Year		Funding Source	
	2004	2005	PGC	PROC
1	12	20	13	19
2	44	48	47	45
3	80	111	118	73
4	180	224	250	154
5	818	1,204	1,325	697
All	1,134	1,607	1,753	988

3.1.5 Final Sample Design

Based on the analysis described above and decisions made with the CPUC ED and MECT, with input from the PAC, this section presents the final sample design for the customer participant impact and process evaluation elements of this Study.

For the PY2004-2005 evaluation we drew IOU-specific samples that were proportionally distributed with respect to energy (Source Btu) savings. For PG&E 25 of the 35 sample points allocated were drawn from electric-predominant applications, while 10 sample points were drawn from gas-predominant applications. All of SDG&E's 12 sample points were to be electric-predominant. However, the only Tier 1 application completed in SDG&E territory was a gas-predominant application that was larger than any of PG&E's completed gas applications. We chose to allocate one of the 12 sample points for SDG&E to that large gas application.

The IOU-specific samples were drawn from customers with active applications as of September-October 2006. We segmented the applications into five strata, each stratum representing one-fifth of program energy (Source Btu) savings. We refer to these as tiers, with Tier 1 being the strata with projects responsible for the largest impacts, and Tier 5 the smallest. The 2004-2005 program population data for the sampling strata are summarized in Table 3-5 and Table 3-6. These figures are based on tracking database extracts received from the utilities in September-October 2006.

Table 3-5: Summary PY2004-2005 SPC Population Counts by Stratum, as of September-October 2006

	Application Counts			
	All	PG&E	SCE	SDG&E
Tier 1	32	14	17	1
Tier 2	88	44	41	3
Tier 3	186	85	92	9
Tier 4	389	170	189	30
Tier 5	1,947	823	942	182
Total	2,642	1,136	1,281	225

Table 3-6: Summary PY2004-2005 SPC Population Energy Savings by Stratum, as of September-October 2006*

	Source BTU (trillions)			
	All	PG&E	SCE	SDG&E
Tier 1	2.49	1.24	1.19	0.05
Tier 2	2.41	1.24	1.08	0.09
Tier 3	2.47	1.12	1.22	0.12
Tier 4	2.45	1.09	1.17	0.18
Tier 5	2.45	1.03	1.23	0.19
Total	12.26	5.72	5.89	0.65

*The source BTU cutpoints are: 44,895 MBtu for Tier 1, 18,530 MBtu for Tier 2, 9,467 MBtu for Tier 3, and 4,025 MBtu for Tier 4.

The final on-site sample had 114 points, distributed by IOU as shown in Table 3-7. The sample size of 114 points and the overall number of points allocated by IOU were approved by the CPUC ED and MECT.

Table 3-7: SPC Impact Evaluation – On-Site Sample Counts by Stratum

	Application Counts			
	All	PG&E	SCE	SDG&E
Tier 1	10	4	5	1
Tier 2	28	10	17	1
Tier 3	27	7	16	4
Tier 4	26	7	15	4
Tier 5	23	7	14	2
Total	114	35	67	12

Applications were sampled randomly within each stratum, but only those completed by September-October 2006 were included in the on-site sample. We over-sampled within each

stratum by 50% to obtain an adequate pool of backup applications. The largest end use associated with each application selected constituted the project for which the ex-post savings estimate and realization rate were developed. Any sample points that could not be completed were re-allocated within the same stratum using backup sample, or equally to the remaining strata within each utility starting with the next largest stratum if all backup sample within the same stratum were exhausted.

The Source Btu savings associated with the completed on-site sample represents 18 percent of total program savings in PY2004-2005, and is shown in Table 3-8.

Table 3-8: PY2004-2005 SPC Impact Evaluation – On-Site Sample Energy Savings by Stratum

	Source BTU (trillions)			
	All	PG&E	SCE	SDG&E
Tier 1	0.87	0.54	0.28	0.05
Tier 2	0.75	0.28	0.44	0.03
Tier 3	0.35	0.09	0.21	0.05
Tier 4	0.16	0.04	0.10	0.02
Tier 5	0.04	0.01	0.02	0.00
Total	2.17	0.96	1.05	0.16

Based on 114 applications sampled.

By sampling randomly within each stratum we expected that the distribution of applications selected across the primary program end uses would closely approximate the distribution of savings by end use within each stratum. As shown in Table 3-9, the distribution of impacts in the on-site sample is relatively close to that in the general population. Any differences can be attributed primarily to the fact that the projects sampled belong to the group of PY2004-2005 applications that had been completed by September-October 2006. Projects that propose installation of custom process measures tend to be installed later than projects that propose lighting or HVAC measures, so the on-site sample captured somewhat more HVAC- and fewer process-predominant sites than in the population.

Table 3-9: SPC Impact Evaluation – Comparison of Energy Use for On-Site Sample and PY2004-2005 Population Distribution, by End Use

	Source BTU distribution by end use			
	Lighting	HVAC&R	Process	Gas
Population	25%	23%	38%	14%
Sample	23%	31%	34%	12%

A separate telephone survey was implemented to obtain process, satisfaction and net-of-free-ridership ratios. Telephone surveys could not be completed with all sites chosen for the on-site impact evaluation, so the net-of-free-ridership sample is slightly different than the on-site sample. The distribution of telephone interviews is shown in Table 3-10 and Table 3-11.

Table 3-10: SPC Net-of-Free-Ridership Evaluation – Telephone Sample Counts by Stratum

	Application Counts			
	All	PG&E	SCE	SDG&E
Tier 1	8	4	3	1
Tier 2	26	10	15	1
Tier 3	29	6	19	4
Tier 4	26	7	15	4
Tier 5	24	7	15	2
Total	113	34	67	12

Table 3-11: SPC Net-of-Free-Ridership Evaluation – Telephone Sample Energy Savings by Stratum

	Source Btu (trillions)			
	All	PG&E	SCE	SDG&E
Tier 1	0.74	0.54	0.15	0.05
Tier 2	0.70	0.28	0.39	0.03
Tier 3	0.37	0.08	0.24	0.05
Tier 4	0.16	0.04	0.10	0.02
Tier 5	0.04	0.01	0.03	0.00
Total	2.01	0.94	0.91	0.16

3.2 Sample Planning for Nonparticipant End User Survey

A survey was conducted of SPC nonparticipants that is targeted at customers 500 kW or larger. This survey was focused on continuing measurement of energy efficiency market indicators developed and measured in previous SPC evaluations. That is, this survey continued a multi-year, longitudinal analysis of SPC-related market indicators. In addition, the SPC nonparticipant survey was closely coordinated with the nonparticipant sampling being conducted by Itron for the 2004-2005 Express Efficiency and 2004-2005 Nonresidential Audit evaluations (including the cross-cutting task within the NRA project). Although the SPC nonparticipant survey did not include small and medium customers under 500 kW, we coordinated with the Express and NRA evaluations to have some SPC-related questions included on the nonparticipant surveys to cover these customer segments.

As presented in our proposal, for the nonparticipant market analysis, we proposed to conduct telephone interviews with 350 customers, the same sample size as we utilized in the 1999 and 2002 nonparticipant surveys. We have found that a sample size of about 350 interviews balances two competing issues; one, that the sample will be large enough to effectively characterize the awareness, attitudes and practices of large customers and, two, that the sample takes into account that there is a relatively small finite population of large customers. This sample size has proved sufficient in past studies to allow comparisons across utility territories, size and business type. It is also adequate to obtain any statistically significant differences when comparing the PY2004-2005 results with those of the 1999 and 2002 surveys. It was important to maintain the same sampling approach as was utilized in the 1999 and 2002 surveys for two reasons. First, the approach used previously was very successful in illuminating critical differences between customer segments. The second reason is that if a different approach is used, it will be necessary to re-weight the data to mirror the earlier approach in order to make comparisons between results from the current and earlier studies. Using the previous sampling design allowed straightforward use of the same weights and clean comparisons of the results over time. This met the PY2004-2005 evaluation objectives, while keeping costs manageable and allowing adequate resources to be available for meeting all project objectives.

Utility CIS data were used for the 1999 and 2002 nonparticipant surveys. In both cases, the frames included all nonresidential customers, except agricultural. The California population frame comprised the SCE, SDG&E, and PG&E service territories.[9] We utilized the latest available utility CIS frames for the 2006 surveys.

The 2002 sample for the baseline surveys was designed principally to characterize the large customer market (over 500 kW) as did the 1999 survey. Although the current program does include some small customers, the primary target population from which the bulk of savings are obtained continues to be the over 500 kW market. We focused on this population as the primary one for the nonparticipant surveys.

As in the 1999 and 2002 SPC nonparticipant surveys, the 2004-2005 SPC nonparticipant sample was segmented by primary SIC code into seven major business type sectors. The business types included were:

- Office
- Institutional

[9] In those studies, a non-California comparison sample which comprised the entire lower 48 United States with California subtracted was also used.

- Other Commercial
- Industrial: Electronics/Machinery
- Industrial: Petroleum/Plastics
- Industrial: Mining/Metals/Stone/Glass
- Industrial: Other

Each business type was divided into three size strata: (1) small (500 to 1,000 kW), (2) medium (1,000 to 2,000 kW), and (3) large (over 2,000 kW).

The sample size of 350 was developed with the purpose of allowing comparison between sampled cells for a stratification that included the seven business types and three sizes groups defined above. We followed the stratification approach used previously which provides for meaningful sample sizes at the business type, size, and utility. This proposed sampling approach allowed us to compare differences between customers in different segments, differences between 1999 or 2002 and 2006, and differences between participants and nonparticipants. Table 3-12 below provides the distribution of completed surveys by business type and customer size. As the table shows, 357 surveys were ultimately completed.

Table 3-12: Distribution of Completed Surveys in California by Business Type and Size

Business Type	Size in Peak kW			Total
	500-999	1,000-1,999	>2,000	
Office	26	5	7	38
Institutional	27	9	7	43
Other Commercial	107	38	27	172
Electronic & Machinery	14	5	4	23
Mining, Metals, Stone, Glass, Concrete	9	7	4	20
Petroleum, Plastic, Rubber and Chemicals	6	2	0	8
Other Industrial & Agricultural	34	13	6	53
Total Accounts	**223**	**79**	**55**	**357**

Table 3-13 shows the distribution of completed surveys by IOU territory and business type.

Table 3-13: Distribution of Completed Surveys by Utility/Region and Business Type

Business Type	PG&E	SCE	SDG&E	All CA
Office	10	19	9	38
Institutional	19	5	19	43
Other Commercial	72	69	31	172
Electronic & Machinery	11	3	9	23
Mining, Metals, Stone, Glass, Concrete	12	8	0	20
Petroleum, Plastic, Rubber and Chemicals	4	3	1	8
Other Industrial & Agricultural	40	8	5	53
# Respondents	**168**	**115**	**74**	**357**

3.3 Sample Planning for Task 6 - EESP Interviews

3.3.1 Participant EESP Sampling

The EESP participant sample was drawn from three EESP subgroups:

1. Those that were involved in the customer projects that comprise the impact sample
2. Those that have participated in more than one IOU service territory
3. Those that participate only in a single non-SCE service territory

Subgroup 1 represents highly active EESPs that are involved in the current round of SPC projects. Subgroup 2 consists of those EESPs that are actively involved in projects across the entire state. And Subgroup 3 compensates for undersampling of EESPs in the SDG&E and PG&E territories, which tend to be less involved in the SPC program than is SCE.

Interviews were ultimately conducted with 42 Energy Efficiency Service Providers (EESPs) that participated in the 2004-2005 SPC Program. The sample breakdown among the 3 subgroups is as follows:

- **Subgroup 1** – 25 interviews completed with EESPs of customers that make up the impact sample.
- **Subgroup 2** – 2 interviews completed with EESPs that are active in 2 or more IOU service territories
- **Subgroup 3** – 15 interviews completed with EESPs active in a single non-SCE service territory

The sample size of 42 completed interviews was developed based on our experience with number and types of EESPs in previous years' programs, and the size of the 2004-2005 participant populations. While the EESPs interviewed covered a full range of sizes and business types, it should be noted that they were not randomly selected, as discussed above.

3.4 Approach to Estimating Ex-Post Energy Savings

The key steps utilized to develop an overall savings estimate for the program were to:

- independently verify reported measure installation records,
- develop ex-post estimates of the energy savings for each project in the sample, and
- apply those findings to the full participant population to obtain a complete estimate of program impacts.

Ex-post impact experience with custom nonresidential projects shows that program effects cannot be reliably measured through a multi-customer regression analysis of billing data (an approach typically employed in ex-post residential analysis and prescriptive commercial programs). In the past evaluators have found that this is true due to the fact that large impact sites are also large customers (typically using in excess of millions of kWh per year), with heterogeneous usage characteristics. As a result, it is difficult to isolate program effects in a billing regression model because of the many customer-specific factors that affect energy consumption. For this reason, we adopted the approach used in the previous evaluation protocols and primarily relied on site-specific measurement and verification for the impact evaluation. However, for projects installed for close to a year, we may also apply individual customer pre- and post-retrofit billing analysis where appropriate.

This study's approach to the impact analysis consists of a distinct set of steps that are listed below and discussed in the subsections that follow. These steps include:

- Developing and implementing the sample design;
- Obtaining the sample of SPC application files and associated documentation;
- Reviewing the applications and preparing the ex-post analysis plans by site;
- Scheduling and conducting the on-site data collection, conducting project verification, and developing the ex-post impact estimates for each site;
- Preparing detailed, site-specific impact evaluation reports;

- Carrying out a quality control review of the ex-post impact estimates and the associated draft site reports and implementing any necessary revisions;
- Estimating a net-of-free-ridership ratio for each site; and
- Extrapolating the final ex-post realization and net-of-free ridership estimates for the sample to the remaining applications.

For the sampled participant sites, the engineering analysis methods and degree of monitoring varied from project to project, depending on the complexity of the measure, the size of the associated savings, and the availability and reliability of existing data. An extremely diverse mix of measures can be seen in the 2004-2005 tracking data (see Chapter 2), consistent with the diversity seen in the 2002-2003 program years.

A multi-step process was performed, involving verification and engineering-based calculations for each application reviewed. The first step was to obtain and review selected application forms and develop site-specific analysis plans and field data collection plans, targeted to gather missing information or verify application information. This step was followed by an on-site audit and measurement to complete the data collection for site characteristics, plant and equipment specifications, measure(s) installed and the operation strategy for applicable equipment. Utilizing the information gathered from the application documentation and site visits, we completed an impact evaluation of the energy and demand savings associated with the target end use for each site in the sample. This evaluation was then documented and submitted for quality control review. The final site-specific evaluation results were then extrapolated to the program population using the ratio estimation method referenced below.

3.4.1 Obtain Sample SPC Application Records

Once the sample was drawn, Itron submitted a formal data request to each utility for the SPC application records, including site data, verification records, all savings calculations, and all information transactions. Once those documents were received, the individual engineer assigned to each application conducted an initial interview. This was used to develop the site-specific engineering plan and to assess the need for additional documentation.

3.4.2 Review Applications and Prepare Analysis Plans

For each selected application, we performed an in-depth application review to assess the engineering methods, parameters and assumptions used to generate all adjusted ex-ante impact estimates. Application review served to familiarize the assigned engineer with the gross impact approach applied in the program calculations. This also allowed an assessment of the additional data and monitoring needs that were required to complete each analysis and

the likely sources for obtaining those analytic inputs. Data sources included third-party SPC program implementers, interviews with EESP's that participated in a given project, and several on-site sources, including interviews completed at the time of the on-site, visual inspection of the systems and equipment, EMS data downloads, spot measurements, short-term monitoring (e.g., less than four weeks), and mid-term monitoring (4 to 8 weeks). In addition, results of the in-program[10] verification efforts were examined.

Each review included a formal analysis plan that was submitted to the study managers. This plan outlined the general ex-post impact approach to be used (including monitoring plans), provided an analysis of the current inputs (which may or may not differ from the approach used in each SPC application) and identified calculations necessary to complete the evaluation. The analysis plan specified what data was required to be collected during the site visit.

The ex-post methods applied varied in complexity from applications that required an entirely new approach, to those that required an independent calculation using the application-based approach, to those that simply required a careful review and verification of the methods and inputs in the ex-ante calculations, and finally to those that required the installation of loggers or other monitoring equipment in support of detailed engineering calculations.

3.4.3 Schedule and Conduct On-Site Data Collection

On-site surveys were completed for each of the 114 customer applications sampled. The engineer assigned to each job called to set up an appointment with the customer. During the on-site audit, data identified in the analysis plan was collected, including monitoring records (such as instantaneous spot watt measurements for chillers or other installed equipment, measured condensate temperatures, data from chiller logs, and energy management system (EMS) downloads), equipment nameplate data, system operation sequences and operating schedules, and, of course, a careful description of the baseline condition being modeled.

The on-site audit consisted of a combination of interviewing and taking measurements. During the interview, the Itron team engineer met with a building representative who is knowledgeable about the building's equipment and operation, and asked a series of questions regarding such matters as operating schedules, location of equipment, and equipment operating practices. Following this interview, the Itron team engineer made a series of detailed observations and measurements of the building and equipment.

[10] We use the term "in-program" to differentiate measurement and other activities conducted by the program administrators and their technical support contractors as opposed to related activities conducted by the evaluation team.

3.4.4 Conduct Site-Specific Verification and Impact Calculations

After all of the field data was collected, including monitoring data, energy and demand savings were developed based on the on-site data, monitoring data, application information, third-party implementer records and, in some cases, billing/interval data.

Energy savings calculations were accomplished using methods that include short-term monitoring, simulation modeling (e.g., DOE-2), bin models, application of ASHRAE methods and algorithms, analysis of pre- and post-installation billing and interval data, and other specialized algorithms and models.[11] Short-term monitoring was a priority for all sites, and peak demand savings was also estimated for all projects in the sample. In cases where billing/interval data analysis was used to estimate energy savings, peak demand savings were estimated using all data and methods, principally interval data (if available) and engineering calculations based on estimates of operating profiles and coincident peak diversity factors (which were obtained, in some cases, from secondary sources [e.g., previous evaluations, CEUS, DEER, etc.]).

3.4.5 Site-Specific Analysis Documentation

Documentation is provided in Appendix A for each site included in the impact analysis. The documentation for each site includes the following elements:

- Measure Description
- Summary of Program Impact Calculations
- Comments on Program Impact Calculations
- Description of the Impact Evaluation Process
- Impact Evaluation Results
- Supporting Documentation

3.4.6 Quality Control Review and Final Site Reports

Two levels of quality control review were implemented for this impact evaluation. The first level of quality control occurred within the impact evaluation team. All sites were assigned to a lead senior engineer who conducted the initial impact estimates. A second senior engineer who did not work on the site directly then reviewed each site report. This peer-to-

[11] Appropriate methods are summarized in Chapter 7 – Measurement and Verification of the *California Evaluation Framework Study*.

peer engineering review focused on the quality and clarity of the documentation and consistency and validity of the estimation methods.

The second level of quality control occurred by submitting the draft site reports to the utilities and their SPC technical support contractors for review. This review was important because it sometimes revealed gaps in the project documentation files received by the evaluation team that are important to calculation of the realization rate.

The Itron engineering and project management team reviewed and commented on all draft site reports and provided feedback to each assigned engineer for revisions or other improvements. Each assigned engineer then revised the draft reports as necessary to produce the final report as approved by Itron.

3.4.7 Estimate Verification, Realization, and Impacts for Participant Population

Extrapolation of the site-specific ex-post results to the population is described in detail in Chapter 5, Impact Results.

4

2004-2005 Customer Interview and Free Ridership Results

This section summarizes the results from a set of structured interviews conducted with participants in the PY2004-2005 SPC Program. The interviews were conducted between July 2007 and October 2007 with representatives from 106 separate customer organizations, accounting for 113 separate SPC program applications. The goal of these interviews was to provide feedback on participant customer experiences, as part of the process element of the PY2004-2005 evaluation scope, and input for estimation of the program's net-of-free-ridership ratio, as part of the impact evaluation scope. Note that many of the questions asked in this survey, including those on net-of-free-ridership, have been included in prior evaluation studies of the SPC program throughout its inception in 1998; thus facilitating consistent benchmarking of results over time.

This section contains the following subsections:

- General Characteristics of the PY2004-2005 Participant Customer Sample
- Drivers of Program Participation and Project Implementation
- Satisfaction with the Program and Program Processes
- Program Influence on Future Energy Efficiency Actions
- Net-of-Free Ridership Results

4.1 General Characteristics of the 2004-2005 Participant Customer Sample

This subsection presents characteristics of the sample of PY2004-2005 SPC customer participants with whom in-depth interviews were conducted in July through September of 2007. The customer participant sample for the process interviews was coordinated with the impact evaluation sample and only included customers with completed projects. As a result, 95 of the 106 customers interviewed are also included in the impact evaluation. As presented

in Section 3, all customer participants were stratified into five roughly equal-sized strata based on the kWh savings associated with each application for *each* utility.

Table 4-1 and Table 4-2 show the interviews completed by utility and by strata. Consistent with the sample design (see Section 3), SCE represented the largest share of the customers interviewed, at 59 percent and SDG&E the smallest share at 11 percent.

Table 4-1: Completed Interviews with PY2004-2005 SPC Participants by Utility

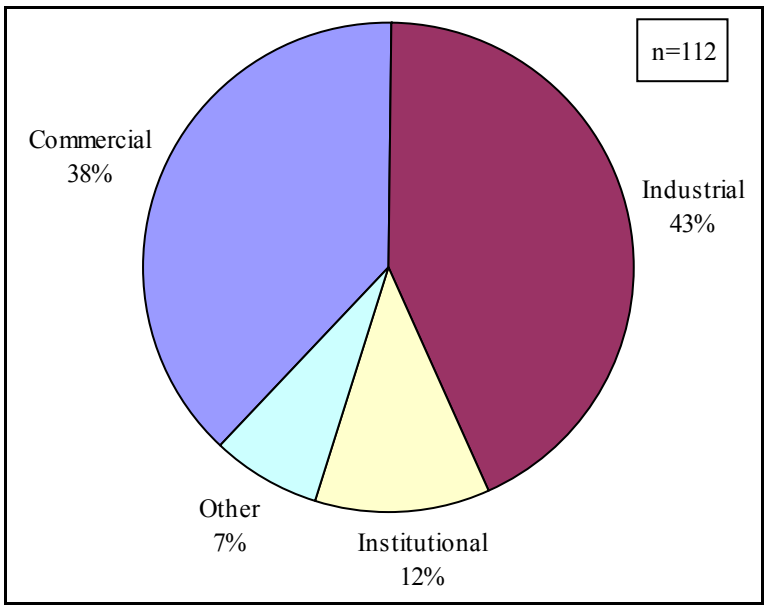
Utility	Percent (2005)
PG&E	30%
SCE	59%
SDG&E	11%
Total Responses	113

Table 4-2: Completed Interviews with 2004-2005 SPC Participants by Utility and Strata

Savings Strata	PG&E	SCE	SDG&E	Statewide %	
Tier 1	4	3	1	8	7%
Tier 2	10	15	1	26	23%
Tier 3	6	19	4	29	26%
Tier 4	7	15	4	26	23%
Tier 5	7	15	2	24	21%
Total	*34*	*67*	*12*	*113*	

As shown in Figure 4-1, the sample of customers also includes respondents from each of the four major market segments, commercial, industrial, institutional, and agricultural. Both the industrial and commercial sectors each had roughly 40 percent of the respondents, closely following the distribution in the overall program population. The average size of participating sites was roughly 540 thousand square feet.

Figure 4-1: Completed Interviews with SPC Participants by Market Sector, PY2004-2005



About three-fourths of the respondents submitted a single application to the 2004-2005 SPC program, while another 10 percent had two active applications. The remaining sixteen respondents had 3 or more active applications.

As shown in Table 4-3, 37 percent of those surveyed used Energy Efficiency Service Providers (EESPs) to sponsor their projects, similar to the proportion of EESP sponsorship in the 2004-2005 SPC program population.

Table 4-3: Completed Interviews with SPC Participants by Sponsorship Status, PY2004-2005

Sponsorship Status	Percent
Self-Sponsor	63%
EESP-Sponsored	37%
Total	113

4.2 Drivers of Program Participation and Project Implementation

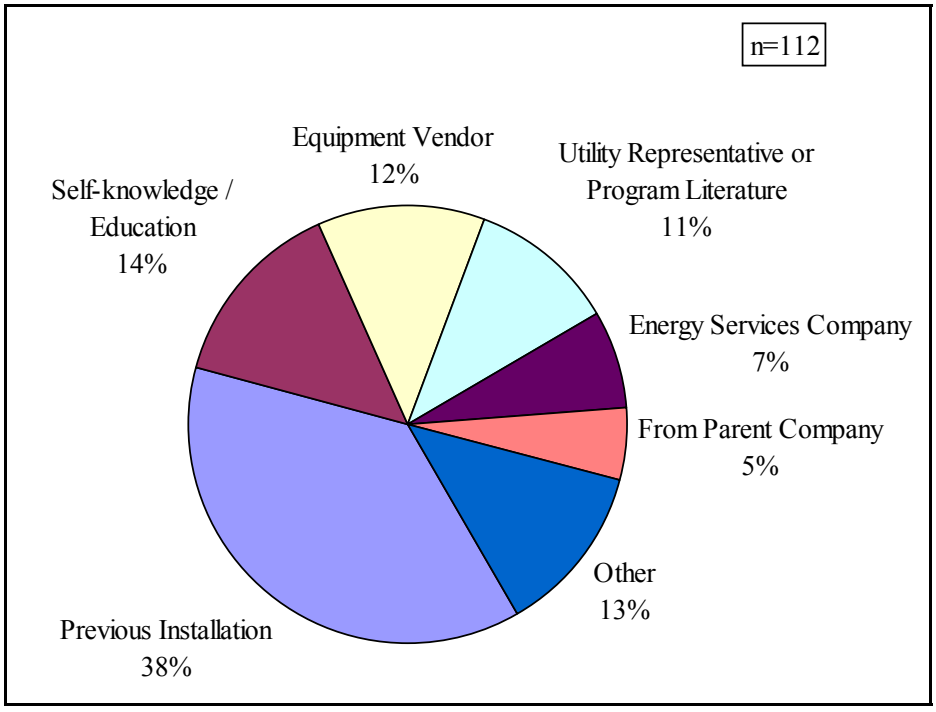
In this subsection, we present responses to a series of questions customers were asked about how they made decisions related to PY2004-2005 SPC projects. Customers were asked how they learned about the efficiency measures implemented, their reasons for pursuing the

projects, condition of equipment replaced, how and when they learned about the SPC program, and the role and significance of third-party firms in their decision-making processes.

4.2.1 Non-Program Drivers

As shown in Figure 4-2, just over half of those implementing projects in PY2004-2005, were already aware of the equipment they installed prior to considering whether to implement the project. Of this group, nearly three-fourths (representing 38% of respondents) had previous experience with this same equipment at other locations. The remainder (14% of respondents) had already learned about the technology through other sources. About one-third of those implementing projects were informed of the installed measure by an outside source, either the utility representative, a contractor/vendor, or an ESCO representative. Again, these findings mirror previous SPC evaluation results.

Figure 4-2: How SPC Participants Learned about the Equipment They Installed, PY2004-2005



The desire to reduce energy costs is a primary motivation for pursuing projects through the SPC program, according to 84 percent of respondents. This is consistent with results from prior years' evaluations. (Note that multiple answers were possible per respondent and that the question was an open end). Improving measure performance and replacing older equipment were the next most common reasons given for implementing measures via the

SPC program. Only about one-fifth of respondents mentioned the rebate as a primary motivating factor. These findings are summarized below in Table 4-4.

Table 4-4: Reasons for SPC Project Installation, PY2004-2005

Reason to Install (Open ended)	Percent
To reduce energy costs	84%
To improve measure performance	37%
To replace old or outdated equipment	30%
To get a rebate from the program	21%
To allow remodeling, build-out, or expansion	13%
To gain more control over how the equipment was used.	13%
To reduce energy demand/likelihood of blackouts	10%
To acquire the latest technology	5%
To protect the environment	4%
Incentive and savings made payback acceptable	3%
To respond to the energy crisis	2%
Recommended in audit	2%
Total (multiple answers permitted)	112

Most of those implementing projects through the SPC program had equipment that was fully functional, or had no pre-existing equipment. Only about a quarter of those interviewed were seeking to replace equipment that had problems or had failed altogether. Another 20 percent were installing new equipment or ancillary measures, such as variable speed drives (VSDs). Table 4-5 reports these findings.

Table 4-5: Condition of Equipment Replaced through Program, PY2004-2005

Reason to Install	Percent
Existing equipment fully functional	53%
Existing equipment had problems	22%
No preexisting equipment	17%
Existing equipment had failed	5%
NA, ancillary (VSD, EMS, controls, etc.)	3%
Total (multiple answers permitted)	113

4.2.2 Sources of Program Awareness

As in prior years, utility representatives were by far the customers' main source of initial information about the SPC program (see Table 4-6). About two-thirds of respondents cited a utility representative as their initial source of program information. One out of six customers mentioned a contractor, vendor, or energy services company as their source of program information.

Table 4-6: How Customers Learned about Program PY2004-2005

Where Heard About Program	Percent
Utility representative	68%
Contractor/Vendor	12%
Energy Services Company	4%
Previous installation	3%
Architect / Engineer	3%
Colleague / Trade show	2%
From parent company	2%
Other	6%
Total	113

Utility audits are another possible path to participation in the SPC program; however, findings indicate that the utility audit is not a strong source of SPC project leads. Just twenty-five of the 113 respondents (22 percent) were listed in the tracking database has having received an audit from their utility in the past 3 years. Of these, 20 confirmed receiving audits, and the remainder could not recall having an audit done. This suggests that only a

minority of SPC participants come to the program as a result of a utility audit. Note that a more detailed analysis of the relationship between the utility audit programs and measure adoption in the SPC and Express Efficiency programs is being conducted as part of the *2004-2005 Nonresidential Audit Program Evaluation* study.

4.2.3 The Influence of Third-Party Firms

EESPs continue to be involved in over one-third of projects implemented through the SPC program. As shown below in Figure 4-3, the percentage of EESP-sponsored applications among customers in the SPC interview sample is similar to that in 2003, but is double the 2001 and 2002 proportions. However, customers are more proactive now than in the past in engaging the services of EESPs to help them implement energy efficiency projects through the SPC program.

Figure 4-4 shows that customers initiated contact with the EESP in about three-quarters of projects. In only 20 percent of the cases did the EESP initiate contact with the customer. This was a significant drop from the 55 percent reported in 2003.

Figure 4-3: Self Reported EESP-Sponsorship within Evaluation Samples 2001-2005

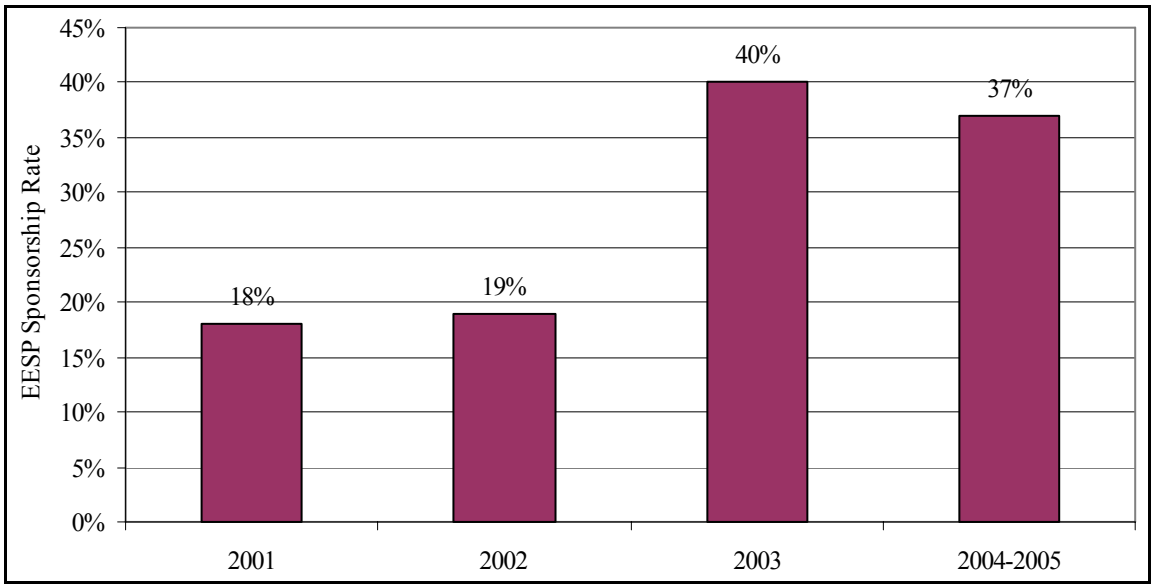
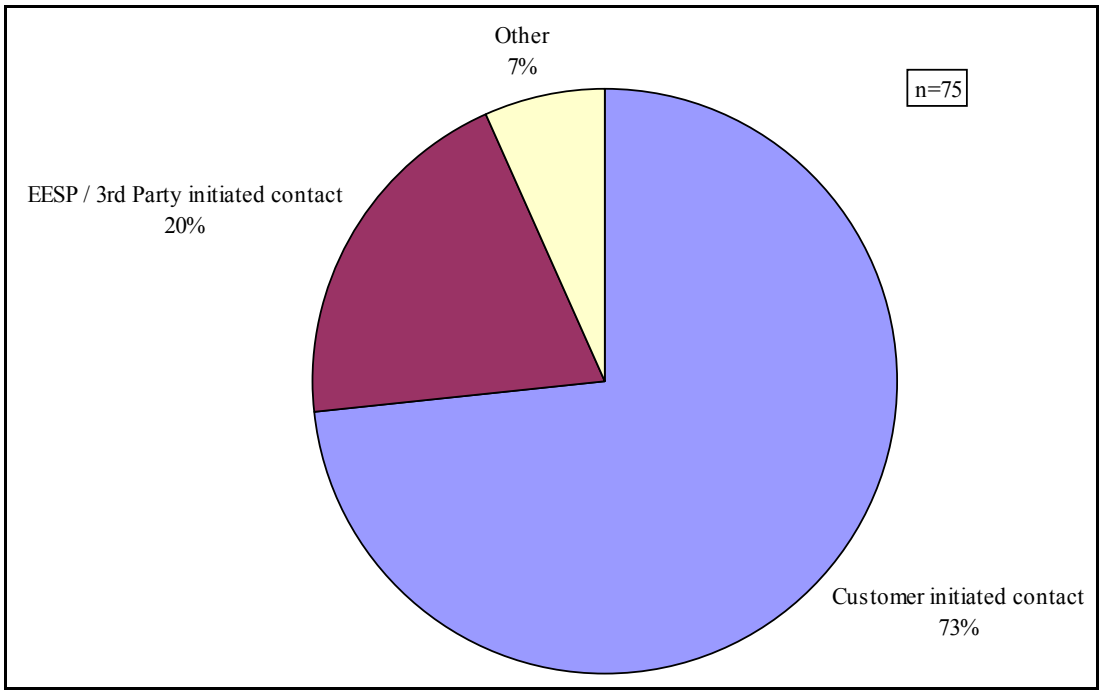


Figure 4-4: Initiator of Energy Efficiency Project, PY 2004-2005



Those that involved EESPs in the design and implementation of their SPC projects reported them to be a key influence in their decision making[12]. As shown in Figure 4-5, nearly 70% of those who used EESP sponsors rated their contribution as either very or somewhat significant in their implementation decision. Only 20 percent rated the third-party firm's role as very insignificant. As in previous evaluations, customers reported that the most common EESP roles were helping with the savings calculations, program paperwork, and in some cases, measure installations. Third-party firms also play a significant role in self-sponsored projects, i.e., those that do not involve an EESP (see). Of those projects which are self-sponsored, nearly three fourths involve third-party contractors and their contributions are perceived to be valuable. Most often, the third-party contribution to design or implementation was reported to be "significant", as was the case for the PY2002-2003 results.

Third-parties also play a strong role in identifying the measures to be implemented and convincing the decision maker to implement them, however, their influence is somewhat less among self-sponsored projects. Figure 4-5 reports findings regarding the roles played by third-party firms, both overall and by sponsorship type. Over half of those implementing SPC

[12] Note that only the 74 EESP-sponsored customers and self-sponsoring customers who reported substantial assistance from an EESP were asked this question regarding the significance of the third-party in their decision-making process.

projects reported having developed the project ideas and pursued installation themselves. Among self-sponsors, this figure rises to 55 percent. Another 3 percent indicated that a third-party was responsible for developing the idea, but that they decided on their own to pursue installation. Just over one-fourth of respondents said that a third-party was responsible for convincing or persuading them to pursue implementation of the projects. As would be expected, several answers differ considerably when segmented by sponsorship. The general result, that roughly half or respondents report that they developed their SPC project concepts themselves and were primarily responsible for successfully making the case for implementation with their organizations is consistent with the results from prior SPC evaluations.

Figure 4-5: Significance of Third-Party Firm Services in Decision to Install SPC Projects, PY2004-2005

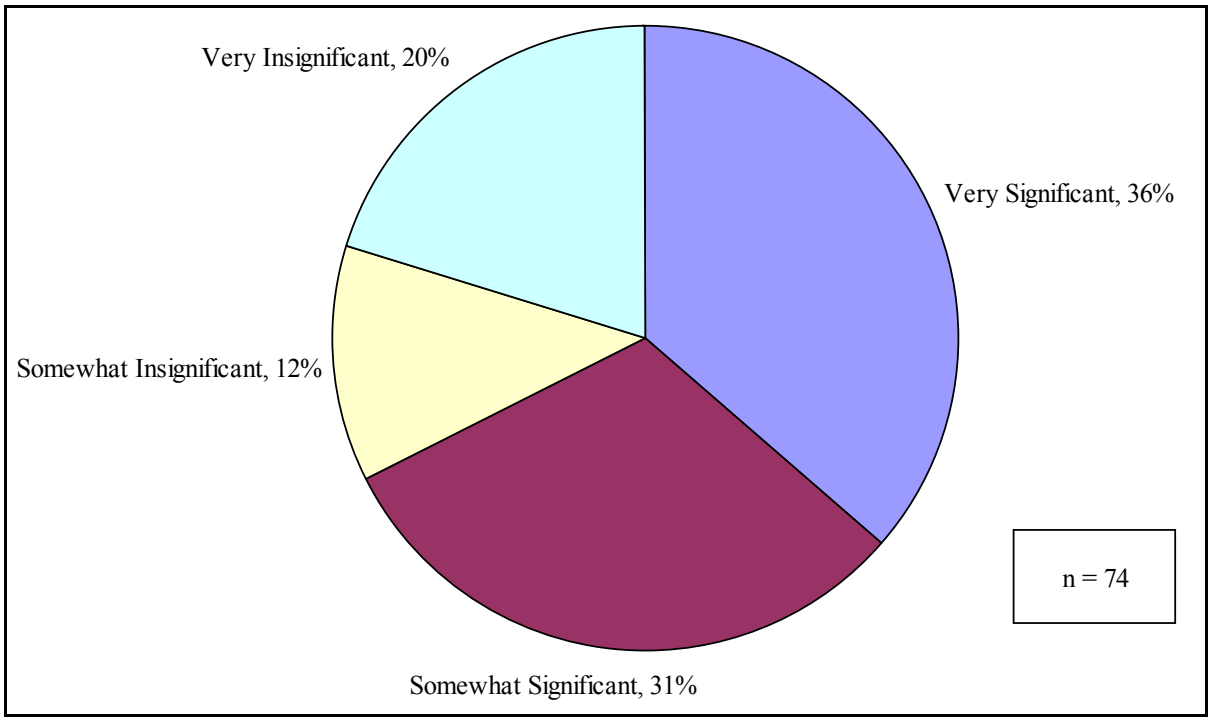


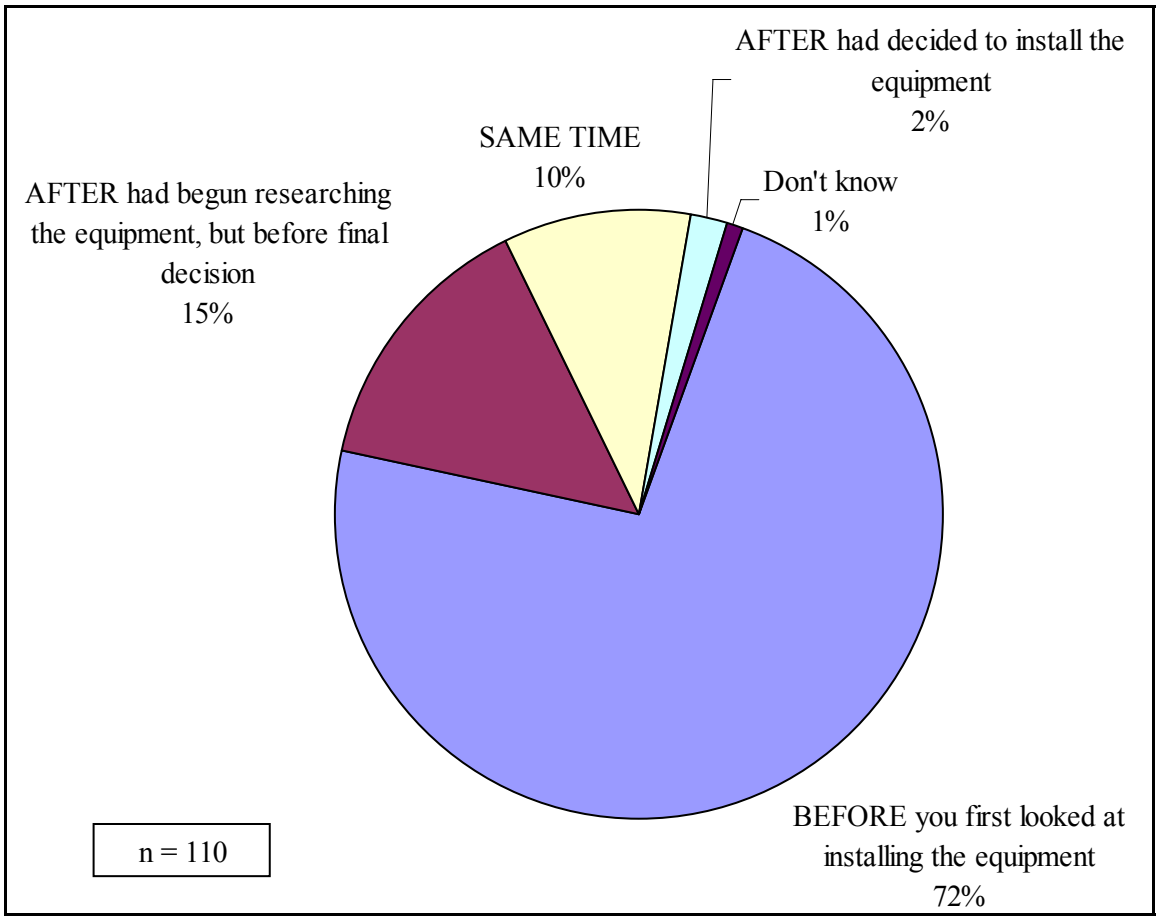
Table 4-7: Role of Third-Party Firms in Project Decision-Making, PY2004-2005

Project Decision-making	EESP Sponsor	Self-Sponsor	Overall
Developed idea ourselves, own decision	46%	55%	53%
Own idea, third-party convinced us	21%	12%	14%
Idea and persuasion from third-party	14%	13%	13%
ID in audit, waiting for incentive	0%	11%	8%
Idea from a third-party, own decision	4%	2%	3%
Other	14%	7%	9%
N	28	85	113

4.2.4 SPC Program Influences on Decision-Making

SPC program awareness levels are quite high among those that ultimately decide to participate in the SPC program. As shown in Figure 4-6, nearly three quarters of the 2004-2005 respondents reported being aware of the SPC program before they considered installing energy efficient equipment through the program. This is somewhat higher than program awareness levels reported in both the 2003 (50 percent) and 2002 (64 percent) evaluations.

Figure 4-6: When Participants Heard About the Program, PY2004-2005



Customers were asked two key questions regarding the role of SPC incentives in their decision to implement the projects included in their program applications. These questions are part of the series of questions used to calculate the net-of-free-ridership ratios, which are presented in Section 5.5.

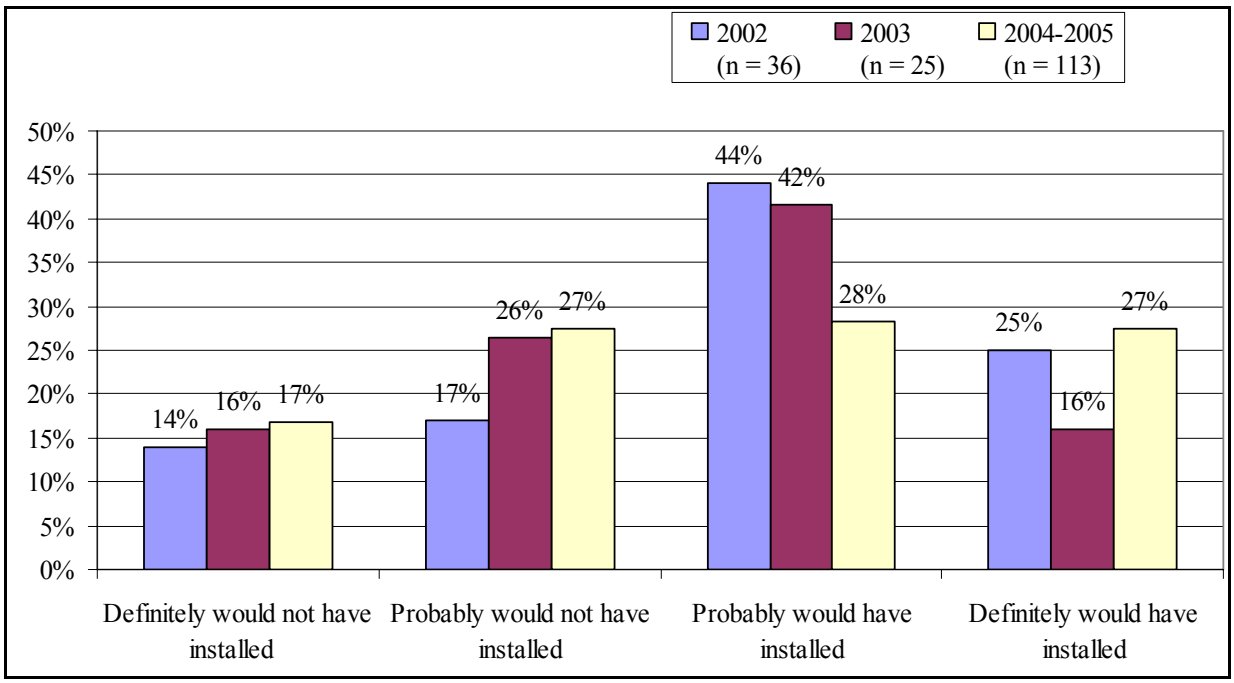
Findings indicate that incentives provided through the SPC program are a key influence in the decision to install energy efficient measures through the SPC program. As Table 4-8 shows, nearly 90 percent of respondents said that the financial incentives were either Very or Somewhat Significant in their installation decision. The percentage of respondents reporting incentives to be Very Significant in PY2004-2005, 55 percent is comparable to the proportion of respondents in 2003 (60 percent), and significantly higher than the 31 percent in 2002.

Table 4-8: Influence of SPC Program Financial Incentives on Decision to Install, PY2004-2005

Influence of Program Incentives	Percent
Very significant	55%
Somewhat significant	34%
Somewhat insignificant	4%
Very insignificant	7%
Total Responses	113

However, a significant proportion of respondents indicated that absent the SPC program, they would have likely installed the same equipment anyway, as shown in Figure 4-7. When asked whether they would have installed the energy-efficient equipment without the SPC program interventions (both financial incentives and any EESP assistance), over half said that they would have either "Probably" or "Definitely" installed the equipment without the program. Participants in PY2004-2005 were also more emphatic about their likelihood of measure installation, with a significantly higher percentage reporting they "definitely would have installed" the measure absent the program compared to PY2003. Roughly 40 percent of respondents said they would definitely or probably not have installed energy efficient equipment absent the program, similar to levels reported in 2003, but considerably higher than those in 2002.

Figure 4-7: Likelihood of Installation without SPC Program
Program Years 2002, 2003, 2004-2005



Another dimension is the efficiency level of equipment that would have been installed in the program's absence. Findings indicate that the selected efficiency level is highly correlated with the likelihood of equipment installation absent the program (Table 4-9). Two-thirds of respondents who had said that they either "Probably" or "Definitely Would" have installed the equipment without the program reported that they would have installed the same level of efficiency as what they installed through the program. With respect to the timing of equipment installation, nearly half (42 percent) reported that they would have installed some type of equipment sooner, within 6 months of actual installation. (See Table 4-10). In contrast, only a quarter of the respondents who said that they "Probably" or "Definitely Would Not" have installed the equipment in the absence of the program reported they would have installed anything in the near future, regardless of efficiency; 41 percent indicated that they might install the same or similar equipment in 2 or more years.

The results from all of the questions on program influence are integrated into a net-of-free-ridership estimate at the end of this chapter.

Table 4-9: Likelihood of Same Efficiency without 2004-2005 SPC Program

Likelihood of Same Efficiency Without Program	Likely to Install Anyway	Unlikely to Install Anyway	All Respondents
Probably NOT as efficient	9%	8%	17%
Probably as efficient	12%	36%	49%
Not applicable for measure (e.g. VSD)	4%	6%	11%
Would not have installed	15%	1%	16%
Don't know	4%	4%	8%
Total Responses	50	63	113

Table 4-10: Timing of Project without 2004-2005 SPC Program

Timing of Project Without SPC Program	Likely to Install Anyway	Unlikely to Install Anyway	All Respondents
Same time or within 6 months	3%	24%	27%
6 months to two years later	7%	23%	30%
Two to three years later	8%	4%	12%
Three to four years later	4%	1%	4%
Four or more years later	11%	3%	13%
Never	10%	0%	10%
When existing failed	3%	1%	4%
Don't know	4%	1%	4%
Total Responses	50	63	113

4.3 Satisfaction with the Program and Program Processes

In this subsection, we present PY2004-2005 SPC Program process-related findings. SPC program participants were asked about their satisfaction with the SPC program as a whole, as well as with specific program attributes. The topics covered include:

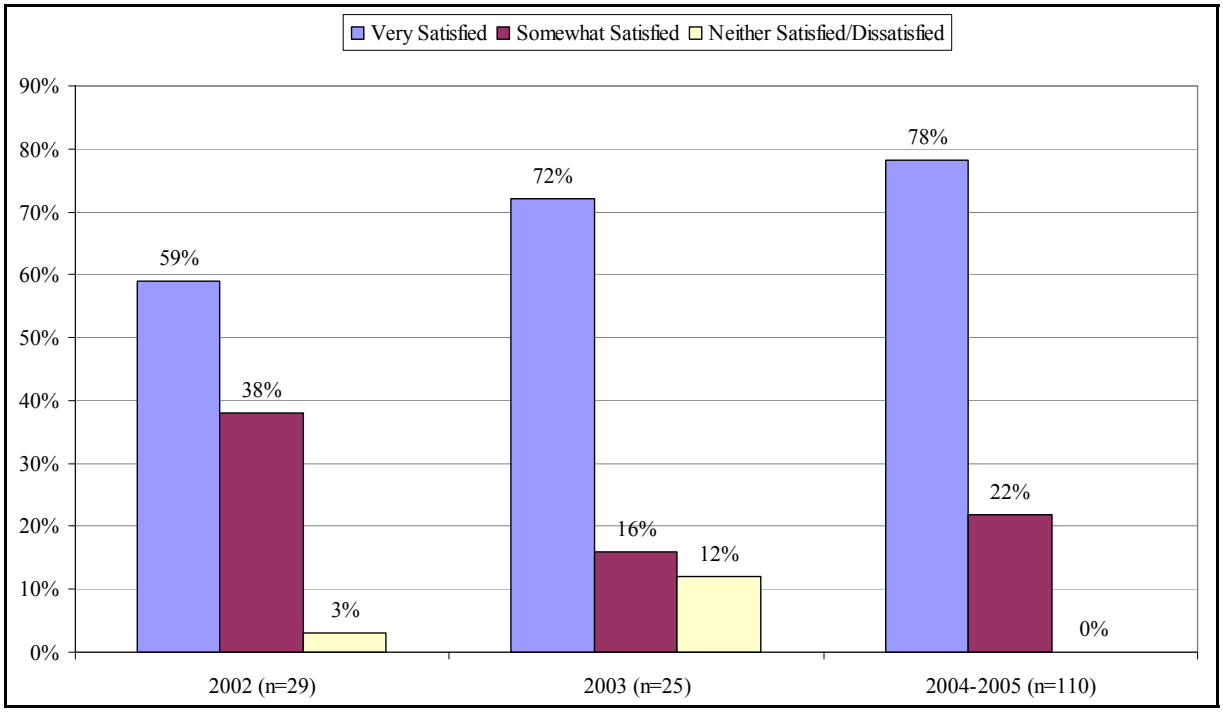
- Overall satisfaction with the program
- Program strengths and weaknesses
- Incentive structure and payment processing

- Usefulness of program tools and supporting materials
- Opinions on program management staff.

4.3.1 Overall Program Satisfaction

Participants were asked to rate their overall satisfaction with the program on a scale of 1 to 5, where 1 meant they were very satisfied with the program or process and 5 meant they were very dissatisfied. In general, participants are highly satisfied with the program, providing very positive overall satisfaction ratings. A large majority (78 percent) of respondents reported being very satisfied with the 2004-2005 SPC program, while the remaining 22 percent reported being somewhat satisfied (Figure 4-8). None reported being dissatisfied or neutral about the program. The "very satisfied" share has been growing steadily since 2002; while the "somewhat satisfied" share also rose from 2003 to 2004-2005.

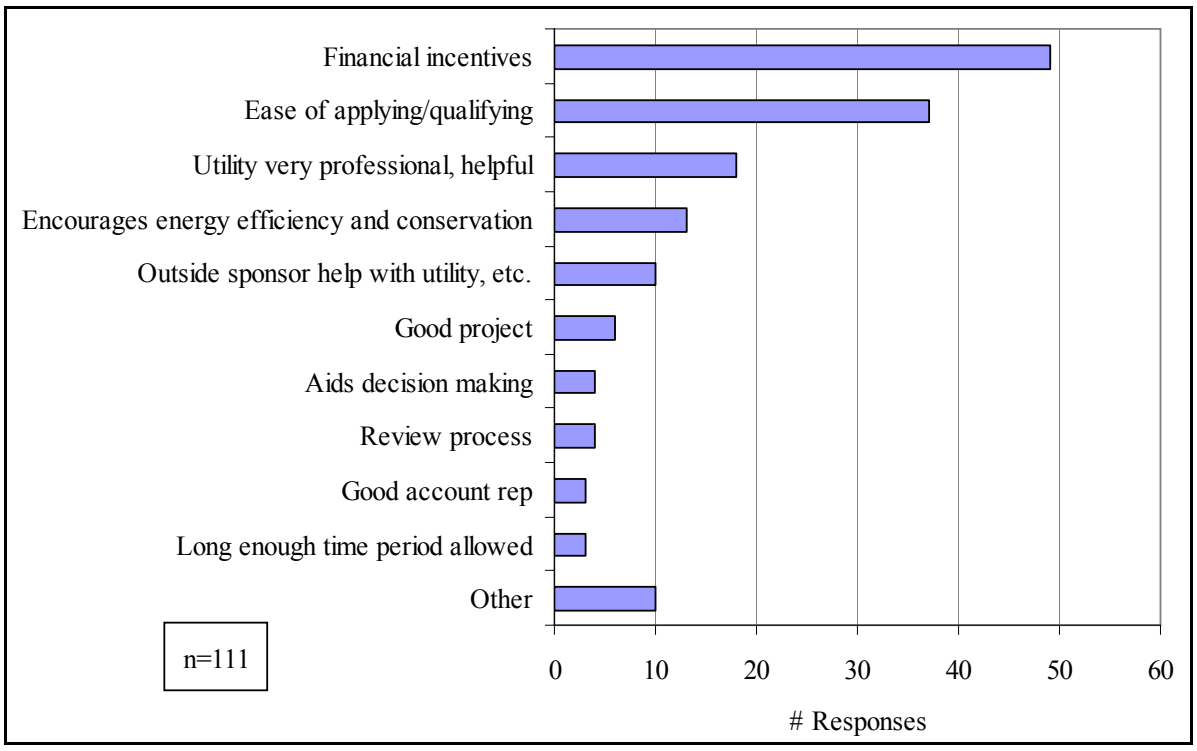
Figure 4-8: Overall Program Satisfaction Program Years 2002, 2003, 2005



4.3.2 Program Strengths and Weaknesses

All the respondents were asked to express what they thought were the strengths and weaknesses of the 2004-2005 program. Figure 4-9 and Figure 4-10 show program attributes that were cited by a minimum of three respondents; less common selections were assigned to the "Other" category.

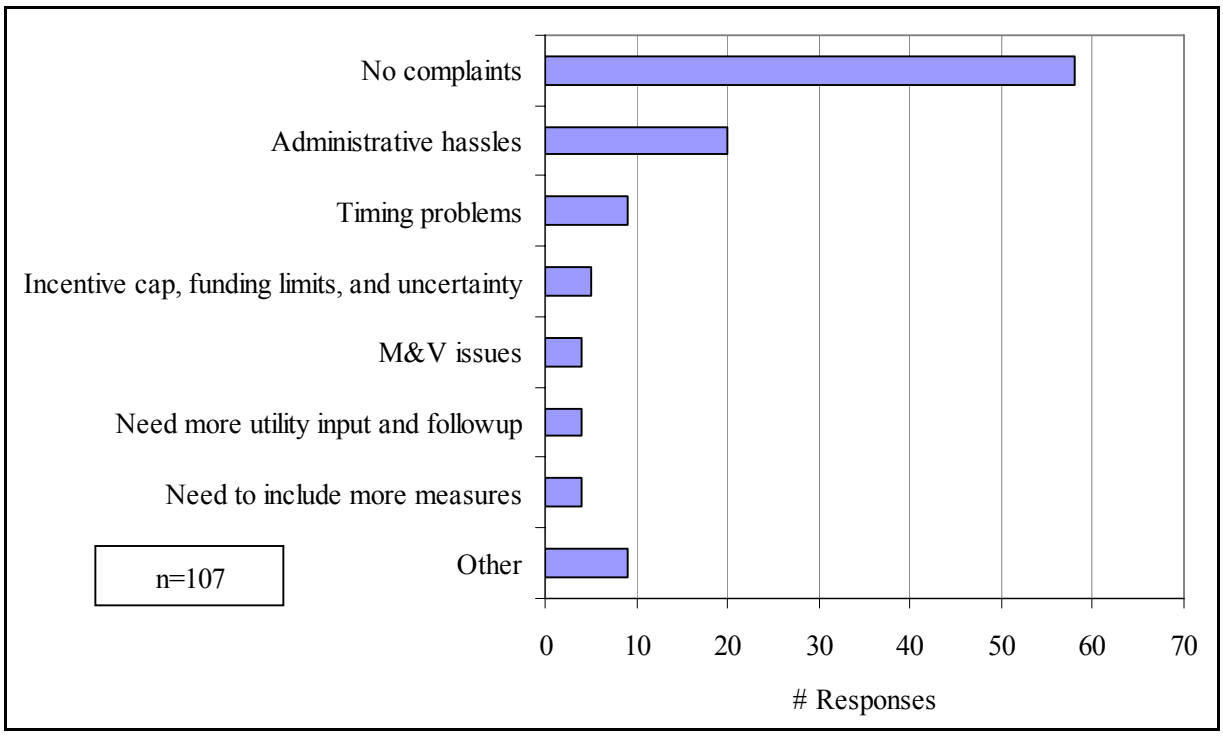
Figure 4-9: Positive PY2004-2005 SPC Program Attributes Cited by More than Two Respondents *(multiple responses allowed)*



As would be expected, the financial incentives offered through the program are most often cited as one of the program strengths, according to 43 percent of respondents. See Figure 4-9. The SPC program's ease of applying and qualifying was next most frequently mentioned as a program strength (33 percent of respondents). This testifies to program administrators' continuing efforts to streamline the application and M&V processes over the nine-year history of the program. A significant number of participants also praised the professionalism and helpfulness of their utility in administering the program (20 percent of respondents).

Comments about the SPC program's weaknesses have escalated since 2003. Over half of PY2004-2005 participants offered various complaints about the program, compared to only 20 percent in 2003. See Figure 4-10. The most common area of complaints concerned administrative hassles associated with participating (19 percent of respondents): Other complaints mentioned were various timing-related problems (8 percent of respondents), and incentive policies or practices (5 percent of respondents). Concerns over the program's M&V requirements, a major problem area in 2003, were only expressed by 4 percent of respondents.

Figure 4-10: Negative PY2004-2005 SPC Program Attributes Cited by Multiple Respondents *(multiple responses allowed)*

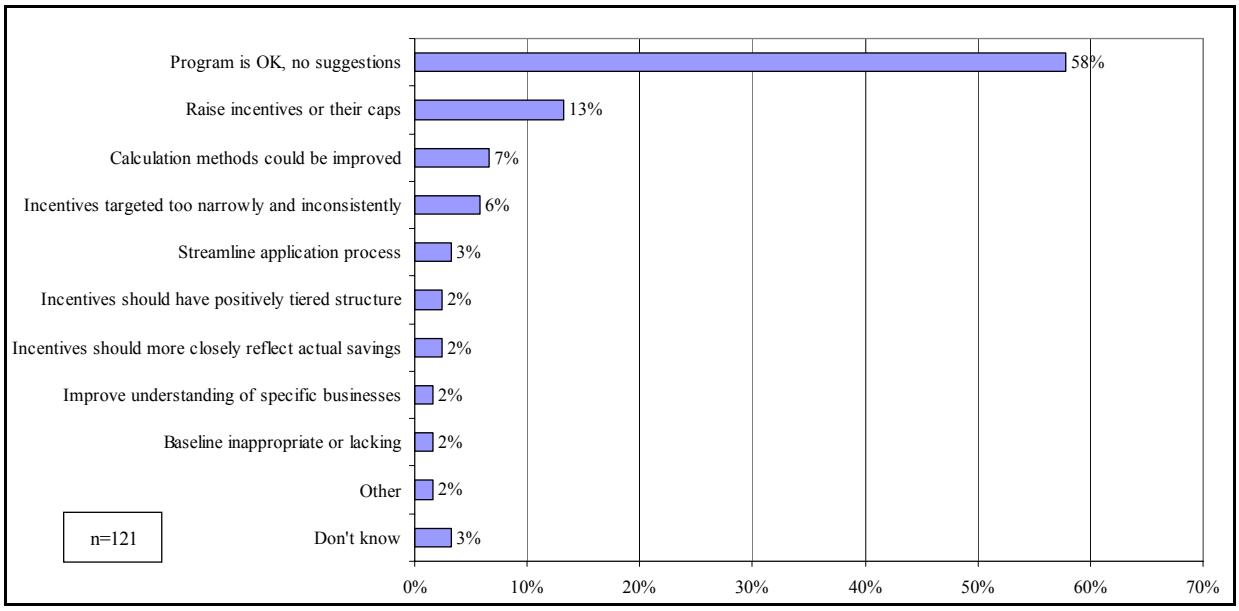


One or two respondents also cited unhelpful utility reps, ESCO complaints, cumbersome calculations, and software not targeted to the user's situation.

4.3.3 Rebate Structure and Payment Processing

In general, SPC participants are satisfied with the incentive level and structure and have few complaints or suggestions. Figure 4-11 shows that almost 60 percent of respondents were satisfied with the PY2004-2005 structure and did not provide suggestions for improvements. Among the suggestions received were: raising incentive rates or their caps (mentioned by 12 percent of respondents), improving incentive algorithms (7 percent of respondents) and broader or more consistent targeting of incentives (6 percent of respondents).

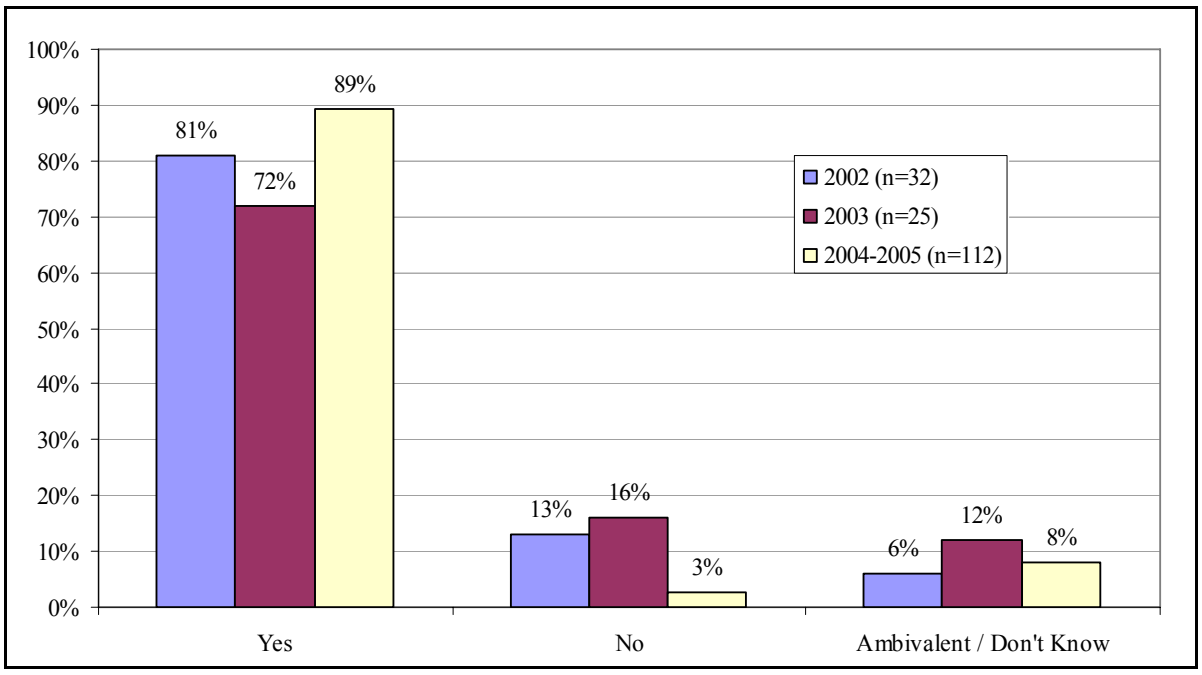
Figure 4-11: Respondents' Thoughts on Incentive Structure, PY2004-2005



The survey also queried participants on the reasonableness of program payment procedures and the timing of payments. Nearly 60 percent of 2004-2005 SPC program participants reported that both were reasonable. Figure 4-12 presents their responses and compares them to responses from 2002 and 2003 SPC program participants.

Figure 4-12: Reasonableness of Payment Procedures and Timing of Payments, PY2004-2005

Question P5a: Please describe your experiences with the payment process for your SPC projects. Are payment procedures and timing of payments reasonable?

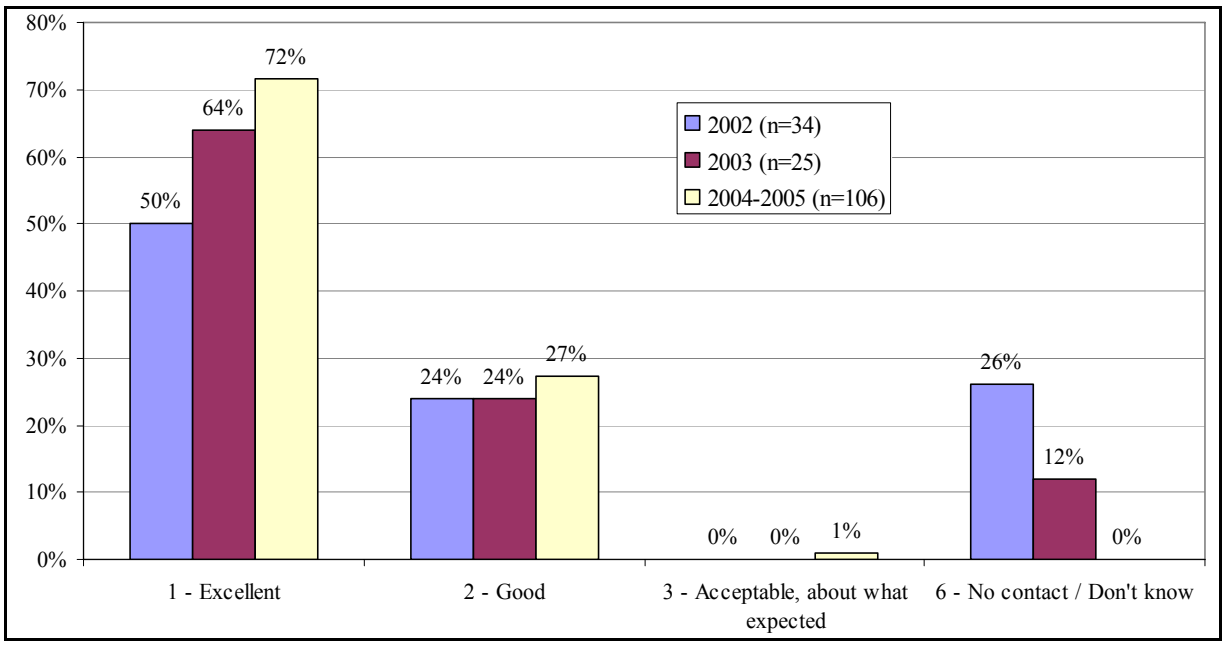


The percentage of respondents providing favorable comments regarding incentive payment procedures and timing continues to rise relative to earlier program evaluations.

4.3.4 Opinions on Administration

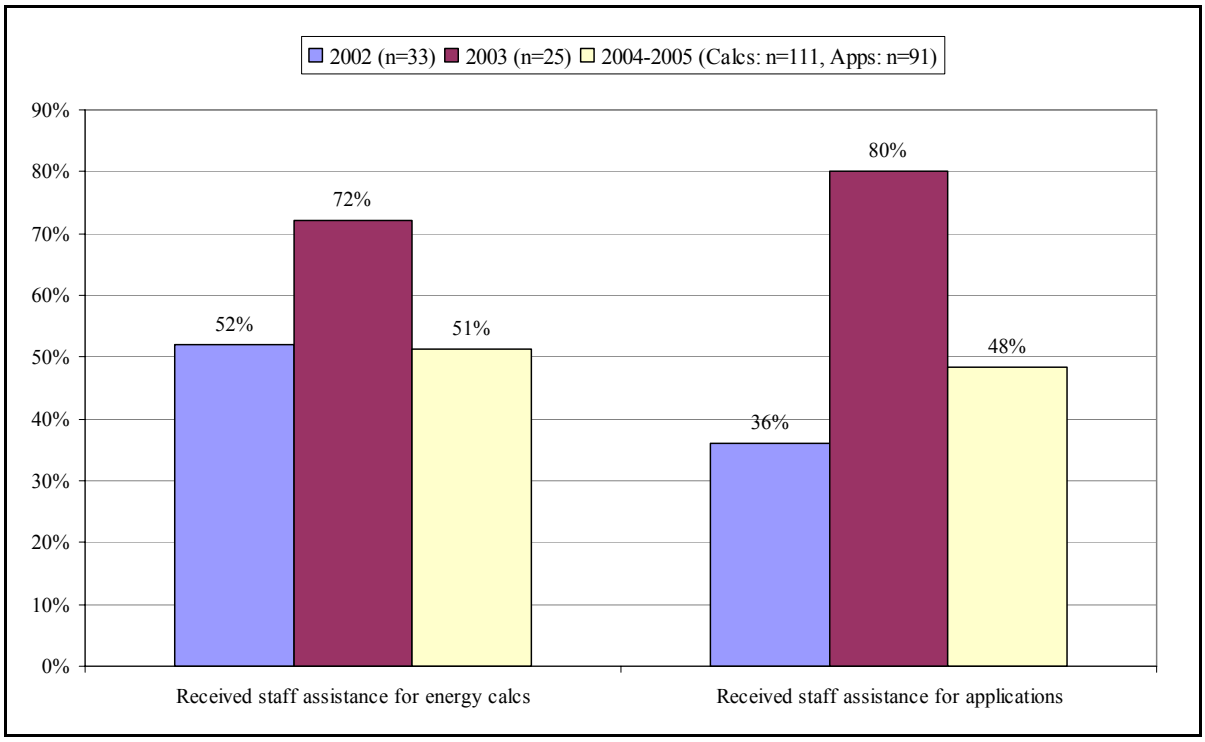
SPC participants were also highly satisfied with the utility's SPC program staff, which included their assigned account representative. Figure 4-13 shows that nearly three-quarters of PY2004-2005 respondents rated their experience with the program staff as "Excellent," up from 64 percent in 2003. Many respondents provided additional positive comments characterizing their SPC contact as helpful, informative, professional, knowledgeable, responsive, timely, or efficient. Almost 15 percent specifically praised their assigned account representative. As in 2002 and 2003, none of the 2004-2005 respondents reported having a poor experience with the utility staff.

Figure 4-13: Overall Program Experience with Utility Program Staff, PY2004-2005



SPC participants also have the option of receiving assistance from the utility staff for performing energy savings calculations or filling out the SPC program project application forms. As Figure 4-14 shows, about half the respondents received utility help for both calculations and applications in 2004-2005, down from about three-quarters of respondents in 2003, and closer to the response from 2002. More than likely, this is a reflection of the program's ongoing efforts to continue to streamline its application and M&V processes.

Figure 4-14: Use of SPC Program Staff Assistance PYs 2002, 2003, 2004-2005



SPC participants can also take advantage of services provided by the program's technical support contractors. More than half of the respondents said that they had availed themselves of these services. Of these 93 percent rated their experience with the technical contractors as "Excellent" or "Good," Only 1 respondent provided unfavorable comments.

The survey also asked 2004-2005 respondents whether the SPC utility program staff could provide any additional types of useful assistance. Several respondents did provide suggestions for improving program staff services. These included:

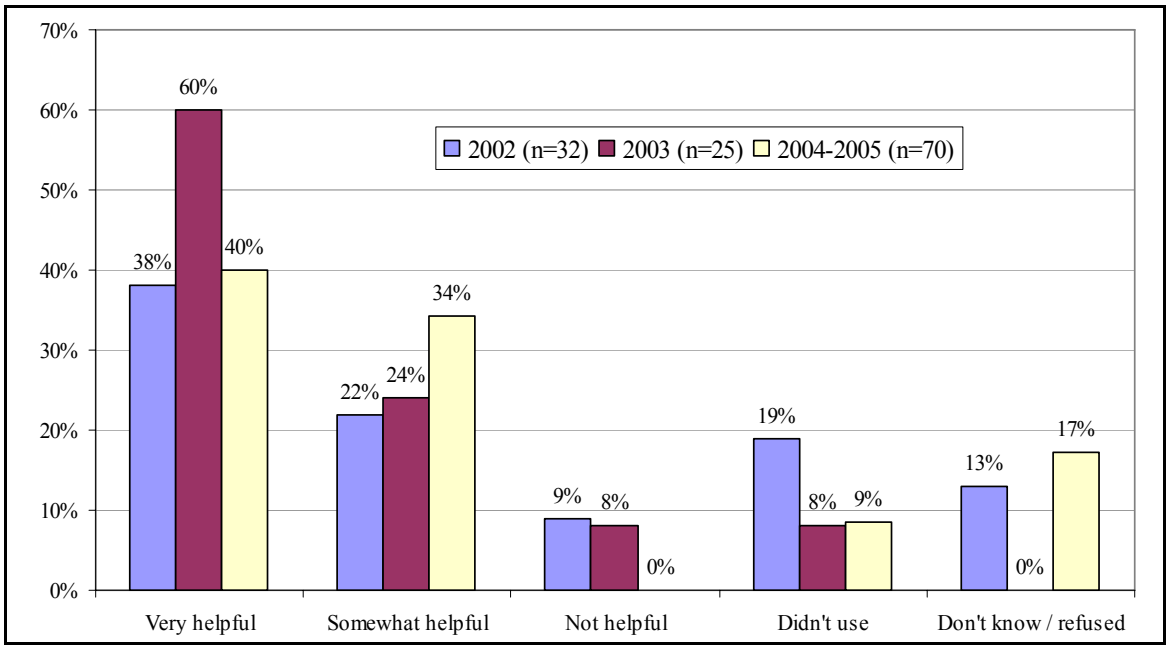
- More programs and incentives
- Further simplifying the paper work and M&V requirements
- More participation by utility representatives throughout the program lifecycle
- Provide more information on energy efficiency programs and technologies.

4.3.5 Program Tools

Participants also find the various tools offered through the program (the savings calculator and the program website) to be helpful in supporting their SPC program applications and decision making. As shown in Figure 4-15, 74 percent of respondents found the program

tools to be at least somewhat helpful; a decrease of ten percentage points over the rating given by the 2003 respondents. This drop was essentially matched by an increase in those who offered no rating. Participants' enthusiasm for these tools has dropped somewhat since 2003, as indicated by the substantial shift in responses from the "very helpful" to the "somewhat helpful" category.

Figure 4-15: Rating the Usefulness of the Program Tools (Savings Calculator and Website, PY2004-2005)



Nearly 80 percent of participants are aware of the SPC program website and over half of them acknowledged making use of it. The most common use of the website is to download forms; less common uses include obtaining load data and getting EE program information. Two respondents volunteered that the website was well-organized and easy to navigate.

Thirty-four percent of "aware" respondents (31 of 90) had used the savings calculator, a moderate increase over the 24 percent in 2003 and 21 percent in 2002. Respondent opinions were mixed on the usefulness of the calculator; with as many saying it was useful as saying it was too difficult. Some used it simply for preliminary estimates, while others referred to it extensively to maximize their incentive.

4.3.6 Net of Free Ridership Results for 2004-2005 Evaluation Sample

This section presents the weighted results of estimated free-ridership for the 2005 SPC customer sample. The free ridership data are used to provide an estimate of the percentage of

the immediate, gross first-year savings that would have occurred in the absence of the program. The method used to calculate free ridership is based on self-reported information provided in response to the battery of questions included in the telephone interviews that addressed:

- Significance of program incentives on decision to install measures
- Significance of any third-party assistance on decision to install measures
- Likelihood of installing high-efficiency measures in absence of the program
- Estimated time period for installation in absence of the program

In order to develop net-of-free-ridership[13] estimates, customer responses to the battery of questions are converted to numeric values, which we refer to as net-of-free-ridership (NTFR) values. Detailed net-of-free-ridership ratios are then calculated for each site included in the analysis. Note that this method has been used extensively as part of previous utility program impact evaluation for programs that require site-specific free ridership calculations, and are consistent with the CADMAC impact evaluation protocols.[14,15] The results are weighted in order to establish the program NTFR.[16]

[13] Note that we differentiate net-of-free-ridership from net-to-gross. Net-of-free-ridership values account for only free ridership-related effects. Net-to-gross incorporates both free ridership and other adjustments, such as participant spillover.

[14] For a discussion of issues related to estimating net-to-gross ratios and free ridership using participant self-reports see *Quality Assurance Guidelines for Statistical, Engineering, and Self-Report Methods for Estimating DSM Impacts*, prepared for the California Demand Side Management Measurement Advisory Committee: The Subcommittee on Modeling Standards for End Use Consumption and Load Impact Models, April 1998. See also CADMAC evaluation protocols at http://www.calmac.org/cadmac-protocols.asp

[15] This method is also generally consistent with the self-report methods for large non-residential programs being developed as part of the CPUC's 2006-2008 energy efficiency program evaluation studies.

[16] For more information on the methodology used to adjust for spillover and self-report bias to establish net-to-gross ratios for the SPC program, see XENERGY, 2001. *Improving the Standard Performance Contracting Program: An Examination of the Historical Evidence and Directions for the Future*. Note that although this report recommends a small adjustment for the potential downward bias in the self-report method, it does not recommend that an alternative approach be employed for large nonresidential site evaluations (because alternative methods have more significant limitations for these types of projects).

4.3.7 Methodology Used to Calculate Net Savings

Initial net-of-free-ridership values were assigned on the basis of customer's responses to three questions: the *significance of program incentives,* the *significance of EESP services,* and the *likelihood of installing anyway* questions.

Table 4-11 presents findings related to the rated significance of program incentives and EESP services in the decision to install program measures in PY2004-2005.

Table 4-11: Assignment of Net-of-Free-Ridership Values for Significance of Program

Significance	Assigned Value	Significance of Incentive (N=113)	Significance of EESP Services (N=74)
Extremely Significant	1.0	55%	36%
Very Significant	0.667	34%	31%
Somewhat Significant	0.333	4%	12%
Insignificant	0.0	7%	20%

We defined the program significance as being equal to the maximum value of the response to questions about the significance of incentives (survey question number PD6c) and significance of EESP services (PD6a). This value was then averaged with the value assigned to the likelihood of installing anyway question (PD7), as shown in Table 4-12, to create the initial net-of-free-ridership value, called NFRV1.

Table 4-12: Assignment of Net-of-Free-Ridership Values for Likelihood of Installing in Absence of Program

Likelihood of Installing Anyway (PD7)	Assigned Value	Percent (2005) (N=113)
Definitely Would Not Have Installed	1.0	17%
Probably Would Not Have Installed	0.667	27%
Probably Would Have Installed	0.333	28%
Definitely Would Have Installed	0.0	27%
Don't Know	-	-

Once NFRV1 was determined, each project was examined regarding the level of efficiency or number of measures the customer intended to install in the absence of the program. In those cases where a customer said they would have installed equipment of lower efficiency or installed fewer or smaller high-efficiency measures (questions PD8 or PDQ, see Table 4-13), an upward adjustment (NFRV1_adj) to NFRV1 was calculated. This adjustment ranged from 0.0 to +0.2 as detailed in Table 4-13. NFRV1_adj was then added to NFRV1 to create the second ratio, called NFRV2. Of the 113 respondents, 76 were unadjusted, 18 were given 0.1 additional, and 19 were given 0.2.

Table 4-13: Calculation of NFRV1_adj Adjustment to NFRV1 Free Ridership, PY2004-2005

Question PD8	Question PD9	Question PDQ	NFRV1_adj
1 – Definitely not as efficient	3 – Installed nothing		0.2
1 – Definitely not as efficient	1 – Standard efficiency		0.1
1 – Definitely not as efficient	2 – Medium efficiency		0.1
4 – Installed nothing	3 – Installed nothing		0.2
4 – Installed nothing	1 – Standard efficiency		0.1
4 – Installed nothing	2 – Medium efficiency		0.1
		1 – Fewer/smaller	0.2

Next, the issue of deferred free-ridership was considered. Responses to the timing question (PD9b) were translated, using the conversion table in Table 4-14, into NFRV3.

Table 4-14: Forecasted Installation Conversion, PY2004-2005

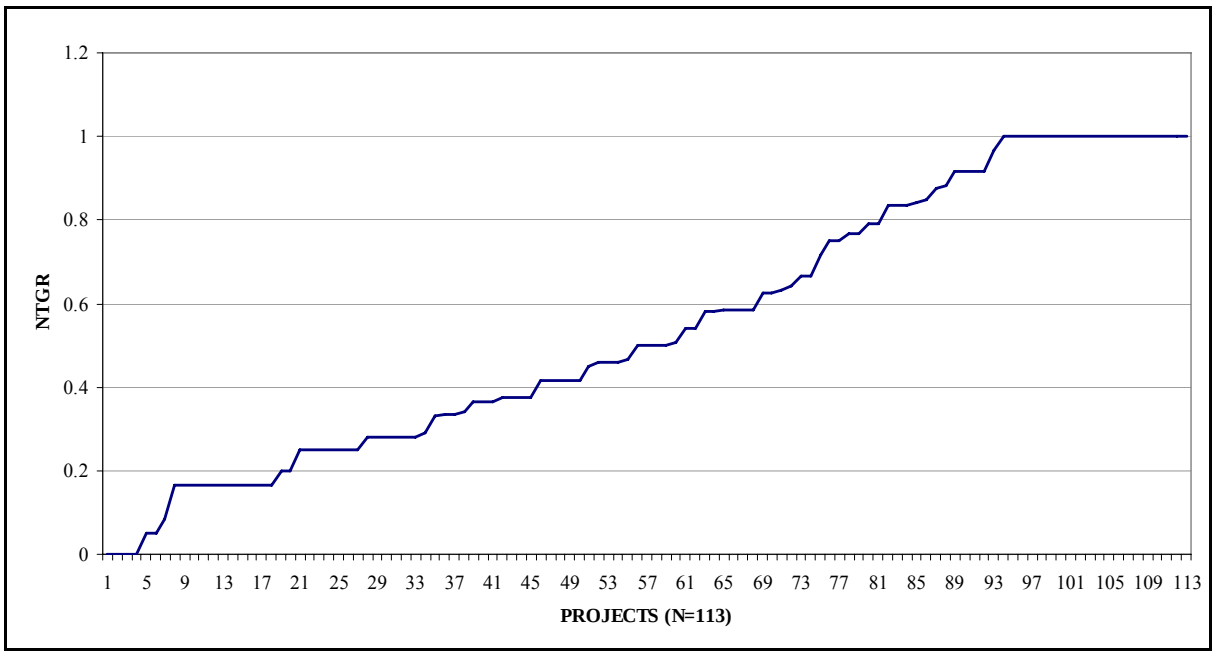
Forecasted Installation of Same Equipment (PD9b)	Assigned Value	Percent (2005) (n=113)
At the same time	0.0	27%
Six months to one year	0.063	18%
1 to 2 years	0.25	12%
2 to 3 years	0.5	8%
3 to 4 years	0.75	4%
4 or more years	1.0	13%
Never	1.0	10%
When existing equipment fails	-	4%
Don't know	-	4%

Lastly, NFRV2 and NFRV3 were averaged to create the final NFRV. If the NRV1_adj upward adjustment pushed the final NFRV over 1.0, this NFRV was reduced back to 1.0. In addition, all cases of inconsistency or response discrepancy, as well as all large projects, were reviewed to ensure that the final net-of-free-ridership values were as accurate and reliable as possible.

4.3.8 Estimate 2004-2005 Free Ridership

The *unweighted* average net-of-free-ridership value for the 2004-2005 SPC sample is 0.54, representing 113 distinct projects. The range of values calculated across the sampled customers for 2004-2005 is shown in Figure 4-16. The free-ridership estimates were then weighted to more accurately reflect the participant population as a whole (see Section 3 for sampling and weighting). A ratio estimation approach is used to develop the weighted results. The approach used is consistent with the requirements of the CADMAC evaluation protocols and the ratio estimation methods described the Chapter 13 of *the 2002 Evaluation Framework Study* (TecMKT Works, 2004). For the 2004-2005 SPC program, the estimated weighted net-of-free-ridership value is 0.57.

Figure 4-16: Range of Net-of-Free-Ridership Values (NFRV) across Sampled PY2004-2005 Projects



The 2004-2005 NFRV value is compared to the estimated values from previous evaluations (1998 through 2003) in Table 4-15. As shown in the Table, these net-of-free-ridership values have varied somewhat throughout the history of the program but have stayed relatively stable. Weighted results have ranged from 0.40 and 0.65; however, unweighted results (which are less sensitive to small sample sizes and the effects of a few large customers) have been even more stable ranging from 0.45 to 0.60.[17]

Table 4-15: Net of Free-Ridership Ratios, 1998-2005

(1 – Free Ridership)	1998	1999	2000	2001	2002	2003	2004-2005
Weighted	0.53*	0.51	0.41	0.65	0.45	0.59	0.57
Unweighted	0.49	0.48	0.46	0.55	0.45	0.60	0.54

*Weighted by incentives rather than by kWh savings.

[17] See Quantum 2004 and other previous SPC evaluation reports for discussion of the reasons for free ridership as well as issues associated with the estimation process.

4.4 Program Effect on Future Energy-Efficiency Actions

As in previous SPC evaluations, the 2004-2005 SPC interviews also examined possible current or future participant spillover effects. Questions were framed in terms of the program's effect on additional measure installations as well as any changes made to the organizational decision-making practices. These questions were strictly self reports and did not include any on-site verification of installation or estimation of savings.

4.4.1 Program Effect on Future Plans for Energy Efficient Measures

Respondents were asked if they planned any additional measure installations as a result of participating in the program. These would include the implementation of energy efficiency projects by SPC participants that occur within or outside the program (e.g., were not implemented using SPC program resources). In theory, it is possible that the effects of participation in the SPC program – such as increased familiarity and comfort with energy efficient technologies, greater appreciation of energy savings benefits, or new awareness of EESP resources – might cause SPC participants to implement additional energy efficiency projects that they would not have implemented otherwise.

First, respondents were asked whether they had already implemented any other high efficiency measures since participation in the 2004-2005 SPC program that were not part of the 2004-2005 program or any other utility or government energy efficiency program. Fifteen percent of respondents said that they had. Next, respondents were asked how significant their experience in the 2004-2005 SPC program was on their decision to install the additional energy efficiency measures. Nearly 30 percent said that the SPC program influence was "Extremely Significant" and another 32 percent said that the program influence was "Somewhat Significant." Over 60 percent, therefore, credited their participation in the SPC program, wholly or in part, with the installation of these additional measures.

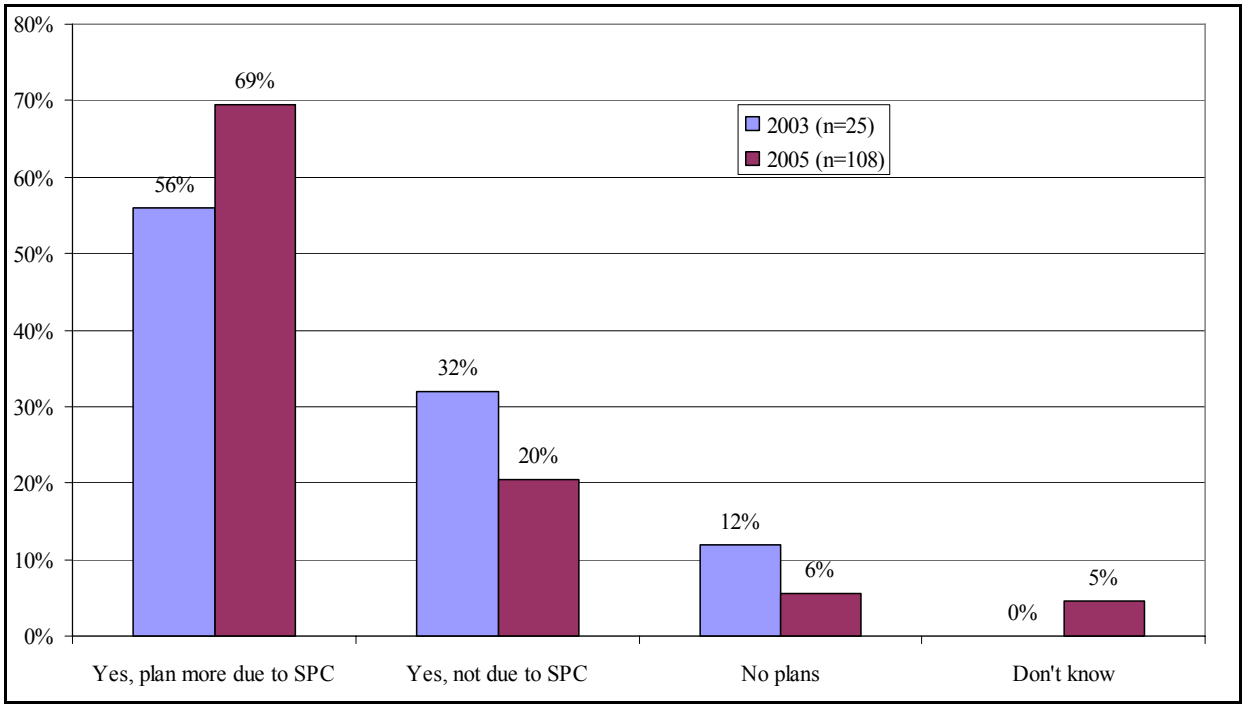
Respondents indicating SPC program-induced spillover were also asked to elaborate on how the SPC program had influenced their decision to pursue these additional projects. The three most commonly mentioned influences related to SPC program participation were greater appreciation of the costs savings that could be gained from energy efficiency, increased familiarity with the financial tools needed to demonstrate the benefits of energy efficiency, and greater awareness of the energy efficiency technologies that were available.

These same respondents were then asked why they had not sought SPC program incentives for these energy efficiency projects. Reasons cited (with about equal frequency) included a belief that the projects were not large enough to justify the elaborate SPC process, a concern

that the SPC process would take too long, a belief that their project was ineligible or that a deadline had been missed, or simply not knowing about an incentive.

The PY2004-2005 SPC program participation experiences also have had a strong influence on participants' plans to implement any additional energy efficiency measures elsewhere in their facility in the future. Nearly three-fourths (69 percent) of respondents said that they did plan to install additional measures as a result of their PY2004-2005 SPC program participation, a significant rise over the 56 percent reported in 2003. Figure 4-17 shows the degree to which respondents said that SPC program participation has influenced these plans.

Figure 4-17: 2003 and 2004-2005 SPC Participants' Future Plans for Energy Efficiency Projects



Those who indicated they planned to implement additional energy efficiency projects were asked whether they intend to apply for utility energy efficiency program incentives for these projects. Nearly 90 percent indicated they either had already applied for program incentives, or planned to apply for them in the future.

4.4.2 Program Effect on Organizational Decision-Making Processes

Program participation experiences also have affected participants' decision making practices regarding energy efficiency projects. Nearly half of the respondents (48 percent) said that it

did, a doubling of the response in the 2003 survey. Reported changes in energy-related decision making are summarized below:

- Twenty percent of respondents say they routinely look at energy efficiency considerations in planning and budgeting;
- Seventeen percent of respondents now include utility program incentives in their calculations when considering future energy-related projects;
- Three respondents said that their local successes with SPC had led their parent corporations to look into replicating the projects nationally; and
- One respondent said the SPC program validated a manager's interest in promoting energy efficiency to the rest of their organization.

5

Impact Results

In this chapter, we present and discuss this evaluation's impact results for the PY2004-2005 SPC Program. First, we summarize our site-specific gross impact results by end-use. Second, we examine the results across all sites and present the overall gross impact realization rates for the program. Third, we take the net-of-free ridership results presented in Section 4 and weight them to produce the weighted overall program net-of-free ridership results. Fourth, we summarize our approach to producing estimates of savings over the measure life of each project, and combine these estimates with the overall gross and net realization rates to produce the final reporting tables of net program impacts over time.

5.1 Site-Specific Gross Impacts

In this sub-section we present our gross impact results on an unweighted basis by program end-use (Lighting, A/C & Refrigeration, Other, and Gas). Anonymous site-specific results are included in summary tables. The impact evaluation analyzed a total of 114 sites. As described in Section 3, a complete M&V plan and an impact evaluation report were developed for each site. The resulting detailed site-specific project descriptions, ex-ante methods, ex-post methods, and ex-post results are provided in Appendix B.

A description of the stages of program documentation is provided below to familiarize the reader with them, since they will be referred to frequently in this report. There are three distinct stages of a project that are documented in each SPC application. These are:

- **Application Submission**: In this first stage, the customer or project sponsor submits the SPC application and supporting savings calculations and documentation to the SPC Program administrator.

- **Application Review**: Next, the SPC application is reviewed and savings calculations are adjusted, if necessary, and accepted by the SPC program administrator. An incentive offer is formalized at this stage.

- **Installation Report**: Following the project installation, the SPC administrator's project reviewer performs a site inspection to verify the installation and make adjustments, if necessary, to the energy and demand savings claim. The financial incentive is finalized and paid to the customer based on this assessment. An Installation Report Review form is generated which includes the final ex-ante

savings. In a few selected cases (less than 10% of the total in the 2004/2005 program years), the SPC program administrator requires measurement (commonly referred to in the Program as "Measurement and Verification" or "M&V") of the savings for the project. In these cases, the financial incentive is based on the results of the measurement. The Operating Report Review then is the final form documenting the SPC application and contains the ex-ante savings claim.

In this section we provide a summary of ex-ante savings for each sampled site, and summary of ex-post savings estimates and gross realization rates for each sampled site.

Note that references to project savings and incentive payments for the sampled sites are based on the information the evaluation engineers obtained from the physical program files. In fewer than 20% of the cases, data in the physical program files did not match the data in the program tracking systems obtained from the utilities, as the utility may not have updated the tracking system. The discrepancies are typically due to minor changes at some stage of the stages in the program; however, in 10% of cases, kW savings were not entered at all or differences of over 10% were found.

In some cases, we have set the realization rates to "NA". Realization rates noted as "NA" indicate that the realization rate was not applicable. Such cases include those for which the ex-ante savings are missing or zero, but the ex-post savings are non zero. This applies primarily to the kW realization rates.

It is important to bear in mind that each ex-post savings estimate reported here also has an associated uncertainty, albeit unreported. The elements that contribute to uncertainty in estimates of savings for each individual site include:[18]

- Variations due to equipment scheduling and performance (both pre- and post-measure installation),
- Modeling errors,
- Instrument error (if measurement is conducted),
- Measurement sampling error within a site, if measurement is not a census, and
- Planned and unplanned assumptions (according to IPMVP, this category "encompasses all the unquantifiable errors associated with stipulations, and the assumptions necessary for measurement and savings determination.")

[18] IPMVP, 2002; *Evaluation Framework Study*, Chapter 7, M&V.

Uncertainty ranges for each of the variables were estimated within the M&V plans for the individual sites. The variables with large uncertainty became the M&V focus in order to reduce the overall uncertainty in the ex-post savings estimate.

5.1.1 Lighting End-use

Thirty-seven projects classified under the lighting end-use were evaluated in the sample. The energy and demand savings approved as the final ex-ante savings after the Installation Report Review or Operating Report were 47,631,678 kWh, 9,205 kW, and 0 therms. Ex-ante savings from the tracking system for this end-use were 46,695,327 kWh, 9,181 kW and 0 therms. Total financial incentives of $3,726,187 were offered for these projects.

Ex-ante energy savings from the Installation Report, ex-post savings from this impact evaluation, and associated realization rates are shown in Table 5-1 for the lighting end-use sample.

The ex-post energy and demand savings estimates for the thirty-seven lighting end-use sites are 39,853,579 kWh, and 6,276 kW, respectively. The realization rates for the kWh energy savings range widely from 0.09 to 2.45. The unweighted average realization rate for the lighting energy savings is 0.86. The realization rates for summer kW demand range from 0.12 to 1.25. The unweighted average realization rate for the lighting demand savings is 0.76.

A description of the retrofit performed at each site is shown in Table 5-2 for the lighting end-use sample. Common retrofits in the sample are T5 fixtures to replace metal halide or high pressure sodium fixtures, T8 bulb and ballast retrofit to replace T12 bulbs and ballasts, LED exit signs to replace incandescent exit signs, and occupancy sensors installed on individual high bay lighting fixtures.

Table 5-1: Summary of Ex-Ante and Ex-Post Savings
Lighting End-use

	Tracking Database Ex Ante Savings			Ex Post Savings			Realization Rate		
Site	kW	kWh	Therms	kW	kWh	Therms	kW	kWh	Therms
A022	126	515,860	-	157	1,264,122	-	1.25	2.45	-
A023	523	2,318,322	-	162	1,599,642	-	0.31	0.69	-
A028	42	193,581	-	30	176,381	-	0.72	0.91	-
A029	399	1,118,347	-	148	1,069,242	-	0.37	0.96	-
A030	242	994,633	-	143	827,135	-	0.59	0.83	-
A031	317	1,638,154	-	324	649,379	-	1.02	0.40	-
A041	135	1,175,899	-	129	1,127,763	-	0.96	0.96	-
A042	102	529,258	-	107	774,750	-	1.05	1.46	-
A047	71	395,520	-	43	312,608	-	0.60	0.79	-
A051A	141	1,139,113	-	163	1,309,979	-	1.15	1.15	-
A057	87	829,601	-	100	420,596	-	1.15	0.51	-
A063	150	655,728	-	129	516,378	-	0.85	0.79	-
A064	36	153,102	-	36	191,502	-	0.99	1.25	-
A065	71	341,533	-	25	139,282	-	0.36	0.41	-
A067	278	1,593,851	-	231	2,021,358	-	0.83	1.27	-
A068	428	1,934,305	-	110	412,188	-	0.26	0.21	-
A069	307	1,480,283	-	93	543,792	-	0.30	0.37	-
A070	135	633,013	-	16	55,655	-	0.12	0.09	-
A072	606	2,660,973	-	310	1,288,931	-	0.51	0.48	-
A073	926	2,811,730	-	209	3,083,784	-	0.23	1.10	-
A076	898	4,778,845	-	863	6,010,853	-	0.96	1.26	-
A077	134	587,710	-	86	693,167	-	0.64	1.18	-
A078	184	1,764,804	-	211	1,666,575	-	1.15	0.94	-
A079	226	1,079,831	-	212	656,173	-	0.94	0.61	-
A080	256	1,218,061	-	288	1,145,340	-	1.12	0.94	-
A081	443	2,095,195	-	221	1,368,795	-	0.50	0.65	-
A082	123	1,002,779	-	105	1,104,851	-	0.85	1.10	-
A083	328	2,201,042	-	305	2,234,177	-	0.93	1.02	-
A084	58	366,545	-	58	367,747	-	1.00	1.00	-
A085	66	343,727	-	56	337,227	-	0.84	0.98	-
A086	169	789,513	-	173	563,789	-	1.03	0.71	-
A087	323	2,641,859	-	294	2,812,877	-	0.91	1.06	-
A088	91	364,672	-	44	278,857	-	0.48	0.76	-
A089a	179	1,323,931	-	210	1,299,388	-	1.17	0.98	-
A112	27	421,419	-	16	408,236	-	0.60	0.97	-
A113	182	853,068	-	84	173,870	-	0.46	0.20	-
A114	373	1,749,520	-	387	947,190	-	1.04	0.54	-
Total	9,181	46,695,327	-	6,276	39,853,579	-			
Average	248	1,262,036	-	170	1,077,124	-	0.76	0.86	-

1. Realization Rates noted as "NA" indicate that the realization rate was not evaluated or that the evaluation was inconclusive

2. A dash " - " indicates that no savings was claimed

Table 5-2: Summary of Retrofit Descriptions
Lighting End-use

Site	Description
A022	Replace 336 high pressure sodium lamp fixtures and 276 metal halide fixtures with 612 six lamp high output T8 fluorescent lamp fixtures
A023	Replace 765 high pressure sodium lamp fixtures with 765 eight lamp high output T8 fluorescent lamp fixtures with occupancy sensors.
A028	Occupancy sensor: wallbox lighting; Occupancy sensor: wall or ceiling mounted lighting CFL: hardwired fixture, >90 watts; Mercury vapor lighting
A029	Replace 664 high pressures sodium fixtures with 664 HO T5 fluorescent fixtures and install 664 ceiling/fixture mounted occupancy sensors. Replace 197 T12 ballasts with 197 T8 ballasts.
A030	Replace 1149 metal halide fixtures with 1149 6-lamp HO T5 fluorescent fixtures and replace 90 metal halide fixtures with 4-lamp HO T5 fluorescent fixtures
A031	Primary Measure - Replace 4 foot T12 fixtures with T8 fixtures
A041	Replace 785 metal halide fixtures with 785 8-lamp T8 fluorescent fixtures
A042	Installation of 338 T5 fixtures, installation of 80 motion sensors, installation of 508 T8 lamps with ballasts, 26 T12 lamps removed, installation of 18 photocells
A047	Interior High Bay Linear Fluorescent Fixtures
A051A	Retrofit high bay 400 watt and 250 watt high pressure sodium fixtures with 8 lamp, T-8 fluorescent lamp fixtures; Install manually operated bypass timers on some of the fixtures; Retrofit “first generation" T8 lamps and electronic ballasts with "third generation" T8 lamps and ballasts; Install screw in CFL's; Install occupancy sensor for selected T8 lighting.
A057	T8 Light Fixtures and Occupancy Sensors
A063	Interior high-bay retrofit, delamping, T8s and T5s
A064	188 3L T5 fixtures to replace 188 250W metal halide fixtures
A065	LED Exits and CFLs to replace Incandescents, T8s to replace T12s, wall and ceiling occ. sensors
A067	Replace 444 400W metal halide fixtures with 444 4-lamp HO T5 fluorescent fixtures and delamp 256 400W metal halide fixtures. Also add 202 occupancy sensors.
A068	Replace: 2123 T12 lamps with T8 lamps, 465 MH fixtures with T8 HO fixtures; install: 728 motion sensors, 175 photocells, 3 exit signs; remove 217 T12 lamps.
A069	Replace 560 400W metal halide fixtures with 560 3-lamp HO T5 fluorescent fixtures, replace 227 400W metal halide fixtures with 227 4-lamp HO T5 fluorescent fixtures, replace 156 250W metal halide fixtures with 3-lamp HO T5 fluorescent fixtures and add 912
A070	Installation of 443 fixture mounted occupancy sensors
A072	Replace 1147 metal halide fixtures and lamps with 1,147 4-lamp HO T5 fluorescent fixtures and Install occupancy sensors on 1143 of these fixtures
A073	Replace EMS system, HPS fixtures and install occupancy sensors.
A076	Replace 1800 400W high pressure sodium fixtures with 1800 4-lamp HO T5 fluorescent fixtures, install 428 fixture mounted occupancy sensors, replace 515 1000W metal halide fixtures with 515 400W pulse start metal halide fixtures.
A077	Replace 36 T12 lamps with 36 T8 lamps, 248 metal halide fixtures using 400 watt lamps; install 248 ceiling mounted occupancy sensors; replace 21 standard metal halide pulse fixtures using 400 watt lamps.
A078	Installation of 221 T5 fixtures, installation of 105 T5 fixtures with motion sensors, installation of 710 T8 lamps with ballasts, 238 T12 lamps removed, installation of 25 ceiling mounted occupancy sensors, installation of 8 wall box occupancy sensors, i
A079	Replace 9006 T12 fluorescent lamp fixtures with T8 lamps and electronic ballasts; Install 216 Occupancy sensors; remove 715 T12 lamps
A080	Reduced hours of operation and Lighting kW and kWh reductions through lowered connected load, time clocks, and occupancy sensors
A081	Replace 800 four foot T12 fixtures with T8 fixtures; 3,240 incandescent lamps with >= 27 watt lamps; Install LED exit signs
A082	Replace 367 high pressure sodium fixtures with 367 eight-lamp HE T8 fluorescent fixtures and replace 68 high pressure sodium fixtures with lower wattage metal halide fixtures
A083	Installation of high efficiency lighting fixtures fhroughout the facility
A084	Replace 711 first gen with third gen T8 fixtures; Install 63 MH fixtures
A085	Indoor System Replacement - HID Indoor System Modification - HID L-M1 LED Exit Sign L-E1 T-8 or T-5 L&E ballast- 2 foot installed L-E3 T-8 or T-5 L&E ballast- 4 foot installed L-E7 T-8 or T-5 L&E ballast- 4 foot lamp removed L-H1 Interior High Bay F
A086	Occupancy Sensor - 258 Ceiling mounted and 479 wallbox mounted, 56 timeclocks
A087	Replace 861 metal halide fixtures with 861 8-lamp T8 fluorescent fixtures and install timers to control 810 of these fixtures; miscellaneous other retrofits
A088	L-H1 Interior High Bay Fixture 6 lamp T-5 Fixtures
A089a	Installation of high efficiency lighting fixtures throughout the facility
A112	Replace 2500 2-lamp T12 fluorescent lamps with 2-lamp T8 fluorescent lamps / EMS control for 2300 fixtures
A113	L-I3 High Bay Lighting Sensor
A114	T-8 L&E ballast 4-ft retrofit from T-12

5.1.2 AC&R End-use

Twenty-two projects classified under the AC&R end-use were evaluated in the sample. The energy savings approved by the program administrators as part of the Installation Report for the AC&R end-use were 24,364,975 kWh, 2,828 kW and 0 therms. Total incentives of $2,872,280 were offered for these projects.

The energy savings in the tracking system for the AC&R end-use differed only slightly in electrical energy savings which were 24,484,027 kWh.

Energy savings from the program Installation Report, this impact evaluation, and associated realization rates are shown in Table 5-3 for the AC&R end-use sample. The ex-post energy savings for the twenty-two AC&R sites is 16,526,763 kWh, 2,563 kW, and 0 therms. The realization rates for the kWh energy savings range from 0.04 to 3.12. The unweighted average realization rate for the AC&R energy savings is 0.77. As discussed in Section 8 and shown in the weighted results later in this section, the AC&R realization rate was brought down significantly by the fact that lifetime savings, instead of first-year savings, were entered into utility tracking systems for several early replacement chiller measures. The realization rates for the demand kW range from 0.28 to 3.60. The unweighted average realization rate for the AC&R demand savings is 1.27.

A description of the retrofit performed at each site is shown in Table 5-4 for the AC&R end-use sample. Common retrofits in the sample are replacing chillers for more efficient models, and installing variable frequency drives on chillers or fans.

Table 5-3: Summary of Ex-Ante and Ex-Post Savings
AC&R End-use

	Tracking Database Ex Ante Savings			Ex Post Savings			Realization Rate		
Site	kW	kWh	Therms	kW	kWh	Therms	kW	kWh	Therms
A043	-	484,200	-	(5)	338,010	-	-	0.70	-
A044	164	946,841	-	211	874,113	-	1.28	0.92	-
A045	30	3,258,547	-	13	183,921	-	0.44	0.06	-
A046	216	991,467	-	171	764,072	-	0.79	0.77	-
A048	22	452,280	-	40	19,327	-	1.84	0.04	-
A049	-	118,673	-	-	37,824	-	-	0.32	-
A005	32	293,091	-	41	141,597	-	1.29	0.48	-
A012	81	1,425,270	-	95	714,939	-	1.17	0.50	-
A013a	99	1,109,844	-	161	761,200	-	1.63	0.69	-
A014	117	1,180,474	-	421	3,684,289	-	3.60	3.12	-
A016	38	459,539	-	96	574,104	-	2.51	1.25	-
A024	46	3,801,660	-	45	220,677	-	0.98	0.06	-
A027	14	34,986	-	14	20,228	-	1.01	0.58	-
A032	408	2,082,330	-	207	1,811,115	-	0.51	0.87	-
A074	106	924,668	-	187	1,639,066	-	1.77	1.77	-
A075	22	36,890	-	-	72,454	-	NA	1.96	-
A092	520	934,994	-	145	962,836	-	0.28	1.03	-
A096	-	758,493	-	-	238,542	-	-	0.31	-
A103	-	663,528	-	(2)	55,294	-	-	0.08	-
A105	102	797,300	-	30	148,752	-	0.29	0.19	-
A106	811	3,706,559	-	682	3,256,516	-	0.84	0.88	-
A108	-	22,393	-	10	7,888	-	-	0.35	-
Total	2,828	24,484,027	-	2,563	16,526,763	-			
Average	166	1,112,910	-	135	751,217	-	1.27	0.77	-

1. Realization Rates noted as "NA" indicate that the realization rate was not evaluated or that the evaluation was inconclusive

2. A dash " - " indicates that no savings was claimed

Table 5-4: Summary of Retrofit Descriptions
AC&R End-use

Site	Description
A005	Early replacement of existing water cooled chiller with VSD centrifugal chiller.
A012	Replace 20 year old constant speed, 1,330-ton chiller with new 1,300-ton variable speed chiller
A013a	VFD on Chiller and HVAC fans, VAV installation
A014	Early replacement of four (4) 265 ton air cooled chillers with three (3) new water cooled chillers with VFDs
A016	Early retirement of 480-ton centrifugal VFD chiller
A024	Early replacement of two 450 ton units with new 450 ton VFD driven units.
A027	Early replacement of one 80 ton chiller
A032	Replace six (6) electric AC units totalling 290 tons with six (6) nitrogen cooling units
A043	Replace two CRAC units with two new CRAC units to enable night central plant shutdown
A044	Early replacement of 500 ton chiller with 500 ton VSD driven chiller
A045	Early replacement of chiller compressors
A046	Early replacement of 450 ton chiller with 700 ton VSD driven chiller
A048	Early replacement of self contained multizone units with new self contained multizone units.
A049	Install Economizers
A074	Replace open multi-deck and coffin style cases with glass door freezer cases (4 stores)
A075	Installation of a Cool Roof under the H-F1 intemized measure
A092	This measure is composed of several sub-measures, which are designed to improve the operation of the ice building system, which will result in reduced run-time on the facility's chillers and chilled water plant.
A096	Install VSDs on a total of 19 different evaporator fans, floating head pressure controls, demand defrost.
A103	Early replacement of 230 ton chillers with 400 ton chillers.
A105	Oversized Evaporative Condenser
A106	400 ton Chillers with VFDs
A108	350 ton chillers to replace existing 350 ton chillers

5.1.3 'Other' End-use

Forty-four projects classified under the 'other' end-use were evaluated in the sample. This end-use is made up of projects that were previously classified as 'process,' 'controls' or 'other'. The energy savings approved by the program administrators as part of the Installation Report for the 'Other' end-use were 81,205,245 kWh, 8,808 kW and 18,132 therms. Total incentives of $5,474,863 were offered for these projects.

The energy savings in the tracking system for the 'other' end-use were 81,731,668 kWh, 8,699 kW and the same number of therms as reported in the Installation Report.

Energy savings from the program Installation Report, this impact evaluation, and associated realization rates are shown in Table 5-5 for the 'other' end-use sample. The ex-post energy savings for the fourteen electric 'other' end-use sites is 67,705,550 kWh, 6,821 kW, and 288,487 therms. The realization rates for the kWh energy use range from 0.06 to 1.67. The unweighted average realization rate for the 'Other' energy savings is 0.75. The realization rate for the demand kW ranges from 0.07 to 2.79. The unweighted average realization rate for the 'other' demand savings is 0.94.

A description of the retrofit performed at each site is shown in Table 5-6 for the 'other' end-use sample. Common retrofits in the sample are replacing compressors for more efficient models, installing variable frequency drives on motors or pumps, and installing more efficient motors, variable volume injection molders, control systems or thermostats.

Table 5-5: Summary of Ex-Ante and Ex-Post Savings
Other End-use

	Tracking Database Ex Ante Savings			Ex Post Savings			Realization Rate		
Site	kW	kWh	Therms	kW	kWh	Therms	kW	kWh	Therms
A110	36	56,433	-	3	71,033	-	0.07	1.26	-
A017	-	152,838	-	11	59,310	-	-	0.39	-
A018	-	1,747,886	-	69	1,727,699	-	-	0.99	-
A001	104	187,453	-	14	10,487	-	0.14	0.06	-
A002	60	415,064	-	59	483,316	-	0.98	1.16	-
A003	72	379,535	-	23	88,534	-	0.32	0.23	-
A004	364	1,515,638	-	172	465,127	-	0.47	0.31	-
A010	-	417,697	-	-	417,697	-	-	1.00	-
A011	75	891,619	-	61	852,821	-	0.81	0.96	-
A015	-	2,374,550	18,132	-	3,115,958	271,412	-	1.31	14.97
A020	18	98,306	-	21	128,160	-	1.16	1.30	-
A021	256	1,538,798	-	272	1,503,840	-	1.06	0.98	-
A025	4,107	19,364,419	-	2,136	16,409,662	-	0.52	0.85	-
A026	22	170,308	-	7	46,891	-	0.31	0.28	-
A039	13	26,423	-	13	34,378	-	1.03	1.30	-
A040	-	16,549	-	-	3,341	-	-	0.20	-
A050	275	2,406,450	-	275	2,402,400	-	1.00	1.00	-
A052	211	2,182,830	-	322	2,820,242	-	1.53	1.29	-
A053	835	5,910,940	-	723	4,390,138	-	0.87	0.74	-
A054	154	1,110,792	-	71	206,644	-	0.46	0.19	-
A055	-	2,279,801	-	53	331,907	17,075	-	0.15	-
A056	238	6,982,527	-	228	6,694,759	-	0.96	0.96	-
A058	61	599,304	-	60	599,725	-	0.98	1.00	-
A059	45	326,698	-	34	217,090	-	0.75	0.66	-
A060	-	1,432,550	-	16	100,930	-	-	0.07	-
A061	-	1,948,268	-	38	369,271	-	-	0.19	-
A062	6	418,497	-	8	49,560	-	1.36	0.12	-
A066	5	104,571	-	15	125,475	-	2.79	1.20	-
A071	16	26,000	-	-	17,923	-	NA	0.69	-
A090	98	425,693	-	95	411,400	-	0.97	0.97	-
A091	-	13,336	-	-	6,775	-	-	0.51	-
A093	36	893,093	-	(35)	176,730	-	NA	0.20	-
A094A	-	1,076,790	-	(37)	1,020,798	-	-	0.95	-
A095	-	1,613,874	-	-	406,655	-	-	0.25	-
A097	102	1,089,704	-	189	1,818,661	-	1.85	1.67	-
A098	291	1,735,928	-	415	1,947,341	-	1.43	1.12	-
A099	-	2,257,500	-	172	1,504,137	-	-	0.67	-
A100	-	7,086	-	-	7,086	-	-	1.00	-
A101	-	405,318	-	8	33,395	-	-	0.08	-
A102	629	5,196,745	-	597	5,084,228	-	0.95	0.98	-
A104	-	4,366,724	-	173	5,115,948	-	-	1.17	-
A107	337	2,939,240	-	336	2,935,296	-	1.00	1.00	-
A109	109	937,228	-	90	671,328	-	0.82	0.72	-
A111	126	3,690,665	-	117	2,821,454	-	0.93	0.76	-
Total	8,699	81,731,668	18,132	6,821	67,705,550	288,487			
Average	300	1,857,538	18,132	184	1,538,763	144,243	0.94	0.75	14.97

1. Realization Rates noted as "NA" indicate that the realization rate was not evaluated or that the evaluation was inconclusive

2. A dash " - " indicates that no savings was claimed

Table 5-6: Summary of Retrofit Descriptions
Other End-use

Site	Description
A001	Install insulation on refrigerated tanks
A002	Install VFDs on blower motors
A003	Early replacement of standard efficiency motors with premium efficiency motors
A004	Install tank insulation
A010	Variable frequency (speed) drives
A011	Replace 827 hotel guest room thermostats with occupancy-based, programmable thermostats
A015	DDC controls, economizers
A017	VFD HVAC
A018	VFD HVAC
A020	Replace one 400T standard hydraulic drive injection molder with one 1100T variable volume injection molder
A021	Replace 2-400HP dust collectors with 17-10HP dust collectors
A025	Replace Pipeline
A026	Replace 60 HP rotary screw air compressor with VFD driven 75 HP rotary screw air compressor.
A039	Two 5 hp motors
A040	Installation of a Cool Roof using SPC calculator
A050	Install parallel piping takeoffs on waterflood pumping header.
A052	VFD installation on four HVAC fan motors, CO2 system and two hot water systems
A053	Install Variable Volume Injection Molding Machines to Replace Standard Hydraulic Machines
A054	Replace one 400T standard hydraulic drive injection molder with one 1100T variable volume injection molder
A055	INNCOM e4 Smart Digital Thermostat
A056	Replace two 300 HP rotary screw air compressors with one VFD driven 300 HP rotary screw air compressor and one 300 HP load unload compressor. Install new distribution piping, intermediate pressure controllers, sequencing controller, and 50,000 gallons of air storage
A058	Replace one 150 HP rotary screw air compressor with a VFD driven 100 HP rotary screw air compressor. Install intermediate presure controller and cycling refrigerated dryer.
A059	Install 2,200 gallon receiver, sequencing controller, mist eliminator. Replace compressed air distribution piping.
A060	INNCOM e4 Smart Digital Thermostat
A061	SensorStat DDC II by Onity Inc, occupancy-based thermostat
A062	Replace two 150 HP rotary screw air compressors with one 175 HP VFD driven and one 150 HP load/unload rotary screw air compressor.
A066	Install VFDS on two 25 HP fans, one 75 HP fan motor, and two 40 HP cooling tower fans.
A071	Installation of a Cool Roof
A090	Install reflective window coating on east, west and south facing windows
A091	Installation of a Cool Roof using SPC calculator
A093	Floating Head Pressure Control / Evaporator Fan Cycling - Hardware, Progamming, Integration, Premium Efficiency Motors on Two Condenser Fans
A094A	VFD on AHU fans
A095	3-O Controls
A097	1500 hp Bag House Blower
A098	Install Efficient Grinders and Pre-Grinder
A099	Install VSD on a Pulper Motor
A100	EMS Control on Refrigeration System
A101	VFD installation on two pumps
A102	System re-piping to include closed system
A104	VFD on 1,500 HP de-scaling pump motor
A107	Replace three 700 HP pumps with one 1,750 HP pump
A109	Replace three 150 HP rotary screw air compressors with VFD driven 400 HP rotary screw air compressor.
A110	Replace existing Cincinnati Milacron and Hatiea Seki lathe machines with ZT 1500 and ZT 2500 Mori Seiki Integrated machines
A111	Higher efficiency classifer using small motors

5.1.4 Gas End-use

Eleven projects classified under the gas end-use were evaluated in the sample. The energy savings approved by the program administrators as part of the Installation Report for the gas

end-use were identical to those in the tracking system totaling 0 kWh, 0 kW and 2,448,332 therms. Total incentives of $1,622,470 were paid for these projects.

Energy savings from the program Installation Report, this impact evaluation, and associated realization rates are shown in Table 5-7 for the gas end-use sample. The ex-post energy savings for the eleven gas end-use sites is 2,287,576 therms. The realization rates for the therms range from 0.5 to 1.67. The unweighted average realization rate for the gas demand savings is 0.90.

A description of the retrofit performed at each site is shown in Table 5-8 for the gas end-use sample. Common retrofits in the sample are replacing heat exchangers for blow down heat recovery units and installing tank insulation.

Table 5-7: Summary of Ex-Ante and Ex-Post Savings Gas End-use

	Tracking Database Ex Ante Savings			Ex Post Savings			Realization Rate		
Site	kW	kWh	Therms	kW	kWh	Therms	kW	kWh	Therms
A006	-	-	554,086	-	-	275,814	-	-	0.50
A007	-	-	82,739	-	-	73,786	-	-	0.89
A008	-	-	64,218	-	-	41,501	-	-	0.65
A009	-	-	281,213	-	-	256,245	-	-	0.91
A019	-	-	538,360	-	-	896,997	-	-	1.67
A033	-	-	18,014	-	-	19,709	-	-	1.09
A034	-	-	60,300	-	-	50,492	-	-	0.84
A035	-	-	315,093	-	(75,740)	191,820	-	-	0.61
A036	-	-	125,247	-	-	156,767	-	-	1.25
A037	-	-	388,797	-	-	310,946	-	-	0.80
A038	-	-	20,266	-	-	13,499	-	-	0.67
Total	-	-	2,448,332	-	(75,740)	2,287,576			
Average	-	-	222,576	-	(75,740)	207,961	-	-	0.90

1. Realization Rates noted as "NA" indicate that the realization rate was not evaluated or that the evaluation was inconclusive

2. A dash " - " indicates that no savings was claimed

Table 5-8: Summary of Retrofit Descriptions Gas End-use

Site	Description
A006	Insulate the Oil Tanks
A007	Install tank insulation
A008	Installation of a blow down heat exchanger, O2 trim and small burner to the boilers
A009	Installation of a condensate collection system for the second and third effects of two (2) four-effect evaporators at a tomato paste production facility
A019	Heat Exchanger, Heat Recovery and Gas Conservation
A033	Fixed Double Acrylic Roof on Greenhouses to Reduce Heat Loss
A034	Installation of heat exchanger for blowdown heat recovery
A035	Replace VOC Abatement Equipment
A036	Replace 16.2 MCF/hr Thermal Oxidizer with 3.0 MCF/hr Regenrative Thermal oxidzer
A037	Seven New Plate and Frame Heat Exchangers, One Carb Gas Heater
A038	EMS and Air Handling Units (5 - 15 hp)

5.2 Overall and Utility-Specific Gross Impact Realization Rate

In this sub-section, we present the overall weighted realization rates. First, we graphically summarize ex-post versus ex-ante savings estimates for the entire sample across all end-uses. Results are then presented by utility.

5.2.1 Gross Impact Results Across All End-uses

Figure 5-1 and Figure 5-2 present the ex-ante (tracking system) and ex-post (engineering estimate) savings for the entire sample, for Source Btu and summer demand kW respectively. The charts also include a unity line, which divides the results into those in which the site-specific realization rates were above one (sites above the line) and below one (sites below the line). Any sites for which the kW impact analysis was inconclusive are excluded from the calculation of the program realization rate (they are not defaulted to realization rates of 1.0).

Figure 5-1: Ex-Post and Ex-Ante Savings (Millions of Source Btu) for PY2004-2005 Sample (n = 114)

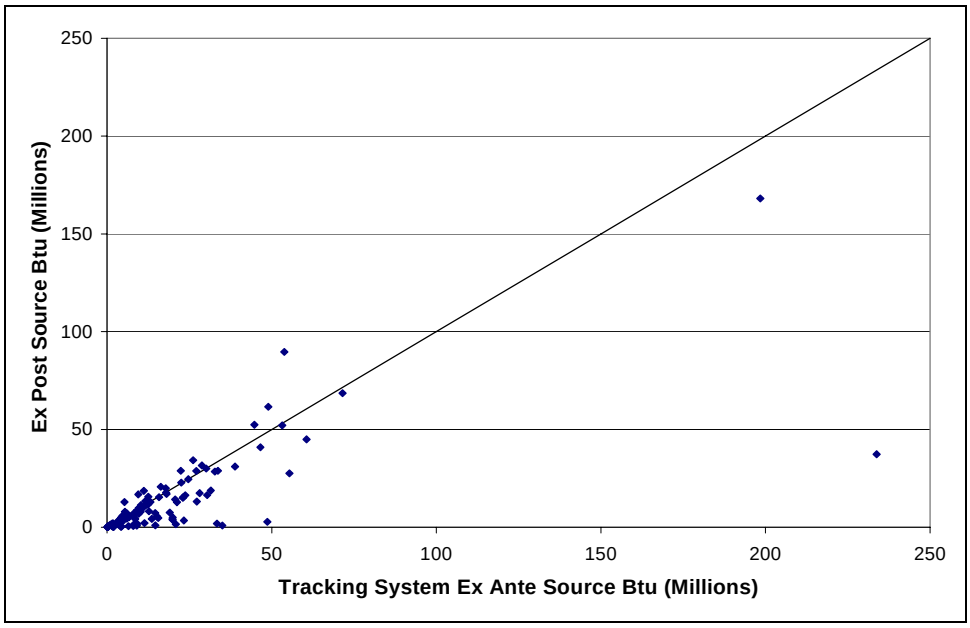


Figure 5-2: Ex-Post and Ex-Ante Savings (kW) for PY2004-2005 Sample (n = 80)

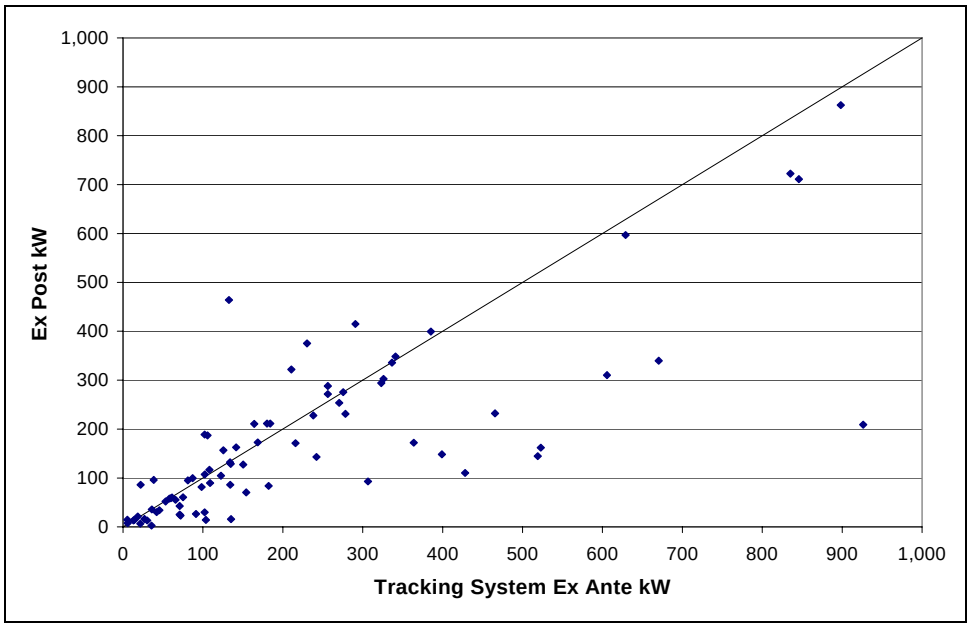


Figure 5-3 and Figure 5-4 present the ex-ante (tracking system) and ex-post (engineering estimate) savings for the PG&E sample, for Source Btu and summer demand kW respectively.

Figure 5-3: Ex-Post and Ex-Ante Savings (Millions of Source Btu) for PG&E Sample (n = 35)

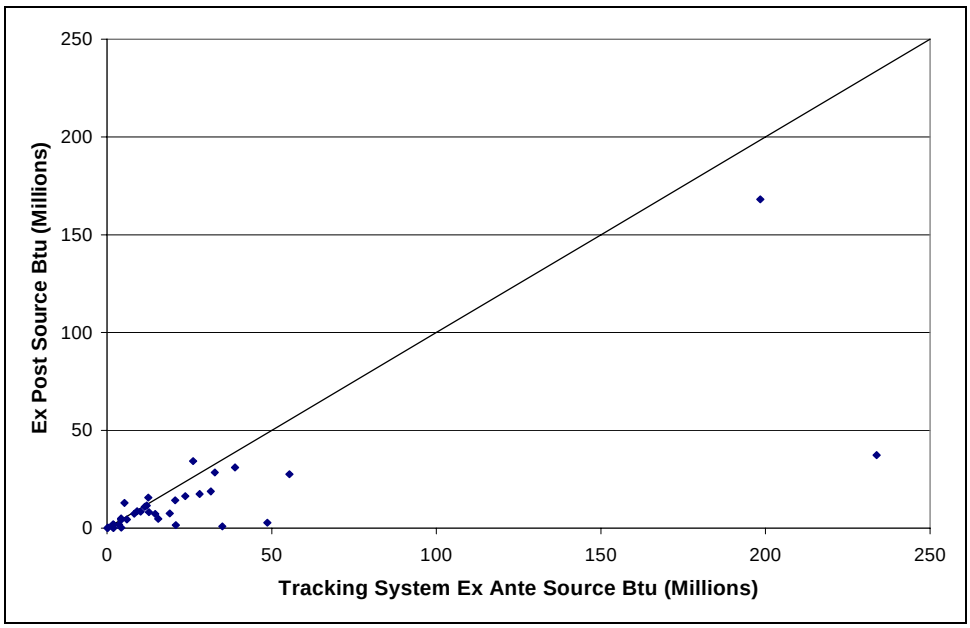


Figure 5-4: Ex-Post and Ex-Ante Savings (kW) for PG&E Sample (n = 22)

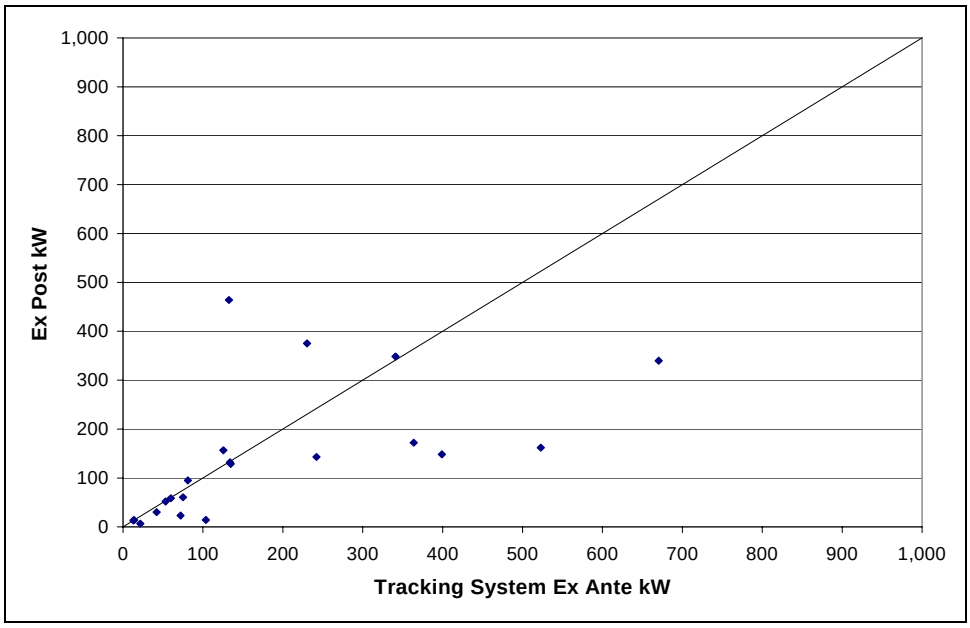


Figure 5-5 and Figure 5-6 present the ex-ante and ex-post savings for the SCE sample, for Source Btu and summer demand kW respectively.

Figure 5-5: Ex-Post and Ex-Ante Savings (Millions of Source Btu) for SCE Sample (n = 67)

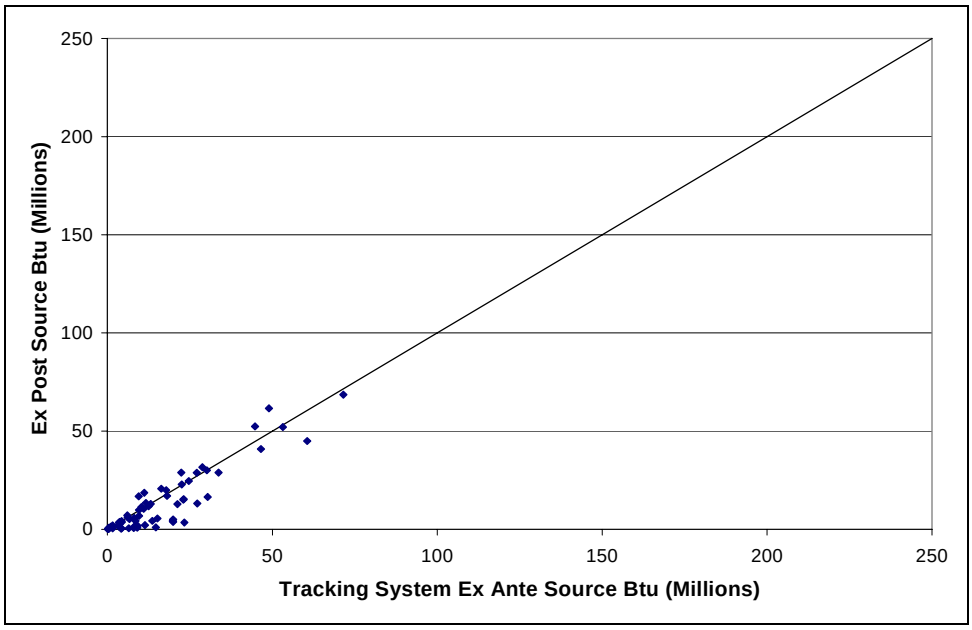


Figure 5-6: Ex-Post and Ex-Ante Savings (kW) for SCE Sample (n = 50)

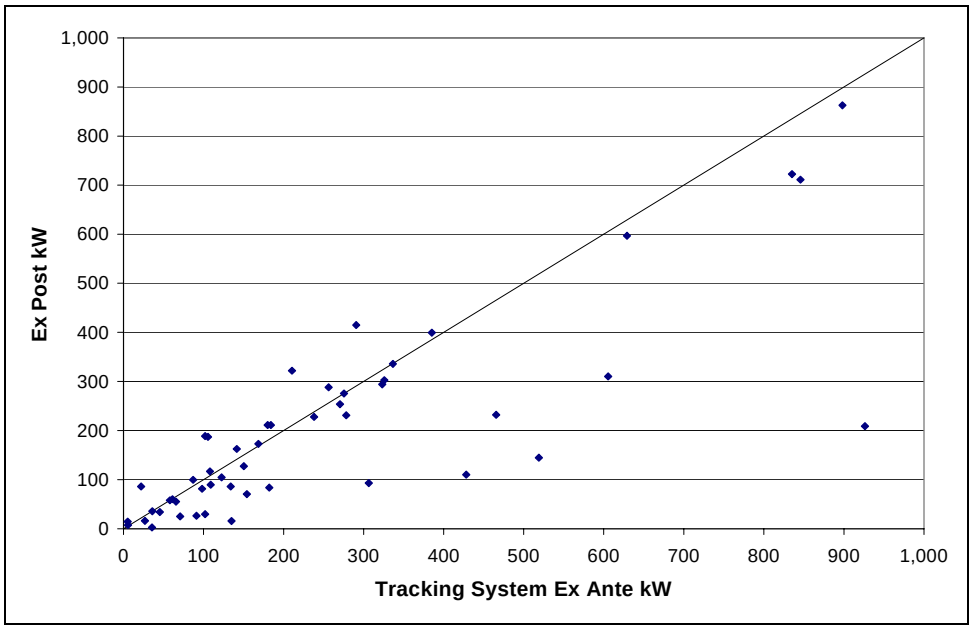


Figure 5-7 and Figure 5-8 present the ex-ante and ex-post savings for the SDG&E sample, for Source Btu and summer demand kW respectively.

Figure 5-7: Ex-Post and Ex-Ante Savings (Millions of Source Btu) for SDG&E Sample (n = 12)

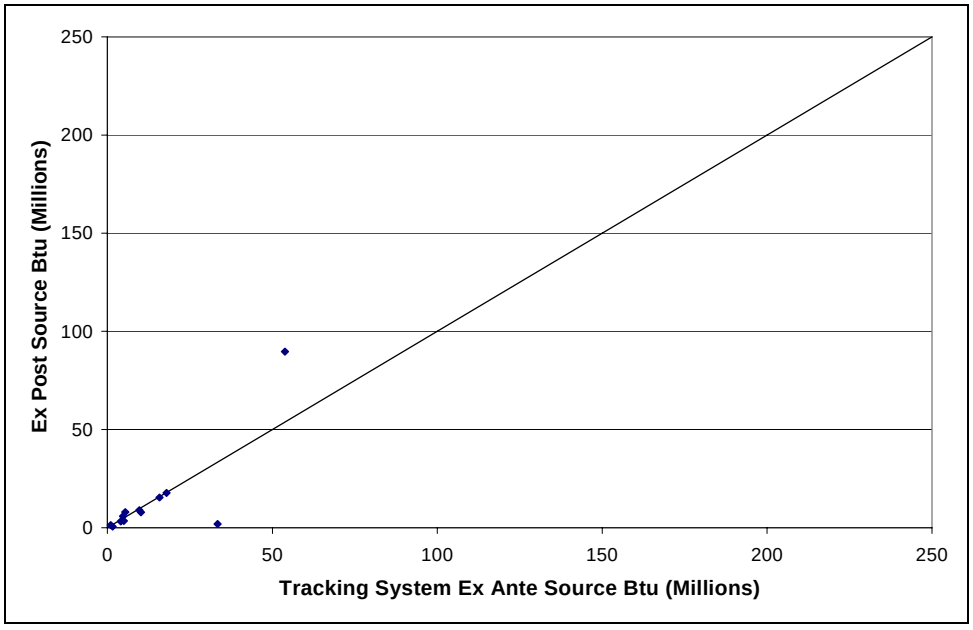
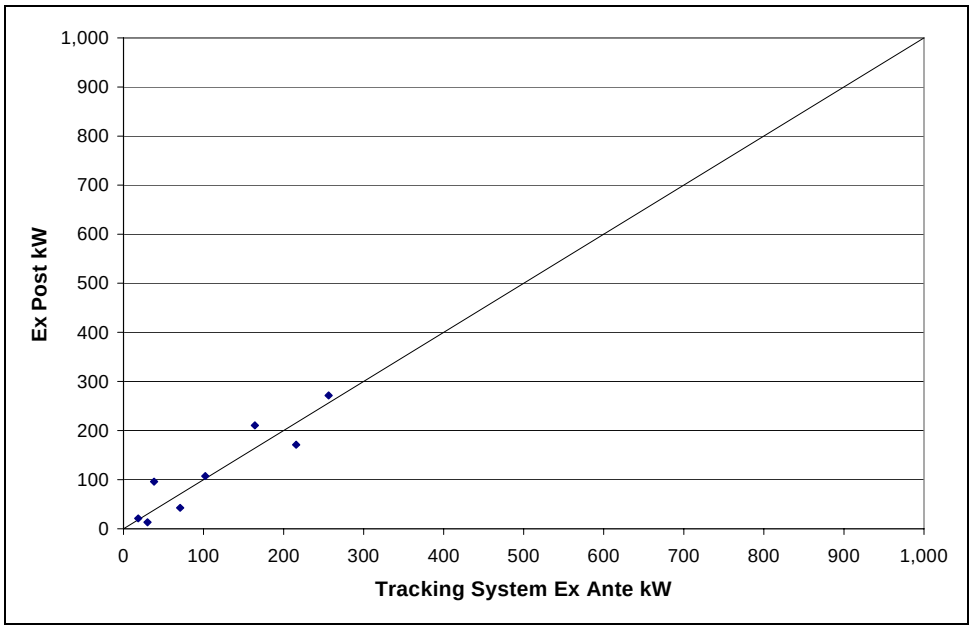


Figure 5-8: Ex-Post and Ex-Ante Savings (kW) for SDG&E Sample (n = 8)



5.2.2 Weighted Overall Program Gross Realization Rates

To produce the overall program realization rate, the individual realization rates for each of the field sample points were weighted by the size of the Source Btu impacts associated with each sample project, and by the proportion of the total program impacts represented by each stratum. The total population impacts for PY2004-2005 are presented in Chapter 2. Table 5-9 through Table 5-12 present the population and sample data used to develop the final weighted results.

Note that the SPC program participation and Source Btu numbers presented below were obtained from a December 2007 tracking database extract, and they include only applications that were completed or were still active. They differ from the numbers reported in Section 3.1.5, *Final Sample Design*, which were based on the September-October 2006 extracts. The main difference arises from the fact that the September-October 2006 extracts included some applications that were cancelled or rejected between September-October 2006 and December 2007.

Table 5-9: Tracking System Source Btu Savings for PY2004-2005 SPC Evaluation by Gross Impact Weighting Stratum (as of December 2007)*

	Source BTU (trillions)			
	All	PG&E	SCE	SDG&E
Tier 1	2.00	1.02	0.93	0.05
Tier 2	1.82	0.95	0.81	0.06
Tier 3	1.79	0.72	0.96	0.11
Tier 4	1.99	0.85	0.97	0.17
Tier 5	2.08	0.80	1.10	0.18
Total	9.68	4.33	4.78	0.57

*The source BTU cutpoints are: 44,895 MBtu for Tier 1, 18,530 MBtu for Tier 2, 9,467 MBtu for Tier 3, and 4,025 MBtu for Tier 4.

Table 5-10: Tracking System Population for SPC PY2004-2005 Evaluation by Gross Impact Weighting Stratum (as of December 2007)

	Application Counts			
	All	PG&E	SCE	SDG&E
Tier 1	27	13	13	1
Tier 2	71	35	33	3
Tier 3	138	57	73	8
Tier 4	323	136	158	29
Tier 5	1,698	646	880	172
Total	2,257	887	1,157	213

Table 5-11: PY2004-2005 SPC Impact Evaluation *Sample* – Tracking System Source Btu Savings by Gross Impact Weighting Stratum

	Source BTU (trillions)			
	All	PG&E	SCE	SDG&E
Tier 1	0.65	0.32	0.28	0.05
Tier 2	0.71	0.23	0.44	0.03
Tier 3	0.35	0.09	0.21	0.05
Tier 4	0.16	0.04	0.10	0.02
Tier 5	0.04	0.01	0.02	0.00
Total	1.91	0.69	1.05	0.16

Based on 114 applications sampled.

Table 5-12: PY2004-2005 SPC Impact Evaluation *Sample* by Gross Impact Weighting Stratum

	Application Counts			
	All	PG&E	SCE	SDG&E
Tier 1	10	4	5	1
Tier 2	28	10	17	1
Tier 3	27	7	16	4
Tier 4	26	7	15	4
Tier 5	23	7	14	2
Total	114	35	67	12

The gross realization rates by stratum, as well as the overall weighted program realization rate and the associated confidence interval are shown in Table 5-13. The overall weighted gross realization rate for Source Btu is 0.79. The 90 percent confidence interval for the 0.79 overall program gross realization rate is 0.69 to 0.89. Individual IOU gross realization rates and 90 percent confidence intervals are also shown in Table 5-13.

These realization rate values include the effect of misreporting of early retirement savings in the tracking system as lifetime savings instead of single-year savings. The effect of this misreporting was reduced somewhat due to corrections made by some utilities to these values in their EEGA filings. That is, for those cases in which corrections were made in EEGA, we corrected the tracking database extracts using the EEGA values, and carried the corrected data into our analysis. Even though the utilities made an effort to replace lifetime savings with first year savings in their EEGA filings, these corrections did not address all misreported impacts for early retirement projects. The effects of those sampled cases that were not previously corrected in EEGA remain a part of the final realization rate for this evaluation. See Section 8-5 for further discussion of this issue and associated effects.

Table 5-13: PY2004-2005 SPC Program Source Btu Gross Impact Realization Rates

Sampling Strata	**All**	**PG&E**	**SCE**	**SDG&E**
Tier 1	0.93	0.78	0.95	1.05
Tier 2	0.73	0.77	0.76	
Tier 3	0.86	0.75	0.89	0.93
Tier 4	0.68	1.16	0.44	1.07
Tier 5	0.75	0.62	0.82	0.75

Weighted Gross Impact RR	0.79	0.82	0.77	0.94
90 Percent CI	0.69 to 0.89	0.67 to 0.96	0.65 to 0.89	0.66 to 1.22
N	114	35	67	12

Note that the confidence interval does not capture any of the uncertainty in the ex-post savings estimate. The confidence interval only captures the effect of the variation in the ex-post to ex-ante ratio of the sample with a finite population factor correction that reflects the population of program participants. Namely, it is as if the ex-post values were known precisely without measurement error. It is important to keep in mind that the ex-post savings themselves are also estimates that can have considerable uncertainty, which is not captured in the reported confidence interval for the program realization rate.

As noted in the presentation of the AC&R results, the field sample included several early replacement projects for which the tracking system showed lifetime instead of first year savings. The tracking systems should have contained first-year savings for these projects, for consistency with all other records in the same field, but for 11 projects, measure life savings were entered and retained in the tracking system. Of these, savings for 7 projects were corrected - *prior to receipt of findings from this evaluation* - in EEGA, but *not* in the tracking systems provided to the evaluation team. For these cases, we corrected the tracking extracts and used the EEGA savings to calculate our realization rates. There remained three sites with early retirement chiller measures and one site with early retirement motor measures for which the IOU tracking systems misreported savings over the measure life instead of first year savings but for which no correction was made to EEGA. For these projects, we used the values reported in the tracking system to calculate our realization rate. This last group of sites has very small realization rates (0.04 to 0.08) and influences the overall realization rate of the program. If these four sites had not been in error in the utilities' tracking systems (or had been corrected earlier in EEGA like the other sites), the gross realization rate for the program would have been 0.82 and the 90 percent confidence interval 0.72 to 0.91. The gross realization rates by IOU would have been 0.85 for PG&E, 0.79 for SCE and 1.03 for SDG&E.

The realization rate for summer kW was obtained in a similar manner as the kWh realization rate, with the primary difference being that kW savings per project and by stratum were used as weights. The overall weighted realization rate for summer kW is 0.73. The 90 percent confidence interval for the 0.73 overall program realization rate is 0.61 to 0.86. Individual IOU realization rates and 90 percent confidence intervals are also shown in Table 5-14.

Table 5-14: PY2004-2005 SPC Program Summer kW Gross Impact Realization Rate

Sampling Strata	All	PG&E	SCE	SDG&E
Tier 1	0.84	0.62	1.20	-
Tier 2	0.68	0.70	0.67	1.00
Tier 3	0.81	0.56	0.87	
Tier 4	0.83	1.06	0.71	1.16
Tier 5	0.58	0.36	0.66	
Weighted Gross Impact RR	0.73	0.64	0.79	1.11
90 Percent CI	0.61 to 0.86	0.49 to 0.78	0.65 to 0.94	0.72 to 1.51
N	80	22	50	8

5.3 PY2004-2005 Net-of-Free-Ridership Ratios (NTFR)

Development of the individual, site-specific net-of-free-ridership estimates is summarized in Section 4. Here we present the weighted program-level results. To produce an estimate of net-of-free-ridership, the individual net-of-free-ridership ratios for each of the applications in the sample were weighted by the size of the impacts associated with the application and the proportion of the total program impacts represented by each sampling stratum. The population data and sampling strata used for the combined net-of-free-ridership analysis are the same as those used for the gross realization rates, and are shown in Table 5-10 and Table 5-11. The sample data are slightly different than those used for the gross realization rate due to the fact that an interview with appropriate site personnel was not possible at all of the engineering sites; the sample strata are shown in Table 5-15 and Table 5-16.

Table 5-15: PY2004-2005 SPC Net-of-Free-Ridership Evaluation Sample – Tracking System Source Btu Savings by Gross Impact Weighting Stratum

	Source Btu (trillions)			
	All	PG&E	SCE	SDG&E
Tier 1	0.52	0.32	0.15	0.05
Tier 2	0.66	0.23	0.39	0.03
Tier 3	0.37	0.08	0.24	0.05
Tier 4	0.16	0.04	0.10	0.02
Tier 5	0.04	0.01	0.03	0.00
Total	1.75	0.68	0.91	0.16

Table 5-16: PY2004-2005 SPC Net-of-Free-Ridership Evaluation Sample by Gross Impact Weighting Stratum

	Application Counts			
	All	PG&E	SCE	SDG&E
Tier 1	8	4	3	1
Tier 2	26	10	15	1
Tier 3	29	6	19	4
Tier 4	26	7	15	4
Tier 5	24	7	15	2
Total	113	34	67	12

Applying the same ratio estimation weighting approach referenced in the realization rate section, the resulting weighted net-of-free-ridership estimate for Source Btu savings is 0.57. This value is similar to estimates of net-of-free-ridership for the SPC program made in prior SPC evaluations conducted for each program year since the program's inception in 1998. Table 5-17 provides the net-of-free-ridership values by stratum and IOU, along with the 90 percent confidence interval.

Table 5-17: PY2004-2005 SPC Program Net-of-Free-Ridership Ratio

Sampling Strata	All	PG&E	SCE	SDG&E
Tier 1	0.67	0.82	0.50	0.56
Tier 2	0.54	0.59	0.48	
Tier 3	0.56	0.62	0.55	0.49
Tier 4	0.65	0.68	0.64	0.64
Tier 5	0.44	0.61	0.39	0.12

Weighted NTFR	0.57	0.67	0.51	0.43
90 Percent CI	0.52 to 0.63	0.6 to 0.75	0.46 to 0.56	0.31 to 0.55
N	113	34	67	12

The net-of-free-ridership estimate for summer kW is 0.56. Individual IOU net-of-free-ridership estimates and 90 percent confidence intervals are also shown in Table 5-18.

Table 5-18: PY2004-2005 SPC Program Summer kW Net-of-Free-Ridership Ratio

Sampling Strata	All	PG&E	SCE	SDG&E
Tier 1	0.75	0.89	0.49	-
Tier 2	0.45	0.50	0.43	0.35
Tier 3	0.59	0.66	0.62	
Tier 4	0.67	0.70	0.66	0.57
Tier 5	0.41	0.51	0.37	

Weighted NTFR	0.56	0.65	0.51	0.50
90 Percent CI	0.5 to 0.62	0.55 to 0.75	0.45 to 0.57	0.35 to 0.66
N	87	25	55	7

5.4 Net Realization Rates

Table 5-19 below summarizes the final verified program savings. The program-claimed NTGR were obtained from the E3 calculators posted on the EEGA web site in December 2005-January 2006. All other values are evaluation-based.

Table 5-19: Verified Gross and Net Realization Rates by Utility

	Net Electric Savings†		Net Gas Savings†	Total Net Energy Savings
Utility	kWh/year	Avg. peak kW	Therms/year	Millions Btu/year*
PG&E				
Verified Results (Net)	150,371,281	16,694	7,639,157	2,303,567
Evaluation Gross Realization Rate	82%	64%	82%	82%
Claimed NTGR[x]	74%	77%	72%	74%
Evaluation NTFR	67%	65%	67%	67%
Evaluation Net Realization Rate‡	56%	42%	50%	54%
SCE				
Verified Results (Net)	182,514,253	24,267	-	1,868,763
Evaluation Gross Realization Rate	77%	79%	-	77%
Claimed NTGR[x]	70%	70%	-	70%
Evaluation NTFR	51%	51%	-	51%
Evaluation Net Realization Rate‡	39%	37%	-	39%
SDG&E				
Verified Results (Net)	16,735,567	2,423	571,096	228,465
Evaluation Gross Realization Rate	94%	111%	94%	94%
Claimed NTGR[x]	70%	70%	70%	70%
Evaluation NTFR	43%	50%	43%	43%
Evaluation Net Realization Rate‡	37%	57%	50%	40%
TOTAL PROGRAM				
Verified Results (Net)	349,621,102	43,384	8,210,253	4,400,796
Evaluation Gross Realization Rate	79%	74%	79%	79%
Claimed NTGR[x]	71%	72%	74%	72%
Evaluation NTFR	57%	56%	57%	57%
Evaluation Net Realization Rate‡	45%	40%	50%	46%

* Conversion rates obtained from *2001 Energy Efficiency Standards for Residential and Non-residential Buildings*, California Energy Commission, June 2001:
1 kWh = 10,239 Btu source energy
1 therm = 100,000 Btu source energy

[x] E3 Report Date December 2005-January 2006.

† Actuals and commitments for all three IOUs based on tracking data extracts dated December 2007-January 2008.
Comittments represent 0% of impacts for PG&E, 11% for SCE and 17% for SDG&E, for a total of 7% of program impacts.

‡ Not equal to the product of RR and NTFR due to the compounding effect of applying strata-specific RR and NTFR to the population.

As the table shows, evaluated gross BTU realization rates range from 77% to 94%, depending on the utility. (An evaluated gross realization rate of 100% would indicate evaluated gross savings which are identical to claimed gross savings.) Another finding is that there are fairly significant differences between claimed and evaluated NTGRs. The primary source of this difference is the exclusion of the +0.15 adjustment in the Evaluation NTGR in accordance with CPUC policy for PY2004-05.

5.5 20-year Impact Reporting

The ex-ante and ex-post evaluation kWh, kW and/or Therm projections for the 114 on-site sample points (please refer to Appendix B for details) were used to derive a unit energy consumption (UEC) shape, as follows:

- After discussions with the CPUC, it was decided that each SPC program application would be attributed a whole year's worth of savings for the installation year, regardless of the actual installation date of the measure.

- The individual on-site 20-year projections presented in Appendix B did take into account the actual installation date of the measures to develop partial first and last year estimates. To make full use of the 114 projections from the on-site sample, we converted the partial year estimates into full year estimates. We also "aligned" the savings projections for each on-site sample point, so that the first year's savings was always labeled "year 1".

- For each of the 114 on-site projects a gross ex-ante unit energy consumption (UEC) shape was derived by dividing the 20-year annualized ex-ante projection by the tracking database savings.

- Similarly, for each on-site project, a gross engineering-based ex-post UEC shape was derived by dividing the 20-year annualized ex-post projection by the tracking database savings.

- The tracking database savings for each participant project and the program-wide tracking database savings per stratum were used as weights to derive IOU-specific gross ex-ante and gross ex-post UEC shapes.

- For each IOU, the net-of-free-ridership ex-post UEC shape was obtained by multiplying the gross ex-post UEC shape by the IOU-specific net-of-free-ridership value.

The gross ex-ante and net of free ridership ex-post UEC shapes for each of the three IOUs are presented in Table 5-20 to Table 5-22. The net of free ridership ex-post shape incorporates both the engineering realization rates and the net-of-free-ridership ratios.

Table 5-20: SPC Program - Unit Energy Consumption Shapes for PG&E

Year	Gross Ex-Ante Program-Projected MWh UEC (1)	Net Ex-Post Evaluation Confirmed MWh UEC (2)	Gross Ex-Ante Program-Projected Peak MW UEC (1)	Net Ex-Post Evaluation Projected Peak MW UEC (2)	Gross Ex-ante Program-Projected Therm UEC (1)	Net Ex-Post Evaluation Confirmed Therm UEC (2)
1	1.000	0.561	1.000	0.419	1.000	0.496
2	1.000	0.561	1.000	0.419	1.000	0.496
3	1.000	0.561	1.000	0.419	1.000	0.496
4	1.000	0.561	1.000	0.419	1.000	0.496
5	1.000	0.561	1.000	0.419	1.000	0.496
6	0.997	0.561	0.996	0.419	1.000	0.496
7	0.997	0.561	0.996	0.419	1.000	0.496
8	0.997	0.561	0.996	0.419	1.000	0.496
9	0.997	0.561	0.996	0.419	1.000	0.496
10	0.997	0.561	0.996	0.417	1.000	0.496
11	0.985	0.555	0.987	0.410	1.000	0.496
12	0.947	0.530	0.930	0.378	1.000	0.496
13	0.909	0.506	0.930	0.378	1.000	0.496
14	0.909	0.506	0.930	0.378	1.000	0.496
15	0.909	0.506	0.930	0.378	1.000	0.496
16	0.456	0.230	0.602	0.236	0.261	0.105
17	0.196	0.058	0.246	0.065	0.219	0.085
18	0.196	0.058	0.246	0.065	0.219	0.085
19	0.196	0.058	0.246	0.065	0.219	0.085
20	0.196	0.058	0.246	0.065	0.219	0.085

NOTES:
1. Gross Program-Projected UECs are those UECs projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed UECs are those documented via the evaluation and include RR and NTFR adjustments.

Table 5-21: SPC Program - Unit Energy Consumption Shapes for SCE

Year	Gross Ex-Ante Program-Projected MWh UEC (1)	Net Ex-Post Evaluation Confirmed MWh UEC (2)	Gross Ex-Ante Program-Projected Peak MW UEC (1)	Net Ex-Post Evaluation Projected Peak MW UEC (2)	Gross Ex-ante Program-Projected Therm UEC (1)	Net Ex-Post Evaluation Confirmed Therm UEC (2)
1	1.000	0.392	1.000	0.372	1.000	0.496
2	1.000	0.392	1.000	0.372	1.000	0.496
3	1.000	0.392	1.000	0.372	1.000	0.496
4	1.000	0.392	1.000	0.372	1.000	0.496
5	1.000	0.392	1.000	0.372	1.000	0.496
6	1.000	0.392	1.000	0.372	1.000	0.496
7	1.000	0.392	1.000	0.371	1.000	0.496
8	1.000	0.392	0.999	0.370	1.000	0.496
9	0.976	0.387	0.978	0.365	1.000	0.496
10	0.976	0.387	0.978	0.362	1.000	0.496
11	0.967	0.381	0.978	0.362	1.000	0.496
12	0.934	0.379	0.978	0.362	1.000	0.496
13	0.920	0.378	0.978	0.362	1.000	0.496
14	0.920	0.378	0.978	0.362	1.000	0.496
15	0.920	0.378	0.978	0.362	1.000	0.496
16	0.559	0.232	0.721	0.276	0.261	0.105
17	0.129	0.054	0.144	0.063	0.219	0.085
18	0.094	0.032	0.087	0.033	0.219	0.085
19	0.094	0.032	0.087	0.033	0.219	0.085
20	0.094	0.032	0.087	0.033	0.219	0.085

NOTES:
1. Gross Program-Projected UECs are those UECs projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed UECs are those documented via the evaluation and include RR and NTFR adjustments.

Table 5-22: SPC Program - Unit Energy Consumption Shapes for SDG&E

Year	Gross Ex-Ante Program-Projected MWh UEC (1)	Net Ex-Post Evaluation Confirmed MWh UEC (2)	Gross Ex-Ante Program-Projected Peak MW UEC (1)	Net Ex-Post Evaluation Projected Peak MW UEC (2)	Gross Ex-ante Program-Projected Therm UEC (1)	Net Ex-Post Evaluation Confirmed Therm UEC (2)
1	1.000	0.374	1.000	0.569	1.000	0.496
2	1.000	0.374	1.000	0.569	1.000	0.496
3	1.000	0.374	1.000	0.569	1.000	0.496
4	1.000	0.374	1.000	0.569	1.000	0.496
5	1.000	0.374	1.000	0.569	1.000	0.496
6	1.000	0.374	1.000	0.569	1.000	0.496
7	1.000	0.374	1.000	0.569	1.000	0.496
8	1.000	0.374	1.000	0.569	1.000	0.496
9	1.000	0.374	1.000	0.569	1.000	0.496
10	1.000	0.360	1.000	0.538	1.000	0.496
11	0.979	0.335	0.907	0.388	1.000	0.496
12	0.979	0.335	0.907	0.388	1.000	0.496
13	0.979	0.335	0.907	0.388	1.000	0.496
14	0.979	0.335	0.907	0.388	1.000	0.496
15	0.979	0.335	0.907	0.388	1.000	0.496
16	0.431	0.203	0.736	0.308	0.261	0.105
17	0.247	0.065	0.209	0.048	0.219	0.085
18	0.247	0.065	0.209	0.048	0.219	0.085
19	0.247	0.065	0.209	0.048	0.219	0.085
20	0.247	0.065	0.209	0.048	0.219	0.085

NOTES:
1. Gross Program-Projected UECs are those UECs projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed UECs are those documented via the evaluation and include RR and NTFR adjustments.

The UEC shapes for each IOU were then used to project 20 year saving series for each individual tracking database project as follows:

- For each installed project, the tracking database was used to determine the measure installation year (from the date when PIR was received or approved.)
- If the installation year was not 2004 then the savings attributed to year 2004 and any other years prior to the installation year were set to zero.
- For 2004-2005 SPC projects committed but not installed as of December 2007, representing 7% of program impacts, we assumed an installation year of 2008.
- 2004-2005 SPC projects that were cancelled or withdrawn were not included in the projections.
- The ex-ante and ex-post savings for the installation year were calculated as the product between the tracking database savings and the UEC for Year 1 (refer to Table 5-9 to Table 5-11 above.)
- Savings for the subsequent years were calculated by multiplying the tracking database savings with the UECs for Year 2, Year 3, etc.
- Total savings for each utility were calculated as the sum of individual project savings.

Impacts by IOU and for the entire program are reported in Table 5-23 to Table 5-26.

Table 5-23: SPC Program – Energy Impact Reporting for PG&E

Program ID:								
Program Name:	Nonresidential Standard Performance Contract							
	Year	Calendar Year	Ex-ante Gross Program-Projected Program MWh Savings (1)	Ex-Post Net Evaluation Confirmed Program MWh Savings (2)	Ex-Ante Gross Program-Projected Peak Program MW Savings (1)	Ex-Post Evaluation Projected Peak MW Savings (2)	Ex-Ante Gross Program-Projected Program Therm Savings (1)	Ex-Post Net Evaluation Confirmed Program Therm Savings (2)
	1	2004	33,309	18,699	6.6	2.8	2,351,998	1,166,406
	2	2005	145,362	81,602	23.2	9.7	6,973,018	3,458,070
	3	2006	168,245	94,449	25.3	10.6	8,163,307	4,048,360
	4	2007	267,274	150,041	39.7	16.6	15,044,565	7,460,923
	5	2008	267,862	150,371	39.8	16.7	15,403,965	7,639,157
	6	2009	267,770	150,358	39.8	16.7	15,403,965	7,639,157
	7	2010	267,457	150,313	39.7	16.7	15,403,965	7,639,157
	8	2011	267,393	150,304	39.7	16.7	15,403,965	7,639,157
	9	2012	267,117	150,264	39.7	16.7	15,403,965	7,639,157
	10	2013	267,115	150,264	39.7	16.7	15,403,965	7,639,157
	11	2014	266,719	150,065	39.6	16.6	15,403,965	7,639,157
	12	2015	264,119	148,574	39.1	16.3	15,403,965	7,639,157
	13	2016	258,317	144,854	38.1	15.7	15,403,965	7,639,157
	14	2017	252,006	140,936	37.9	15.5	15,403,965	7,639,157
	15	2018	247,362	137,928	37.0	15.1	15,403,965	7,639,157
	16	2019	228,487	126,296	34.9	14.1	13,664,733	6,719,215
	17	2020	169,034	89,684	27.1	10.6	10,149,502	4,864,239
	18	2021	129,452	64,118	20.5	7.5	9,076,530	4,305,265
	19	2022	78,638	32,901	15.0	5.1	3,938,389	1,589,721
	20	2023	52,549	15,717	9.8	2.6	3,385,538	1,310,045
	TOTAL	2004-2023	4,165,588	2,297,740			242,191,190	118,952,974

NOTES:
1. Gross Program-Projected savings are those savings projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed savings are those documented via the evaluation and include the evaluation contractor's NTFR adjustments.

Table 5-24: SPC Program – Energy Impact Reporting for SCE

Program ID:								
Program Name:	Nonresidential Standard Performance Contract							
	Year	Calendar Year	Ex-ante Gross Program-Projected Program MWh Savings (1)	Ex-Post Net Evaluation Confirmed Program MWh Savings (2)	Ex-Ante Gross Program-Projected Peak Program MW Savings (1)	Ex-Post Evaluation Projected Peak MW Savings (2)	Ex-Ante Gross Program-Projected Program Therm Savings (1)	Ex-Post Net Evaluation Confirmed Program Therm Savings (2)
	1	2004	80,800	31,695	14.1	5.2	0	0
	2	2005	268,762	105,426	38.6	14.3	0	0
	3	2006	268,762	105,426	38.6	14.3	0	0
	4	2007	414,488	162,589	59.5	22.1	0	0
	5	2008	465,285	182,514	65.3	24.3	0	0
	6	2009	465,285	182,514	65.3	24.3	0	0
	7	2010	465,285	182,509	65.3	24.3	0	0
	8	2011	465,285	182,495	65.3	24.2	0	0
	9	2012	463,341	182,052	65.0	24.1	0	0
	10	2013	458,817	181,001	64.4	24.0	0	0
	11	2014	458,076	180,516	64.4	23.9	0	0
	12	2015	450,211	178,483	64.0	23.7	0	0
	13	2016	441,720	177,762	63.8	23.7	0	0
	14	2017	437,721	176,798	63.8	23.6	0	0
	15	2018	432,507	176,219	63.8	23.6	0	0
	16	2019	399,643	164,228	60.2	22.4	0	0
	17	2020	296,363	122,394	45.8	17.3	0	0
	18	2021	212,672	87,184	30.9	11.7	0	0
	19	2022	153,533	61,762	24.1	9.1	0	0
	20	2023	72,517	28,435	10.6	4.2	0	0
	TOTAL	2004-2023	7,171,072	2,852,002			0	0

NOTES:
1. Gross Program-Projected savings are those savings projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed savings are those documented via the evaluation and include the evaluation contractor's NTFR adjustments.

Table 5-25: SPC Program – Energy Impact Reporting for SDG&E

Program ID:									
Program Name:	Nonresidential Standard Performance Contract								
	Year	Calendar Year	Ex-ante Gross Program-Projected Program MWh Savings (1)	Ex-Post Net Evaluation Confirmed Program MWh Savings (2)	Ex-Ante Gross Program-Projected Peak Program MW Savings (1)	Ex-Post Evaluation Projected Peak MW Savings (2)	Ex-Ante Gross Program-Projected Program Therm Savings (1)	Ex-Post Net Evaluation Confirmed Program Therm Savings (2)
	1	2004	5,300	1,982	0.4	0.2	26,263	13,024
	2	2005	27,363	10,231	3.0	1.7	459,741	227,996
	3	2006	37,394	13,982	3.5	2.0	1,096,593	543,824
	4	2007	37,854	14,154	3.5	2.0	1,141,728	566,207
	5	2008	44,758	16,736	4.3	2.4	1,151,585	571,096
	6	2009	44,758	16,736	4.3	2.4	1,151,585	571,096
	7	2010	44,758	16,736	4.3	2.4	1,151,585	571,096
	8	2011	44,758	16,736	4.3	2.4	1,151,585	571,096
	9	2012	44,758	16,736	4.3	2.4	1,151,585	571,096
	10	2013	44,758	16,661	4.3	2.4	1,151,585	571,096
	11	2014	44,649	16,218	4.2	2.3	1,151,585	571,096
	12	2015	44,192	15,519	4.0	1.9	1,151,585	571,096
	13	2016	43,985	15,258	3.9	1.8	1,151,585	571,096
	14	2017	43,975	15,150	3.9	1.8	1,151,585	571,096
	15	2018	43,833	14,975	3.9	1.6	1,151,585	571,096
	16	2019	40,928	14,278	3.8	1.6	1,132,164	560,823
	17	2020	27,863	10,645	3.1	1.3	810,525	390,745
	18	2021	18,303	6,277	1.7	0.6	321,507	132,889
	19	2022	16,204	4,831	1.4	0.5	261,562	102,362
	20	2023	12,336	3,860	1.3	0.4	252,390	97,594
	TOTAL	**2004-2023**	712,729	257,698			18,169,908	8,917,518

NOTES:
1. Gross Program-Projected savings are those savings projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed savings are those documented via the evaluation and include the evaluation contractor's NTFR adjustments.

Table 5-26: SPC Program – Energy Impact Reporting Statewide

Program ID:								
Program Name:	Nonresidential Standard Performance Contract							
	Year	Calendar Year	Ex-ante Gross Program-Projected Program MWh Savings (1)	Ex-Post Net Evaluation Confirmed Program MWh Savings (2)	Ex-Ante Gross Program-Projected Peak Program MW Savings (1)	Ex-Post Evaluation Projected Peak MW Savings (2)	Ex-Ante Gross Program-Projected Program Therm Savings (1)	Ex-Post Net Evaluation Confirmed Program Therm Savings (2)
	1	2004	119,409	52,376	21.1	8.2	2,378,261	1,179,431
	2	2005	441,486	197,259	64.8	25.8	7,432,759	3,686,065
	3	2006	474,401	213,856	67.3	26.9	9,259,900	4,592,184
	4	2007	719,617	326,784	102.7	40.7	16,186,293	8,027,131
	5	2008	777,906	349,621	109.4	43.4	16,555,550	8,210,253
	6	2009	777,813	349,608	109.3	43.4	16,555,550	8,210,253
	7	2010	777,500	349,557	109.3	43.4	16,555,550	8,210,253
	8	2011	777,436	349,535	109.3	43.3	16,555,550	8,210,253
	9	2012	775,216	349,052	108.9	43.2	16,555,550	8,210,253
	10	2013	770,691	347,927	108.3	43.0	16,555,550	8,210,253
	11	2014	769,443	346,799	108.2	42.7	16,555,550	8,210,253
	12	2015	758,522	342,576	107.0	41.9	16,555,550	8,210,253
	13	2016	744,022	337,874	105.9	41.1	16,555,550	8,210,253
	14	2017	733,702	332,884	105.6	40.9	16,555,550	8,210,253
	15	2018	723,701	329,122	104.7	40.3	16,555,550	8,210,253
	16	2019	669,059	304,802	98.9	38.2	14,796,897	7,280,038
	17	2020	493,260	222,723	76.0	29.3	10,960,027	5,254,984
	18	2021	360,428	157,580	53.0	19.7	9,398,037	4,438,154
	19	2022	248,375	99,494	40.6	14.7	4,199,950	1,692,083
	20	2023	137,402	48,012	21.7	7.2	3,637,927	1,407,639
	TOTAL	**2004-2023**	12,049,389	5,407,440			260,361,098	127,870,492

NOTES:
1. Gross Program-Projected savings are those savings projected by the program before NTFR adjustments.
2. Net Evaluation Confirmed savings are those documented via the evaluation and include the evaluation contractor's NTFR adjustments.

6

Energy Efficiency Service Provider (EESP) Findings

6.1 Overview of EESPs Interviewed

Interviews were conducted with 42 Energy Efficiency Service Providers (EESPs) that participated in the 2004-2005 SPC Program. While the EESPs interviewed covered a full range of sizes and business types, it should be noted that they were not randomly selected. As part of the evaluation of the 2004-2005 program, detailed site data were collected for a number of projects, including metering, review of installed measures, and interviews with implementing customers. To provide additional information on these customers and how they made their participation decision, the 42 EESPs who sponsored one or more of these projects made up the first group of EESPs targeted for interviews, and 25 interviews were completed with this group. The second group of 17 EESP interviews was then drawn from a sample that included EESPs with applications in multiple utility territories and EESPs in territories that had relatively fewer sites in the impact sample (i.e., SDG&E and PG&E).

In all, the EESPs interviewed had a total of 251 projects for 163 customers in the program database, and most confirmed that the numbers were or sounded correct. The one significant exception was a lighting contractor with one project in the database that said they actually did 20 to 30 projects in SCE territory – although he may have been referring to the Summer Lighting Initiative. In addition, about one-fourth of respondents also reported a limited number of projects they worked on where the customer or another EESP was the sponsor

About two-thirds of the EESPs had also participated in the SPC program in previous years, while 33 of the 42 said they had done projects through SPC in 2006 or 2007. Reasons offered by the nine firms who had not participated since 2004-2005 included a shift in their focus to markets in other states and the use of other programs within California, including the Multifamily, Express Efficiency, Custom Incentive, and SDG&E Bid programs. In addition, other EESPs mentioned their customers' long planning cycle, lack of market opportunities, and the termination of a strategic marketing partnership that had previously brought in business. Finally, one EESP said they were preparing to start a new SPC project, and another said they had finished developing a new product that they planned to market through SPC.

6.1.1 Demographics

The firms interviewed in this evaluation encompassed a variety of business types, including 10 EESPs, 4 engineering firms, 16 equipment vendors (including manufacturers, distributors, contractor/dealers and manufacturers representatives), 7 traditional ESCOs, 1 facilities management company, several consultants and 1 retail energy services company. Participants said they had been providing energy efficiency services for anywhere from 3 to 34 years, with one vendor noting that they had been selling lighting since 1897.

Participating EESPs range in size from 1-person operations to large ESCOs and the local sales offices of multinational building automation equipment manufacturers and large energy companies with up to 300 employees in California. Several EESPs said they served the California market from out of state offices using local contractors, with no full time employees in the state. The participating EESPs interviewed averaged 49 FTE employees in California, although this average was skewed by several firms with 100 or more employees, and the number of employees actually working on energy efficiency projects was generally much smaller.

- 19 of the 42 respondents said they do business nationally or internationally, although several emphasized that much of their out-of-state business was not specifically related to energy efficiency.

- Another 11 do business statewide, including several who also do business in other western states

- The remaining companies said they do business only in one part of California, typically in a single utility's service territory, although some said they cover the entire northern or southern part of the state.

6.1.2 2004-2005 Program Changes

When asked if they recalled the changes to the SPC program from 2003 to 2004, four EESPs mentioned the greater funding and the reduced likelihood that the program would run out of money, while five recalled the addition of Express Efficiency Measures to the program, and two noted the addition of early replacement for HVAC and motors. However, the most often recalled change, noted by 11 EESPs (sometimes in conjunction with the addition of itemized measures), was the overall streamlining of the participation process; including improvements to the SPC software and the greater ease of applying, calculating estimated savings, and receiving payment.

Those EESPs who recalled the changes in 2004-2005 generally viewed them favorably, noting that they facilitated the participation process and reduced the administrative burden.

For example, one EESP said "We had estimated about 80 hours for a project based on our previous experience, and it took about half that because the program got easier and the folks who were doing the review made us realize we didn't need as much detail." Another respondent commented, however, that the greater ease of participation "somewhat undermined our business. The easier the program became with prescriptive measures, the less our third-party expertise was needed."

6.1.3 Program Strengths and Weaknesses

EESP were asked about the 2004-2005 SPC program's key strengths and weaknesses. Table 6-1 below summarizes their responses.

Table 6-1: Perceived Program Strengths and Weaknesses

Strengths	#	Weaknesses	#
Incentive availability	14	Complexity, paperwork, admin. time	15
Ease of participation/application	9	Difficulty of communicating with utility	7
Helps sell, validates sales message	8	Engineering review process	3
Program is well designed and run	8	Limited funds/uncertainty of funds	3

The most often cited strength of the SPC program, mentioned by one-third of respondents, was simply that the availability of incentives that allow customers to implement projects that otherwise would not meet payback criteria. Also cited by about 20% of EESPs were the ease of participation and the streamlined participation process, the fact that the program validates their sales message through the IOUs' involvement, and the efficiency with which the program is run, including the responsiveness of SPC program staff.

- Regarding program strengths, respondents provided the following comments:
- "The greatest strength is having rebates available."
- "Because of the incentive, we were able to add this on to an existing project."
- "The much improved, faster process let us do more projects."
- "Everything went on time and as we thought; we got paid fast, so it encouraged us to do more of these. It was a success and pleasant."

- "A major strength is definitely the fact that they came up with the calculated approach, so that the client gets paid faster."

- "One thing the program does on the compressor side is when PG&E comes back and says we're going to give you a rebate . . . it's like independently verifying what I'm recommending."

- "It gave you a reason to get in front of the customer. . . .That got me in the door."

- "The overall program is sound, with good structure and administration."

- The most often cited weakness was the still time consuming and sometime complex process of applying for SPC funds, cited by 15 EESPS, while 7 respondents commented on the difficulty of identifying and communicating with IOU program staff. In addition to several respondents who mentioned problems relating to the engineering reviews and uncertainty regarding the availability of funds (either overall or specifically for lighting projects), 5 EESPs said they could not identify particular weaknesses of the program.

- Regarding program weaknesses, specific comments received were:

- "The fact that we had to do detailed eQuest modeling for each application in order to get the incentive."

- "A weakness would have to be the paperwork, that we have to fill out multiple applications. We now have to fill out another one to get the final 40%."

- "You still have to do the pre and post review. It takes a good amount of time to go through that and the waiting for the review."

- "The amount of paperwork is a little bit high, but the truth is it's not a whole lot different from others, and if you do a custom project that is not prescriptive you have to have some documentation, so it is not an inordinate amount."

- "(The biggest weakness is) using contractors to do things that should probably be done in house. Every technical contractor they hire is different. Within the utility you get used to dealing with one person, but that changes from contractor to contractor."

- "We never knew how much money was used and how much was left. At NYSERDA they update (the website) weekly so you know how much is left. The California SPC didn't have that."

When asked about their perception of 2004-2005 incentive levels, more than three-fourths of EESPs described them as "reasonable," "OK," "fair" or "generous." About a half dozen

respondents expressed reservations about the level of incentives, either overall or for specific measures. Their specific comments were:

- "Lighting was a little underpaid."
- "Rebate levels were fairly small; barely sufficient to improve customer ROIs."
- "The incentive was very low for this project (only $900); the cost of preparing the application and other paperwork was not worth the incentive."

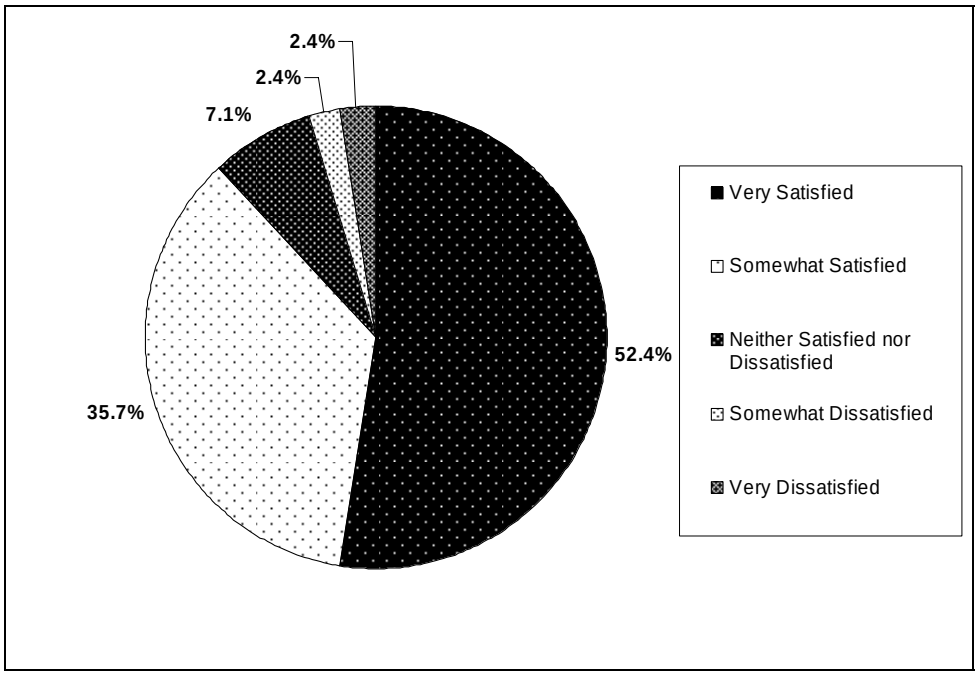
Similarly, most respondents had no complaints about the payment schedule, although several said that payments took too long and three made reference to having to wait a year for the final 40% to be paid. While most EESPs noted no significant differences in how the utilities handled payments, one respondent said PG&E was slower than SCE to make payment; another reported the opposite.

Most EESPs said that the various program incentive caps had not been an issue for them, but six of those interviewed said they had been affected by the program cap that limits incentives to 50% of project cost. Only one recalled facing the per-site cap, but another respondent said the $350,000 site cap was "not adequate for large or multi-building facilities" and a third felt that "there is no justification for caps in a procurement funded program."

6.1.4 EESP Satisfaction

EESPs were also asked to rate their overall satisfaction with the SPC program. Findings indicate that the majority of EESPs are highly satisfied with the program (Figure 6-1). More than half of all participating EESPs who offered responses said they were very satisfied with the program overall, while another 36% said they were somewhat satisfied, and only 4.8% (2 respondents) said they were somewhat or very dissatisfied.

Figure 6-1: EESP Satisfaction with the 2004-2005 SPC Program



When asked to explain their ratings, Very Satisfied respondents attributed their satisfaction with the program to its role in their marketing efforts as well as the streamlined application process and the relative ease of working with the program. Their comments included:

- "It's a significant part of our market. All of our folks use it and are familiar with it."
- "It's a great program. It gets the casinos energy savings, some extra money, and the verification by the utility that it works."
- "The program ran well, incentives supported our sales. California programs are pretty well run relative to those we work with elsewhere in the country."
- "Basically we could link up with people at the engineering level. That was a big plus for us."
- "The SPC program certainly helped customers do these projects."

Several of those who were Somewhat Satisfied offered specific reasons why they did not provide a Very Satisfied rating:

- "The reason is primarily due to one difficulty in tracking the status of an application – it was almost impossible."
- "It was personally satisfying to participate. The incentives were low, though."

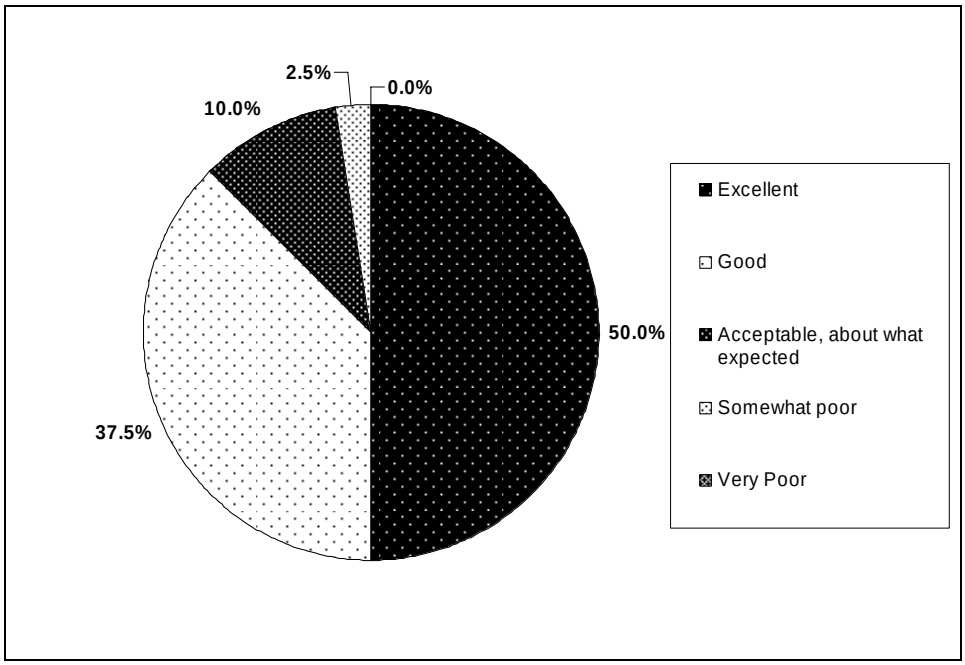
- "Outside review contractors delayed reviews and payments."
- "It encouraged a couple of customers to buy systems, but the ROI was not great due to administrative time lost."

The two EESPs who were Dissatisfied focused on the complexity of participating:

- "It was too cumbersome; we absorb time and effort as overhead. We much prefer to use the Express Program."
- "It's way too complicated. I want little simple formulas that you can use."

EESPs were also asked to rate their experiences with the utilities administering the 2004-2005 SPC program (Figure 6-2). Almost 90% of the 40 EESPs said the experience had been Good or Excellent, and only one respondent rated it as very poor. None of the EESPs who worked with multiple IOUs reported significant differences among them.

Figure 6-2: EESP Experience with Utilities Administering the Program



Respondents who provided Excellent ratings offered the following comments illustrating the importance of communication and accessibility to EESP satisfaction:

- "At SCE I can call any one of a dozen people and get an immediate response."
- "I like the fact that they're easy to get hold of and know what they're talking about."

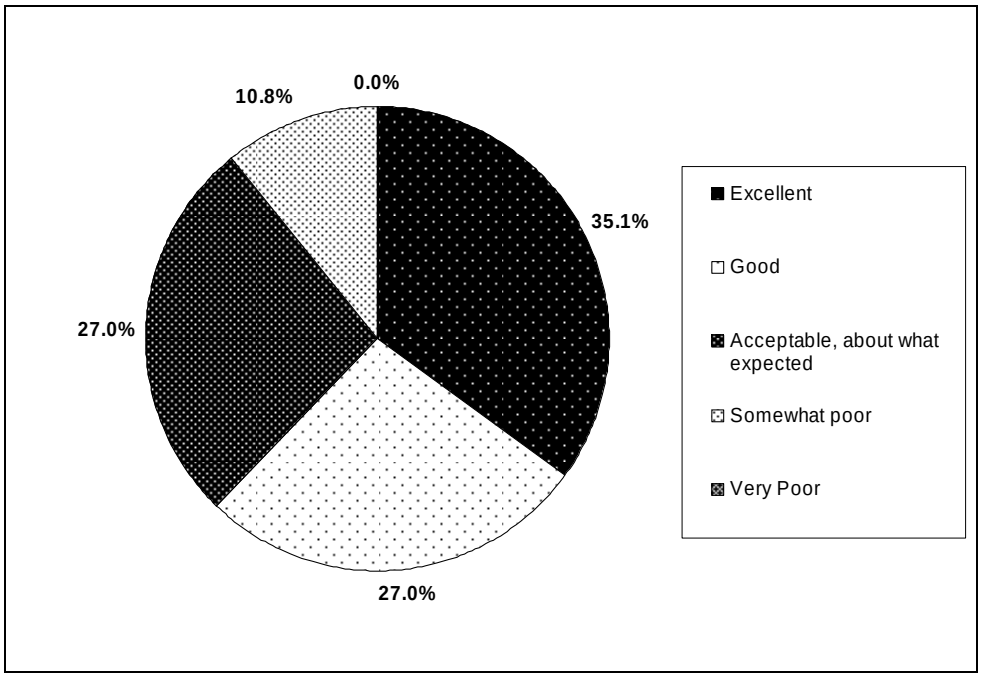
- "Working together with the people who administered the program was a cooperative arrangement and a good experience."
- "Anytime we had questions, a program manager was available."
- "Communications have improved; accessibility and management improved; payments are faster; they were just generally better."

Comments from EESPs who were Less Satisfied or who offered caveats to their good rating of utility performance included the following:

- "We had processing delays, and the ease of checking on the overall program funding status left a lot to be desired. They would have occasional updates, but not in anything like real time."
- "There's no accountable person you can put your finger on. It's a bureaucracy."
- "It took awhile to get approved and we were trying to keep track of the progress. On the one hand we had a deadline to get the project done, but we also had to get approval before we could start."
- "People were good, but we could have used more understanding from the utility representatives as far as incorporating newer technologies."
- "It varies depending on the account rep."
- "The utility really tried to work with us; despite the fact that outside review contractors delayed reviews and payments"
- "They were led by the consultant, and were not well served, because neither SCE nor the consultant understood the technology."

As suggested by the above comments, there is somewhat of a dichotomy between how EESPs see the utilities and their technical consultants, who are perceived by some EESPs as obstacles to project completion. Nevertheless, more than 60% of respondents who had direct contact with the technical reviewers rated their experience with these contractors as good or excellent, as shown in Figure 6-3.

Figure 6-3: EESP Experience with Technical Contractors



Their specific comments were:

- "All the contractors, really everybody concerned were diligent and carried out their duties to make sure the money was appropriately spent."
- "They were professional and efficient."
- "They were very helpful & attentive; we worked out some discrepancies or "language barriers" about terminology of measures."
- "They were OK, a necessary evil -- not a lot of expertise. They may have gotten interns and told them what to do from an inspection perspective."
- "Sometimes they're right on, sometimes a little critical, but it can become adversarial. Everyone goes into this trying to work out a good deal for everyone, but some of the contractors act like we're trying to take advantage (of the program)."
- "At times there seems to be some sort of ego thing to try to discredit what you're calculating, trying to knock down your numbers."
- "They kept asking for more information, and would say, this is a rule, even if it's not particularly reasonable."

6.1.5 Use of Calculator and Website

Participating EESPs were asked both whether they had used the savings calculator and whether they had used the SPC website. Slightly over half of 2004-2005 participants said they had used the calculator, and more than 75 percent had used the website. Only three EESPs who used the Calculator and two who used the website found them not at all helpful, although more respondents had at least some problems with the tools.

Comments on the calculator included:

- "Pretty well done. There should have been a technical resource that was a little more familiar to answer questions. I had some issues with it, but messed around with it and got it to work, and it enabled us to account for longer operating hours."
- "Some measures fit that, some didn't, so we were able to use both the calculator and modeling."
- "I found it easy to work with."
- "Very cumbersome. Graphical user interface was poor."
- "We had a lot of trouble with it, and they said do it manually, so we went back to doing it that way again."
- "It's OK once you use it, but they ask for way too much; you spend the whole day filling out silly little numbers. At this point we know these applications (VSDs) work, and it's a huge amount of trouble to enter all this data."

Their specific comments on the website were:

- "It's useful for obtaining technical information, downloading forms."
- 'It's easy to use for collecting forms and program information."
- "Utilities usually have the hardest to understand websites, but this one was very clear."
- "We found everything we needed."
- "I don't buy that it's great; it's cumbersome, it's just got way too much garbage and too many links on the home page. It should have separate page for contractors. You'd log in, so they know who you are and your history, once they know, you could save a lot of time."

6.1.6 Use of Incentive Funds

About 70 percent of respondents said they pass the full amount of the incentive through to the customer, either in an upfront price reduction (in which case the vendor keeps the check when it arrives) or by sending the customer the full amount of the incentive once received by the EESP. The remaining EESPs who say they share the incentive funds typically say they take out a percentage to cover the cost involved in completing the application process, with all of them noting that they inform the customer upfront what percentage they will retain. The one EESP that said they retained the incentive completely explained that the upgrade to more efficient equipment was done through a change order to a fixed price contract, with the amount of the incentive covering the extra equipment cost. Several EESPs noted that they were more likely to offer customers an upfront price reduction after they became more confident that SPC funds would be available for the full 2004-2005 program cycle.

6.1.7 EESP vs. Customer Sponsorship

About 75% of participating EESPs said they prefer to sponsor the applications, noting that it gives them greater control over the process and frees the customer from the paperwork. Among the remaining respondents, 15% had no preference and 10% preferred to let the customer handle the application process as a way to minimize their own paperwork.

Regarding sponsorship, respondents commented that:

- We prefer to sponsor, allows us to stay in control and we have all the sweat equity. They don't keep up on programs, don't have the tools.
- "I get paid that way (by sponsoring). One guy said he'd sponsor and he sent me half what he owed me."
- "We prefer to sponsor. I give them the discount upfront, so this ensures we get paid."
- "I prefer to sponsor for better control over the outcome of the implementation and the verification process. If we've done the assessment and they sponsor, we still get all the calls from the review firm, since we have the raw data. We'll charge a small fee to do the whole thing, like field calls etc. We can't get that if they sponsor."

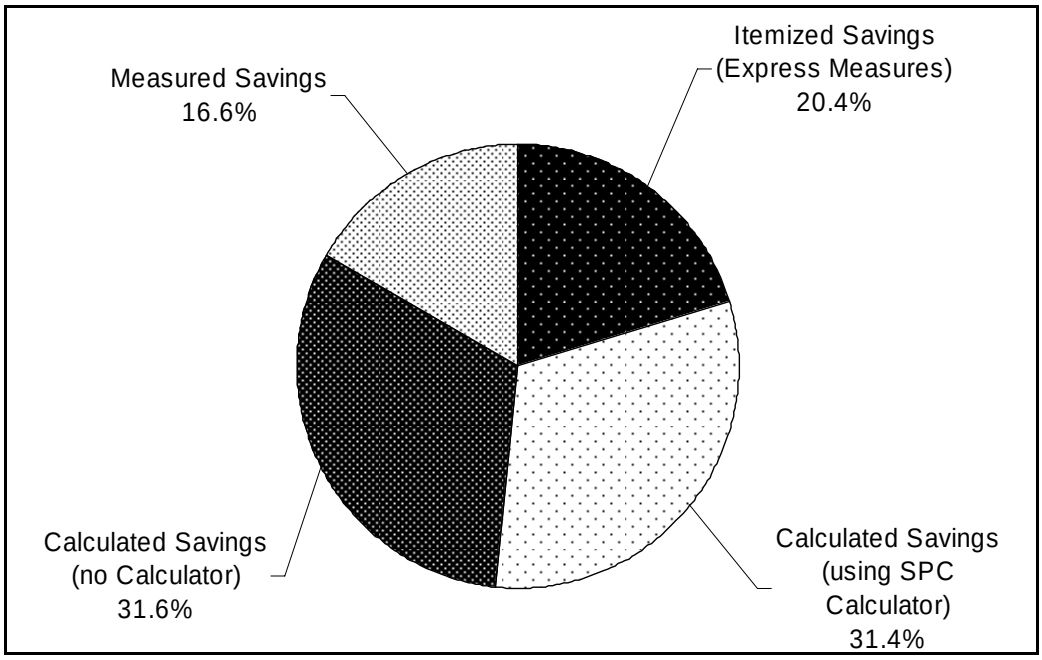
6.1.8 Calculated vs. Measured Savings

Most participating EESPs preferred the greater ease of use of deemed and calculated savings over measured savings, and many were enthusiastic about the addition of deemed savings for itemized measures. Figure 6-4 shows the unweighted mean percentage of projects using the various types of methods to estimate savings. Calculated savings – using both the SPC calculator and other calculation approaches – accounted for almost two-thirds of projects,

while itemized savings accounted for about one-fifth of projects and measured savings for about one-sixth. It should be noted, however, that projects using "measured" savings often were not using the full M&V approach, but instead would use spot measurements and short-term metering to confirm values used in the calculated approach. This appears to have worked out well for EESPs, customers, and the utilities, since the greater precision of field-collected data could be combined with the ease of application and prompt payment associated with the calculated approach.

Benefits cited for the calculated savings approach included ease of application and prompt and complete payment. The primary drawback mentioned was that calculated savings values are somewhat conservative and may understate actual energy savings.

Figure 6-4: Savings Methods Used



Regarding calculated, deemed and measured savings, respondents commented that:

- "I tried using the SPC calculator, but it was ridiculous, so we had to use measured, which is even more complicated. ".
- "In the past we used the calculator almost exclusively, but more recent programs like 2004-2005 they had what we were doing in the itemized menu. Just helps further streamline the process."
- "The calculator may predict savings for some measures, but if a measure is not included, then we do it with our own engineering spreadsheets."

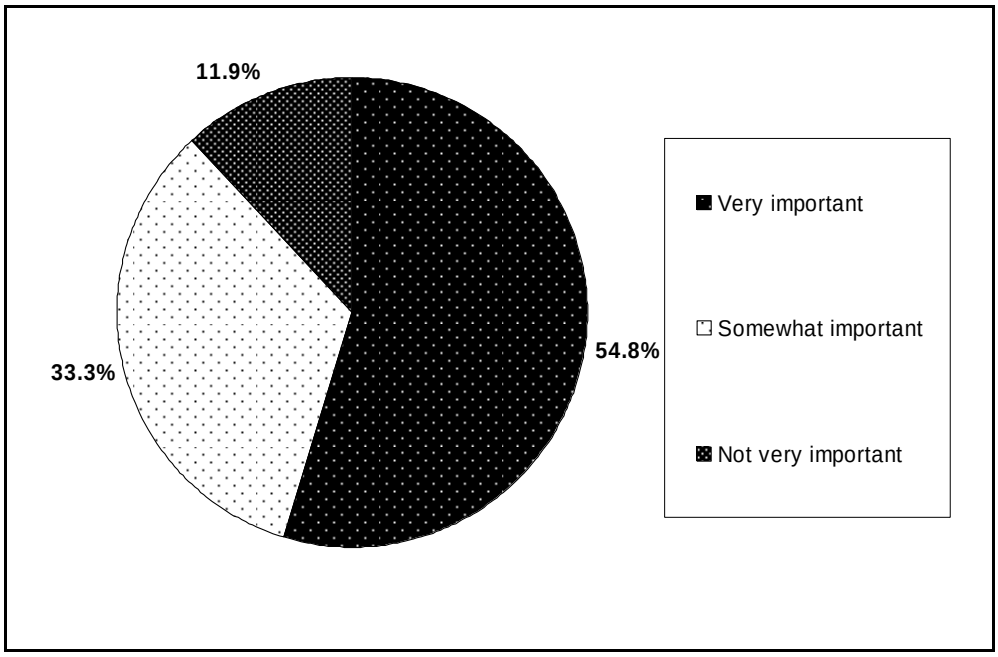
- "We only did calculated savings with the SPC Calculator, as this was done for customer satisfaction because the process was faster. You wait a long time for payment on itemized measures."

- "We're on the hook for savings, so we do more thorough analysis on our own for shared savings projects."

6.1.9 Potential Market Effects

As shown in Figure 6-5, more than half (55%) of EESP respondents said the 2004-2005 SPC program had been very important to their business, and only 11% said it was not very important.

Figure 6-5: Importance of SPC Program to Business



Most EESPs said that the SPC program enabled them to incorporate the program incentives into their marketing approach, while those who said it was less important typically said they sold the project independent of any SPC incentive. Comments included:

- "For us in San Diego, 50% of jobs were pushed over the edge by the incentive kicker. It's probably less for the other locations (LA, SF), because we down here are more of a service-based operation, up there it's more contractor-based and going for larger projects."

- "The first few months of M&V on (the first project) gave them the confidence to go forward on 7 other warehouses."

- "It was our whole marketing program in CA."
- "It is a significant part, probably half of our business."
- "I was working for another company where I didn't use it. When I came (here), it was their policy to do it. It does require the data logging beforehand and extra time, but it's worth it."
- "Relatively not that important; we would have used (it) if there were more incentives available and if it was easier to use. Other programs are easier and better."
- "It was cumbersome; we only did it if the customer wanted to participate."

Of the 32 EESPs who participated in previous years, half said the importance of the SPC program to their marketing efforts stayed about the same, 16 said it was more important, and 1 said it was less important, noting that there were more third-party programs that they used in 2004-2005.

When asked if they had any recommendations on how the SPC program could be modified to capture additional energy savings (without paying more for measures that would be installed anyway), a few EESP respondents were able to offer specific examples of technologies with somewhat longer paybacks that could have been given higher incentive levels by the program. Comments on these measures included:

- "Boiler incentives are pretty low and don't push people over the edge. When we come to a total boiler project, the efficiency piece usually gets kicked out; they feel they don't need multi-stage high efficiency, and go with a standard efficiency single stage boiler. Higher incentive on that would help. In 2002 or 2003, the incentive was double what it was more recently."
- "The changes in 2004-2005 helped, but SPC still lagged behind the changes in the market, like ballasts, HID, vs. the technology that was covered. They were still hawking metal halide and didn't include comprehensive controls for dimming and light harvesting."
- "One was a frictionless compressor, which was not added until 2006."
- "Oil-free compressors are not really affected by the program. They cost more and are lower horsepower, so the effect of the incentive is much less."

Several EESPs noted that caps on SPC project funding kept customers from adding more measures with somewhat longer paybacks, while others said the caps on lighting projects also had the effect of limiting the installation of other cost-effective measures.

A few respondents were unable to quantify how many projects would have gone ahead without SPC incentives, but those that offered an estimate said that on average about 40% of the projects would ultimately have gone ahead, with responses ranging from zero to 100%. Several EESPs questioned whether the question was meaningful, pointing out that it was difficult to define the scope of the projects that would have been pursued, with some respondents noting that the overall scope would have been smaller or that standard efficiency measures would have been replaced for some – but not all – energy efficient alternatives. Others said the project would have been difficult to sell without the validation provided by the program. Comments included:

- "They would have done the projects, but would do a lot fewer measures."
- "It depends. If you look at doing some kind of project, probably 75% would have done something. The influence is more on the type of equipment and measures they put in."
- "If the program wasn't there it would be hard to get people to do anything. It's the credibility. Not so much the payback, but the verification that the process is accurate."
- "The incentive makes projects more attractive, lowers the bar, and allows us to convince them."
- "We don't think you can rely on it, so we make the project stand on its own."

In addition, several EESPs noted that utility incentives are now an integral part of customer decision making, and if there had been no SPC program, customers would have waited until another incentive was available. Also, some EESPs emphasized that they work with national chains, and that those organizations base their decision of which projects to implement on where incentives are available. Comments included:

- "If you have a customer with 50 locations nationwide, they'll pick projects off from the top, and spend on those with the greatest payback. California still has high rates that tend to make projects more attractive, so some would still be done, but most probably would not."
- "They would have used their money on projects elsewhere in the country where they had access to rebates."
- "If there had never been any incentive we could have sold most of them, but once they know there might be an incentive, they won't act without it, so I'd say none of them would have sold without it."

EESPs were also asked about the likelihood that specific projects would have proceeded, with the goal of comparing EESP responses for these projects to the responses provided by decision makers for projects in the impact sample. The more EESPs described individual projects, the more it became clear that the likelihood of pursuing a project is less relevant than the scope of a project and the individual measures included. For example, one EESP explained that even if measures that received an SPC incentive might have been installed anyway, the incentive allowed the customer to include other measures with longer paybacks that were not covered by the program. Comments on individual projects illustrative of those that would not have been done, that definitely would have been done, and that would have been reduced in scope, included the following:

- "That specific customer is extremely rebate driven. We did the CO2 sensors under SPC, (otherwise) they definitely would not have done those."
- "They would have done the project anyway, and would have done the same measures. We have to make it stand on its own, by Federal regulation they are not allowed to include incentives in the payback calculations."
- "For this measure, the SPC incentive was so small it didn't make or break it, just a little extra."
- "They would have done some of the installation, but not all, and they would have missed the chance to install some of those measures."
- "They would leave off a few measures and go for the quicker payback."

6.1.10 Conclusions

On balance, EESPs felt that the 2004-2005 SPC program represented an easier to use, more effective approach to capturing energy savings than in previous years. EESPs who recalled the changes in 2004-2005 – particularly the addition of itemized measures -- viewed them favorably, noting that they facilitated the participation process and reduced the administrative burden.

EESPs strongly favored the calculated savings approach as being easier to use, involving less uncertainty, and using program resources more effectively. Very few projects used the full M&V approach to estimating savings, although a number of EESPs said they used spot measurements and short-term metering to provide reliable input for calculated savings – particularly for more complex measures, such as compressor upgrades.

The most often cited strength of the SPC program, mentioned by one-third of respondents, was simply that the availability of incentives allowed customers to implement projects that

otherwise would not meet payback criteria. Also cited by about 20% of EESPs were the ease of participation and the streamlined participation process, the fact that the program validates their sales message through the IOUs' involvement, and the efficiency with which the program is run, including the responsiveness of SPC program staff.

The SPC program overall, the performance of the utilities, and, to a lesser extent, the performance of the engineering contractors, all received generally favorable ratings from EESPs. Almost 90% were somewhat or very satisfied with the program, 87.5% gave good or excellent ratings to utilities, and 63% rated the support contractors as good or excellent. The focus of dissatisfaction tended to be on program paperwork for the program overall, the difficulty of communicating with program staff for the utilities, and the perception that third-party reviews held up projects for the engineering contractors.

Most EESPs still prefer to sponsor the project application, and most say they pass the full amount of the incentive on to the customer, either by applying up-front discounts or sending them the final check. Almost 90% of EESPs said the SPC program was somewhat or very important to their marketing efforts, but many found questions about whether individual projects would have moved forward without the SPC program difficult to answer, explaining that the program was more likely to affect the scope or timing of an overall project. Moreover, they say some customers have made the availability of incentives part of their decision making process, and will not pursue projects in the absence of a program, because they believe another incentive will come along. Similarly, national customers will pursue projects only in territories where utility incentives help improve payback, and will wait in the absence of a program, if they think other incentives may be forthcoming in the future.

7

Nonparticipant Interview Results

This section contains results from interviews conducted with a representative sample of large (> 500 kW) nonparticipating nonresidential firms in California. The purpose of conducting the interviews is to obtain updated baseline information on topics relating to a variety of establishment and energy efficiency characteristics, behaviors and attitudes. The objective of this survey was not only to characterize the current market, but also to re-assess market indicators that were measured in the 1999 and 2002 SPC Program evaluations in order to determine whether any changes have occurred in the marketplace that may be attributable to the SPC or related programs.

This chapter is organized into the following subsections:

- 7.1 — Summary of Sampling Process
- 7.2 — Establishment Characteristics
- 7.3 — Energy Conservation, Demand Response, Efficiency Actions, and Third-Party Energy Suppliers
- 7.4 — Energy-Related Decision Making
- 7.5 — Energy Program Awareness and Participation
- 7.6 — Familiarity With and Use of Energy Performance Contracting
- 7.7 — Awareness and Assessment of Specific Types of Energy Service Providers and Service Offers
- 7.8 — Customer Efficiency-Related Suggestions

The baseline survey instrument is provided in Appendix C. To facilitate cross-referencing of the results with the survey instrument, the survey question number is included in parentheses in each of the Tables presented in this section.

The findings presented for the current baseline survey are intended to represent baselines for the 2004-2005 Program Year populations. For ease of reference, we will refer to these as the 2005 findings throughout this chapter.

7.1 Summary of Sampling Process

As with the 1999 and 2002 SPC Program Evaluations, the sample for the 2005 baseline survey was designed to characterize the large customer market (over 500 kW). The customers in the population that were included in the sample were mapped by primary SIC code into seven major business type sectors. These business types represent segments that account for the majority of the large customer load among the three IOUs. The business types included in the sample are as follows:

- Office
- Institutional
- Other Commercial
- Industrial: Electronics/Machinery
- Industrial: Petroleum/Plastics
- Industrial: Mining/Metal/Stone/Glass
- Industrial: Other

Each business type has been divided into three size strata: (1) small (500 to 1,000 kW), (2) medium (1,000 to 2,000 kW) and (3) large (over 2,000 kW).

The population frame of interest for this analysis is the population of commercial and industrial accounts in the SCE, SDG&E and PG&E service territories. Table 7-1 presents the energy consumption levels by business type for the sampled population of commercial and industrial accounts in the three utility service territories in California with greater than 500 kW demand. Table 7-2 presents the number of accounts in each cell.

Table 7-1: Energy Consumption by Business Type and Size (GWh)

Business Type	2005 Size in Peak kW			2005 Total kW	2005 Total	2002 Total	1999 Total
	>500	>1000	>2000				
Office	1,160	842	886	2,889	7%	9%	11%
Institutional	1,081	1,001	3,116	5,198	13%	22%	12%
Other Commercial	5,300	3,147	4,644	13,091	34%	24%	29%
Electronic, Machinery, and Fabricated Metals	1,024	1,101	2,127	4,251	11%	12%	10%
Mining, Metals, Stone, Glass, Concrete	434	492	3,445	4,371	11%	11%	12%
Petroleum, Plastic, Rubber and Chemicals	410	577	2,792	3,779	10%	9%	9%
Other Industrial and Agriculture	1,483	1,561	2,319	5,362	14%	14%	19%
Total:	10,893	8,720	19,329	38,942	100%	100%	100%

Table 7-2: Number of Accounts by Business Type and Size

Business Type	2005 Population by Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Office	459	161	67	687	1,087	1,091
Institutional	412	172	156	740	1,370	1,131
Other Commercial	2,253	686	376	3,315	2,605	3,143
Electronic, Machinery, and Fabricated Metals	365	180	96	641	756	547
Mining, Metals, Stone, Glass, Concrete	195	105	108	408	401	386
Petroleum, Plastic, Rubber and Chemicals	153	96	70	319	415	432
Other Industrial and Agriculture	698	337	162	1,197	1,414	1,339
Total:	4,535	1,737	1,035	7,307	8,048	8,069

To ensure that we collected data from a representative distribution of customers, the sample design allocated customer interviews uniformly to cells defined by customer size and type. This design sought to distribute 350 interviews roughly evenly among 35 strata (5 size categories by 7 customer types). Ultimately, a total of 357 surveys were completed; the distribution of completed surveys by utility and business type is shown in Table 7-3. Overall, the baseline survey reached 4.9 percent of the population of accounts with over 500 kW in demand. Table 7-4 shows the number of completed interviews by business type and customer size.

Table 7-3: Distribution of Completed Surveys by Utility/Region and Business Type

Business Type	PG&E Total	SCE Total	SDG&E Total	2005 Total	2002 Total	1999 Total
Office	10	19	9	38	50	55
Institutional	19	5	19	43	49	53
Other Commercial	72	69	31	172	87	57
Electronic, Machinery, and Fabricated Metals	11	3	9	23	38	51
Mining, Metals, Stone, Glass, Concrete	12	8	0	20	33	36
Petroleum, Plastic, Rubber and Chemicals	4	3	1	8	32	39
Other Industrial and Agriculture	40	8	5	53	61	58
Total:	168	115	74	357	350	349

Table 7-4: Distribution of Completed Surveys by Business Type and Size

Business Type	Total by Peak kW >500	>1000	>2000	2005 Total	2002 Total	1999 Total
Office	26	5	7	38	50	55
Institutional	27	9	7	43	49	53
Other Commercial	107	38	27	172	87	57
Electronic, Machinery, and Fabricated Metals	14	5	4	23	38	51
Mining, Metals, Stone, Glass, Concrete	9	7	4	20	33	36
Petroleum, Plastic, Rubber and Chemicals	6	2	0	8	32	39
Other Industrial and Agriculture	34	13	6	53	61	58
Total:	223	79	55	357	350	349

The results reported in the remainder of this chapter are weighted based on energy consumption. Weights were constructed such that the sum of the weights for all interviewed customers within a stratum equals the total energy consumption for that stratum.

7.2 Establishment Characteristics

As shown in Table 7-5 and Table 7-6, the 2005, 2002, and 1999 respondents are similar with respect to the size of facilities and the number of employees by business type. The size by business indicates that institutional and mining facilities average the largest square footage, while petroleum and electronic facilities are more likely to be less than 500,000 square feet, reflecting their higher energy intensity.

Table 7-5: Square Footage of Facility (EC2) (weighted)

Square Feet Occupied	Peak kW >500	>1000	>2000	2005 Total	2002 Total	1999 Total
Less than 10,000 sq ft	10%	3%	6%	7%	7%	27%
10,000-20,000 sq ft	8%	8%	13%	11%	3%	
20,000-50,000 sq ft	14%	8%	9%	10%	8%	
50,000-100,000 sq ft	22%	14%	7%	13%	14%	
100,000-200,000 sq ft	18%	27%	13%	18%	25%	23%
200,000-300,000 sq ft	5%	14%	2%	5%	8%	19%
300,000-400,000 sq ft	4%	7%	3%	4%	5%	
400,000-500,000 sq ft	2%	0%	1%	1%	3%	
More than 500,000 sq ft	6%	9%	40%	24%	16%	18%
Ag/Non-facility - Outdoors	5%	6%	3%	4%	5%	0%
Don't know	8%	3%	4%	5%	5%	12%
N	223	79	55	357	350	349

Over three-fourths of 2005 respondents have less than 1,000 employees. As would be expected, energy demand is correlated with number of employees. While 92 percent of facilities with 500-1,000 kW demand have less than 1,000 employees, only 67 percent of those over 2,000 kW in demand have less than 1,000 employees (see Table 7-6.) Consistent with facility size trends, office and institutional facilities are most likely to employ over

1,000 employees, while petroleum, office, and other commercial are most likely to have less than 50.

Table 7-6: Number of Employees at Location (EC7) (weighted)

Full Time Workers at Facility	Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
1 to 10	20%	10%	14%	15%	10%	34%
11 to 50	22%	22%	18%	20%	16%	
51 to 100	17%	11%	10%	12%	16%	
101 to 250	21%	29%	23%	24%	24%	27%
251 to 500	8%	13%	0%	5%	12%	16%
501 to 1000	3%	4%	2%	3%	5%	8%
More than 1000	2%	8%	28%	16%	15%	13%
Refused	0%	0%	0%	0%	0%	0%
Don't know	6%	3%	5%	5%	2%	1%
N	223	79	55	357	350	349

Table 7-7 presents some additional firmographic data comparing the 2005, 2002, and 1999 samples on an energy-weighted basis. As the Table indicates, the responses for 2005, 2002, and 1999 are similar in terms of key firm characteristics.

Job title. Respondents are most likely to be facility or production managers or their assistants, although a significant fraction also hold administrative or managerial positions.

Table 7-7: Characteristics of Surveyed Establishments (weighted)

	Peak kW					
Job Title of Respondent (SC1)	**>500**	**>1000**	**>2000**	**2005 Total**	**2002 Total**	**1999 Total**
Facilities Manager	37%	34%	47%	41%	35%	55%
Energy Manager	2%	1%	2%	2%	9%	8%
Other facilities management/maintenance	14%	8%	11%	11%	29%	24%
Chief Financial Officer	0%	3%	1%	1%	1%	<1%
Other financial/administrative position	7%	4%	4%	5%	18%	7%
Proprietor/Owner	1%	2%	0%	1%	1%	<1%
President/CEO	2%	5%	0%	2%	8%	3%
Engineering Manager/Chief Engineer	15%	22%	25%	22%	0%	0%
General Manager	12%	12%	6%	9%	0%	0%
Project Manager	4%	1%	0%	1%	0%	0%
Property Manager	3%	0%	2%	2%	0%	0%
Other	4%	7%	2%	4%	0%	0%
N	223	79	55	357	350	345
Own or Lease Facility (EC3)						
Own this space	67%	78%	70%	71%	82%	69%
Lease this space	23%	14%	21%	20%	12%	20%
Own a portion and lease the remainder	2%	2%	4%	3%	3%	9%
Property Manager ONLY	6%	6%	2%	4%	0%	0%
Refused	0%	0%	0%	0%	1%	1%
Don't know	1%	0%	3%	2%	1%	2%
N	223	79	55	357	350	345
Type of Payment Arrangement (EC4)						
Pay own electric bill	91%	100%	100%	97%	92%	92%
Part of the lease arrangement	6%	0%	0%	2%	8%	4%
Refused	0%	0%	0%	0%	0%	1%
Don't know	2%	0%	0%	1%	0%	3%
N	59	13	12	84	350	345
Average Monthly Electric Bill (EC5)						
Less than $10,000	16%	6%	7%	9%	8%	15%
$10,000-$25,000	26%	15%	8%	14%	10%	14%
$25,000-$50,000	25%	27%	5%	15%	18%	15%
$50,000-$100,000	11%	33%	19%	20%	23%	16%
$100,000-$250,000	1%	7%	47%	26%	26%	5%
More than $250,000	0%	4%	13%	7%	9%	9%
Refused	0%	0%	1%	1%	0%	0%
Don't know	21%	9%	1%	8%	5%	24%
N	200	72	53	325	350	345
Number of Organization Locations (EC6)						
1	32%	36%	33%	33%	29%	25%
2 to 4	19%	17%	33%	26%	69%	75%
5 to 10	12%	12%	7%	10%		
11 to 25	9%	9%	7%	8%		
More than 25	27%	21%	20%	22%		
Don't know	1%	5%	0%	1%	2%	0%
N	223	79	55	357	350	345

Facility Ownership. An overwhelming majority of establishments interviewed own at least a portion of their facilities. The overall share of businesses owning facilities, 74 percent in 2005 represents a drop from 2002 (85 percent) but is similar to the proportion in 1999. Institutional (94 percent) and Mining (75 percent) firms are most likely to own all their facilities, while Offices (54 percent) and Other Industrial firms (55 percent) are least likely. Petroleum (32 percent) and Other Industrial firms (43 percent) are most likely to lease.

Payment Arrangements for Leased Space. On average, 20 percent of those firms interviewed lease all of their space, while another 3 percent own some of their space and lease the rest. Of the firms that lease at least a portion of their space, 97 percent now pay their own electric bill, up from 92 percent in 1999 and 2002.

Average Monthly Electric Bill. Overall, the larger a firm's energy demand, the larger is the size of the reported bill. Of those interviewed, 38 percent have bills of less than $50,000, the same proportion as in 2002. Another 20 percent have bills between $50,000 and $100,000 and the remaining firms (33 percent) have bills over $100,000 per month.

As in the 1999 and 2002 evaluations, there are inconsistencies between reported energy bills and demand. A small percentage of the smallest firms in terms of energy demand reported bills over $250,000, and some of the over 2,000 kW firms reported bills less than $10,000 per month. This phenomenon has been seen in other baseline studies and is not the basis for undue concern, as the majority of respondents seem to have estimated their electricity costs appropriately. It is unclear whether these discrepancies are due to misunderstanding the question, such as month versus year reporting, or reporting by site breakdown different than how our sample was created (e.g. a respondent giving the energy cost for a single building, when our sample reflects demand for an entire complex, would underestimate the bill.) It is also possible that respondents who overestimated their bills are actually reporting total utility costs, rather than electricity only.

Number of Locations. Roughly one-third of firms in all size groups have only one facility. The largest firms are more likely to have 2 to 4 facility locations, and less likely to have 5 or more locations. The overall share of single location firms in the survey has increased steadily since 1999.

7.3 Conservation, Demand Response, and Efficiency Actions

This section presents results of self-reported energy conservation, demand response, and energy efficiency related actions taken over the year preceding our survey (roughly Summer 2006 through Summer 2007).

7.3.1 Energy Conservation Actions

In the original 1998 and 1999 large nonresidential baseline surveys, we focused our questions around energy-efficiency actions that involved equipment modifications. Because we knew that the 2001 energy crisis engendered a significant amount of energy *conservation*, in 2002 we began asking customers about their conservation as well as efficiency actions. This focus was continued in the current survey.

Respondents were asked a series of questions regarding conservation actions they are taking to manage the use of energy at their facility (in contrast to physical replacements of equipment). Results indicate that an overwhelming majority of firms are taking these conservation actions on their own. Over three fourths of respondents said that they are taking energy conservation actions to reduce overall energy use (Table 7-8). By size, more of the larger customers (84 percent) take energy conservation actions than the smallest customers (77 percent). By business type, Other Industrial businesses, Institutional entities, and Offices are most likely to undertake energy conservation actions, while Electronics firms are least likely to undertake any energy conservation actions.

Table 7-8: Took Energy Conservation Actions, by Size (CON1) (weighted)

	Peak kW				
Took Energy Conservation Actions?	>500	>1000	>2000	2005 Total	2002 Total
Yes	77%	83%	84%	82%	79%
No	21%	17%	16%	17%	20%
Don't know	3%	0%	0%	1%	1%
N	223	79	55	357	350

Table 7-9: Took Energy Conservation Actions, by Business Type (CON1) (weighted)

	Business Type								
Took Energy Conservation Actions?	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial	2005 Total	2002 Total
Yes	86%	88%	79%	62%	78%	75%	92%	82%	79%
No	14%	11%	20%	38%	22%	25%	5%	17%	20%
Don't know	0%	1%	0%	0%	0%	0%	3%	1%	1%
N	38	43	172	23	20	8	53	357	350

Table 7-10 shows the actions taken to conserve energy. For the most part, these are low-cost or no-cost strategies. Changing thermostat setpoints and switching off lights in unused rooms are the most often cited (by 52 and 51 percent of respondents, respectively), followed by switching off office equipment (38 percent) and shifting high energy processes to off-peak

hours (16 percent). It is likely that inexpensive and readily available technologies, such as occupancy sensors and timers, are increasingly being used to facilitate these actions. Results by business types reveal some additional energy conservation strategies are being undertaken:

- One-third of Petroleum Industries reported installing more efficient equipment,
- Roughly one-fourth of Mining Industries are decreasing production or consolidating shifts,
- Electronic industries are setting AC thermostats to pre-cool buildings (43 percent of respondents) and running backup generators at times of peak demand (18 percent of respondents),
- Institutional organizations are performing equipment maintenance (12 percent of respondents).

Table 7-10: Energy Conservation Actions Taken (CON5) (weighted)

Energy Conservation Actions Taken	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
Turn off office equipment (PCs, monitors, etc.)	35%	20%	47%	38%	34%
Reset thermostats	47%	52%	53%	52%	58%
Schedule high energy-use processes off-peak	11%	13%	20%	16%	22%
Turn off lights that are not being used	54%	55%	48%	51%	76%
Turn down the remaining lighting levels	6%	7%	4%	5%	14%
Set AC thermostats to pre-cool building	8%	18%	4%	8%	2%
Employee alert system	1%	5%	1%	2%	2%
Reprogram EMS schedule	4%	4%	0%	2%	7%
Run backup generator at times of peak demand	1%	0%	5%	3%	3%
Decrease production or consolidate shifts	5%	6%	7%	6%	8%
Install more efficient equipment	6%	12%	8%	8%	0%
Lights are on timers/sensors	10%	2%	2%	4%	0%
Participate in an energy efficiency program	2%	1%	7%	5%	0%
Employee awareness/education	3%	0%	4%	3%	7%
Always looking for things to do	1%	2%	3%	2%	0%
Adjust chilled water temperature	0%	2%	1%	1%	0%
Equipment maintenance	2%	0%	4%	3%	0%
Other	2%	6%	1%	3%	13%
Refused	0%	0%	0%	0%	0%
Don't know	1%	0%	0%	0%	<1%
N	179	69	44	292	290

With respect to the timing of these energy conservation actions, over half of respondents have always tried to conserve energy in these ways, while one-fifth started these actions more recently, within the past one to two years (Table 7-11). These figures are down from

the 57 and 41 percent, respectively, reported in 2002. By business type, Offices most commonly reported that they have always tried to conserve ((81 percent of respondents), while institutional facilities are most likely to date the start of their conservation efforts to the energy crisis of 2001 (65 percent of respondents). Other Industrial firms were most likely to have only recently started conserving (31 percent of respondents).

Table 7-11: When Did Energy Conservation Actions Start (CON7) (weighted)

When Conservation Started	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total
We've always tried to conserve energy	57%	60%	45%	51%	57%
We started conserving a year or two ago	18%	26%	17%	19%	41%
We just recently started conserving	6%	2%	12%	8%	1%
Since the 2001 energy crisis	17%	12%	27%	21%	0%
Refused	0%	0%	0%	0%	<1%
Don't know	2%	0%	0%	1%	<1%
N	179	69	44	292	290

Respondents in 2005 estimate they are saving, on average, 7 percent of their annual energy requirements by taking these conservation actions (Table 7-12). This self reported average level of savings is consistent with the overall level of energy use reduction estimated by the California Energy Commission to have resulted from the energy crisis of 2001. Among business types, Institutional entities estimate they were achieving 8.7 percent energy savings on average, Mining and Other Commercial firms reported 8.0 percent savings, Offices - 6.6 percent energy savings, Petroleum firms - 6.4 percent energy savings. Other Industrial and Electronic firms estimated the lowest levels of energy savings due to conservation actions, of 5.4 and 3.6 percent, respectively.

Table 7-12: Percent Reduction in Energy Bills due to Energy Conservation Actions (CON20) (weighted)

Estimated Energy Savings Through Conservation	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total
0%-2%	12%	24%	22%	20%	24%
3%-5%	22%	16%	20%	20%	24%
6%-10%	14%	14%	34%	24%	13%
11%-15%	6%	7%	8%	7%	9%
16%-20%	8%	9%	4%	6%	8%
More than 20%	15%	6%	0%	5%	7%
Refused	0%	1%	0%	0%	1%
Don't know	23%	22%	12%	17%	15%
N	179	69	44	292	290

Respondents also believe they saved more energy in the past 12 months due to their conservation efforts, than in previous years. When asked how their energy conservation results compared to those in the previous year, 46 percent of respondents said they were saving more, 44 percent said they were saving about the same, and only 5 percent said they were saving less than during the previous year (Table 7-13). This also represents a shift toward increased savings compared to 2002. Among business types, the Electronic and Other Industrial firm categories were most likely to say they were saving more than during the previous year (71 and 64 percent, respectively), while Offices and Mining firms were most likely to say they were saving less (18 and 12 percent, respectively).

Table 7-13: Trend in Energy Savings Compared to Previous Year (CON25) (weighted)

Trend in Energy Savings in Past Year	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
More	45%	41%	48%	46%	38%
Less	11%	7%	2%	5%	12%
About the same	41%	49%	44%	44%	48%
Refused	0%	0%	0%	0%	1%
Don't know	3%	3%	6%	5%	1%
N	179	69	44	292	290

Finally, when asked about their motivations for undertaking energy conservation actions, Table 7-14 shows that the vast majority of 2005 firms are motivated by the desire to reduce their energy bill (87 percent of respondents). Findings are very similar to those in 2002. Other reasons cited included: civic duty (25 percent of respondents), reducing strain on the grid/increase reliability (14 percent of respondents), and the desire to reduce greenhouse gases/mitigate climate change (11 percent of respondents). By business type, over 90 percent of Petroleum, Mining, and Other Industries cited lowering their energy bill as their main reason for taking energy conservation actions. Two-thirds of Institutional facilities and about one-fourth of Electronics and Other Commercial firms were motivated by civic duty.

Table 7-14: Reasons for Taking Energy Conservation Actions (CON30) (weighted)

Reasons for Conservation Actions	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
Lower energy bill	86%	85%	89%	87%	87%
Reduce strain on grid/increase reliability	15%	24%	8%	14%	5%
Be less vulnerable to outages / risk management	10%	12%	6%	8%	2%
Avoid Blackouts	8%	15%	2%	7%	3%
Civic Duty	16%	16%	34%	25%	21%
Reduce greenhouse gases/mitigate climate effects	21%	13%	5%	11%	1%
Help solve energy crisis	0%	0%	0%	0%	4%
Other	5%	5%	4%	4%	5%
Refused	0%	0%	0%	0%	0%
Don't know	0%	0%	0%	0%	<1%
N	179	69	44	292	290

7.3.2 Demand Response Behavior

Findings also indicate that firms are highly willing to take additional actions to reduce their peak demand on power alert days. Nearly three-fourths of respondents, 74 percent, said that they had taken or would be willing to take additional actions during power alert days (Table 7-15). This represents a substantial increase over the corresponding finding in 2002.

Institutional firms indicated the greatest willingness to respond to power alerts (92 percent of respondents), followed by Offices (85 percent of respondents). Mining firms (59 percent of respondents) and Other Commercial firms (65 percent of respondents) were the least likely to take additional actions during power alerts.

Table 7-15: Have Taken/Would Take Additional Actions During Power Alert Days (DR20) (weighted)

Additional Actions on Power Alert Days?	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
Yes	68%	78%	76%	74%	52%
No	29%	20%	24%	24%	46%
Refused	0%	0%	0%	0%	1%
Don't know	3%	2%	0%	1%	1%
N	223	79	55	357	350

The most commonly-mentioned demand response actions (Table 7-16) are switching off lights in unused rooms (39 percent of respondents), lowering thermostat set-points (38 percent of respondents), and turning off unused office equipment (28 percent of respondents),

all of which were cited earlier as common conservation activities. The use of backup generators was mentioned by 16 percent of respondents, and shifting high-energy processes to off-peak periods by 13 percent of respondents. The biggest changes since 2002 are an increased number of those reporting they adjust of thermostat set-points and turn off of unused lighting, with fewer reporting they schedule high energy uses for off-peak hours.

There were a number of changes in patterns of response by business type. While the Petroleum industry reported in 2002 that its main actions (51 percent) were decreasing production and consolidating shifts, the 2005 survey showed only 4 percent reporting these actions. Instead, Petroleum firms in 2005 cited shifting high energy uses to off-peak hours as their most likely tactic (38 percent of respondents). In 2002, 31 percent of Mining respondents reported using backup generators; in the current survey none of the Mining industry respondents mentioned backup generators as a peak reduction strategy. Instead, institutional facilities in 2005 were the most likely (53 percent) to use backup generators in such situations.

Table 7-16: Additional Actions Taken During Power Alert Days (DR30) (weighted)

Actions Taken on Power Alert Days	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
Turn off office equipment (PCs, monitors, etc.)	26%	23%	31%	28%	22%
Reset thermostats	39%	32%	40%	38%	21%
Schedule high energy-use processes off-peak	10%	12%	15%	13%	26%
Turn off lights that are not being used	48%	42%	33%	39%	28%
Turn down the remaining lighting levels	10%	10%	1%	5%	11%
Set AC thermostats to pre-cool building	6%	12%	1%	5%	2%
Employee alert system	2%	8%	3%	4%	8%
Reprogram EMS schedule	1%	1%	2%	2%	2%
Run backup generator at times of peak demand	4%	9%	26%	16%	15%
Decrease production or consolidate shifts	15%	8%	0%	6%	10%
Other	1%	0%	0%	0%	15%
Refused	0%	0%	0%	0%	0%
Don't know	3%	8%	3%	4%	0%
N	152	61	40	253	191

A desire to reduce energy bills is again the main reason for taking additional actions during power alert days, up from 31 percent in 2002 to 38 percent in the 2005 survey (see Table 7-17). Avoiding blackouts dropped significantly as a concern, from 21 percent in 2002 to only 12 percent in 2005. Reducing strain on the grid and increasing reliability more than doubled from 13 percent in 2002 to 29 percent in 2005. These answers are predictable as memories of the energy crisis of 2001 recede. Responses again varied significantly by

business type. While respondents in the Petroleum (96 percent) and Institutional (78 percent) categories are strongly focused on lowering their energy bills, Offices (49 percent) and Other Industrial firms (69 percent) are most motivated by reducing stress on the grid to increase reliability. Mining and Other Commercial firms were most likely to mention civic duty (35 and 22 percent, respectively).

Table 7-17: Primary Reason for Taking Additional Actions During Power Alert Days (DR35) (weighted)

Primary Reason to Take Those Actions	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total
Lower energy bill	32%	43%	39%	38%	31%
Reduce strain on grid/increase reliability	28%	26%	30%	29%	13%
Be less vulnerable to outages / risk management	8%	2%	6%	5%	8%
Avoid Blackouts	18%	19%	4%	12%	21%
Civic Duty	11%	10%	15%	13%	17%
Reduce greenhouse gases/mitigate climate effects	1%	0%	0%	0%	0%
Help solve energy crisis	0%	0%	0%	0%	2%
Other	1%	0%	5%	3%	8%
Don't know	1%	0%	0%	0%	0%
N	150	60	39	249	191

7.3.3 Response to Greenhouse Gas Mitigation Policies and Procedures

Due to the growing concerns about the environment and greenhouse gases, a battery of questions was added to the 2005 survey to address these issues. Respondents were asked about their experiences with various greenhouse gas mitigation policies and procedures being discussed or implemented by various government or quasi-government entities. Table 7-18 shows that over one-fourth of firms (29 percent) are currently subject to rules or policies that seek reduction in greenhouse gas emissions. The largest electricity users (> 2000 kW) are far more likely than smaller users (> 500 kW) to be subject to such rules or policies (40 percent of large users versus 12 percent of smaller users).

Table 7-18: Subject to Rules/Policies Seeking Reduction in Greenhouse Gas Emissions (CC1) (weighted)

Subject to rules/policies seeking reduction in greenhouse gas emissions?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total
Yes	12%	26%	40%	29%
No	80%	68%	54%	65%
Don't know	8%	6%	6%	7%
N	223	79	55	357

Overall, as Table 7-19 shows, air quality regulations are the most frequently mentioned (42 percent), followed by emissions reporting (28 percent). Among smaller firms, emissions reporting is the most common requirement (45 percent), while for larger firms it is air quality rules or policies (50 percent).

Table 7-19: Applicable Greenhouse Gas Reduction Policies or Rules (CC1A) (weighted)

Which rules or policies?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total
Emissions reporting	45%	14%	29%	28%
Assembly bill 32	0%	3%	4%	4%
Air quality	16%	28%	50%	42%
Reduce energy use	16%	14%	0%	5%
Other	18%	16%	16%	16%
Don't know	5%	24%	0%	5%
N	24	19	19	62

Over half of the firms interviewed (51 percent) believe they will never be subject to greenhouse gas emissions rules or policies (see Table 7-20). The majority of those who eventually expect to face these requirements believe they will not happen for at least another 2 years. The middle- and large-size firms are more likely to believe they will never be affected by these requirements; however, there is a considerable element of uncertainty in their responses (as indicated by the large percentage of those that answered "don't know."

Table 7-20: Anticipated Timing of Applicable Greenhouse Gas Reduction Policies or Rules (CC2) (weighted)

Expect to be subject to such rules/policies? If so, when?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total
Yes, within the next year	3%	0%	8%	4%
Yes, 1-2 years from now	6%	7%	1%	4%
Yes, more than 2 years from now	18%	11%	13%	14%
No, we do not believe this will affect us	38%	57%	58%	51%
Other	0%	1%	0%	0%
Refused	0%	0%	4%	2%
Don't know	35%	24%	16%	24%
N	199	60	36	295

Firms were also queried about their interest in energy efficiency in light of these possible upcoming requirements. Half of those surveyed indicated they have a greater interest in energy efficiency investments as a result of concerns over current or prospective greenhouse

gas emissions rules or policies (see Table 7-21). Over one-fourth of respondents said that they are already planning more investments in energy efficiency, while another 23% have a greater interest in energy efficiency, but no further investment is planned. The remainder are unchanged and therefore neither have interest nor plans for investing in energy efficiency at their facilities (42 percent of respondents).

Table 7-21: Effects of Concerns about Greenhouse Gas Emissions Rules/Policies on Energy Efficiency Investments (CC3) (weighted)

Interest and plans regarding energy efficiency investments	Peak kW			2005 Total
	>500	>1000	>2000	
More interest and more investment planned	21%	20%	34%	27%
More interest but no more investment planned	28%	33%	17%	23%
No more interest nor planned investment	38%	40%	46%	42%
Don't know	13%	6%	4%	7%
N	223	79	55	357

7.3.4 Use of Non-Utility Electricity Suppliers

Starting in 2002, respondents have been asked whether they purchased electricity from any source besides the local utility. As shown in Table 7-22, the number of firms purchasing from non-utility electricity purchases has decreased, and the largest users are the most likely to make such purchases. In addition, there is considerable variation by business type (Table 7-23), with Institutional entities (58 percent) and Electronics firms (28 percent) the most likely to make non-utility electricity purchases.

As shown in Table 7-24, Constellation New Energy is the leading non-utility provider overall (55 percent), for both medium- and large-size firms (41 percent and 66 percent, respectively), and also for customers of PG&E and SCE. APS serves a higher share of SDG&E customers than does Constellation. Sempra is the leading vendor to small-size firms (24 percent), particularly in PG&E territory.

Table 7-22: Purchases of Electricity from non-IOU, by Utility and Firm Size (ES1) (weighted)

Does facility purchase from non-IOU	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
Yes	7%	22%	28%	21%	15%
No	91%	78%	72%	78%	84%
Don't know	3%	0%	0%	1%	1%
N	223	79	55	357	350

Table 7-23: Purchases of Electricity from non-IOU, by Business Type (ES1) (weighted)

Does facility purchase from non-IOU	Business Type							2005 Total	2002 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial		
Yes	10%	58%	14%	28%	0%	0%	14%	21%	15%
No	89%	42%	85%	72%	99%	100%	86%	78%	84%
Don't know	1%	0%	1%	0%	1%	0%	0%	1%	1%
N	38	43	172	23	20	8	53	357	350

Table 7-24: Major Non-IOU Electricity Suppliers (ES2) (weighted)

Electricity provider	PG&E	SCE	SDG&E	Peak kW			2005 Total
				>500	>1000	>2000	
Constellation New Energy	36%	64%	35%	19%	41%	66%	55%
APS - Arizona Public Service	0%	8%	39%	0%	2%	17%	12%
Sempra Energy	25%	3%	10%	24%	6%	5%	7%
Eastside Power Authority	0%	8%	0%	0%	0%	9%	6%
Owl Energy	0%	7%	0%	0%	20%	0%	5%
WAPA	17%	0%	0%	0%	0%	4%	2%
Strategic Energy	4%	0%	11%	9%	6%	0%	2%
Cogeneration	0%	3%	0%	0%	8%	0%	2%
Imperial Irrigation District	0%	2%	0%	16%	0%	0%	1%
BP Energy	6%	0%	0%	0%	3%	0%	1%
Power & Water Resources Pooling Authority	6%	0%	0%	0%	3%	0%	1%
City of Aniheim	0%	1%	0%	8%	0%	0%	1%
Riverside Power	0%	1%	0%	8%	0%	0%	1%
Coral	4%	0%	0%	6%	0%	0%	1%
Commerce	0%	0%	3%	0%	2%	0%	0%
Don't know	4%	3%	3%	11%	9%	0%	3%
N	10	13	16	14	14	11	39

7.4 Energy Efficiency Actions

The following subsection discusses results regarding actions taken by firms to improve energy efficiency. The questions asked in our 2005 survey are compared to identical or related questions asked in 2002 as well as in the 1999 baseline surveys.

Approximately 78 percent of the firms reported (Table 7-25) that they have taken actions to improve energy efficiency or conservation in the past year, virtually the same as in 2002. This is considerably higher than the 60 percent of customers who said they took such actions in 1999. Most of this difference is probably associated with ongoing conservation actions taken by customers in the wake of the 2001 energy crisis. Looking at the actions described (Table 7-26), we note that in 2005, fewer firms are installing new efficient equipment than in 2002, while more are changing their use and operation only. The > 1000 kW firms are much more likely to have installed energy efficient equipment than > 500 kW or >2000 kW firms (58 percent compared to 32 percent and 18 percent, respectively). By type of business, a large majority (72 to 93 percent) of all business types except for Petroleum firms are likely to

have taken recent energy efficiency actions; these activity levels are similar to those found in 2002.

Table 7-25: Any Actions to Improve Energy Efficiency in Past Year (IM3-IM3a) (weighted)

Any Actions to Improve Energy Efficiency?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total	1999 Total
Yes	67%	71%	87%	78%	78%	60%
No	32%	29%	13%	22%	22%	40%
Don't know	1%	0%	0%	0%	0%	<1%
N	223	79	55	357	350	349

Table 7-26: Which Actions to Improve Energy Efficiency in Past Year (IM3-IM3a) (weighted)

Actions Involved Installation or Changed Use	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total
Installation of new efficient equipment	32%	58%	18%	29%	34%
Changes in use and operation only	26%	15%	19%	20%	21%
Both	42%	27%	64%	51%	44%
Don't know	0%	0%	0%	0%	2%
N	152	56	45	253	267

As shown in Table 7-27, the most common actions taken among those who have installed new energy efficiency equipment are installing: efficient lighting (68 percent), efficient motors or variable speed drives (48 percent), and efficient HVAC/refrigeration equipment (44 percent). Compared to 2002 and 1999, installations of motors and energy management systems have dropped, while efficient lighting, HVAC, and refrigeration installations have increased.

Table 7-27: Type of Energy Saving Action(s) Taken (IM4) (weighted)

Efficiency Measure Types	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total	1999 Total
Installed efficient lighting equipment	62%	54%	76%	68%	50%	64%
Installed efficient HVAC or refrigeration	45%	32%	48%	44%	40%	48%
Installed efficient motors or VSDs	35%	29%	60%	48%	59%	60%
Re-engineered manufacturing or processes	22%	9%	44%	32%	31%	33%
Installed energy management control system	23%	20%	30%	26%	34%	32%
Other	8%	12%	0%	4%	14%	16%
Don't know	0%	1%	0%	0%	0%	<1%
N	112	45	34	191	191	208

Firms in all size categories installed a significant percentage of each type of measure. The largest firms (>2000 kW) were more likely to have installed variable speed drives (VSD) and energy management systems but, in a change from the 2002 survey, they were also most likely to install efficient lighting. By business type, Institutional organizations were most likely to have installed multiple measures. They also have the highest likelihood of installing energy efficient lighting, (95 percent of respondents). In contrast, only 12 percent of petroleum firms installed efficient lighting, although 85 percent of these firms installed efficient motors.

Respondents were asked to estimate the amount by which their actions had reduced their electricity consumption, and responses are shown in Table 7-28 and Table 7-29. While 53 percent of the small-size firms (>500 kW) and 60 percent of the middle-size firms (>1000 kW) reported energy savings of up to 10 percent, 78 percent of the large-size firms (>2000 kW) reported such savings. Conversely, 13 percent of the small firms reported estimated savings of greater than 20 percent, compared to only 4 percent of the large firms.

For those respondents who reported estimates of energy savings due to equipment installations, the average saving estimate was 7.3 percent, almost the same as the 7 percent reported in 2002 (see Table 7-30). The highest savings were reported by Petroleum firms, who averaged 21.3 percent. The lowest savings, 2.8 percent, were reported by Other Industrial firms. Table 7-31 indicates that self-reported energy savings estimated through conservation are negatively correlated with the size of firms reporting, with the largest users reporting the smallest percentage savings.

Table 7-28: Estimated Energy Savings (IM4B) (weighted)

Estimated Energy Savings	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
0%-2%	20%	23%	28%	25%	22%
3%-5%	16%	21%	16%	17%	19%
6%-10%	17%	16%	34%	27%	12%
11%-15%	11%	7%	4%	6%	14%
16%-20%	5%	4%	3%	4%	6%
> 20%	13%	8%	4%	7%	11%
Don't know	18%	21%	12%	15%	15%
N	112	44	34	190	179

Table 7-29: Estimated Energy Savings by Industry (IM4B) (weighted)

Estimated Energy Savings	Business Type							2005 Total	2002 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial		
0%-2%	30%	19%	17%	32%	8%	0%	53%	25%	22%
3%-5%	14%	10%	22%	19%	3%	6%	23%	17%	19%
6%-10%	9%	62%	24%	12%	29%	6%	3%	27%	12%
11%-15%	16%	3%	5%	21%	5%	9%	2%	6%	14%
16%-20%	0%	3%	1%	2%	26%	0%	3%	4%	6%
> 20%	0%	3%	13%	0%	0%	72%	0%	7%	11%
Don't know	31%	2%	17%	13%	28%	6%	16%	15%	15%
N	21	25	94	9	13	5	23	190	179

Table 7-30: Estimated Average Energy Savings by Industry (IM4B) (weighted)

Estimated Energy Savings Through Conservation	Business Type							2005 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial	
Savings	5.3%	7.1%	8.7%	6.0%	11.1%	21.3%	2.8%	7.3%
N	15	23	79	8	10	4	17	156

Table 7-31: Estimated Average Energy Savings by Peak kW (IM4B) (weighted)

Estimated Energy Savings Through Conservation	Size in Peak kW			2005 Total
	>500	>1000	>2000	
Savings, in percent	9.5	7.5	6.4	7.3
N	91	36	29	156

About one-third of 2005 firms have identified, but not undertaken, certain energy-efficiency actions, roughly the same as in 2002 (see Table 7-32). The main reasons cited for inaction are related to competition for capital to finance these investments. Over one-third of firms cited other priorities for capital investment (36 percent) and more than one-fourth mentioned lack of funds available for investment as reasons why they are not able to take action. There is considerable variation by type of business in responses (see Table 7-33). Seventy-two percent of Mining firms have projects underway, while none of the Electronics and Other Industrial firms do. Over three-fourths of Petroleum firms cite insufficient return on investment as a barrier, while for the other market segments, this is far less of an issue.

Table 7-32: Energy Savings Actions Not Taken, By Industry (IM8) (weighted)

Energy Savings Actions Not Taken	Business Type							2005 Total	2002 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial		
Yes	23%	71%	22%	28%	27%	32%	17%	30%	36%
No	76%	29%	72%	72%	73%	68%	82%	67%	63%
Don't know	1%	0%	6%	0%	0%	0%	0%	3%	1%
N	38	43	172	23	20	8	53	357	350

Table 7-33: Reasons Energy Savings Actions Not Taken, By Industry (IM8) (weighted)

Reasons Action Was Not Taken	Business Type							2005 Total	2002 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial		
Other priorities for capital spending	57%	67%	13%	0%	28%	14%	0%	36%	11%
Amount of savings did not justify added	0%	3%	4%	2%	61%	0%	4%	7%	10%
No funds available for investment	7%	20%	37%	0%	68%	0%	44%	27%	39%
Energy savings were too uncertain	7%	0%	0%	0%	0%	0%	0%	0%	1%
Could not obtain financing for investmen	0%	0%	4%	0%	0%	0%	0%	1%	1%
Needed more information to make decision	7%	0%	10%	62%	0%	0%	0%	8%	3%
Not enough management time to oversee pr	32%	1%	6%	0%	0%	0%	0%	4%	1%
Would have taken too much time to get a	4%	0%	2%	0%	0%	0%	0%	1%	1%
Insufficient payback	0%	4%	6%	24%	0%	77%	34%	10%	5%
Currently working on it	12%	5%	7%	0%	72%	0%	18%	11%	14%
Impact on operations	0%	0%	19%	2%	0%	9%	0%	6%	0%
Building was for sale/Renters have no power	0%	0%	0%	0%	0%	0%	0%	0%	4%
Cannot do it at this time	0%	0%	0%	0%	0%	0%	0%	0%	3%
Requirements were unacceptable	0%	0%	0%	0%	0%	0%	0%	0%	6%
Other	14%	0%	5%	9%	0%	0%	0%	3%	6%
N	9	17	43	6	6	3	9	93	129

7.5 Energy-Related Decision Making

The baseline survey also included questions regarding energy related decision making, the approval process, staff responsibility for controlling energy costs, and specific energy efficiency policies. These questions were included in the 2005, 2002, and 1999 surveys as well and results are compared below.

7.5.1 Getting Approval for Energy Efficiency Projects

Interviewees were first asked about the complexity of their organization's internal process for approving efficiency-related investments. The results in Table 7-34 indicate that the perceived complexity of the process of approving energy efficiency investments has been largely unchanged since 1999. The most common response continues to be that the process is somewhat complex, but manageable.

Table 7-34: Complexity of Process to Approve Energy Efficiency Investments (DM2A) (weighted)

Decision-Making Process	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total	1999 Total
Relatively simple and straightforward	37%	35%	22%	29%	33%	33%
Somewhat complex, but manageable	47%	48%	53%	50%	49%	48%
Complex and difficult to get through	14%	17%	20%	18%	18%	18%
Refused	0%	0%	0%	0%	<1%	1%
Don't know	3%	1%	5%	3%	<1%	0%
N	223	79	55	357	350	349

7.5.2 Assigned Responsibility for Controlling Energy Costs

Energy-related decision making continues to be largely a centralized function, accomplished by either an individual or a group. As shown in Table 7-35, three-fourths of large firms have a person or group of staff assigned to manage energy costs, compared to only two-thirds of small firms. Overall findings for 2005, 2002 and 1999 are virtually identical, although there are some differences among the size categories. For example, the largest firms are shifting toward slightly more use of staff groups, small firms are moving more strongly in the opposite direction, toward more use of an individual assigned to this task. Reliance on outside contractors to perform this function has increased slightly, particularly among the largest firms. Offices and Other Industrial firms are the least likely to have anyone assigned (27 and 31 percent, respectively).

Table 7-35: Person in Charge of Energy Usage/Costs (DM7) (weighted)

Responsibility for Energy Decisions	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total	1999 Total
An in-house staff person	49%	45%	36%	42%	42%	50%
A group of staff	17%	21%	44%	32%	32%	22%
An outside contractor	4%	6%	22%	13%	8%	2%
No one	32%	27%	11%	21%	26%	23%
Refused	0%	0%	0%	0%	0%	<1%
Don't know	2%	2%	1%	2%	<1%	2%
N	223	79	55	357	350	349

Only 11 percent of firms offer a financial reward or compensation linked to energy savings to the person or group in charge. This is down slightly from 2002 and much lower than the 30 percent that reported using rewards in 1999. Medium-size firms are more likely (17 percent) to offer rewards for energy savings than large firms (9 percent) or small firms (11 percent). By business type, Petroleum firms are most likely to offer rewards (25 percent) while Institutional organizations are least likely (2 percent). The most common rewards are

bonuses, but the size of the "other" category suggests considerable variation in approaches used.

7.5.3 Organization's Energy Efficiency Policies

Almost 40 percent of firms have formalized specification policies for the selection of energy efficiency equipment, down slightly from 2002. As indicated in Table 7-36, the larger the firm, the more likely they are to have developed formal policies. Institutional facilities are the most likely to have developed policies (with an even greater share, 77 percent in 2005, indicating affirmatively). Offices, Electronic, Mining, and Other Industrial firms are least likely (about 22 percent).

Table 7-36: Any Policy for Selection of Energy Efficiency Equipment? (DM9) (weighted)

	Peak kW					
Energy Efficiency Policy for Equipment	**>500**	**>1000**	**>2000**	**2005 Total**	**2002 Total**	**1999 Total**
Yes	34%	36%	42%	39%	43%	30%
No	63%	57%	55%	58%	54%	67%
Refused	0%	0%	0%	0%	<1%	0%
Don't know	3%	6%	2%	3%	3%	3%
N	223	79	55	357	350	349

7.5.4 Investment Criteria for Energy Efficiency Projects

Almost half of the firms interviewed use payback periods as their primary economic criterion for energy efficiency investments, while another third reported using internal rate of return or life-cycle cost analysis. Reliance on a return on investment metric has increased from zero to 6 percent between 2002 and 2005.

Payback period requirements have relaxed somewhat since 2002. The mean payback period reported, weighted by energy usage, is 4.1 years for the 234 respondents who were able to provide estimates. This answer is higher than the 3.3 years estimated in 2002, and the 2.5 years reported in 1999. As indicated by Table 7-37 (which includes all respondents, even those who provided no estimated payback), the most common response is 3 to 3.5 years, and just under 50 percent of firms in all categories accept paybacks of 3.5 years or less. However, about a quarter of respondents allow payback periods of 5 years or longer. It should be noted that these self-reported results are somewhat inconsistent with anecdotal reports from energy-efficiency service providers that the majority of customers routinely ignore efficiency opportunities with paybacks of less than two years.

Table 7-37: Payback Period for Energy Efficiency Investments (DM12A) (weighted)

Payback Period Required	Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Less than 1 Year	1%	1%	0%	1%	3%	14%
1 to 1.5 Years	6%	6%	3%	5%	10%	
1.5 to 2 Years	0%	0%	0%	0%	8%	
2 to 2.5 Years	8%	23%	12%	13%	22%	30%
2.5 to 3 Years	0%	2%	0%	1%	1%	
3 to 3.5 Years	9%	18%	42%	27%	14%	13%
3.5 to 4 Years	0%	0%	0%	0%	1%	
4 Years	4%	4%	0%	2%	3%	4%
5 Years	19%	13%	10%	13%	13%	12%
6 to 10 Years	14%	11%	13%	13%	9%	4%
Over 10 Years	0%	0%	1%	0%	0%	<1%
We don't have a payback period	9%	6%	4%	6%	0%	0%
Refused	1%	0%	2%	1%	2%	0%
Don't know	27%	17%	14%	18%	13%	22%
N	223	79	55	357	350	349

Interviewees were also asked about the major obstacles to obtaining approval for energy efficient investments. Again, competition for capital is the most frequently mentioned barrier. Nineteen percent of respondents cite other priorities for capital spending, while 17 percent mentioned lack of funds. These findings are similar to those in 2002. It is interesting to note that fourteen percent of respondents cited inadequate payback as a barrier, while none mentioned this in 2002. Roughly one in five respondents perceive no major obstacles to seeking approval for these projects.

7.5.5 Concerns Regarding Energy-Efficiency Improvements

The survey included a series of questions to measure uncertainty regarding purchasing energy efficient equipment and related services. Respondents were asked to rank uncertainty as a barrier to potential energy-efficiency investments on a 0-to-10 point scale. As shown in Table 7-38 and Table 7-39, uncertainty regarding the performance of energy efficient equipment, estimates of savings, and trustworthiness and prospects of third-party firms are all significant barriers to investment in energy efficiency measures. Concerns about the trustworthiness of the energy efficiency service provider remain the most significant barrier for all firms, regardless of their size. The largest firms also expressed significant, uncertainty about the equipment performance and achieved energy savings (as indicated by their mean scores in the 7.5 range). Mining firms are least concerned about these uncertainties, while Institutional and Other Industrial firms cite these uncertainties as their most significant obstacle to their investing in energy efficiency. Overall, the mean uncertainty scores are higher than 2002 levels, but not lower than those 1999 suggesting some volatility in these results.

Table 7-38: Mean Rating of Uncertainty Regarding Energy Efficiency Equipment and Services by Size (BR1A) (weighted)

Uncertainty about …	Size in Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Performance of EE Equipment	5.7	6.0	7.6	6.8	6.0	7.0
Actual vs Estimated Savings	5.8	6.2	7.6	6.8	6.5	7.3
Firm's Trustworthiness	6.4	6.5	7.5	7.0	6.8	7.8
Firm's Providing Services	6.6	6.9	7.6	7.2	6.8	--
N	196	68	50	314	343	342

Table 7-39: Mean Rating of Uncertainty Regarding Energy Efficiency Equipment and Services by Business Type (BR1A) (weighted)

Uncertainty about …	Business Type							2005 Total	2002 Total	1999 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial			
Performance of EE Equipment	6.7	7.6	6.5	6.3	5.6	4.1	7.5	6.8	6.0	7.0
Actual vs Estimated Savings	6.0	7.8	6.5	6.8	5.7	7.0	7.1	6.8	6.5	7.3
Firm's Trustworthiness	6.9	7.8	6.9	6.2	4.8	8.7	7.4	7.0	6.8	7.8
Firm's Providing Services	6.9	7.7	7.0	6.6	5.1	8.6	7.9	7.2	6.8	--
N	34	39	153	20	15	8	45	314	343	342

Firms also consider their knowledge of various types of energy efficiency opportunities to be quite high. When asked to rate their organizations' level of knowledge of energy saving opportunities in the lighting, HVAC, and other equipment categories on a zero to 10 scale, respondents provided mean scores of between 6.7 and 7.2, depending on the type of opportunity (Table 7-40). As the results show, there are only slight differences by firm size and end-use equipment categories. As in the 2002 and 1999 surveys, the respondents rate themselves as most knowledgeable of lighting opportunities and least knowledgeable of HVAC opportunities.[19]

[19] Due to different size segmentation, the responses from the 1998 and later surveys are not directly comparable. The results reported in the 1998 column represent responses from the 1998 large and very large customers only.

Table 7-40: Mean Rating of Energy Efficiency Knowledge Levels (KN2) (weighted)

Knowledge of . . .	Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Lighting opportunities	6.6	7.2	7.6	7.2	7.2	7.3
HVAC opportunities	6.1	6.7	7.0	6.7	6.7	7.0
Other opportunities	6.3	7.1	7.1	6.8	6.9	6.8
N	213	77	52	342	345	342

7.6 Program Awareness and Participation

7.6.1 Efficiency Program Awareness

Respondents were asked about their familiarity with utility programs or resources designed to promote energy efficiency. Results indicate that awareness of utility energy efficiency programs is fairly high, most likely a reflection of the programs' long-term presence in this customer market. Over two-thirds of firms are familiar with these programs; less than one-third are not. These findings are similar to those in 2002 (see Table 7-41.) Awareness is significantly higher among larger firms, as would be expected. Among the smallest firms, just over 50% are aware of utility programs, suggesting that additional awareness building would be beneficial to this group.

Table 7-41: Aware of Any Utility Energy Efficiency Program or Resource in 2005 (PR1) (weighted)

Aware of other programs	Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Yes	54%	66%	79%	69%	70%	57%
No	40%	30%	21%	28%	25%	41%
Refused	0%	0%	0%	0%	0%	<1%
Don't know	6%	3%	1%	3%	5%	2%
N	223	79	55	357	350	349

When asked which specific energy-efficiency programs provided by their utility they are aware of, over half mentioned rebates or incentives, including the SPC program, down from two-thirds of respondents in 2002. Awareness of seminars/classes is similar to 2002, while familiarity with energy audits has doubled.[20] As shown in Table 7-42, unprompted

[20] It is important to note that this question was asked on an unaided basis; that is, respondents were asked of which types of program efforts they were aware of, without being prompted with each of the program types and asked if they were familiar with them. Respondents may have provided one or more examples of

awareness of individual programs or resources varied by size category, with the larger firms generally more aware of all existing resources than the smaller firms.

Table 7-42: Unprompted Mentions of 2005 Utility Programs or Resources by Size (PR1) (weighted)

Awareness of which other programs	Peak kW			2005 Total	2002 Total
	>500	>1000	>2000		
Rebates/incentives	37%	55%	59%	52%	66%
Business energy audits, feasibility studies	17%	19%	29%	23%	10%
Energy Centers	6%	5%	10%	8%	7%
Seminars, classes, and workshops	15%	5%	28%	19%	20%
Savings by Design	2%	0%	2%	1%	--
Demand Response	2%	6%	1%	3%	
Other	5%	7%	14%	10%	17%
Refused	0%	0%	0%	0%	7%
Don't know	6%	3%	1%	3%	
No, not aware of any programs	40%	30%	21%	28%	
N	223	79	55	357	350

It is also interesting to look at differences in program awareness by business type, as indicated in Table 7-43. Overall, Institutional facilities continue to report the highest awareness of all programs, with the exception of energy centers; classes and audits are particularly familiar to institutional businesses. Electronic and Petroleum firms are very aware of rebate/incentive programs, while the Other Industrial firms are most knowledgeable of other program offerings. The lowest program awareness is among those in the Office and Mining sectors, where fewer than half are unaware of any programs or program services.

programs with which they are familiar. Aided awareness levels are typically significantly higher than unaided levels.

Table 7-43: Unprompted Mention of 2005 Utility Programs or Resources by Business Type (PR1) (weighted)

Awareness of which other programs	Business Type							2005 Total	2002 Total
	Office	Institu-tional	Other Com-mercial	Elec-tronic	Mining	Petro-leum	Other Indus-trial		
Rebates/incentives	33%	67%	54%	60%	26%	60%	46%	52%	66%
Business energy audits, feasibility studies	20%	54%	16%	34%	2%	4%	19%	23%	10%
Energy Centers	19%	1%	8%	13%	16%	4%	2%	8%	7%
Seminars, classes, and workshops	6%	63%	13%	12%	20%	4%	1%	19%	20%
Savings by Design	0%	2%	2%	0%	0%	0%	0%	1%	--
Demand Response	1%	3%	2%	8%	2%	0%	3%	3%	
Other	8%	12%	5%	0%	4%	0%	29%	10%	17%
Refused	0%	0%	0%	0%	0%	3%	0%	0%	7%
Don't know	3%	0%	4%	2%	3%	35%	0%	3%	
No, not aware of any programs	49%	12%	31%	31%	49%	3%	21%	28%	
N	38	43	172	23	20	8	53	357	350

We also asked customers whether they had participated in any energy efficiency programs in 2005. Self-reported participation rates have grown substantially since the previous survey. As shown in Table 7-44, only one-third of firms reported *not* participating in any programs, half the rate found in 2002. Institutions and Electronic firms reported the highest participation rates, while Mining, Office, and Other Commercial firms had the lowest.

Results by program indicate there is broad participation by SPC nonparticipants in utility-funded programs and related activities. Thirteen percent of firms indicated they had participated in the Express Efficiency program, 16 percent said they participated in SPC, 30 percent in some other utility program, 7 percent reported participating in a non-utility program, and 7 percent noted they participated in an energy audit. These results should be viewed cautiously, however, because although we asked customers to focus on whether they participated in programs in the 2004-2005 program years, we believe many customers may have included multiple years in their responses. . It is likely that, in the case of SPC, some customers are also factoring in the multi-year nature of participation and the fact that projects often take a year to two years to install beyond the actual program signup year).

Table 7-44: Self-Reported Participation in 2005 Efficiency Programs (PR9) (weighted)

Participation in Program?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total
Yes, Express Efficiency	16%	13%	11%	13%	11%
Yes, PC/Standard Performance Contract	4%	8%	27%	16%	9%
Yes, Business Energy Audits	7%	4%	8%	7%	5%
Yes, other utility program	25%	35%	30%	30%	6%
Yes, other non-utility program	5%	5%	10%	7%	7%
No, did not participate in other 2004-05 program	48%	32%	21%	31%	66%
Don't know	9%	9%	8%	9%	5%
N	223	79	55	357	350

7.6.2 Demand Response Program Participation

Because of the ongoing importance of peak demand management in California, we also asked customers whether they had participated in any Demand Response programs in 2005. As shown in Table 7-45, about one-fifth of firms have participated in some type of demand response effort. Institutions are least likely to participate (83 percent report not participating) while Petroleum and Mining firms are most likely. (nonparticipating rates of 32 and 34 percent, respectively. Note that only about half of those who said they participated in a demand response program were able to clearly articulate a specific program or tariff by name (program names were not prompted), with the vast majority citing a generic "interruptible" tariff or program. It is possible that many of the customers who recall participating in a program but are unable to clearly identify it by name may have been simply reporting voluntary demand response efforts they made outside of formal programs and tariffs.

Table 7-45: Self-Reported Participation in 2005 Demand Response Programs (PR10) (weighted)

Demand Reduction Program Participation	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total
NO, Did NOT Participate in any DR Program	69%	60%	66%	66%
Demand Response, not specific	6%	16%	15%	13%
CPP	1%	3%	0%	1%
DBP	1%	4%	1%	2%
Interruptible	2%	7%	2%	3%
BIP	0%	0%	2%	1%
Curtailment	0%	2%	0%	1%
Other	4%	2%	2%	3%
Refused	0%	0%	0%	0%
Don't know	17%	10%	11%	12%
N	223	79	55	357

7.7 Familiarity With and Use of Energy Performance Contracting

This subsection discusses awareness and experience with energy performance contracting (EPC). Energy performance contracting (EPC) was at the center of the evaluation of the first two years of the Nonresidential SPC program. This was because one of the key market transformation–related goals of the original program articulated by a number of stakeholders was to increase the size and sustainability of the energy performance contracting market in California (Rufo, 1999 and XENERGY, 1999). As a result, a number of baseline indicators of the performance contracting market, both in California and nationally, were put into place in the previous evaluations of the 1998 and 1999 SPC programs. Although transformation of the performance contracting industry is not a core objective of the current program, it is informative to continue to track indicators of performance contracting since it continues to be a significant and long-standing energy efficiency market activity.

7.7.1 EPC Awareness

Respondents were first asked how familiar their organization was with the concept of energy performance contracting. As shown in Table 7-46, just over half of firms are either very or somewhat familiar with EPC, similar to levels reported in 2002 and 1999. The largest firms are most familiar with EPC (as indicated by the Very or Somewhat Familiar response categories), while smaller firms are less familiar with it. By business type, Institutional organizations and Electronic firms are most familiar with EPC, while Mining, Petroleum, and Offices are the least less familiar with it.

Table 7-46: Familiarity with Performance Contracting (PC1) (weighted)

Familiarity with Energy Performance Contracting	Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Very familiar	11%	15%	11%	12%	21%	23%
Somewhat familiar	34%	31%	51%	42%	29%	32%
Unfamiliar	50%	49%	34%	42%	47%	39%
Don't know	6%	5%	4%	5%	4%	5%
N	223	79	55	357	350	349

7.7.2 EPC Offers

Next, firms were asked whether they had received any EPC offers within the past year. Findings indicate that EPCs are less active in soliciting customer business than in 2002 and 1999. Table 7-47 shows that only one-fifth of the respondents had received an offer from a performance contracting firm within the past year; down from 2002 and 1999, when 25 and 28 percent, respectively, reported receiving offers. This suggests that the level of private sector EPC marketing has been decreasing during the past few years, despite major changes in the regulatory structure of California electricity markets and significant increases in prices.

As in 2002, middle-size firms (> 1000 kW) are most likely to have been approached, while the largest firms, are much less likely (17 percent) to have received an EPC offer than in the previous survey (26 percent) While Mining (4 percent), Offices (16 percent), and Other Industrial firms (15 percent) were least likely to have been solicited, Petroleum (45 percent) and Electronics (39 percent) were most likely to have received a bid from an EPC.

Table 7-47: Firm Solicited with Performance Contract in Past Year (PC3) (weighted)

Approached for Energy Performance Contract?	Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Yes	22%	31%	17%	21%	25%	28%
No	66%	66%	74%	70%	66%	65%
Don't know	11%	3%	9%	8%	8%	7%
N	223	79	55	357	350	349

7.7.3 EPC Accepted

Table 7-48 shows that one-fifth of 2005 respondents who were offered an Energy Performance Contract were able to successfully negotiate and sign it, up from 11 and 13 percent of firms in 2002 and 1999, respectively., In addition, the percentage of firms that asked for and received a formal proposal has increased, while the share of firms that heard a presentation but did not request a proposal has gone down. This suggests that firms that decide to consider offers are more serious about following through with bid review and contract execution than in the past.

Findings also indicate that the largest firms are almost twice as likely as medium- and small-sized firms to successfully negotiate a contract (28 percent vs. 16 percent). Only 4 percent of solicited respondents tried but failed to negotiate successfully.

A net total of 4.8 percent (17 of 357) of customers reported signing a performance contract. The net market penetration of EPC has grown by about one-third over the 3.6 percent estimated for 1999, even while the number of firms approached has continued to shrink from 28 percent in 1999, to 25 percent in 2002, to 21 percent in 2005.

Table 7-48: Outcome of Performance Contract Solicitation (PC4B) (weighted)

How Far in Decision Process?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total	2002 Total	1999 Total
Heard presentation but did not request proposal	42%	8%	37%	29%	49%	38%
Asked for and received formal proposal(s)	32%	48%	35%	38%	30%	35%
Tried to negotiate contract but failed	4%	8%	0%	4%	5%	6%
Negotiated and signed contract	16%	16%	28%	20%	11%	13%
Don't know	6%	21%	0%	8%	3%	8%
N	50	22	13	85	90	98

7.7.4 Reasons for Entering and Not Entering an EPC

Of the 30 firms that selected an EPC and provided reasons they did so, 15 cited the value of the incentives offered and very low first cost. Other reasons given were the ease of participation, the energy savings achieved, and the fact that an EPC allowed them to fulfill their civic duty.

The most frequently cited reason, offered by one-fourth firms that have not executed an EPC, was that the proposal does not "work" for them (see Table 7-49). Other reasons mentioned included: an inadequate payback, a corporate decision is forthcoming, the contract details are still being finalized, or an evaluation is still in progress. For the largest firms, initial cost and contract problems are least important, while payback and their corporate decision making criteria are the most important reasons why they have not executed an EPC. Contract problems were frequently cited as an obstacle by the medium and smallest-sized firms.

Table 7-49: Reasons Customers Did Not Sign Performance Contract (PC5) (weighted)

Why No Energy Performance Contract?	Peak kW >500	Peak kW >1000	Peak kW >2000	2005 Total
Initial cost	8%	15%	1%	7%
Contract didnt work for us	44%	27%	9%	25%
Lack of understanding	3%	2%	0%	2%
Skeptical	10%	0%	0%	3%
Bad time	5%	19%	0%	7%
Payback/Didnt seem worth it	5%	0%	27%	12%
In process of finalizing	2%	9%	25%	13%
Still evaluating	12%	9%	9%	10%
Havent looked into it yet	5%	0%	0%	2%
Not interested	3%	8%	9%	7%
Corporate decision	3%	6%	20%	11%
Other	1%	4%	0%	2%
Refused	0%	0%	0%	0%
Don't know	1%	0%	0%	0%
N	39	18	9	66

There are some interesting response patterns by business type. Over half the institutional firms that had not yet instituted EPCs are in the process of finalizing contracts, indicating their faith in and support for this approach. Other types of firms cited considerable barriers to executing an EPC. Approximately 96 percent of Electronics firms and 84 percent of Petroleum firms reported that the proposed contract does not meet internal corporate decision-making criteria. For Offices, initial cost, inadequate payback, and simple lack of interest were the biggest obstacles.

7.8 Awareness and Assessment of Specific Types of Energy Service Providers and Service Offers

The following subsection presents results of the respondents' awareness and opinions of third-party providers and service offers. These efficiency market indicators were also benchmarked in the 2002 and 1999 surveys.

7.8.1 Energy Efficiency Services Offers

In the previous section we presented results of customers experience with a specific form of energy efficiency project (an EPC). We also asked customers whether they had received any kind of offer to improve energy efficiency. Table 7-50 shows that almost two-thirds of the firms reported being solicited by a third-party to improve energy efficiency in 2005, a decline from the level percent reported in 2002. By business type, Institutional entities were most likely (91 percent) to have been solicited, while Mining (29 percent) and Petroleum firms (42 percent) were least likely.

Table 7-50: Firm Solicited to Improve Energy Efficiency in Past Year (EO1) (weighted)

	Peak kW					
Approached by ESCOs?	>500	>1000	>2000	2005 Total	2002 Total	1999 Total
Yes	63%	60%	65%	63%	73%	55%
No	34%	39%	35%	35%	25%	40%
Don't know	3%	2%	0%	1%	2%	5%
N	223	79	55	357	350	349

7.8.2 Credibility of Companies Providing Energy Efficiency Services

Electric utility distribution companies are not considered to be a very credible source of energy efficiency related information, based on 2005 findings. When asked to rate the credibility of different sources of energy efficiency–related information on a 0-to-10 point scale, the mean score for the local electric distribution company dropped from 7.6 in 2002 to

only 4.7 in 2005 (see Table 7-51). The decline in credibility is not unique to the utilities; ratings for ESCOs dropped similarly, from 5.3 in 2002 to 3.3 in 2005. Non-utility energy service providers (ESPs) received the highest rating, 6.1 in 2005, up from 5.5 in 2002. Note that this coincides with ESP's increased use by firms surveyed (see Table 7-24, above).

Table 7-51: Mean Rating of Credibility of Firms as a Source of Energy Efficiency Related Information by Size (SP4A) (weighted)

Type of Firm	Size in Peak kW			2005 Total	2002 Total	1999 Total
	>500	>1000	>2000			
Engineering/Architectural Design Firms	5.2	5.7	5.7	5.4	6.4	6.9
Energy Equipment Contractors/Installers	5.6	5.8	5.2	5.6	5.8	6.7
Energy Service Companies (ESCOs)	2.8	3.7	4.4	3.3	5.3	6.4
Local Electric Distribution Companies	4.3	5.7	4.8	4.7	7.6	8.4
Other Energy Service Providers (ESPs)	5.9	6.2	6.7	6.1	5.5	--
N	223	79	55	357	347	280

Table 7-52 reports the credibility rankings by business type. Ratings for electric distribution companies in 2005 shows much variation by business type with Mining and Petroleum firms providing among the lowest scores. Ratings of Energy Service Companies (ESCOs) are particularly low.

Table 7-52: Mean Rating of Credibility of Firms as a Source of Energy Efficiency Related Information by Business Type (SP4A) (weighted)

Type of Firm	Business Type							2005 Total	2002 Total	1999 Total
	Office	Institu-tional	Other Commer-cial	Elec-tronic	Mining	Petro-leum	Other Indus-trial			
Engineering/Architectural Design Firms	5.7	6.1	5.2	6.1	4.1	6.0	5.2	5.4	6.4	6.9
Energy Equipment Contractors/Installers	6.0	5.7	5.6	6.0	5.6	4.1	5.2	5.6	5.8	6.7
Energy Service Companies (ESCOs)	3.9	2.9	3.4	4.3	2.0	3.6	2.7	3.3	5.3	6.4
Local Electric Distribution Companies	4.9	5.7	4.7	4.4	3.6	3.8	4.4	4.7	7.6	8.4
Other Energy Service Providers (ESPs)	5.0	6.6	6.2	6.0	5.0	5.8	6.5	6.1	5.5	--
N	38	43	172	23	20	8	53	357	357	357

7.9 Comments and Suggestions Regarding Energy-Efficient Product, Practices, or Programs

Finally, interviewees were asked whether they had any comments or suggestions regarding products, services, or programs that support energy efficiency or peak load reduction. One-fourth of respondents offered a wide range of suggestions. The most common suggestion was to provide more energy efficiency and program information. Another common theme was to broaden, increase, or modify the methods for handling incentives. A number of respondents

indicated they were already very pleased with programs and didn't see much room for improvements. Many customers also took the opportunity to raise concerns over electricity prices, pricing structures, and promotion of generation alternatives such as solar, biomass, and nuclear power, all issues that were outside the scope of our survey, but provide valuable feedback to utilities and other Energy Service Providers.

8

Key Findings

8.1 PY2004-2005 SPC Evaluation Objectives and Scope

In this chapter, we present a discussion of some of the major findings and issues identified in this study. We have divided this chapter into several sections.

- In the *Historical Context* section, we remind readers of the history of the SPC program and of the SPC evaluation, and how this history relates to the findings in this PY2004/2005 Impact Evaluation.
- In the *Application Quality* section, we discuss issues related to the wide range of quality we found in our review, and we cite examples in the documentation for specific projects.
- In the *Application Review Process and Technical Content* Issues section, we offer observations on the review process itself.
- In the *Tracking System Content* section, we address issues that adversely affect data quality, namely data entry and cross-program data sharing procedures.
- SPC program *Process-related findings* summarize participating customers' and EESPs' overall satisfaction with the program and various program elements, and their perceptions of the program's key strengths and weaknesses.
- *Free-ridership findings* address various elements of free-ridership, namely:
  - Reasons for participation
  - The role of EESPs in energy efficiency decision making
  - The influence of environmental concerns and other factors
  - Other market influences or barriers

8.2 Nonresidential SPC Historical Context

The purpose of this section is to put some of the evaluation findings in this report, including those in the remainder of this chapter, into a historical context that recognizes that the program has undergone significant changes throughout its history in response to market and evaluation feedback, as well as to changes in the CPUC's energy efficiency policy goals.

The findings point toward the need for improvements in the rigor of application documentation, review quality, and energy savings estimation. In contrast, in the early years of the program, the evaluation findings[21] concluded that application and energy savings measurement requirements were more stringent than necessary to ensure overall ratepayer value.

Since the establishment of the SPC program in 1997, there has been an ongoing issue whether, and to what extent, savings should be measured rather than calculated. Another issue has been the extent of documentation required in application forms. In the first two years of the program, M&V was required on virtually all projects, and application documentation requirements were extremely detailed. However, the time, effort, and cost associated with measuring savings on every project became an issue in the 1998 and 1999 program year evaluations because of concern that measurement census was a conservative but possibly sub-optimal approach, due to its expense and the human resource requirements on the part of both the participants and program administrators. As a result, application documentation requirements were significantly reduced and, in PY2000, the utility program administrators introduced the *calculated* savings path. Under the calculated path, on-site verification of project installation remained a requirement but direct measurement of savings was replaced with engineering calculations made by or approved by the administrators. In PY2000 and PY2001, customers were offered the choice of whether to apply under the calculated path or the M&V path. While the M&V path paid a 10 percent incentive premium, most customers chose the calculated path. In PY2002, the calculated path became the default application path, with the administrators retaining the right to require the M&V path for projects for which a calculated approach was not considered adequate.

For PG&E and SCE, program administrators estimated that roughly 90 percent of 2002 projects were on the calculated path, while for SDG&E the reported figure was roughly 50 percent.

In making these changes, the SPC Program managers acknowledged and recognized the limitations of energy savings calculations based on assumptions for custom projects, but intended that the program err strongly on the conservative side when reviewing, approving, or utilizing such assumptions.

Nonetheless, it does appear to the evaluation team that the program has over-corrected with respect to the extent of its reduction in measurement and energy savings application

[21] XENERGY, 1999. *Evaluation of the 1998 Nonresidential Standard Performance Contract Program*. XENERGY, 2001a. *1999 Nonresidential Large SPC Evaluation Study*.

requirements. Some degree of over-correction is always a risk when programs make significant changes as they seek to improve.

Ex-post impact evaluations were conducted on the SPC program in 2002 and 2003, after the program changed to a primarily calculated savings program. In program years 2004 / 2005, the trend toward calculated savings increased, with less than 10% of sites requiring M&V, and the adoption of itemized savings for common measures (a de facto calculation approach using generalized assumptions and deemed savings / incentive amounts).

Because of the emphasis on calculated versus measured savings, many of the issues identified in the 2002/2003 evaluations are still relevant today and are therefore included.

Overall we found many issues that compromise the integrity of savings estimates. Two issues of particular concern are: (1) the use of inappropriate calculation methodologies, particularly the use of savings assumptions for itemized incentives that do not fit well with the characteristics of actual projects in the program; and (2) the lack of a pre-retrofit system descriptions in many cases. Each of these will be discussed below.

8.3 Findings Related to Application Quality

This section discusses issues related to the quality of SPC project applications based on review by the evaluation team engineers for the 114 applications in the sample. We found that there are several examples of good documentation supported with credible calculations and a clear definition of the installed measures and their impact in the applications reviewed. At the same time, we also found that there are some sites where the supporting documentation is unclear or even non-existent. Suggestions to address the issues identified in this chapter are contained in the Recommendations chapter of the report.

8.3.1 Areas of Improvement

Clarity About How a Proposed Project Will Save Energy

This is an area that has shown improvement from previous program years. Most applications were found to contain a clear description of how the proposed retrofit will reduce energy consumption (fewer than 10% did not have this description). A clear description is essential to support an accurate review of the proposed project and to identify the parameters that require verification in order to assess the energy savings claim.

Technical Accuracy

There were far fewer technical and calculation errors in sampled PY 2004-2005 applications than in PY2002-2003. Only about 5% of the reviewed applications contained such errors.

There were, however, still some limitations to the technical information needed to perform the evaluation. The following observations are based on the PY 2004-2005 applications reviewed in this evaluation:

- Pre installation conditions were not always documented and in many cases, were not thoroughly documented. This lack of pre-installation information often led to the greatest uncertainty in the ex-post energy savings estimates.

- Access to all application paperwork and supporting documentation was not always provided. There were no central repositories for all hard copy and electronic information, and there were believed to be cases where blueprints/CDs were not duplicated for, or made available to, the evaluation team.

- Site and sponsor contact information, particularly for larger multi site entities, was not always current. There were often cases where contact names were incorrect due to staff changes, resulting in significant loss of time which could have better spent on activities geared toward improving overall evaluation results.

8.3.2 Areas of Concern

Many of the areas of concern that were identified earlier in the PY2002-2003 evaluation were also found to be issues in the PY2004-2005 SPC program. These issues are summarized below.

Wide Range in the Quality of Applications and Supporting Documentation

There continues to be a wide range of quality in the submitted calculations and documentation supporting the energy and demand savings. Some applications reflect very high quality submittals, while others had inadequate documentation of savings estimates. In general:

- Sites with small quantities of installed measures (such as compressed air systems, cool roofs, industrial processes or variable speed drives) had sufficient documentation because many used the itemized incentive approach of deemed or SPC Calculator-based savings. There were a few cases where custom calculations were inadequate or not well documented.

- Projects involving measures such as chillers or compressed air systems often did not provide adequate descriptions of how the units operated in a system or did not take

the unit operation into account when calculating savings. This occurred even in instances where the SPC calculator was used.

- Applications with a large number of installed or controlled items in a measure category frequently did not include full documentation of the final installation conditions.
  - For example, lighting applications would include total quantities of lighting fixtures and a single declaration of yearly on-time, but did not provide a breakdown by area of use.
  - Applications involving energy management system installations and other custom applications that used DOE 2.2 or eQuest energy models did not submit the underlying energy models. Requests to obtain energy models or other supporting information from reviewers, EESPs, or vendors were attempted in 10% of the cases, but were successful less than half of the time.

- In all cases, a general description of the measure was provided. However, in many instances it was not verifiable, since items were not clearly delineated, serial numbers of unique pieces of equipment were excluded, or as-built measure lists were left out.

For two of the utilities, electronic documentation was available for nearly all sites, but one of these utilities provided only minimal hard copy documentation. The third utility provided the majority of the application data in hard copy format, with electronic data only for selected sites.

For itemized measures or those which calculated savings using the SPC Calculator, a clear and comprehensive presentation of the energy savings calculations and underlying assumptions may not be necessary when certain criteria are satisfied (if the savings calculations can be clearly understood from workpapers and SPC Calculator documentation – which is very seldom the case); for all other measures, such information is necessary to better understand ex-ante calculations in order to determine their adequacy and correctness.

A large number of applications involving custom measures and calculations did not provide sufficient energy savings documentation. For example, 20% of the applications using customized calculations completely omitted these calculations. In an additional 30% of the applications, the calculations were found to be inadequate (due to inadequate documentation or insufficient level of technical rigor). The remainder (50% of the applications) had adequate calculations, with satisfactory (but not necessarily detailed) reports and savings estimates from the EESP or from the customer.

Several projects sponsored by energy-efficiency service providers (EESP) had a higher volume of (but not necessarily higher quality) documentation than customer-sponsored

applications. These EESP applications were, however, clearer in their descriptions of the energy efficiency measures and were easier to comprehend. This clarity simplifies verification and impact evaluation, and gives a higher level of confidence in the results.

Unverified and Undocumented Assumptions Used as Inputs for the Savings Calculations for Many Applications

As in PY2002-2003, we found a number of cases where the assumptions for the program calculations were unverified and undocumented. Increased documentation of input assumptions for savings estimation is needed, particularly, for larger and more complex sites. In general, the assumptions underlying savings calculations for customized measures were more reliable than those using the SPC calculator or using itemized incentives. Nevertheless, there are still areas for improvement.

For example, energy savings calculations for many controls, refrigeration, and compressed air projects are based on actual data. However, an estimated 20% of these types of complex projects use an assumed load or estimated average annual load point. In some cases, the applicant assumed that the system would operate an estimated number of hours at a certain load before the modification, and then base their calculations on a reduced number of hours and/or load. Program savings estimates for such projects are thus based on unverified assumptions that can vary widely from site to site. Often, rules of thumb and averages are used in these calculations. There is no measured data to back up the load estimates, nor any documentation of how the load varies throughout the year.

As another example, in most lighting cases, there is no documentation to substantiate the hours of operation. In many lighting projects, hours of operation are not differentiated by area and specific fixtures and counts are not clearly associated with specific areas. For instance, an open office area is likely to have different hours of operation than a conference room or a storage area.

Rigidity of Assumptions in SPC Calculator

We also found that frequently, energy savings calculations based on the SPC calculator are less reliable than customized calculations. This is largely due to the rigidity of the inputs. This rigidity yields incorrect ex-ante savings estimates in cases where data on actual operating conditions is available. Examples are provided below:

- At times, the SPC calculator does not account for the system being modeled (e.g., a multi chiller plant with lead and standby chillers operating under a nonstandard sequence of control).

- For some measures, such as injection molding equipment and cool roofs, the SPC calculator models appear to rely on empirical data. While not inherently incorrect, these underlying assumptions need to be explicitly stated and should be able to be changed when better data is available, to yield reliable defendable energy saving estimates.

- For the majority of the lighting projects and several other projects (including variable speed drives), the hours of operation are stipulated in the Itemized Measure Savings Worksheet. Thus, hours are not able to be changed to reflect actual conditions.

- The power consumption in kW (or kW controlled for lighting sensors) also cannot be modified.

- The savings for variable speed drives (VSDs) are based on an HVAC system, while VSDs were used on process systems as well, also resulting in incorrect ex-ante savings estimates.

- Programmable thermostat calculations also often yield incorrect savings estimates, as they are assumed to control a larger area than was actually controlled.

The workpapers from the Express Efficiency program are reportedly the basis for the assumptions and algorithms used to calculate savings in the itemized measures. This linkage is evident in the calculations on many applications, a few notable exceptions notwithstanding:

- In a significant number of lighting cases we were not able to exactly replicate the savings using the assumptions in the Express Efficiency workpapers.

- Both electric and gas savings are reported in the Express Efficiency workpapers for programmable thermostats, however, gas savings are omitted from the itemized measure sheet.

Lack of Pre- and Post-Retrofit Monitoring

The applications indicate that post-retrofit monitoring is done for only a small fraction of projects. Of the 114 sites that were evaluated in PY2004-2005, post retrofit system monitoring was conducted at only three sites. One utility had no M&V sites in the sample. It may be appropriate to consider requiring M&V for a minimum percentage of applicants undertaking certain types of projects.

Pre retrofit system monitoring was conducted in very few cases as well. Although it is obviously not cost effective to pre-measure all sites, conducting such measurement on a

sample weighted toward the largest projects would be helpful in improving ex-post savings estimates.[22]

Wide Range in the Quality of Application Reviews

In general, the comprehensiveness of application reviews by program administrators and their proxies varied widely. Some of the applications had very thorough reviews, including documented inquiries to the project sponsor requesting supporting information. However, it appeared that many of the applications received only a cursory review and post installation inspection was very limited and inconclusive.

There were very few documented cases where requests were made of the project sponsor or applicant of more information to support the application. Even when a project application was unclear or contained errors, the reviewers apparently did not request information to improve the documentation or correct the errors in the calculations. Many of the applications seem to have received only a cursory review and post installation inspection was too limited to verify the actual installation and operation.

As an example, the reviewers would be expected to identify the use of lifetime kWh savings for early retirement chiller and motor projects in the application paperwork (instead of first-year savings as with all other measures) at some stage. However, this error was seen in several applications, regardless of the utility or sponsor. There were a total of three chiller projects and one motor project for which this error was carried through to the post installation inspection phase and the utility tracking system (and not corrected in EEGA, see discussion in Section 8.5 below), representing 3.5% of the total sampled applications. As noted in Section 5 of this report, this single-measure reporting error alone accounted for a 3.6% reduction in the gross savings realization rate for the entire program.

Another example is that of an industrial process modification project that involved the installation of nitrogen cooling equipment reducing the consumption of electric energy. Although this project was paid a high incentive and claimed a very large quantity of energy savings, the analysis in its application was very basic, and included unsupported assumptions for the energy use prior to the retrofit. Pre installation metering would have been warranted for this site. The evaluation suffered because of the lack of pre or post inspection monitoring and energy usage data for this site.

[22] As discussed in the Recommendations section of this report, such pre-measurement could be carried out by an impact evaluation team rather than the program implementers.

While this may not be fuel switching in the conventional sense (using conventional fossil fuels), there was no discussion of whether this was a type of fuel switching in the application paperwork. The SPC Policy Manual states that fuel-switching measures are ineligible. This project may, under some definitions, be considered to be a fuel-switching project, with the new fuel being nitrogen. It was determined that the nitrogen was produced in California, and it seems that the energy input for producing the nitrogen should be considered in the ex-ante and ex-post energy savings calculations.

8.4 Findings Related to the Impact Evaluation Quality

This section discusses issues related to the overall evaluation quality for PY 2004-2005. These findings are based on our experience as evaluators in PY 2004-2005 and our experience as evaluators for this program in previous years.

8.4.1 Improvement in Impact Evaluation Quality and Process

Better Estimation of Peak kW Savings

The PY 2004-2005 evaluation has primarily focused on kWh and therm savings. However, the estimation software (the SPC calculator and the itemized incentive measure worksheets) also computes kW savings. The customized calculations also generally included calculation of kW savings. While these are adequate for developing building-level noncoincident peak demand savings, in many cases, they are not sufficient for determining the coincident system peak kW savings. In addition, a specific statewide definition of coincident peak demand was not made available to program implementers, thus, coincident peak kW-based estimates could not be reliably produced.

However, some progress was made toward a standardized definition in this evaluation effort. The 2003 SPC evaluation report noted:

> ***Limited Estimation of kW Peak Demand Savings.*** *The PY2002 and PY2003 SPC programs did not require and track peak coincident demand savings, although estimates were included in a number of applications. Estimating peak coincident demand kW reduction is generally more complex than estimating annual energy savings. Accurate estimation of demand reduction usually requires that data must be collected and evaluated on an hourly basis. If quantifying demand reduction is important, as we believe it is, given the peak demand-related resource importance of energy efficiency programs, more rigorous and systematic estimation of peak demand impacts (both in-program and through the evaluation process) should be considered.*

The PY2003 report recommended that a more rigorous approach with a larger evaluation budget was necessary in the future to support this objective. This was accomplished in part in PY2004-2005 through an increase in overall per-site funding and a much larger evaluation budget.

Baseline Use Reporting

In response to recommendations made in previous evaluations, the utility program administrators added a field to their forms requiring a calculation of savings as a percent of total baseline end use energy. This was intended to serve as a flag for calculations with problems and to determine when a higher level of scrutiny should apply to specific savings claims and applications. However, it was found that this additional information did not trigger any changes in the calculation approach. There were also many cases where this field was not completed in the Application Review Form.

Planned Review of the SPC Calculator

The SPC calculator is used to estimate energy savings for a significant percentage of installed measures (about 30% of the measures in PY2004-2005). It is our understanding that utility program administrators are planning to undertake a comprehensive review of the SPC calculator by an independent party. This review is needed in order to improve the integrity and accuracy of the SPC calculator going forward.

Increased Budget Allowed for Additional Ex-Post Measurement

In response to a recommendation made in the PY2003 evaluation, a much larger evaluation budget was adopted for this PY2004-2005 evaluation. As a result, this evaluation study was able to undertake a much greater level ex-post measurement much more often than previously.

8.5 Findings Related to Tracking System Content

This section addresses specific problems found in Tracking System data, which were uncovered in the course of performing the evaluation. Specific problems relate to data entry and the sharing of measure-level information across programs.

- Data Entry and Tracking System-EEGA Filing Inconsistency
  - **Data entry quality was inconsistent and, in the case of early retirement measures, was not always consistent with EEGA data.** The review of paperwork pertaining to the 114 on-site projects shows that the tracking databases do not always contain the correct information about savings. In addition, corrections were made to EEGA for some early replacement projects without

making equivalent changes in the tracking system data provided to the evaluation team for this study.

- Some projects included early retirement measures and used the SPC calculator to estimate savings. For early retirement measures, the SPC calculator returns savings over measure life rather than first-year savings. The tracking systems should have contained first-year savings for these projects, for consistency with all other records in the same field, but for 11 projects, measure life savings were entered and retained in the tracking system. Of these, savings for 7 projects were corrected - *prior to receipt of findings from this evaluation* - in EEGA, but *not* in the tracking systems provided to the evaluation team. There remained 3 chiller projects and one motor project for which measure life savings were in the tracking system but not corrected in EEGA. While in those cases we revised the draft evaluation realization rates to use the EEGA data instead of the tracking system data, this process was far from ideal. We emphasize that correction in EEGA, without correction in the tracking data used as the basis for this evaluation, was suboptimal and added considerably to the time necessary to complete the study. The delay occurred because the IOUs did not bring the inconsistency to the evaluation team and Energy Division's attention until after submission of the draft report for this evaluation.
- The paperwork for some projects indicates that early estimates of savings were made, and then revised and re-submitted by the applicant. Yet, in some cases, the savings correction was never made in the tracking database, which still contains the early estimates of savings.
- The paperwork for some projects contains calculations of gross and net savings. The tracking system should contain gross savings, yet in several cases the net value was entered instead.

- Measure Information Sharing Across Programs
  - **Striving for uniformity of measure information across programs might lead to errors.** The effort to standardize measure information within the IOU tracking systems should be limited to measure description and per-unit savings. However, we have found at least one case in which the same "standard" NTG ratio for a given measure was used inappropriately across programs.

8.6 Findings Related to SPC Program Processes

This section reports high-level findings from the process evaluation of the PY2004-2005 program that was performed as part of this study. Results pertaining to overall satisfaction with the program, and perceived strengths and weaknesses of the program are presented here.

- Program Satisfaction

- **In general, participants are highly satisfied with the program,** providing very positive overall satisfaction ratings. Over three-fourths of respondents reported being very satisfied with the program.
- **Participants are also highly satisfied with the utility's SPC program staff,** which includes their assigned account representative. Nearly three-quarters of PY2004-2005 respondents rated their experience with the program staff as "Excellent". Many respondents provided additional positive comments characterizing their SPC contact as helpful, informative, professional, knowledgeable, responsive, timely, or efficient.
- **SPC participants can also take advantage of services provided by the program's technical support contractors.** More than half of the respondents said that they had availed themselves of these services. Of these, 93 percent rated their experience with the technical contractors as "Excellent" or "Good".
- **The majority of EESPs are highly satisfied with the program**. More than half of all participating EESPs who offered responses said they were very satisfied with the program overall, while another 36% said they were somewhat satisfied. When asked to explain their ratings, respondents cited the program's role in their marketing efforts as well as the streamlined application process and the relative ease of working with the program.

- Program Strengths
  - As would be expected, the financial incentives offered through the program are most often cited as one of the program strengths, according to 43 percent of respondents.
  - **The SPC program's ease of applying and qualifying is next most frequently mentioned.** This testifies to program administrators' continuing efforts to streamline the application and M&V processes over the nine-year history of the program.
  - A significant number also praised the professionalism and helpfulness of their utility in administering the program.
  - Participants also find the various tools offered through the program (the savings calculator and the program website) to be at least moderately helpful in supporting their SPC program applications and decision making. Feedback is mixed on the usefulness of the calculator. Most find it useful, but many also commented on the difficulties of using it.
  - **In general, SPC participants have few complaints or suggestions regarding the incentive level or structure.** Almost 60 percent of respondents are satisfied with the PY2004-2005 incentive structure and did not provide any suggestions for improvements. In addition, nearly 60 percent find both the program payment procedures and the timing of payments to be reasonable.
  - EESPs praised the program for making incentives available that allow customers to implement projects which would otherwise not meet payback criteria. Other strengths mentioned by EESPs included the program's ease of participation due to

its streamlined participation process, the fact that the program validates their sales message through the IOUs' involvement, and the efficiency with which the program is run, including the responsiveness of SPC program staff.

- **EESPs also rated highly the utilities administering the program.** Almost 90% of the 40 EESPs said the experience had been good or excellent.
- Most participating EESPs preferred the greater ease of use of deemed and calculated savings over measured savings, and many were enthusiastic about the addition of deemed savings for itemized measures.
- **More than half of EESPs respondents said the 2004-2005 SPC program had been very important to their business.** Most EESPs said that the SPC program enabled them to incorporate the program incentives into their marketing approach.

- Program Weaknesses
  - Participating customers view the program very positively and offered relatively few complaints.
  - The most common concern expressed was over the administrative hassles associated with participating (19 percent of respondents).
  - Other complaints mentioned were **various timing-related problems** (8 percent of respondents), and **incentive policies or practices** (5 percent of respondents).
  - **Concerns over the program's M&V requirements**, a major problem area in 2003, were only expressed by 4 percent of respondents.
  - **The weakness most often cited by EESPs is the still time consuming and sometimes complex process of applying for SPC funds.** Other complaints centered on the difficulty of identifying and communicating with IOU program staff, various problems relating to the engineering reviews, and uncertainty regarding the availability of funds.
  - When asked about their perception of incentive levels, more than three-fourths of EESPs described them as "reasonable," "OK," "fair" or "generous." Several respondents expressed reservations about the level of incentives, either overall or for specific measures. Their specific comments were: "Lighting was a little underpaid", "Rebate levels were fairly small; barely sufficient to improve customer ROIs", and "The incentive was very low for this project; the cost of preparing the application and other paperwork was not worth the incentive."
  - **Several EESPs noted that caps on SPC project funding kept customers from adding more measures with somewhat longer paybacks**, while others said the caps on lighting projects also had the effect of limiting the installation of other cost-effective measures.

8.7 Findings Related to Free Ridership

This section highlights issues related to free ridership in the program. These findings are based on the results of interviews with participating customers and EESPs, and with nonparticipating customers.

The conclusions directly below are based upon the results of surveys of participating customers and EESPs that were performed as part of this evaluation.

- Reasons for Participation
  - **The desire to reduce energy costs is a primary motivation for pursuing projects through the SPC program.** Energy cost reduction was mentioned by over 80% of respondents as their primary motivating factor. Other factors, such as the rebate offered through the program, or equipment that had problems or had failed, do not play a prominent role in installation decisions.
    - Only about one-fifth of respondents mentioned the rebate as a primary motivating factor.
    - Only about a quarter of those interviewed were seeking to replace equipment that had problems or had failed altogether.

- Role of EESPs
  - **EESPs are only involved in about one-third of SPC projects.** Customers are more proactive now than in the past in engaging the services of EESPs to help them implement energy efficiency projects through the SPC program. Customers initiated contact with the EESP in about three-quarters of the projects where EESPs played a role.
  - Those that involved EESPs in the design and implementation of their SPC projects reported them to be a key influence in their decision making. Nearly 70% of those who used EESP sponsors rated their contribution as either "Very" or "Somewhat Significant" in their implementation decision.
  - Of those projects which are self-sponsored, nearly three fourths involve third-party contractors and their contributions are perceived to be valuable. Most often, the third-party contribution to design or implementation was reported to be "significant"
  - A significant proportion of respondents indicated that absent the SPC program, they would have likely installed the same equipment anyway. Over half said that they would have either "Probably" or "Definitely" installed the equipment without the program. Two-thirds of those reported that they would have installed the same level of efficiency as what they installed through the program. With respect to the timing of equipment installation, nearly half (42 percent) reported that they would have installed some type of equipment sooner, within 6 months of actual installation.

  - EESPs estimated, on average, that about 40% of the projects would ultimately have gone ahead without SPC incentives.
  - In addition, several EESPs noted that utility incentives are now an integral part of customer decision making, and if there had been no SPC program, customers would have waited until another incentive was available.

- Influence of Environmental Concerns
  - **Concerns about the environment are fostering increased interest in energy efficiency in the general population.** Half of Nonparticipating customers surveyed indicated they have a greater interest in energy efficiency investments as a result of concerns over current or prospective greenhouse gas emissions rules or policies. Over one-fourth of respondents said that they are already planning more investments in energy efficiency.

The findings below are for the general population of large nonresidential customers who are eligible for the SPC program. These are based on the survey of Nonparticipants that was completed as part of this study.

- **Procurement policies.** Almost 40 percent of firms have formalized specification policies for the selection of energy efficiency equipment. In general, the larger the firm, the more likely they are to have developed formal policies. Over three-fourths of Institutional facilities have developed such policies.

- **Financial policies and barriers.** Reported payback period requirements may have relaxed somewhat since the previous process evaluation of the PY2002 program; the mean payback period required for energy efficiency investments was 4.1 years. Competition for capital is the barrier mentioned most frequently. The largest firms also expressed significant uncertainty about energy efficiency equipment performance.

- **Program and measure awareness.** Firms consider their knowledge of specific types of energy efficiency opportunities to be quite high, as is their awareness of utility energy efficiency programs. This latter finding is most likely a reflection of the programs' long-term presence in this customer market. Over two-thirds of firms are familiar with these programs.

9

Recommendations

In this section we present our recommendations based on the results of the impact evaluation, net-of-free-ridership, and related issues.[23] Ultimately, the purpose behind these recommendations is to provide suggestions for program designers and managers to consider that may help to improve the resource reliability of the program.

Although the SPC program is no longer being offered on a statewide basis, several of the IOUs' nonresidential incentive programs include a substantial SPC component. In addition, several third-party implementers offer SPC-like custom incentive programs. The following recommendations are intended for utility and third-party managers of such programs.

9.1 Application Quality

Consider Increases in the Level of Technical Documentation Required for All Projects, especially the Largest, Most Complex Projects. There is a balance between keeping the application process and forms from being overly complex and costly to navigate, while at the same time providing adequate levels of documentation for verification and savings analyses. The early SPC program year evaluations recommended simple forms and processes. However, application documentation should not be over-simplified given the complexity of measures and range of site-specific characteristics in this program.

As noted in Chapter 8, better documentation is needed regarding pre-installation or pre-retrofit operating conditions. In particular, large complex projects should be required to submit a greater level of site-specific application data than smaller projects, since (a) they contribute disproportionately to total program savings; (b) the large incentive payments increase the temptation for gaming or fraud; (c) measures implemented are often site-specific or industry-specific; (d) there may be many units in several locations, and (e) savings may be very sensitive to baseline conditions.

[23] Some of the recommendations presented in the section were developed in Quantum, 2005. *Energy Efficiency Best Practices Study - Large Nonresidential Comprehensive Incentives Programs.* www.eebestpractices.com.

For simpler projects that have itemized incentives or use the SPC Calculator, a summary-level simplified calculation would be useful to verify that the SPC Calculator and the itemized measure worksheets yield relatively accurate savings. Pre-retrofit information could also be captured for all projects on a standard section in the project application form. The program administrators would then have the option of requiring a different (custom calculation) approach, or even requiring pre retrofit metering. For large and complex projects, the utilities should increase the depth and quality of backup documentation provided. For complex technologies, a detailed description on how a project saves energy should be required. This should include a technical description of how the proposed modifications reduce energy consumption and the associated supporting calculations.

In addition, utilities should increase efforts to utilize the field requiring energy savings as a percentage of total baseline energy use. This field was added to forms in response to a recommendation in the previous evaluations. It was intended to flag calculations with obvious problems (especially, potential overestimation of savings) and to indicate when a higher level of scrutiny would be warranted for specific savings claims and applications. However, for many projects this field was not populated, nor did it trigger additional review. Enforcement and mechanisms to trigger review would provide needed quality control for savings estimates that are inconsistent with actual facility use.

Increase Pre- and Post-Installation Inspection Thoroughness. During the pre installation phases, information regarding model and serial numbers, hours of usage, EMS trend reports and records, submetered data, and other important parameters (ballast models, lumen levels, etc.) should be collected' particularly for medium and larger applications. Post installation inspections should capture the same type of information. Energy estimates based upon a "snapshot" spot reading or even two week trending are not as accurate as those based on longer or multiple monitoring periods. Pre-installation data may not be available in later periods and is emphasized. We recognize that all of these actions may not always be cost effective for smaller applications. We address this issue in a separate recommendation below regarding further integration of sample-based evaluation and program implementation.

Increase Pre-Installation Measurement for Very Large Projects with Highly Uncertain Baseline Conditions. Savings cannot be reliably estimated for many types of projects on purely an ex-post basis, due to the number of variables that need to be quantified. Pre-installation measurements can significantly improve savings estimates for projects such as complex compressed air and industrial process retrofits. The program includes pre-installation inspection for all projects but only very limited amounts of pre-installation measurement. Consideration should be given to increasing the amount of pre-installation measurement for large, complex measures that cannot otherwise be reliably quantified with

only ex-post data. Pre-installation measurement can be challenging in practice and burdensome to applicants. Care should be taken in this effort; in some cases, applicant installation schedules and other constraints may outweigh pre-installation measurement in importance.

Further Standardize the Review Approach and Documentation Requirements for Recurring Complex Projects. The utilities have made efforts to standardize savings estimates for measures addressed by the SPC calculator and provide guidance for complex measures such as compressed air, large refrigeration projects, etc. However, it appears that additional effort may be needed to increase the consistency of analyses required of applicants and carried out by program reviewers for these types of projects. This would include a more detailed and rigorous requirement for the supporting documentation and certain types of measurement (which could be carried out through the program evaluation function, if well coordinated). The main emphasis should not be on creating rigid tools but on creating guidelines that mandate minimum requirements.

Consider Providing More Technical Support for Applicants With Complex Projects. It may be beneficial to offer technical consultant assistance to participants to help them prepare the required documentation for complex projects. This will help to ensure that they meet the level of increased requirements recommended above.

Improve Access to All Application Information. The CPUC should require that the utilities and SPC Program administrators make all application information available to the evaluation team. This may, in some cases, involve review of project documents at the program administrator's offices. The evaluation effort should be fully funded to allow these activities. Program administrators should plan ahead for such evaluator review. The administrators should make increased efforts to provide the information quickly to the evaluators, and to forward any new information received for specific applications.

It may be possible and desirable for the administrators to digitize or otherwise and develop multiple copies of application files and supporting documents throughout the implementation process (e.g., including blueprints and other bulky documentation where applicable). This may apply to the entire application or only to technical documentation with the ex-ante savings claims and their calculation process. More specifically, program administrators should not wait for evaluators' request to prepare copies of such materials but should maintain such copies on all projects routinely, perhaps targeting the largest projects which have the highest savings contributions.

Improve Reviewer Documentation. The program should require that reviewer calculations, which document the approved savings upon which the incentive is paid, be attached to the installation report. For some projects, documentation of energy savings was provided for the approved application, but not for the final approved incentive which is usually based on the installation report. The basis of the incentive paid to the participant needs to be well documented and easy to ascertain with the project file. Initial Project Application Review Forms should always be included, completely filled out, and accessible to the evaluation team and program administrators. Also, 12 month (or longer) pre-installation energy billing and, where available, hourly or 15-minute interval data histories should be provided, as they are extremely helpful.

Consider a Stronger Affidavit Statement for Technical Accuracy and Evaluation Access. Included in the current affidavit is a release of liability for injury, violation of law, energy savings shortfall, performance and qualifications of project sponsor, and agreement to permit inspection and measurement of the project. As recommended in the PY 2003 evaluation**,** the utilities should consider an additional affidavit statement in the application concerning customer/sponsor-supplied information on operating hours and characteristics of equipment described in the application, such as the following statement: "The information provided in this application is true and accurate to the best of my knowledge." This might eliminate some gaming in the information provided by the project sponsors. The permitting of inspection and evaluation should be highlighted as well. Possible inspection and evaluation efforts, including timeframes, should be more clearly described to customers, allowing smoother coordination of follow up inspection and evaluation efforts.

9.2 Application Review and Measurement

Consider Requiring M&V for a Minimum Percentage of Applicants. This could apply to all projects or only certain types of projects (such as non lighting, industrial, refrigeration, compressed air, etc.). This would ensure that all utilities and all important end uses are monitored. Requirements may also be differentiated by large versus small projects. As noted in a separate evaluation-related recommendation below, this may be addressed by the CPUC as the CPUC's evaluation process becomes integrated earlier into the program implementation process. Program administrators may want to assess their own measurement needs to determine whether they should supplement the CPUC's evaluation-based measurement requirements.

Allow, and At Times Require, Deviation from SPC Calculator or Itemized Approaches. If the above recommendations are followed, and initial Project Application Review Forms are always included, completely filled out, and accessible to the program administrators, then it will be easier to determine when a deviation from Itemized incentive or SPC Calculator

approaches is justified. A brief and transparent energy savings calculation or calculation input sheet reflecting actual conditions also needs to be provided. In addition, data on historical baseline energy use would be extremely useful for making sure that energy savings claims are reasonable.

Consider Independent Review of the Itemized Incentives and Itemized Measure Savings Worksheet. Enhancements to the SPC Program in the 2004 and 2005 program years included the use of Itemized Measure Savings for common measures. This entailed the use of prescribed or deemed savings and incentives. Where possible, the basis of these measures was reviewed in the impact site reports. Typically, the basis is the Express Efficiency workpapers. Review under that program and within this SPC evaluation should guide the decision of when to include the itemized measure approach as appropriate for the SPC program and other larger commercial or industrial energy efficiency programs. The use of itemized incentives– based on a unit incentive per quantity installed – may not be reliable for programs with larger commercial industrial customers with highly-varying facility characteristics like SPC.

The following recommendations regarding future impact evaluations were made in the PY2002 and PY2003 evaluations. These are still relevant in the PY 2004/2005 evaluation.

Consider Increasing Conservatism for Calculated Path Savings Estimates; Increasing Measurement for Large Complex Projects; and Increasing the Incentive Premium for Measured Projects. When the SPC program was shifted from a primarily measurement-based to a primarily calculation-based program, the SPC Program managers acknowledged and recognized the limitations of calculations for custom projects but intended that the program err strongly on the conservative side for these projects. The expected result of choosing to err strongly on the conservative side would be realization rates greater than 1.0 for calculated savings projects. However, the estimated ex-post realization rate is somewhat below 1.0. Thus, the program may not be adequately implementing the program managers' intended conservative philosophy for the calculated savings projects. The program should consider making more conservative assumptions for the calculated projects. The program should also consider utilizing measurement more often for the largest and most complex projects (or having this function performed by the evaluation team – see related recommendations below). If calculated savings are made more conservative, consideration should also be given to increasing the payment difference between the calculated and measured projects (to provide further incentive, if necessary and appropriate, for those projects that believe they can prove their savings are greater than would be allowed under the calculated path).

Consider Requiring Senior Engineer Sign Off for Complex Projects. Many SPC projects are very complex, especially in the industrial sector, and should only be handled by experienced, engineers and energy consultants, preferably professional engineers (P.E.) with Certified Energy Manager (CEM) credentials. Some projects are of more moderate complexity and may not require a P.E. for lead review but should include a P.E. / CEM secondary review and for formal approval and sign off.

Further, the signature of the lead senior engineer during the application review could improve accountability for the approved savings. However, there are both legal and cost implications of requiring a P.E. signature or stamp; these should be thoroughly investigated prior to the instatement of such requirements.

Consider Independent Review of the SPC Calculator. The SPC calculator was used in many instances and should receive an independent and/or peer group review. While envisioned as possibly being conducted in the PY2004-2005 program evaluation, there was not adequate support or budget to perform this task. Future efforts should include an independent reviewer. There also may be an opportunity to identify enhancements to the calculator tool that would increase the level of detail to support applications.

At a minimum, the SPC calculator should be made more transparent, and may require additional development to ensure more accurate energy savings estimates. This must be balanced against the certainty and program stability provided by the current program.

Prepare for Integration of CPUC Evaluators Early in the Program Process to Enable Pre-Installation Verification and Measurement for Sampled Projects. Under the CPUC's 2006-2008 and 2009-2011 EM&V policies, it is important for the evaluation to be integrated into the program implementation process so that pre-installation verification and measurements can be made for large, complex projects and random samples of other projects (based on the evaluation research plans and associated uncertainty analyses). This will likely result in expanded data tracking requirements; along with greater interaction between the evaluation and implementation teams early in the project development cycle.

9.3 Other Issues

9.3.1 Project Information and Reporting

- Site and sponsor contact information should be improved and updated annually, particularly for larger multi-site entities. At a minimum, the utility tracking data should include more complete sponsoring companies and individual's names.

- Secure FTP servers should be maintained for larger projects and all programs to facilitate timely data access and allow evaluation results to be made more readily available.

- Invoices should be maintained and available both electronically and in hard copy for all projects.

- Access to all application paperwork and supporting documentation should be provided to evaluators.

- Utility reviewers should be trained to identify obvious errors, such as the over-reporting of savings based on multiple year, versus first-year, savings and cases where annual savings are a large percentage of base case annual energy use or exceed total energy use.

- Electronic documentation should be maintained. Electronic documentation was available from two of the three participating IOUs. However, these electronic files were not always well maintained, and calculation sheets available only in formats that did not allow updating did not facilitate evaluation efforts. Nor was electronic documentation always complete; in many cases, only the utility review forms were available in this format.

9.3.2 E3/Cost-Effectiveness Program Reporting

- The 2004-2005 E3 cost-effectiveness calculator allows entry of a net-of-free-ridership ratio, which all utilities have utilized. In most cases, the CPUC Policy Manual value of 0.7 was used for the SPC program; although one utility also used higher values for some measures. Utilities should use net-of-free-ridership values that are consistent with the latest CPUC policies and should consider also including a gross realization rate adjustment factor for the SPC program. In addition, the E3 calculator should be revised to accommodated lifecycle net present value analysis for early retirement measures.

9.4 Tracking System

Entering correct measure data, savings and program-specific factors into the tracking systems is of utmost importance for all IOU programs. Tracking system-related recommendations are to:

- **Ensure that the tracking system data are consistent across projects and contain current values for gross first-year savings.** Training of program personnel is crucial for ensuring high-quality data entry into the tracking systems.

- **Ensure that measure information sharing across programs does not extend to program-specific factors.** Training of tracking system personnel is also crucial for

ensuring that program-specific factors such as NTG are correctly entered into the tracking systems.

- **Ensure that measure definitions and field naming conventions are consistent across IOUs.** SPC evaluators have provided SPC database consistency recommendations since 1998. There continue to be inconsistencies in measure and field naming conventions across IOUs.

9.5 Program Processes

As noted previously, the SPC program is viewed very positively by both participating customers and EESPs, and they had very few complaints regarding program administrative and delivery processes. The recommendations below address relatively minor problems that were cited.

- **Continue to streamline the process of applying for SPC incentives.** If possible, consolidate the application process so that a single, multi-part form can be filled out all at one time. Eliminate any redundancies in required documentation and application forms. Reduce turnaround time where possible.

- **Improve communications with EESPs and trade allies regarding funds availability and project status.** Program staff should communicate regularly (at least monthly) with EESPs and trade allies regarding funds availability and project status, to eliminate uncertainties not otherwise addressed by the utilities' web sites.

- **If possible, provide for in-house review and processing of applications.** If contractors must be used exclusively, training should be enhanced to ensure they are all administering the program uniformly.

9.6 Free Ridership

With the re-introduction of a shareholder incentive mechanism in 2006-2008, utilities are once again subject to incentives and disincentives based on *net* savings. This provides them with a direct incentive to design and implement the program in a manner that discourages obvious free ridership. Given historical program free ridership levels of between 40 and 60%, there is significant opportunity for reducing free ridership levels in the SPC program. The following recommendations are offered to provide program managers with a range of ideas to apply toward that effort.[24] We do not provide these recommendations prescriptively, and we understand that program administrators must make the final determination of how to balance the need to reduce free ridership with other program design objectives. We do note,

[24] Many of these were also developed as part of the PY2002 SPC evaluation (Quantum 2005) but are being repeated here because of their continued relevance.

however, that efforts to reduce free ridership appear to have been minimal over the 1999-2005 period.

- **Optimize incentive levels.** A key objective of most incentive strategies is to maximize customer adoption of targeted efficiency measures and practices while minimizing payments to customers who would have adopted the measure or practice anyway in the absence of the program. In the large non-residential customer market, achieving this goal is particularly challenging. Large non-residential customers are by far the most sophisticated end users when it comes to developing and understanding energy efficiency projects. However, these customers can appear to behave enigmatically with respect to these investments. While they engage in a wide range of energy efficiency projects that are often shown to be independent of any program influence, there is also ample evidence that there are numerous cost-effective efficiency opportunities that they do not adopt without program support. Optimizing the use of program funds toward those projects that would not otherwise be implemented is difficult in both program design and practice.

- One approach to consider, with care, **is increasing incentives for higher payback measures,** particularly for emerging technologies. There is a point at which low incentive levels creates a token-level incentive that may have a limited effect on the financial decision making of end users. This approach can pose a dilemma: the CPUC does not want to pay too much for measures that have some risk of otherwise being adopted on their own, but neither should one pay so little that mostly free riders are attracted. For some measures in some market segments, it may be better to pay nothing than to pay a low incentive.[25] On the other hand, there are some specific types of measures for which a higher incentive is well justified. In particular, we believe that certain emerging technologies, in the early stages of commercialization and with high impact and cost-effectiveness promise, may justify higher incentive levels than the SPC currently offers.

- **Implement a minimum payback threshold.** An additional approach to consider is adopting a payback floor, excluding projects for which the payback time is less than, say, one year. Project-specific investigation of free ridership for the SPC program also indicate that projects with extremely short payback periods are more likely to be free riders, all else being equal. Although it is certainly true that many customers do not adopt attractive efficiency projects with very low paybacks,[26] a payback floor can still be helpful, particularly if it is not set too high and if the administrator is allowed some flexibility in its application (see below). Several program administrators in other parts of the country have used payback floors effectively, although such criteria

[25] The SPC does this, for example, with first generation T8 lighting systems, which no longer qualify for incentives.

[26] For example, it is well established that industrial end users often do not invest in compressed air projects with paybacks as low as one year or even less.

present project cost verification challenges. Minimum payback periods of 6 to 18 months are common in such programs.

- **Provide a bonus for first-time participants.** Another possibility is to provide an increased incentive or bonus to end users (not EESPs) that are first time participants in the SPC program. This may help to attract customers that tend to be laggards rather than leaders in their energy efficiency-related investment decisions. Alternatively, incentives could be decreased for projects that individual customers repeat in the program year after year; this would also encourage bigger projects (with larger savings) upfront.

- **Set a minimum percentage for incentive payments.** An alternative incentive strategy is to establish a prescribed minimum percentage threshold for the share of incremental measure cost paid for by the incentive. A minimum level helps to insure that the program is providing a meaningful incentive amount to each project, thereby making the program more attractive to those that were not planning to install the measure absent the rebate. The obvious goal of this approach is to draw those into the program who require more than a token incentive level in order to participate.

The approaches discussed above are focused on trying to minimize free ridership through indirect programmatic rules and requirements. There are other potential strategies available to discourage/minimize free ridership, which will be discussed next.

- **Screen and exclude obvious free riders.** Another approach is to allow the program administrators the flexibility to simply exclude projects from the program that they believe have a high probability of being free riders. Administrators in several other jurisdictions have used this; however, these are generally smaller service territories than those found in California.[27] In these cases, the administrator has the flexibility to determine total incentive amounts on a case-by-case basis, including zero incentives. We do believe consideration should be given to development of a process by which projects considered to be very high likelihood free riders could be excluded from participation. Such a process could require the involvement of an advisory group that includes staff from the CPUC, or at least CPUC policy approval (to mitigate costs associated from challenges). This would offer protection from claims that such exclusions were unfounded or unfair. Alternatively, or in conjunction with this type of approach, rules could be developed that exclude incentive payments for projects that are driven exclusively by non-energy factors that produce energy savings as a by-product, such as some naturally-occurring improvements in certain industrial processes (whether or not they are production related or baseline related and merely conform to standard current operating practices for that industry).28

[27] Quantum, 2005.

[28] A related example is that of a pipeline that is expanded to increase revenue-generating throughput but which also results in per unit pumping savings due to reduced friction losses. The revenue-generating benefits of

- **Encourage greater participation by EESPs and other trade allies at the project identification stage.** Findings from the Participant and EESP surveys suggest that EESPs play a pivotal role in influencing the customer's decision to install energy efficient equipment. These findings also reveal that EESPs are only involved in less than one-third of all projects, and that the customer solicited their participation in about three-quarters of the projects where they played a role. Many of these were projects that the customer had already planned to do anyway. It is likely that if greater, and more proactive participation by EESPs and trade allies were to occur, this would cut down on program free ridership, both by increasing the number of EESP and trade ally-initiated projects and by providing a greater level of EESP and trade ally involvement and influence in energy efficiency decision making. Utilities should increase their outreach to EESPs and other key trade allies, encouraging them to become involved proactively at the project identification stage, rather than waiting for a phone call after key project decisions have already been made. Utilities should consider offering them a bonus payment for all projects that they successfully identify, develop and implement, in effect, rewarding them for projects with low/no free ridership that would not otherwise have been done.

- **Influence customer adoption at the earliest stages of the design process.** Free ridership can often be reduced by working with customers at the earliest possible point in their equipment- and process-related decision making. Early intervention allows program administrators and energy service providers to identify efficiency plans and determine whether even higher efficiency options are feasible. If so, early intervention allows time for modification of the end user's original plans. In the large industrial and commercial sector, such early intervention must occur months and often even years before project installation.

Finally, readers and policy makers should keep in mind that some free ridership is inevitable in energy efficiency programs – indeed, in programs of all kinds. The presence of possible free riders should not be considered a reason, in and of itself, to reduce or eliminate program efforts but rather should be seen as something to be managed and minimized.

9.7 Summary

The SPC Program has gone through several changes since its inception in 1998. Significant progress has been made to streamline the application process, standardize the calculation methodology, simplify the review process, and maintain confidence in the savings estimates associated with each application. There are a great number of highly qualified professionals engaged in various aspects of the Program who have worked hard to improve it. In this

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the project completely drive the decision; the energy savings are an unintended and naturally occurring by product of the decision. This type of project has occurred in 2002 / 2003, as well as in current program years, and is likely to continue unless program rules are modified.

report, we have identified several important ways that energy savings estimates in this program might be further improved. Most of these changes should be relatively easy to address, resulting in an increase in the certainty of the program's resource value. Reducing free ridership is likely to be a more difficult challenge. These challenges not withstanding, the SPC has fulfilled a critically important role in the portfolio of nonresidential energy-efficiency programs by supporting complex and comprehensive energy-efficiency projects that offer large, and very cost-effective, energy savings and peak demand reductions that would otherwise not be captured through prescriptive approaches.