MEASUREMENT AND EVALUATION STUDY OF SAN FRANCISCO PEAK ENERGY PROGRAM (SFPEP) PROGRAM YEAR 2003-2004 FINAL REPORT

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EXECUTIVE SUMMARY

This executive summary highlights the key findings and recommendations from the Measurement and Evaluation of the San Francisco Peak Energy Program (SFPEP). SFPEP grew out of the need to reduce the electricity peak as well as energy resources required within the City of San Francisco due to a planned shutdown of both the Potrero and Hunters Point power plants, and the transmission constraints to and within the peninsula. The San Francisco office of Environment (SFE) requested program funds specifically to reduce peak loads in the City, and partnered with PG&E to offer a program to meet load reduction targets.

In April 2003 the CPUC approved of the partnership concept for San Francisco, and PG&E and SFE developed implementation plans soon thereafter. These plans were submitted as the San Francisco Peak Energy Program (SFPEP) in June 2003. The partnership was designed to create new ways to capture energy savings opportunities that might otherwise be lost. The implementation plan was approved in October, and updated energy savings targets were filed by PG&E in November 2003. The San Francisco Peak Energy Program was formally rolled out in December 2003 at City Hall by the Mayor of San Francisco and the CEO of PG&E. The stated goal of the program was to achieve a minimum of a 16 MW (gross) load reduction coincident with the city's summer daytime peak, and to achieve similar reductions in winter evening peaks by 2005. The

The *objectives* of the measurement and evaluation study were to:

- Develop adjusted, reliable ex-post estimates of summer and winter peak energy savings
- Assess the overall effectiveness of the SFE/PG&E partnership with respect to the statewide program approach and make recommendations for improving partnership effectiveness
- Determine the implementation effectiveness of the five major program elements, and make recommendations on adaptations to achieve stated goals.

The evaluation team accomplished these objectives through: 1) an *impact evaluation* that verified measures installations, metered key measures to develop end-use load shapes, and recalculated peak demand and energy savings estimates for each program element; and 2) a *process evaluation* that reviewed program information and databases maintained by SFE and PG&E, conducted in-depth interviews with key stakeholders, and surveyed a representative sample of participating customers.

The evaluation was focused on program activities through February 2005 (the date the 2004 program was extended until). The SFPEP program has continued to operate since that time with both SFE and PG&E continuing some project activities. These recent activities are not included in this report.

Program Impacts

The assessment of program impacts was focused on the four main program elements that tracked energy savings (Cash Rebates for Business, Standard Performance Contracting, Single Family Direct Install, and Multi Family Rebate). For each program element, the evaluation team reviewed participant data, determined appropriate samples for on-site data collection, reviewed savings calculation methods, and gathered and analyzed end-use data. On-site data collection activities varied by program, depending on the distribution of savings among various program measures, and whether data logging activities were undertaken to assess load profile metrics. After adjustments to savings calculation assumptions based on metered data collection and supplemental analyses were made, the evaluation team then statistically adjusted the values, based on results of telephone surveys and on-site verifications with larger participant

samples. The results of these analyses were then compared with the PG&E measure savings workpapers and secondary sources (like DEER) to estimate adjustments to ex-post savings by program element.

A summary of the program planned, recorded (ex-ante), and evaluation adjusted (ex-post) estimated energy and demand impacts are contained in the table below. The original program design savings targets (goals) were developed as GROSS targets by the City of San Francisco[1], the program reported savings (ex-ante) are recorded as NET by PG&E[2] in their databases, and savings adjustments were applied during the EM&V process to the ex-ante numbers at the measure level, then summed for each program. These ex-post NET savings were then '*grossed up'* by dividing the adjusted net savings by the NTG ratio previous applied – producing the GROSS savings outlined in Table E-1 (Gross) and E-2 (Net) below.

Table E-1 Comparison of GROSS program goals and ex-post savings

Program Element	GROSS MW (goals)	GROSS MW (ex-ante)	Summer GROSS MW (ex-post)	Winter GROSS MW (ex-post)	GROSS MWh (ex-ante)	GROSS MWh (ex-post)
Cash Rebates for Business	18.65	7.17	6.60	6.60	39,814	38,025
SPC	2.10	4.26	4.26	4.73	31,336	31,336
Single Family	0.15	0.26	0.29	0.54	2,012	2,277
Multi-Family	0.40	0.24	0.24	0.24	1,832	1,832
TOTAL	**21.32**	**11.93**	**11.40**	**12.11**	**74,994**	**73,470**

Table E-2: Comparison of NET program goals, ex-ante and ex-post savings

Program Element	NET MW (goals)	NET MW (ex-ante)	NET Summer MW (ex-post)	NET MWh (ex-ante)	NET MWh (ex-post)
Cash Rebates	17.90	6.88	6.34	38,222	36,504
SPC	1.11	2.26	2.26	16,608	16,608
Single Family	0.13	0.23	0.26	1,791	2,026
Multi-Family	0.36	0.21	0.21	1,630	1,630
TOTAL	**19.50**	**9.58**	**9.07**	**58,251**	**56,768**

[1] Gross targets were developed jointly by SFE and PG&E. SFE is interested primarily in gross demand reductions in the City, regardless of whether they are savings net of free riders – due to nature of the target for reducing peak demand in the City in order to close the Potrero and Hunters Point power plants.

[2] Net savings are recorded in each program database by applying a net-to-gross (NTG) ratio to the Workpaper calculated unit energy and demand savings before measure savings are summed. These factors are as follows: 0.96 for CBR, 0.89 for the residential programs, and 0.53 for SPC.

Ex-ante savings values are based on PG&E program records, and are cumulative through February of 2005 [the extension deadline for the 2004 program year]. These values are based on recorded measures installed and the workpaper-derived unit value for measure savings, with NTG ratios applied as described above. PG&E workpapers include coincident demand factors for summer, but not for winter. It should also be noted that program targets appear to have been adjusted again recently, so those

While the stated summer and winter demand reduction target was a minimum 16 MW gross demand reduction, EM&V activities indicate that about 71% of that goal was achieved in the summer, and about 76% in the winter – *for the 2004 program year*. It should be noted that when some funds were shifted between program elements during the course of the program year, goals for each element were not adjusted accordingly. However, several measures and community outreach efforts showed promise for future success. Two energy efficiency measures contributed particularly to increased winter peak reductions. These were adjustable speed drives on HVAC equipment in the commercial sector and torchieres for residential lighting. In addition, it should be noted that the SPC and Single Family program elements exceeded their targets. Some shifts in funding and staff efforts among program elements may have adversely affected the results of the Cash Rebates for Business and Multi-family elements, and they did not meet targets.

Key Process Findings

While the partnership did not achieve its ambitious MW reduction targets in the relatively short period available – the partnership does show promise as a means to meet longer term energy and demand reduction goals. Key partnership findings include:

- The relatively short program duration of the partnership was not long enough to develop and effectively utilize relationships and marketing channels to achieve ambitious energy savings goals. Perhaps the goals were too ambitious for some program elements.
- The planning and regulatory process took nearly a year before final approval. This may be required for a new partnership of this magnitude, but is too long for a short duration program.
- The regulatory process imposed incentive caps, measure requirements, and community development objectives that hindered the partnership from achieving energy and demand targets.
- There was a sense on the part of SFE that PG&E wanted to avoid significant alterations to the statewide programs PG&E already had in operation, and whether true or not that impression limited the development of SFPEP program features.
- The roles and responsibilities laid out in the contract between SFE and PG&E specified too many tasks given the limited resources available to the program.
- Marketing effectiveness was improved by the partnership, and had the program continued over a longer period that effectiveness probably would have further grown.
- Hard-to-reach markets were served through the program: ethnic, low-income, important geographic, and small business markets all were served. Multi-lingual versions of selected marketing flyers was very helpful in recruiting participants of differing ethnic backgrounds.
- Community outreach was improved by the partnership, particularly in residential and small business segments that utilized SFE's relationship strengths for such efforts as the torchiere exchanges and CTS. This success did not extend to all constituents in the City.

- Better coordination between SFPEP and Statewide programs is needed to avoid customer confusion and tracking concerns.

Key program element specific findings:

- Energy efficiency measure measures not available in statewide programs saw market penetration in the Business sector, especially refrigeration measures –subsequent statewide program developments created some confusion when they offered the same measure incentives.
- In the Multi-family program, difficulty in replacing hard-wired CFL lamps on burnout is concern of program participants.
- Commercial Turnkey Services energy audit and follow-up services provided by SFE staff to small businesses filled a gap in PG&E's business program portfolio and provided a neutral perspective on measures recommended by contractors.

Recommendations

Overarching program recommendations include:

- ***Allow more time*** – partnerships require time to develop. The program length was not sufficient for a new partnership to meet ambitious targets, particularly given the time required for initial program planning and approval. While the commitment of key individuals can overcome many obstacles - policy, cultural, and process constraints take time to overcome. ***It should be noted that some SFPEP program activities continued after February 2005, and additional savings have accrued during the past year.*** Further savings could be attained by building on the foundation created by partnership efforts.
- ***Separate social goals from program impact goals*** by providing separate funding for training and community development efforts.
- ***Keep it Simple!*** A simpler program structure would reduce the regulatory reporting requirements, particularly for a first-time partnership.
- ***Better coordinate*** measure incentive levels and eligibility ***with statewide programs***. While a relatively small percentage of program participants were aware of the statewide program, there was confusion about eligibility among some customers.
- Some ***additional analysis***, including an evaluation of the 2005-06 SFPEP program efforts could inform future partnership efforts by PG&E and other IOUs. The SFPEP program evolved after the close of the 2004 program year, and analyzing ongoing program activities, successes, costs, and current EE opportunities, will benefit program planners going forward.

Impact evaluation activities yielded several recommendations that may enhance program success. These recommendations are intended to both improve the operational efficiency of the program and enhance the ability of the program to reduce peak demand and include;

- More detailed study of *occupancy sensors* by space type is recommended, as this measure has significant peak reduction potential. The measure workpaper assumes the occupancy sensor controls eight 4-foot 2-lamp fluorescent fixtures, and that savings are based on an application in an office environment. The number of configurations offered should be revised and expanded. For example, the use of occupancy controls to operate T8 lamps with long run hours has been a successful installation *in parking garages,* and should be considered as a standard configuration.
- Additional measures with high *winter peak reduction* should be considered. Data logger results indicate that winter peak and summer peak are virtually the same for most measures logged in

the majority of business sectors (the exception being adjustable speed drives for HVAC systems). But, it is likely that the widespread use of *electric heating* contributes to a winter peak in San Francisco. It is recommended that they be the subject of a separate research effort.

- Given recent volatility in natural gas markets, PG&E may want to consider a review of therm savings for program elements that produce gas savings.
- More complete program records should be kept by *direct install field contractors* for Single Family and Multi-family program elements to support future evaluations. Developing a comprehensive Integrated Data Collection plan will improve tracking accuracy and save money in the long run.
- Conduct a metering study of CFLs at multi-family facilities. While there is some statewide data available to support MF run-time estimates, better local data would allow more accurate estimate of the value of future lighting programs for HTR customers.

The following recommendations were developed through the *process evaluation*, and are intended to help future partnership efforts identify and understand potential strengths, weaknesses, opportunities and threats they may face, and to take appropriate actions to build on strengths and mitigate problems.

- Keep *monthly report filings* up to date better. The availability of the updated, accurate data on program goals and accomplishments for all program partners and stakeholders is important to making mid-stream program corrections. In the case of SFPEP, inaccurate, or delayed reporting hindered some program efforts.
- Develop *contingency plans* and define an efficient process for deciding when to implement them. If planned program achievements lag in specific markets, have alternative approaches outlined and ready to go, and/or shift funding to program areas that demonstrate opportunity. A pre-defined process that streamlines decision making will allow mid-stream program corrections to be implemented in a timely manner.
- Assemble and *support dedicated individuals in each organization* for the duration of the program. Staff the program with people who are willing, able and have been successful in the past in taking on the multitude of barriers and constraints inherent in a large-scale program effort. Also, be selective about who to recruit as informal partners in the community to promote the program. Look for those who are experienced at delivering similar messages and activities, and who are excited about energy efficiency. Then *maintain staff continuity* as much as possible throughout the program. Staff turnover means having to train the new people and rebuild the individual trust that is central to relationships with market actors.
- *Focus on a few channels* and offerings that produce the most "*bang for the buck*" in order to achieve short term goals. While reliance on a limited number of marketing and outreach channels and program offerings can be risky (in that lost opportunities may be missed), the successfully adaptive program will plan to try a variety of channels and offerings that have potential for success, but be ready to cull poor performing channels to focus program resources as cost- and time-effectively as possible.
- Clearly define *data collection and reporting requirements* to support program tracking and evaluation for all contractors and partners. For example, tenant names, and measure counts were not recorded for the Multi-family program element. There is a also a need to coordinate spreadsheet based tracking systems maintained by SFE with MDSS based program tracking at PG&E. Records between the two systems did not always agree, and the discrepancies affected the focus of program activities (i.e. – which measures to actively pursue).

1. INTRODUCTION

The plan describes the key activities required to conduct the evaluation, including data collection methods (phone surveys, interviews, and on-site verification), sample design, survey instrument development, data management and analyses, and reporting.

The *overall goals* of the evaluation study, in priority order, are to:

- Develop adjusted, reliable ex-post estimates of summer and winter peak energy savings
- Assess the overall effectiveness of the SFE/PG&E partnership with respect to the statewide program approach and make recommendations for improving partnership effectiveness
- Determine the implementation effectiveness of the five major program elements, and make recommendations on adaptations to achieve stated goals.

These goals will be accomplished by: 1) an impact evaluation that verifies measures installations and recalculates peak demand and energy savings estimates for each program element; and 2) a process evaluation that builds on information collected by program staff and outreach partners and contractors, conducts in-depth interviews with key stakeholders, and surveys of participating customers.

1.1 Program Background

The Peak Energy Program (PEP) grew out of the need to reduce the electricity peak as well as energy resources required within the City of San Francisco, as reflected in the electricity resource plan (ERP) prepared for the CCSF/SFE. The required emission control upgrade at the Potrero plant and shutdown schedule for both the Potrero and Hunters Point plants, and transmission constraints to and within the peninsula, have motivated SFE to seek program funds specifically to reduce peak loads in the City, and partnered with PG&E to offer a program to meet load reduction targets. The program has near-term goals due to the planned timing of the shutdown of Potrero for emissions control upgrades.

Both summer and winter peak energy resources are needed in San Francisco, due to the unique nature of loads within the city that cause winter peaks of similar magnitude to summer peaks. Thus, PEP has additional economic justification beyond statewide programs that have a summer-peak focus. Yet PEP was developed and operates in the broader context of California's statewide programs run by the investor-owned utilities, and local programs run by local governments and other entities. There is an implicit challenge to understand both the PEP-specific program issues and the broader programmatic environment that affects San Francisco citizens and businesses.

The San Francisco Peak Energy Project was formally rolled out in December 2003 at City Hall by the Mayor of San Francisco and the CEO of PG&E. The program evolved when PG&E initiated discussions in 2002 to develop a partnership program, and together with San Francisco's Environment Department presented to the CPUC a proposal for the San Francisco Energy Efficiency Pilot Program. This resulted in an April 2003 CPUC approval of the concept for San Francisco, and the development of implementation plans by PG&E and SFE in the spring of 2003. These plans were submitted as the San Francisco Peak

Energy Program (SFPEP) in June 2003. The implementation plan was approved in October, and updated energy savings targets were filed by PG&E in November.[3]

The primary goal of the program is to achieve a minimum of a 16 MW (gross) load reduction coincident with the city's summer daytime peak, and to achieve similar reductions in winter evening peaks by 2005. Demand-side resource potential was analyzed in the Electricity Resource Plan conducted by the City of San Francisco.[4] The ERP indicated that a demand-side management program was key to ensuring adequate capacity reserves in the city by limiting projected load growth. The partnership estimated that a total of 24.4 MW was achievable through the program, with the majority of the potential in the commercial sector. The Program has projected savings of 22.8 MW gross peak reduction in the summer, and 16.1 MW during the winter peak. Through September 2004 the estimated 'Cumulative and Committed' savings are 40% of the demand goal and 31% of the energy savings goal.[5] [Final program tracking (through 2/28/05) indicated 45% of demand goals, and 55% of energy goals were achieved.]

During the fall of 2004, a decision was reached to extend the program past the scheduled December 31 deadline. An extension was granted through February of 2005, and a significant push was made to get eligible measures installed between December and February. This push was accompanied by the doubling of incentives for some efficiency measures. This resulted in a particularly high uptake in the installation of refrigeration measures as part of the Cash Rebates for Business program element. For the purposes of this evaluation, the program was closed February 28, 2005.[6]

1.2 Layout of the Report

This report is organized as follows:

- Section 2 discusses the evaluation methodology, including both impact and process sampling plans, data collection activities, and analysis procedures.
- Section 3 presents the impact evaluation results, by program element, for the 4 major elements for which impacts were assessed: Cash Rebates for Business, Standard Performance Contracting, Single Family Direct Install, and Multi-Family Rebate.
- Section 4 presents the process evaluation results, including partnership assessment findings and program element specific findings.
- Section 5 presents conclusions and recommendations derived from evaluation findings.
- Appendices (provided in separate volume) include:
    - Detailed bibliography and datalog of information sources consulted during the course of the evaluation;
    - Data collection instruments used for on-site verification, in-depth interviews, and telephone surveys.

[3] 2003 Energy Efficiency Quarterly Report Narrative, San Francisco Peak Energy Pilot Program, Pacific Gas & Electric Co., May 2004, and discussions with Project Advisory team.

[4] *Choosing San Francisco's Energy Future*, San Francisco Public Utilities Commission, revised December 2002.

[5] September 2004 Monthly Report Narrative

[6] It is the understanding of the evaluation team that 'bridge' funding has been provided by PG&E in 2005 to support SFE's efforts to continue energy conservation and demand reduction efforts in the City that rely on the infrastructure and staffing developed for SFPEP.

2. EVALUATION METHODOLOGY

In this section, the evaluation issues are outlined, and evaluation approach methodologies summarized. The key approaches to achieving the stated evaluation goals are:

- Review of program participant data, marketing materials, and other information;
- In-depth interviews with program implementation staff, contractors, market actors, and community groups;
- Telephone surveys of participating customers;
- On-site verification of measure installations and data logging of energy efficiency measures to acquire data used to make adjustments to ex-ante savings estimates.

The impact evaluation was focused on four key program elements:

- Cash Rebates for Business Customers
- Standard Performance Contract
- Single Family Direct Install
- Multi-Family Rebate.

These and Commercial Turnkey Services for Small Business were the primary focus of the *process evaluation*, along with a modest effort to assess the impacts associated with the Torchiere Exchange (a component of the Single Family Program element). The remaining program elements of Residential Case Studies, Energy Audits, Codes and Standards, and Emerging Technologies were considered only in the context of the overall effectiveness of the Partnership.

The evaluation team relied extensively on data, reports, and other information that had already been gathered by PG&E and SFE. An initial data request and review of program documentation assisted in informing the project research plan. Additional review of these data and other information obtained throughout the evaluation are documented in the sections below, and in the appendices.

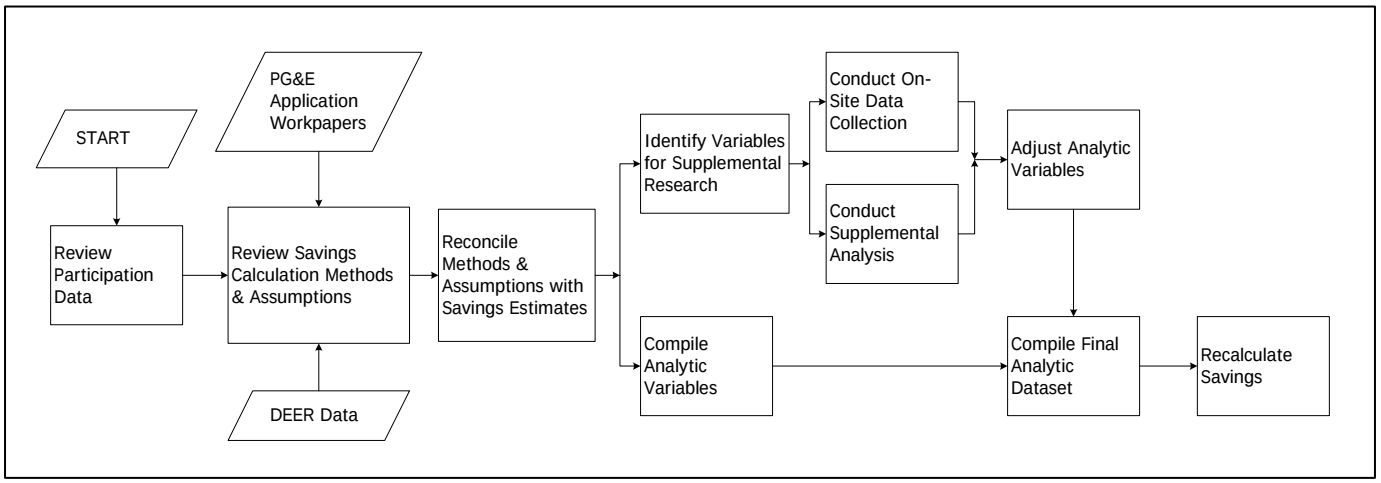
2.1 Impact Approach

2.1.1 Overall Impact Approach

The proposed EM&V plan did not correspond directly to any of the IPMVP options. We instead used an alternative method that relied on developing program-specific adjustments to the ex-ante savings values. The approach is similar to Option A: Partially Measured Retrofit Isolation, in that it used partial short-term field measurement of energy use to verify or adjust ex-ante energy and demand savings estimates for measures installed. Some performance parameters were stipulated or based on secondary data, or estimates included in ex-ante calculations. Engineering adjustments were made to specific measure savings and extrapolated to the population of installed measures for the program element.

Figure 2-1 provides an overview of the process followed in this evaluation.

Figure 2-1. SFPEP evaluation process



The evaluation team relied extensively on data, reports, and other information provided by PG&E and SFE. The evaluation also included a review of other California program results and secondary data to confirm the evaluation approach. A full list of data sources is provided in Appendix A.

The approach discussions in the remainder of this section review evaluation activities in this same program order. The Torchiere Exchange program is discussed in the context of the Single-Family Program element, where impacts are included. The impact evaluation is focused on four key program elements (in order of contribution to program gross kW savings).

- Cash Rebates for Business Customers
- Standard Performance Contract
- Single Family Direct Install (including Torchieres)
- Multi-Family Rebate.

For each program element, energy and demand savings were re-estimated. The estimation process encompassed several distinct steps, including:

- Review of program participation data.
- Review of savings calculation methods and assumptions as contained in program documentation (PG&E Application Workpapers, PIP, and participation records) and reference sources (e.g., DEER database, statewide studies).
- Reconciliation of the savings calculation methods/assumptions with program savings estimates.
- Compilation of participation data and verification of methods and assumptions in an analytic database.
- Identification of measure performance variables for supplemental research and analysis.
- Conducting on-site verification inspections and data collection.

- Conducting supplemental analyses of key variables as required to provide additional resolution in savings estimates (some of these data were developed through the participant survey described in the process evaluation section).

- Developing adjustments to savings calculation methods/assumptions based on supplemental analyses and data collection, including adjustments to measure counts, hours of operation, and coincidence with peak.

- Compilation of evaluation data in analytic database.

- Re-calculation of program savings and summarization of results by measure type, and market segment.

- Comparison of results with ex-ante savings values and recommending adjustments to the results as necessary.

On-site data collection activities (see following section) were used to verify measure installations and supplement the existing dataset, and to confirm selected variables used in the savings calculation process.

An initial review of program participation revealed that the largest fraction of participation savings were from lighting measures, and as such the evaluation focused in-field data collection on confirming lighting performance variables, specifically through lighting run-time hour data logging. The one major variation from this approach was for the SPC program element, which had a high proportion of HVAC/refrigeration measures. For the detailed on-sites conducted for SPC, the sites were selected through consultation with PG&E, in order to represent major vertical segments participating in this element.

Summer and Winter Peak Period Definitions

Initially, the evaluation team considered using PG&E's E-19 tariff to determine the SUMMER Peak Period (Service from May 1 through October 31). This rate has a peak period of noon to 6:00 p.m., and a partial-peak from 8:30 a.m. to 12:00 noon and from 6:00 p.m. to 9:30 p.m. Monday through Friday (except holidays). All other times were considered off peak. For WINTER Peak (service from November 1 through April 30), the rate had no peak period, only partial peak and off-peak. During subsequent conversations with the Project Advisory Group, it was determined that for SFPEP, the peak periods should be considered as follows:

- 5 – 7 PM winter
- 1 – 3 PM summer[7]

2.1.2 On-Site Sampling Plans

The final sample sizes for each program element varied somewhat from those specified in the RFP and proposal, based on the statistical requirements of the project and participant populations that were

[7] During the presentation of interim findings in April 2005, it was determined that the referenced PG&E commercial rate peak periods as defined above did not adequately represent the most critical periods for peak reduction in San Francisco. It was agreed that the evaluation team would confirm the hours to be used for San Francisco peak with Cal Broomhead of SFE. That confirmation was received via email on June 21, 2005.

different than anticipated.[8] The *on-site* samples are stated in Table 2-1 and Table 2-2 below. The primary change from the original proposed sample was the addition of a sample of torchiere exchange participants, where data logging was performed. The number of verification inspections conducted for the Cash Rebates for Business (CRB) program was reduced (from an original proposed number of 300 to 232, as stated in the final research plan) to accommodate the addition of on-site data logging of torchiere sites, and a phone survey of Torchiere participants. The research team installed dataloggers at 20 customer sites to verify runtime hours. These data were compared to secondary literature findings and responses from the larger participant survey to adjust ex-ante estimates. All on-site inspections were coordinated in consultation with the PG&E project manager. The 232 measure verification visits conducted in the CRB program included 50 sites where run-time hours were metered for lighting equipment.

Table 2-1. Completed site verifications

Program Element	Number of Verification Inspections Planned	Number of Verification Inspections Achieved
Rebates for Business Customers	232	232 (50 w/ logging)
Standard Performance Contracts	4	5
Single-Family Direct Install	40	40
Single Family Torchiere Exchange	20	20
Multi-Family Rebates	100 units	100

Table 2-2. Data logger installation accomplishments

Program Element	Number of data logger sites planned	Number of winter sites with clean data	Winter logging period (earliest install – latest removal	Number of summer sites with clean data	Summer logging period (earliest install – latest removal
Cash Rebates for Business	50	47	2/1 – 3/8	40	7/29 – 9/25
SPC	4	5	2/4 – 3/2	5	8/3 – 9/2
Torchiere Exchange	20	20	2/23 – 4/19	19	8/18 – 9/26

A portion of the on-site participants were also surveyed by as part of the participant telephone survey. This *nested sample* was used to adjust ex-post savings estimates if a statistical correlation justified such an adjustment.

The specifics of these samples are discussed below.

Cash Rebates for Business

The sample of CRB participants who received data logging was defined by the type of measure, the number of distinct measure types installed at a facility, and the participant business sector. Program

[8] These samples and much of the approach material were described in the final research plan provided to PG&E and the PAG, *Measurement and Evaluation Study of SFPEP: Research Plan*, January 27, 2005.

records indicated that 10 installed measures accounted for 96% of program savings. Data logging efforts focused on 2 of these measures: high efficiency 4 ft T8 lamps (L290) and occupancy sensors (L83) on lighting fixtures. In selecting the sites to receive data logging in the winter, these measures were further divided into 3 strata to help identify sites where high impact measures had been installed and where there may be the potential to observe multiple measure types installed at a single facility, such as both lighting controls and high efficiency lamps and ballasts. Finally, each stratum was further refined to allow for an accurate representation of all business sectors participating in the CRB Program. Within each business sector, candidate sites were selected at random.

The summer logging sample varied from the winter because the winter sample was based on the *overall* participant population for business customers - including 198 commercial turnkey and 31 SPC sites. The sample of sites selected for data logging in the summer omitted these sites in order to better reflect the actual Cash Rebates participant population. This sample ensured that the largest contributors to program savings received a share of the analysis effort proportional to their contribution to overall program savings. Table 2-3 provides the summary of the CRB program savings, by sector, and the resulting summer and winter sample of sites receiving data loggers.

Table 2-3. Distribution of savings by business segment used for data logging

Business Segment	Recorded kW Savings (Program records)	Percent of kW Savings	Recorded kWh Savings (Program records)	Percent of kWh Savings	Winter Logged Sites with Clean Data	Summer Logged Sites with Clean Data
Grocery	936	14%	8,098,008	21%	4	4
Hotel & Restaurants	1,271	18%	9,491,023	25%	9	5
Offices	2,934	43%	11,203,917	29%	10	13
All Others	1,062	15%	5,740,562	15%	16	12
Retail	676	10%	3,688,576	10%	8	6
Total	6,880	100%	38,222,086	100%	47	40

Cash Rebates for Business Verification-only On-Site Sample

Verification of measure installation occurred at 182 participant business locations (in addition to the 50 sites receiving data logging plus verification). As with data logged sites, sites where verification visits occurred were based on business segment participation as defined by NAICS codes. This ensured that verification occurred proportionally across all participant types, and provided the most accurate view of the firmographic impact of the program. Table 2-4 shows how the total of 732 unique entities[9] that participated in the CRB Program was segmented into the 6 general business segments defined by the program, and the number of site verifications that occurred in each business segment.[10]

[9] Based on program records received from PG&E in December 2004.

[10] Note that some entities that participated in the program have more than one site and may also have submitted more that one rebate application for any one site.

Specific sites were selected within each sector at random. A*ll measures* present at a chosen site were verified, including measures representing multiple applications submitted for that site. Table 2-4 provides a distribution of CRB participants, by market sector, and the site verified sample.

Table 2-4. Distribution of participants by business segment and proposed target for verification-only on sites

Business Segment	Participant Population*	Percent of Population	Verification Only Sites
Offices	85	12%	22
Retail	132	18%	33
Hotels	40	5%	9
Restaurants	92	13%	24
Grocery	111	15%	27
All Others	272	37%	67
Total	732	100%	182

SPC Data Logging Sample

For Standard Performance Contracting, program impacts are significant, but each SPC site is custom, and already receives substantial site verification of measure installation as part of the program implementation process. This verification work (conducted by EMCOR, a contractor to PG&E) includes a pre-installation baseline confirmation, and post-installation inspection.

A sample of business and measure types was selected for EM&V to reflect the overall SPC participant population (this included one of each of the following business types; office, retail, hotel/restaurant, and grocery). After a due diligence review of savings calculations for those sites was performed by reviewing the program files, *five* sites were selected through interactive discussions with the PG&E evaluation manager and SPC program manager. An individual data collection plan was then developed for each site. Only four sites were scheduled to receive this 'spot check' onsite focused on verifying savings estimates associated with the installations (five sites were actually completed). Only if the review of these sites indicated large discrepancies in savings estimates, would additional follow-up work be recommended on a more robust sample for this program. The data logging for Standard Performance Contract customers followed state guidelines for measurement and evaluation of these contracts.[11] Table 2-5 details the SPC on-site sample plan.

[11] The method employed was a modified version of Option A: Partially Measured Retrofit Isolation, discussed in the *Draft Evaluation Protocols: The 2005 California Energy Efficiency Evaluation Protocols*, prepared for CPUC, September 20, 2005. The metering equipment used was a *Dent Elite Pro*. Field staff were trained on Dent Elite Pro ELOG 2004 Software, release date February 11, 2004, through consultation with Pacific Energy Center staff.

Table 2-5. Summary of data logging sample for SPC projects

Customer	NAICS Market Sector	Type of Equipment Logged	Total Approved kW	Approved Project kWh	Approved kWh Attributable to Measures Logged	% of Approved Project kWh Savings Attributable to Measures Logged
Transamerica Real Estate Management	Offices	VSD on chilled water pump	0	213,989	213,989	100%
The Pan Pacific Hotel	Hotels	VSDs on HW pump & condenser tower	12.5	280,929	164,249	58%[12]
Starwood Hotels and Resorts	Hotels	VSD on condenser tower	0	31,212	31,212	100%
California State Automobile Association	Offices	VSDs on chill water pump and condenser tower	53.8	197,185	23,868	12%
Macy's West Inc	Department Stores	VSDs on air distribution supply fans	7.9	434,209	434,209	100%
Total			74.2	1,157,524	867,527	75%

Single Family On-site Sample

Single family verifications occurred onsite at the location where the measures were installed. During the course of the on-site visit field staff verified the installation and operation of the measure listed in program records, and administered brief surveys. The sample of 40 verification site visits included 20 participants who had also received a telephone survey employed for the process evaluation. Both of these surveys included a battery of questions asking about measure installation and use, including:

- Has any of the equipment been removed or replaced since installation?
- Was the equipment properly installed and is it in working condition?
- About how many hours are fluorescent lighting fixture(s) being used on a typical weekday morning (before noon), weekday afternoon (between noon and 6:00 P.M.), and weekday evening (after 6:00 p.m.)?

[12] The VSDs logged at the Pan Pacific Hotel and California State Automobile Association (AAA) sites comprised 58% and 12% of total SPC project savings at these sites. Additional SPC savings were achieved through lighting and chilled water generation components at both the Pan Pacific Hotel and AAA sites.

- Has the participant purchased or installed any ***additional*** CFLs other than the fixtures installed through the program?
- Is the participant satisfied with the program and measures installed?

The ***torchiere exchange*** element was a critical component of the Single Family Program, contributing nearly 42% of ex-ante savings. In order to fully assess this activity, dataloggers were employed at 20 separate residences for both the winter and summer peak periods to profile torchiere usage and load characteristics. Candidates for torchiere data logging were selected based on several criteria:

- Which exchange event they participated in, or whether they participated through a 'Self Help for the Elderly' outreach effort;
- Number of lamps.

Within each event list, candidates were stratified by the number of lamps installed and sites to be logged were then selected at random from these strata. Once a site was scheduled for a visit, a Summit Blue Consulting field person would visit the home at the scheduled time and install either one datalogger (for single lamp homes), or two dataloggers (for multiple exchange homes). For sites with multiple lamps, the lamps to be monitored were chosen by asking the occupant which lamps are used (a) most, and (b) least in the home and choosing a representative lamp from each usage group. The field staff also verified whether or not all lamps recorded as exchanged are actually in operation and the room where they are located.

Multi-Family Verification-Only On-Site Sample

Many HUD housing tenants had energy-efficient fluorescent lighting equipment installed by SFPEP. The evaluation team worked through PG&E program implementation staff to contact HUD program management in San Francisco, who subsequently put Summit Blue in touch with managers and site inspectors at HUD facilities in Hunters Point and Hunters View. The field verification staff accompanied HUD fire and safety inspectors during their scheduled inspections of 100 apartment units at these facilities in order to verify the installation of hard wired CFL fixtures in those units that were installed by the SFPEP program contractor. These inspections would have been difficult to complete without the cooperation and assistance of HUD staff.

The evaluation team also contacted about 125 residents at the Hunters Point East and West buildings who received new lights installed, as part of the telephone survey. The survey asked those residents if they are happy with the equipment or not, and inquired how the program worked for them and also how the equipment is being used (hours of use).

2.1.3 Data Collection Procedures

On-site verification and data collection inspections were completed for each of the four major program elements. The on-site verification process involved on-site observation of installed measures and collection of key energy performance variables. In addition, selected end-use monitoring was employed for a sample of Cash Rebate for Business, SPC, and Torchiere Exchange customers. For measures that were listed in the database but not present onsite we made efforts to determine if they were ever present, or the removal date and reason. The recording of measure information occurred on data collection instruments that were customized for each program element – based on the actual measures installed. These instruments, presented in Appendix C, verified several key parameters, including:

- Presence and appropriate installation of the measures installed
- Quantity of measures installed

- Capacity of measures installed (e.g., amps, watts, tons)
- Efficiency of measures installed
- Key performance data such as daily schedules, seasonal variations in schedules, and control strategies
- A limited set of behavior and demographic questions.

End uses monitored data reflect the distribution of measures installed by the program, including the business sector for commercial installations. Single- and multi-family installations involved primarily lighting. *Cash Rebates for Businesses savings also came primarily from lighting measures*, however 23% of CRB gross program savings came from refrigeration measures, primarily in the restaurant and grocery market sectors. The bulk of these *refrigeration measures* were installed late in 2004 through February 2005, as the SFPEP program was extended. Since the program records on which on-site samples were based were part of an initial data pull that occurred before this push, the savings associated with these measures was not known to the evaluation team at the time the field samples were developed. In the spring of 2005, the evaluation team learned of the significant impact these refrigeration measures could have on overall program savings, and suggested a methodology to examine these savings more thoroughly. No additional evaluation budget was available to conduct that analysis, thus savings associated with these measures are not adjusted, but based on program records and workpaper calculations.[13]

On-sites data collection occurred in two phases in order to capture measurements for both summer and winter peaks.

On-site Procedures

For CRB projects, runtime-hour data logging was performed on lighting installations. The project team utilized portable battery operated HOBO on/off data loggers. The CRB lighting installation on/off data allowed the team to determine runtime profiles and annual operating hours for the lighting systems, by market segments analyzed. These data were used to determine the annual kWh energy savings of lighting measures installed under the program. For SPC projects where the team monitored demand and energy consumption on various HVAC VSD motor applications, the team used DENT power loggers.

Data logging for CRB, SPC, and Torchiere installations occurred over two separate intervals: winter peak and summer peak. Roughly 80% of the sites logged in the winter were also logged in the summer. Where the same site was monitored for both periods, the same load was metered (motor, lighting circuit, etc.). The overlap between winter and summer data logging was not 100% because CRB and torchiere samples were adjusted in the summer to better reflect additional program data available. Also, some sites logged in the winter declined to be logged again in the summer. 100% of SPC sites and loads logged in the winter were also logged in the summer.

Data loggers were set at the time of the verification inspection and left in place for approximately three to four weeks for both summer and winter periods. Loggers were located to capture runtime hours for typical equipment in representative space-use types (e.g., office, restroom, conference room) or use (HVAC distribution fan, chilled water pump, etc.) in each building.

[13] See memorandum SFPEP Refrigeration dated June 3, 2005 provided to PG&E and SFE that outlined an assessment methodology for gaskets and strip curtains installed on walk-in coolers during the end-of-program push. The evaluation team also reviewed the PG&E PY2004/PY2005 Refrigeration Workpaper (pp.41-43 of 79), that included a new Summary table added to correct the workpaper regarding the use of linear feet in the savings and rebate calculations.

2.1.4 Data Analysis Procedures

Management and Quality Control of Field Data

Cash Rebates for Business

The following steps were used for the analysis of the HOBO logger data for the winter and summer peak period for the Business Cash Rebates program:

- Upon retrieval of the HOBO data loggers, data were downloaded and saved from each while still in the field. During the download process, each logger identification number was entered into a separate spreadsheet and verified against records established at the time the logger was initially placed. These data included the associated property name, location, market sector, measure code, space type, and the status of the data[14]. Each HOBO logger file was downloaded regardless of whether the data were good or bad.

- The data for each site were reviewed for gross errors. We experienced a number of logger failures where the data were clearly of poor quality[15]. Each of the HOBO data files that appeared acceptable was exported into Excel. The exported data yielded an hour-by-hour summary of the percent of time the light was "ON" for each both winter and summer activity.

- Once in Excel the data were trimmed and aligned so all data covered the same timeframe and included only full metering days[16]. After this process was completed, each Excel file contained approximately 800-900 data points, and the entire dataset contained approximately 85,000 data points.

- The various Excel logger files were aggregated into market sectors and each sector was analyzed separately. A summary spreadsheet was then used to aggregate the data from these multiple market sector files in order to create a program level view.

- The last step involved developing hour and day type (weekday or weekend day) load shapes for each market sector and the aggregate program level view.

SPC

The following steps were used for the analysis of the DENT logger data for the winter and summer peak period for the SPC Program:

- At the time of installation, the operation of the logger was verified by reviewing demand and energy readings while the corresponding motor was cycled between minimum and maximum load. We verified 80% of logger operations in this fashion.

[14] It was easiest to note during the download process whether or not the logger had failed, and this was duly documented.

[15] For example, in the winter peak period a total of 100 HOBO files were acceptable out of 124 loggers placed, indicting a failure rate of about 19%. This rate is a bit higher than normally experienced, but includes exclusion of loggers that collected some data, but some data was invalid. The team used only loggers that had clean data across the monitoring period, rather than use data that may be suspect.

[16] The loggers were often launched and installed over the period of several days. Consequently, some of the data at the beginning and end of the logging period could not be used.

- Upon retrieval of the SPC data loggers, data on the installation of each logger were verified against records established at the time the logger was initially placed. These data included the associated property name, location, market sector, and motor use. The data from each logger were downloaded to DENT software and exported to Excel.

- The data for each logger were reviewed for gross errors. While we experienced only 1 logger failure out of 20 loggers installed, we did experience several occurrences where the power factor recorded by the logger was irrational while the current and voltage readings appeared correct. This problem yielded what we believed were incorrect kW and kWh values on 20% of logger installations. This problem was addressed during the analysis by replacing the power factor logger data with power factor values available in SPC verification data, or by using power factor values for motors operating at the same facility.

- Once in Excel the data were trimmed and aligned so that data from all sites covered the same time frame and included only full metering days. This process yielded a 15-minute interval power profile for each motor logged.

- The last step involved developing operating profiles for each motor for both the winter and summer logging period and comparing these values with the energy and demand data provided in the application and verification records for each project.

Single Family Direct Install – Torchiere Exchange

- Logging of torchiere operating profiles used equipment and a logger placement and recovery strategy that was identical to that used for CRB logging. After reviewing the raw logger data for gross errors, the exported logger data yielded an hour-by-hour summary of the percent of time the light was "ON" for both winter and summer torchiere activity. This allowed the evaluation team to develop hour and day type (weekday or weekend day) load shapes for each site and an aggregate program level view.

Review of Program Data

To determine if the kW and kWh savings values reconciled correctly with the workpaper methods defined, the team contacted PG&E program staff to determine the calculation method used to derive interactive effects coefficients, for example. Workpaper methods were then compared with DEER update values, and recent statewide studies for key measures in each sector. DEER update team members were contacted to better understand how they calculated interactive effects. [17]

As the final field data were being collected, final program records were requested, so that any ex-post adjustments to savings estimates could be applied to the final measure counts associated with each program element. A review of these final program records for the Cash Rebates for Business and Single Family elements (participation through 2/28/05) was used to determine if the kW and kWh savings values reconcile correctly with the work paper methods, and SFE records. Table 2-6 below summarizes key data sources consulted during the review of ex-ante savings. Additional sources of information are listed in the datalog in Appendix A.

[17] DEER and Measure Cost Study Update Methods and Results, Itron, April 22, 2005.

Table 2-6. Program data and information sources for impact review

Program Element	Information Source	Referenced Data
Cash Rebates for Business	Program Records	PG&E program records for the Cash Rebates for Business Program participation through 2/28/05; The Program Implementation Plan (PIP) version 1.1.5; PG&E work papers on lighting and refrigeration measures
	Non-program stakeholders	The revised run hour for commercial lighting systems as proposed for the 2005 DEER revision. Impact and Process Evaluation of the San Francisco Power Savers Small Commercial Lighting Program: Final Report, November 12, 2003, ICF Consulting. Evaluation Of Pacific Gas & Electric Company's 1995 Nonresidential Energy Efficiency Incentives Program For Commercial Sector Lighting Technologies Appendices, PG&E Volume I: Analysis Appendices, Study ID Number: 324, March 1, 1997, Quantum Consulting Inc.
SPC	Program Records	PG&E program records for the SPC Program applications received through 1/3/05; The Program Implementation Plan (PIP) version 1.1.5; PG&E work papers on lighting, refrigeration, food services, and AC measures; Program applications and M&V reports on select completed SPC installations
	Non-program stakeholders	The revised run hour for commercial lighting systems as proposed for the 2005 DEER revision. Evaluation Of Pacific Gas & Electric Company's 1995 Nonresidential Energy Efficiency Incentives Program For Commercial Sector Lighting Technologies Appendices, PG&E Volume I: Analysis Appendices, Study ID Number: 324, March 1, 1997, Quantum Consulting Inc.
Single Family	Program Records	PG&E program records for the Single Family program element for participation applications received through 1/25/05; The Program Implementation Plan (PIP) version 1.1.5; San Francisco Office of the Environment tracking documents for torchiere exchange activity and LED exit sign installations; PG&E work papers on lighting measures;
	Non-program stakeholders	CFL Metering Study Final Report, prepared by KEMA, February 25, 2005.
Multi-Family		PG&E program records for the Multi-Family Program applications received through 2/4/05; The Program Implementation Plan (PIP) version 1.1.5; PG&E work papers on lighting measures;

Ex-post Statistical Adjustments

One of the issues associated with this evaluation is how to combine the information collected from runtime loggers with the self-reported data from phone surveys and on-site verifications to obtain the most precise (i.e., the lowest variance) estimate of the hours of use for the population. The most direct

approach would be to simply apply the results from the runtime loggers to the larger population, since it directly measures the hours of use. In most cases, this is indeed the best approach. However, for the situation where there is a relatively small number of runtime loggers *nested in a larger sample of surveyed customers*, a more precise approach is to combine the two measurements via a "ratio estimator." The ratio estimator is useful for cases where the ratio between two approaches has a lower variance than the two approaches used singularly.

A simple example helps to clarify this point. Suppose we have five customers who have received both runtime loggers and also surveys. The results are presented in Table 2-7. In this example, the average usage is seven hours, with a relatively larger variation (as one would expect in the field). The customer reported usage is larger and more variable. However, in this example, the customers consistently overstate the hours of use, so that the ratio is fairly consistent across all customers. In this case, the ratio estimator can substantially reduce the variance of the hours of use, thereby increasing the level of precision.

Table 2-7. Example of ratio estimator using survey and logger results

Observation	Hours of use		Ratio of Survey to Logger
	Loggers	Self Report Survey	
1	2	3	**1.5**
2	5	8	**1.6**
3	4	6	**1.5**
4	9	14	**1.56**
5	15	25	**1.67**
Average	7	11.2	**1.56**
Standard Dev.	5.15	8.7	**0.07**
Coeff. Of Variation (St.Dev./Average)	**73.5%**	**77.7%**	**4.5%**

The statistical analysis will consider both telephone survey self-reported data and self-reported data gathered during on-site verifications of measure installations. One caveat to note with this method is that it may not be true that the ratio is consistent across customers. If such a case arises in the analysis, then the evaluation team will use the estimate that has the lowest variance.

For most characteristics of an installed measure, the on-site inspection gives a trained, impartial, third party estimate of the characteristics. As such, it is generally assumed to give a value that is closer to the actual value than is found by using customer surveys. For hours of use however, the on-site inspector does not have the ability to measure this information, and must rely upon the customer's self-reported hours of use. Therefore, comparing the results from the survey and the on-site inspection provides a limited insight into the actual hours of use.[18]

[18] It is noted that in this evaluation, much more consistent data were gathered during the on-site verification surveys, than during the telephone surveys. One reason for this may be that when a trained individual is onsite, with a clipboard taking notes, the resident or business owner (who has been contacted in advance to schedule the on-site visit), may give more thought to the actual hours of use for the energy efficiency measure (particularly lighting measures), than if the same person responds to a telephone survey, when he or she is most likely answering questions with other issues on his or her mind.

Adjustments to ex-post savings estimates are discussed in more detail in Section 3.2.

2.2 Process Evaluation Approach

2.2.1 Overall Process Evaluation Approach

The process evaluation approach had two basic paths, a partnership path and a participant path. These efforts were supplemented by a review of program tracking data, marketing materials and other information generated by the program, and also a review of related statewide program evaluations and partnership success literature.

Partnership Path

The partnership path utilized a series of in-depth personal interviews to assess the success of the partnership. These interviews were conducted with a cross-section of key program stakeholders, either in person or by telephone. The partnership assessment was organized according to program process functions. This was done to provide a logical, comprehensive view of the program's various aspects during its life cycle. Using a functional assessment framework also helped focus discussion on program issues and provided a context in which interviewees could discuss the problems and successes of the program more objectively than probing for issues in an ad hoc manner that could miss some important nuances. The partnership interviews helped inform the subsequent design of the participant surveys.

Participant Path

The participant path utilized a series of telephone surveys of business, single-family and multi-family customers[19] to assess customers' opinions about their experiences and satisfaction with the various program elements and respective program processes. In addition, a special survey of Torchiere Exchange event participants was conducted with the assistance of the Charity Cultural Services Center. Specifically, the surveys focused on following segments:

- Single-family residents participating in the *Single Family Direct Install* element;
- Single- and multi-family residents participating in the *Torchiere Exchange*;
- Multi-family residents and property owners or manager participating in the *Multi-Family Rebate* element; and
- On-site customer contacts of customers participating in the *Cash Rebates for Business Customers*, *Commercial Turnkey Services for Small Businesses* and *Standard Performance Contracting* program elements – coordinating with the on-site verification visits for the SPC and Cash Rebates for Business elements.

The participant surveys were complicated by the need to overlap a subset of the participant telephone surveys with participants who also received on-site measure verification visits.[20] The purpose of

[19] Multi-family included property managers/owners.

[20] The overlapping subsets were for the Standard Performance Contracting, Cash Rebates for Small Business, Multi-Family Rebates (tenants) and Torchiere Exchange elements.

overlapping samples between the surveys and on-site visits was to assess the accuracy of participants' self reports concerning the use of the equipment installed in the program.

Program non-participants were explicitly NOT included in this evaluation, as there were no attribution or other issues specified in the project scope that would require a non-participant assessment, additional resources to explore the matter were not available, and another project was slated to have a battery of free rider questions that might suffice.

2.2.2 Issues and Associated Research Methods

The project initiation meeting confirmed that the top priority objective of the evaluation was to be the impact assessment, followed by the partnership effectiveness assessment and, thirdly, program implementation effectiveness. The process evaluation directly addressed the partnership and program implementation objectives, and supported the impact assessment through measure enumeration incorporated in participant surveys.

Comprehensive lists of issues that could be addressed in the process evaluation were identified in the project proposal. Based on the project initiation meeting and continuing consideration, the issues listed in Table 2-8 and Table 2-9 were proposed in priority order to guide the data collection design. Ongoing review of other, related program evaluations and feedback from the stakeholder interviews suggested further modification and re-prioritization of these issues, so the final issues incorporated into the partnership interviews and participant surveys evolved with that feedback.

Overarching and other issues that were identified in the project initiation and other project meetings included the following:

- Understand the institutional relationships and use of market actors' strengths to achieve program goals.

- Strive to understand ALL effects of programs in San Francisco, including market forces and interaction with statewide and other locally run programs.

- Understand the use and effectiveness of city/utility marketing channels and resources (both inter-organizational and intra-organizational) relative to initial expectations and assumptions about such usage. In retrospect, were those expectations/assumptions fair and did they contribute to program success – if so, where? If not, what changes could be recommended?

- How did CTS affect the use of other PEP elements and programs?

- Analyze the distribution of C&I participants by building type, to assess effect of PEP's focus on restaurants relative to statewide Express Efficiency or other C&I programs.

Table 2-8. Partnership research issues

Partnership Research Issues	Research Instrument	Other Data Sources
SFE/PG&E Partnership effectiveness: Key expectations, clarity and understanding of respective roles and responsibilities, communications and various functional performance relative to partnership agreement	Program manager and stakeholder interviews	Partnership agreement, process flow charts, and documents
SFE/PG&E/Community Organization Partnership effectiveness: Key expectations, understanding of roles and responsibilities, perceived performance per formal or informal agreements	Program manager and stakeholder interviews	Partnership agreement, process flow charts, and documents
SFE/PG&E/Contractor Partnership effectiveness: expectations, roles and responsibilities, performance per program service contract	Program manager and stakeholder interviews	Program service agreement, process flow charts, and documents
Efficiency of the partnership implementation – combined costs to SF and PG&E to get impacts, by 5 key program elements and overall. This may include consideration of issues such as getting a sense of what costs could be pared or eliminated if the program were done again with 20/20 hindsight. i.e. 2nd time around costs could be lower due to lessons learned, trust of other parties that reduces redundancy in oversight and management, etc.	Program manager and stakeholder interviews	Program cost records Impact findings
Lessons learned Aspects improved by partnership Aspects burdened by partnership	Program manager and stakeholder interviews	Related statewide program evaluations
Recommendations for changes to partnership arrangement in future how and under what circumstances to use partnerships to best advantage	Program manager and stakeholder interviews	
Summarize how SFPEP services, eligibility, or rebates differ from Statewide programs, to assess how critical differences have helped or hindered either PEP or statewide programs Obtain PG&E, SFE, and stakeholder views on merits of these changes in SF	Program manager and stakeholder interviews	Review of program materials

Table 2-9. Program element issues

Issues Related to Program Element Implementation Effectiveness	Research Method/ Instrument	Other Data Sources
Did the element reach its *efficiency goals* and "Hard-to-reach" *market segment targets* [a) ethnic customers and businesses, b) leased space, c) low-income households, d) geographic concentrations]	Program Manager and Stakeholder Interviews	Quarterly reports Program records
Customer satisfaction with services and products received and experience (Program design, technical assistance, paperwork/application process, payment process, complaints, inspections, and bill savings)	Participant surveys	
Reasons for *participation* (e.g. saving money, energy, environment, due to PG&E or city roles)	Participant surveys	Other evaluations review
Barriers to participation: economic, cultural, physical, etc. and ways to overcome noted barriers.	Participant surveys Program Manager and Stakeholder Interviews	Other evaluations review
Effectiveness of *marketing*. Address the following by program element. What marketing and communication materials did customers experience? How did they hear/see these? How useful were they? Which were most effective/ most persuasive? Who delivered the effective methods? Address types of media or contact, frequency applied, frequency observed, degree noticed, impact	Participant surveys Program Manager and Stakeholder Interviews	Review of program materials and marketing program records
Effectiveness of program *delivery*: Timely execution of processes, including service delivery and incentive payments, thoroughness of information and interaction with customers, convenience to customers, sufficient follow-up support, timely etc.	Participant surveys Program Manager and Stakeholder Interviews	Review of implementation activities and records
Recommendations for *changes* to program design or implementation steps	Participant surveys Program Manager and Stakeholder Interviews	
Additional Issue Specifics		
Marketing – Effectiveness of outreach via water and waste bills, tax notices, and city building and other data bases and communication methods	Program manager and stakeholder interviews	Review of marketing and intake records?
Program design: Effectiveness of higher incentives than statewide programs (varying from 1x to 3x statewide rebates) (Cash Rebates and SPC) Impact of "first come, first-served until money runs out" (Cash Rebates) Impact of 50% max incentive, up to $400K in limiting participation or measures taken (SPC)	Participant surveys Program Manager and Stakeholder Interviews	Comparison analysis with statewide program, where comparative data are available, such as participation rates, satisfaction level, energy impacts as % of

Issues Related to Program Element Implementation Effectiveness	Research Method/ Instrument	Other Data Sources
Impact of allowing large customers >500 kW to participate (Cash Rebate) Attractiveness of the additional EE items not eligible statewide (Cash Rebates) Impact on participation levels of installation deadlines (i.e., by 12/03 for winter MW items and by 5/04 for Summer MW items) (SPC) Effect of paying incentives based on incremental cost at time of natural replacement relative to marketing techniques used? (Cash Rebates)		total bill, etc.
Cross-impacts: Does use of Commercial Turnkey assistance increase participation in other program elements and/or increase measure savings? (Cash Rebates, SPC); have CTS participants installed other measures outside of program rebates?; what is awareness of other programs (statewide or PEP)?	Participant surveys	Statistical analysis of those who used turnkey versus not?
Commercial Turnkey Services element focuses on: a) extent to which Commercial Turnkey Services were conducted or offered, and b) perception of their adequacy and usefulness	Participant surveys, with extra questions for those who got CTS Program manager and stakeholder interviews	Cross-check CTS participation with other program elements

2.2.3 Sample Plans

The initial sample plan for the partnership tracks was developed by identifying key program staff and associated informal partners in the community. Table 2-10 lists the final list of people identified for the in-depth personal interviews.

The sample plan for the participant telephone surveys initially was developed on the basis of desired sampling confidence intervals and precision. As the project developed the initial plan was modified somewhat due to the length of time the Single Family Direct Installation telephone survey was found to be in pre-testing the survey instrument. The sample sizes for the single-family and multi-family surveys were downsized in order to accommodate the longer single-family survey length, while the business survey sample size was retained in order to enable a more robust analysis. In other words, the project team agreed it was important to gain additional information and project management was willing to trade off some statistical certainty for the additional information.

The final realized samples for the single-family and multi-family surveys were between the original size and the reduced sample size, as the actual single-family surveys averaged slightly less time than the pre-testing had indicated, thus allowing more survey cases to be developed. Table 2-11 shows the original, modified and final sample sizes for each of the participant surveys.[21]

[21] The stated statistical precision represents the expected precision of a proportional question with the value for the population being 50% for a binomial distribution.

Table 2-10. Partnership interviewees

1. SF Environment:
   - Ann Kelly – Senior Energy Specialist
   - Cal Broomhead – Energy Programs Manager
   - Alena Gilchrist – Marketing and Data Manager
   - Renee Fernandez – Energy Engineer (Commercial Turnkey Services staffer – interviewed as part of delivery service contractor group)

2. PG&E:
   - Joanne Cromosini - Senior Program Manager, Customer Energy Efficiency (CEE) [PEP manager]
   - Dave Hickman – Supervisor of Partnership Programs [managed PEP before Joanne Cromosini. was brought on]
   - Carol Harty – Express Efficiency program manager. [Listed but declined interview due to minority program role.]
   - Kathy Burney – Project Manager [program manager for Cash Rebates for Business Customers]
   - Albert Chiu – Program Manager [program manager for Single Family Direct Install]
   - Helen Fisicaro – Senior Program Manager [program manager for Multifamily Program]

3. Government, Community Organizations and Associations
   - Bayview/Hunter's Point Community Groups:
     - One Stop: Charleston Pierce, Coordinator
     - Bayview Network for Elders, Kathy Davis, Director
   - Business associations:
     - Pier 39: Kathy Paver, Marketing and Joe Smith, Operations
     - Local BOMA representative: Ken Cleaveland, Director of Governmental Affairs
   - Charity Cultural Services Center: Ivy Wan, Coordinator
   - Community Meeting Facilitator: Al Williams, independent consultant: 415-781-4211
   - Department of Building Inspection (co-marketing): Laurence Kornfield, Chief Bldg Inspector
   - San Francisco Public Utilities Commission (water conservation): Dana Haasz

4. Delivery Contractors:
   - American Synergy: Jim Amos [single family direct installation contractor]
   - EMCOR: Curtis Schmitt, Manager [standard performance contracting]
   - SFE Commercial Turnkey Services staff: Renee Fernandez, Energy Engineer

Table 2-11. Participant survey samples: research plan, revised plan and final completed sample

	Research Plan			Revised Plan [3]		Actual Completed Surveys	
Program Element	Participant Population*	Participant Surveys	Statistical Precision (@ 90% Conf.)	Participant Surveys	Statistical Precision (@ 90% Conf.)	Participant Surveys	Statistical Precision (@ 90% Conf.)
Single-Family							
Total	995	214	± 5%	108	± 8%	168	± 5%
Moderate income (97%)	926	208	± 5%	105	± 8%	168	± 5%
Non-moderate income (3%)	29	6	±30%	3	± 50%	0	na
Multi-Family							
Apartment Tenants	4491	255	± 5%	118	± 8%	118	± 8%
Property Managers	37	20	± 15%	10	± 20%	10	± 20%
Business Segment							
Total	961	211	± 5%	211	± 5%	211	± 5%
Offices (30%)	293	64	± 9%	63	± 9%	33	± 15%
Retail (25%)	242	53	± 10%	53	± 10%	46	± 11%
Hotel/Restaurants (16%)	151	33	± 13%	33	± 13%	42	± 11%
Grocery (11%)	110	24	± 15%	24	± 15%	13	± 22%
All Others (17%)	165	36	± 12%	36	± 12%	77	± 7%
Cash Rebates [1]	732	153	± 6%	153	± 6%	163	± 6%
CTS (w/ field survey)	198 [2]	42	± 11%	42	± 11%	40	± 12%
SPC	31	16	± 15%	16	± 15%	8	± 25%

[1] Five customers from SPC and apparently two customers from CTS also participated in Cash Rebates.
[2] Eliminating customers with similar names (representing different buildings which may or may not be at the same location) reduces the size to 176 customers.
[3] Per trade-off of final survey length and available budget; see project change memorandum dated May 9, 2005.

2.2.4 In-depth Interview Procedures

The in-depth interviews proceeded on the basis of a list of prospective interviewees and a set of interview guides tailored to the various perspectives of the interviewees.

Interviewee Selection

An early step in the project was to compile a list of over 25 potential individuals and organizations to a final list of 20 prospects. Of these, 19 were interviewed (the 20th person declined an interview based on the person's limited role in PEP.) The list was prioritized and winnowed to 20 in order to fit the available budget. The ideal respondents were stated as those who could provide articulate and insightful feedback to the program's various functional aspects and underlying policy and cultural influences.

The issues noted previously drove development of the interview guides, beginning with the outlines shown in Table 2-8 and Table 2-9. The outlines were supplemented with additional issues during the early weeks of the project and interview guide development followed. The guides were tuned to the perspectives of SFE, PG&E, various community organizations and other CCSF departments, and program implementation contractors. In all, four guides were developed:

- "PG&E/SFE Round One" guide administered to senior program staff at PG&E and SFE;
- "PG&E/SFE Round Two" guide administered to other PG&E and SFE program staff;

- Community organization/other city agency guide administered to community/business organizations and individuals, and other involved CCSF departments; and
- Implementation contractor guide administered to the staff of contractors providing installation and audit services to the program (including SFE's own staff that performed CTS audit services).

The guides were refined to a variety of target audiences, using the initial Round One guide as the basis for developing the additional guides.

The interview guides purposely were not developed as rote questionnaires. Many questions could have been asked, potentially, because of the varied perspectives of the people being interviewed. Thus, a comprehensive approach was chosen that focused primarily on program functions. The functions included planning, marketing and outreach, administration and information management, overall management and communications, and other program functions. The guides were lengthy and somewhat complex in order to be flexible to each interview situation. Conducting the interviews, therefore, relied heavily on the interviewers' professional skills to adapt the guides to the particular interview situation.

The procedure for conducting the interviews was simple: the interviewers contacted the prospective interviewee, set an appointment and conducted the interview. Some interviews were done in person, others by telephone. Following the interview, which was recorded with the permission of the interviewee, the discussion was either transcribed (done for the senior program staff interviews) or summarized into chronological notes that captured the content and "flavor" of each interview.

The partnership interview guides that were used are contained in Appendix B.

2.2.5 Telephone Survey Procedures

The telephone surveys proceeded from development of a comprehensive sample frame, tied to the impact analysis for integrating survey and impact analysis data, and the development of three survey instruments:

- Single Family, covering the Single Family Direct Install program element;
- Multi-Family, including property owners/managers, covering the Multi-Family Direct Install program element; and
- Business, including participants in the Commercial Turnkey Services, Cash Rebates for Small Business and Standard Performance Contracting program elements.

These surveys were developed based on the issues outlined at the beginning of the project. They were administered by Northwest Research Group (NWRG) using NWRG's computer-assisted telephone interviewing system.

Telephone survey administration proceeded with an initial call to the individual identified from program records. Respondents were asked several screening questions to qualify them for the survey, and the resulting qualified respondents were asked the survey questions. Contact procedures included up to six attempts in order to connect to the sampled customers. If the identified customer could not be reached or was in some way disqualified from the survey, a replacement case was drawn so that the survey sample quotas would be met. Complete details of the telephone survey administration, including incidence and completion rates, are contained in the NWRG Field Services Reports; see Appendix H for reference to the reports' contents. The full reports are lengthy and so are available as separate documents.

Torchiere Surveys

In addition, a smaller telephone survey was developed to research the Torchiere Exchange activity that was part of the Single Family elements. This survey was developed as a supplement to the other telephone surveys and partnership interviews. It was administered by staff of the Cultural Charity Services Center. The population of participants for the torchiere survey was stratified by the following criteria:

- Which exchange event they participated in, or whether they participated through a 'Self Help for the Elderly' outreach effort
- Number of lamps exchanged.

The torchiere survey attempted to complete surveys with 80 participants, using the break-out of participants in Table 2-12. Within each event list, candidates were selected at random, except for attempting to complete approximately half the surveys with those who exchanged only one lamp, and half with those who exchanged multiple lamps.

Table 2-12. Target for torchiere phone surveys

Program Delivery Event	Phone Survey Target Completes
China Town, Sat Feb 28, 2004	20
Portsmouth Square, Jan 29, 2004	10
Portmouth Square, signups after Jan. 29, 2004	10
Bayview Opera House, Jan 17, 2004;	10
Whitney Young Parent Association, Feb 20, 2004	10
City College of SF, Feb 21, 2004	5
Black Cuisine Cooking Contest, Feb 28, 2004	5
Self Help for the Elderly	10
TOTAL	**80**

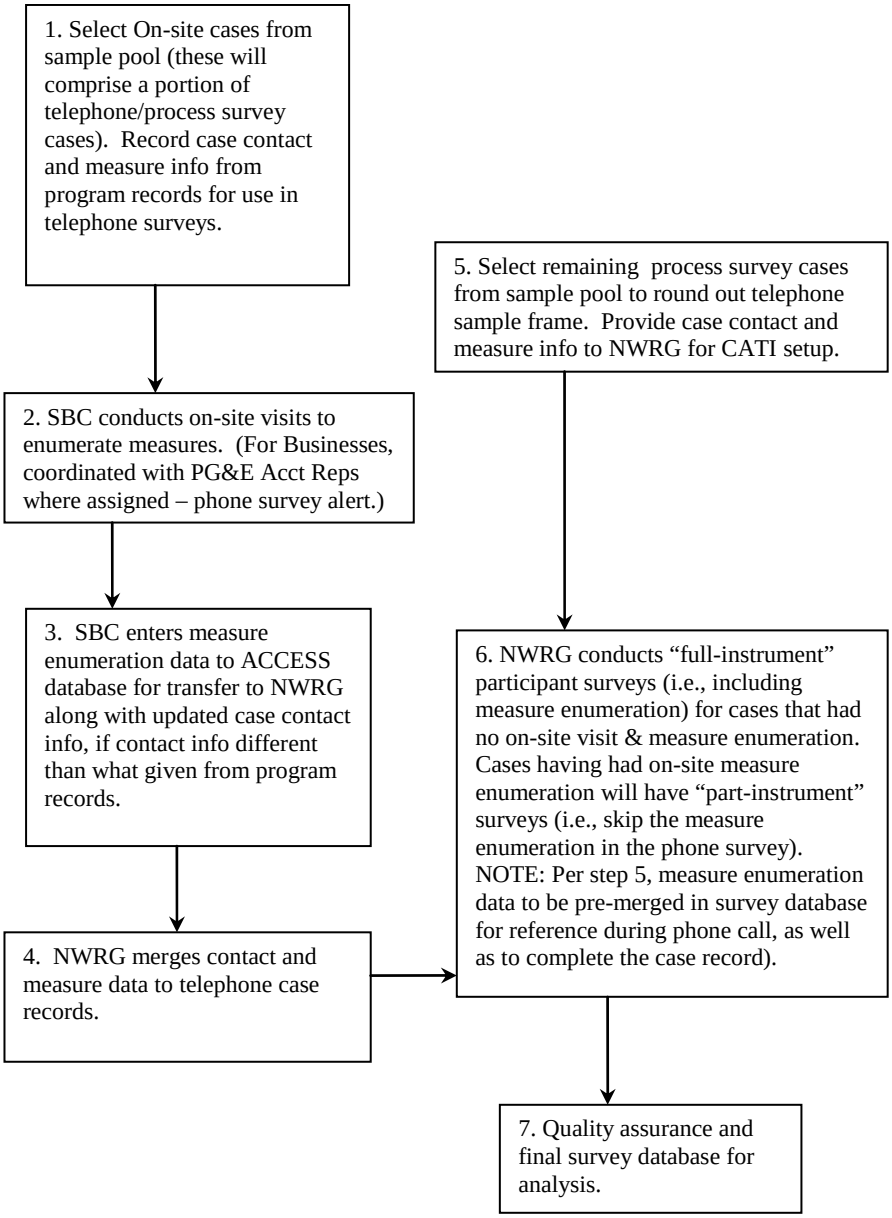
2.2.6 Data Management and Quality Control

Participant Telephone Survey Data

All telephone survey data were subjected to NWRG's quality assurance process using their CATI system. The telephone survey results were written to SPSS and Excel file formats for use in subsequent tabulations and charts.

The participant survey data also had to be tied to the impact analysis work, particularly the on-site verification visits, to enable extrapolation of participant self-reports concerning the usage patterns of the program-installed equipment. Thus a significant data management effort was required to tie the various participant survey and on-site data sets. Figure 2-2 shows the process for this integration.

Figure 2-2. Participant telephone survey data management process



In-depth Person Interview Data

The in-depth personal interviews were recorded to electronic audio files during the interviews (with respondents' permission). Selected key personnel interviews were fully transcribed, and the remainder were summarized into Word files for use in the analysis of the partnership evaluation. All data collection instruments are available in Appendix B.

3. IMPACT RESULTS

As outlined in Section 2.1, the assessment of program impacts was focused on the four main program elements that tracked savings (Cash Rebates for Business, Standard Performance Contracting, Single Family Direct Install, and Multi Family Rebate). For each program element, the evaluation team reviewed participant data, determined appropriate samples for on-site data collection, reviewed savings calculation methods, and gathered and analyzed end-use data. On-site data collection activities varied by program, depending on the distribution of savings among various program measures, and whether data logging activities were undertaken to assess load profile metrics. The discussions that follow reflect the data analysis emphasis placed on the program activities that produced the greatest energy and demand impacts.

After adjustments to savings calculation assumptions based on metered data collection and supplemental analyses and field data collection were made, the evaluation team then statistically adjusted the values, based on results of telephone surveys and on-site verifications with larger participant samples. These adjustments were made through the use of *nested samples within a larger sample of surveyed customers*, allowing a more precise means of combining the two measurements via a "ratio estimator." The results of these analyses were then reconciled with the PG&E measure savings workpapers and secondary sources to estimate ex-post savings by program element.

A ***summary of the findings*** of the impact analysis is contained in Table 3-1 below (also included at the end of this chapter), which includes a statement of the original program design savings goals (planned), the program reported savings (ex-ante), and the savings verified through this report (ex-post)[22]. *Please note that measure impacts throughout the chapter are indicated in terms of NET savings, as recorded in program records. The evaluation team made measure savings adjustments to program recorded savings. NTG ratios used by PG&E were 'reverse-applied' to get GROSS savings in the summary tables*. The remainder of this chapter provides a review of the impact analysis for each program element.

Table 3-1. Comparison of program goals, ex-ante and ex-post savings values

Program Element	GROSS MW (goals)	Summer GROSS MW (ex-post)	Winter GROSS MW (ex-post)	NET MW (ex-ante)	NET Summer MW (ex-post)	GROSS MWh (ex-post)	NET MWh (ex-ante)	NET MWh (ex-post)
Cash Rebates for Business	18.65	6.60	6.60	6.88	6.34	38,025	38,222	36,504
SPC	2.10	4.26	4.73	2.26	2.26	31,336	16,608	16,608
Single Family	0.15	0.29	0.54	0.23	0.26	2,277	1,791	2,026
Multi-Family	0.40	0.24	0.24	0.21	0.21	1,832	1,630	1,630
TOTAL	**21.32**	**11.40**	**12.11**	**9.58**	**9.07**	**73,470**	**58,251**	**56,768**

[22] Based on values presented in program PIP version 1.1.5. More recent PIP filings indicate revisions in both the program kW and kWh goals, however, these revisions could not be confirmed for inclusion in this report as of the submittal date. Ex-ante savings are based on final program databases and documents received from, and reviewed with, PG&E and the SFE.

Ex-ante savings values are based on PG&E program records, and are cumulative through February of 2005 [the extension deadline for the 2004 program year]. These values are based on recorded measures installed and the workpaper-derived unit value for measure savings, with NTG ratios applied as described above. PG&E workpapers include coincident demand factors for summer, but not for winter. It should also be noted that program targets appear to have been adjusted again recently, so those

While the stated summer and winter demand reduction target was a minimum 16 MW gross demand reduction, EM&V activities indicate that about 71% of that goal was achieved in the summer, and about 76% in the winter – *for the 2004 program year*. However, several measures and community outreach efforts showed promise for future success. Two energy efficiency measures contributed particularly to increased winter peak reductions. These were adjustable speed drives on HVAC equipment in the commercial sector and torchieres for residential lighting.

3.1 Cash Rebates for Business

This section, and each of the following sections, describes the analysis completed for each of the four program elements for which impacts were evaluated. Each section describes a) the review of program records, b) verification of measure savings process that looked at both unit savings and the number of units installed (for the measures that contributed significantly to program savings), and c) recommendations for ex-post amendments to ex-ante impact estimates.

3.1.1 Review of CRB Program Records

Our analysis included a view of program impacts among six market sectors. Sector definitions were developed based on groupings of several hundred North American Industry Classification System (NAICS) codes. These groupings sometimes include specific code definitions that were difficult to place within a sector, but do present a good approximation of the overall distribution of program market sector activity. As can be seen in Table 3-2, 42% of program demand impacts were achieved in the office sector. In general, the distribution of demand savings closely aligned with the distribution of program rebate dollars, while the distribution of energy savings was influenced by variations in annual operating hours inherent in each market sector.

Table 3-2. Summary of CRB ex-ante net impacts by market sector

Sector	Rebate[23]	% Rebate	Net kW	% kW	Net kWh	% kWh
Grocery	$332,162	11%	936	14%	8,098,008	21%
Hotel and Restaurants	$470,653	15%	1,271	18%	9,491,023	25%
Office	$1,317,848	42%	2,934	43%	11,203,917	29%
Other	$604,903	19%	1,062	15%	5,740,562	15%
Retail	$396,240	13%	676	10%	3,688,576	10%
Total	**$3,121,807**	**100%**	**6,880**	**100%**	**38,222,086**	**100%**

The Cash Rebates for Business Customers program included installation goals on 71 measures. Of this goal, five measures were identified that accounted for 75% of kW savings resulting from completed

[23] Note that rebate values are based on monthly reported values available to the team the December 2005 program workbook SFPEP Monthly Rpt 1205 V2.xls

installations. These measures, listed in Table 3-3, also accounted for 75% of kWh savings and 84% of rebate dollars expended. Of particular note is that premium T-8/T-5 Lamp and Ballast retrofits on T-12 systems, wall and ceiling mounted occupancy sensors, and new door gaskets on coolers and freezers accounted for about 68% of kW savings.

The measures presented in Table 3-2 can be grouped into two broad categories: lighting and refrigeration. Table 3-4 shows that 77% of program demand impacts can be attributed to lighting measures. Of note is the relationship between rebates, demand, and energy impacts. While refrigeration consumed only 14% of rebates, these measures collectively contributed 23% of demand savings and 36% of energy savings.

Table 3-3. Summary of high impact measures

Measure Code	Measure Description	Number of units installed	Net kW saved	% of kW program savings	Net kWh saved	% of kWh program savings	% of rebates
L290	4-foot premium T-8/T-5 Lamp & Electronic Ballast replacing of T-12 lamp & efficient magnetic ballast	199,266	2,203	32%	11,158,510	29%	62%
L83	Wall or ceiling mounted occupancy sensors for area lighting	3,456	1,265	18%	2,616,518	7%	6%
L137	High efficiency LED exit signs	6,818	278	4%	2,299,750	6%	8%
R50	Door gasket replacements on cooler and freezer doors	27,948	170	2%	1,490,484	4%	4%
R2	Strip curtains for walk-in coolers	49,103	1,256	18%	11,003,050	29%	5%
Total			**5,173**	**75%**	**28,568,312**	**75%**	**84%**

Table 3-4. Summary of CRB impacts by broad measure category

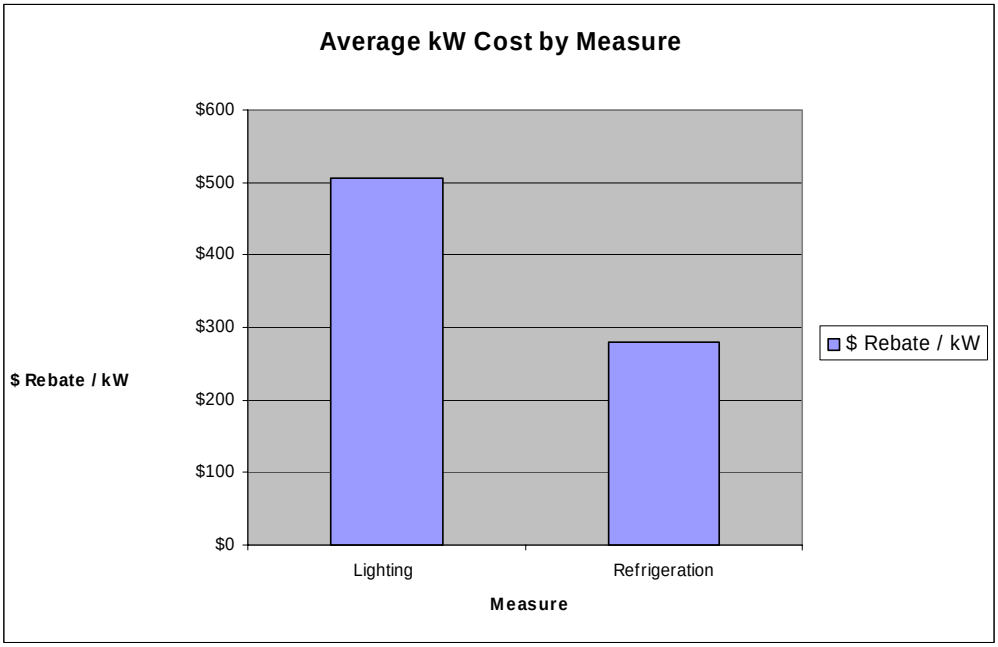
Measure type	Rebate	% Rebate	Net kW	% kW	Net kWh	% kWh
Lighting	$2,670,177	86%	5,266	77%	24,520,455	64%
Refrigeration	$ 451,630	14%	1,614	23%	13,701,632	36%
Total	$3,121,807	100%	6,880	100%	38,222,086	100%

The observation that over 1/3 of energy savings came from refrigeration measures can likely be attributed to the operating parameters of refrigeration systems. In general, refrigeration systems have peak loads that are coincident with peak generating demands, operate long hours, including a mean of 4,960 full load

operating hours, and overall annual operating hours of 8,760 hrs/yr[24], and have economically feasible energy efficiency opportunities.

Figure 3-1 shows that the economics of refrigeration measures were favorable for this program. In general the rebate cost per kW for refrigeration measures was roughly 40% less than the cost per kW for lighting measures.

Figure 3-1. Rebate cost per net kW, by end use measure category



Of these high impact measures, a large percentage of refrigeration gasket installations had been verified by program personnel, so field work for this evaluation focused on T8 lighting retrofits and occupancy sensor installations. This activity included two components:

1. Verification of measure installation rates
2. Verification of annual operating hour assumptions.

Verification of measure installation rates was accomplished through on-site inspections as discussed in Section 2. Verification of annual operating hour assumptions was accomplished through the installation of dataloggers at multiple sites over both the winter and summer peaking periods. This allowed an analysis of both the net operating hours and when peak demand occurs in San Francisco. The following sections discuss the results of the installation rate and run hour estimates for three critical lighting measures: L290 (Premium T-8/T-5 4 ft lamp and electronic ballast replacing T-12 lamp & ballast), L299 (same as L290 except 8 ft lamp), and wall and ceiling mounted occupancy sensors (L83).

[24] PY 2004 / PY 2005 Refrigeration Work Paper.

3.1.2 Verification L290 Measure Savings

Verification of L290 Installation Rates

A database of on-site verification inspection results was used to compare the quantity of measures installed relative to the program tracking database, by measure and segment. The results of that analysis are presented below for L290 measures. This same approach was used for L299 and L83 measures.

Table 3-5 presents the quantity of L290 measures found in the verification inspections relative to the program database. This table indicates that the verification inspection found more measures installed than are reported in the program tracking database for all segments. This difference varied by as little as 1% for Offices to as much as 9% in the "Other" segment. However, the 90% precision indicates that the difference between the program average and the verification average is not statistically significant.

Table 3-5. Installed L290 measures

Segment	Program Database			Verification Results			Ratio:Verified to Program Data
	Total Installed	Average	Precision of Average	Total Installed	Average	Precision of Average	
Grocery (24)	2,793	116.4	±62	2,848	118.7	±61	102%
Hotel(23)	1,367	63.2	±15	1,453	63.2	±19	106%
Office (27)	5,825	215.7	±80	5,883	217.9	±81	101%
Other(42)	7,360	175.2	±41	8,025	191.1	±45	109%
Retail (77)	8,691	112.9	±21	8,864	115.1	±24	102%
Overall (193)	**26,036**	**134.9**	**±22**	**27,073**	**144.8**	**±22**	**104%**

There may be two reasons for the installation of more measures. One reason may be that participants install additional lights on their own. Another reason may be that the installation contractor installed the additional measures while he was at the site, and for whatever reason this information was not accurately reported, thus not included in the program tracking database. However, since these differences were not statistically significant at the 90% level, *there is no reason to assume that this difference will be true for the population of participants.*

Verification of L290 Annual Operating Hour Assumptions

A key component of the CRB evaluation was the use of dataloggers to record lighting run hours at numerous facilities in all market sectors. The following discussion provides a summary of the data gathered from that activity and the resulting revisions to program ex-ante savings. Figures 3-2 and 3-3 present a summary of the data for several measures and market sectors while graphic data results for additional market sectors can be found in Appendix C-4.

Figure 3-2 shows the typical load profile for a T8 lighting retrofit installed by the program in the office market sector. T8 retrofits in this market sector accounted for over 13% of all CRB program ex-ante savings. This figure provides the percentage of lighting circuits in the sample of office facilities that were

'on' at any given hour during a typical weekday and weekend day for both the winter and summer periods. This percentage 'on' corresponds to the aggregate demand created by the lighting systems monitored, and serves as a proxy for the demand created by the market sector broader population. This figure shows that the magnitude of the peak demand was similar for both summer and winter periods. Also, the magnitude of the weekday peaks was similar for both winter and summer at roughly 90% of fixtures monitored. Note that weekend demand is approximately 10% of weekday demand, and that winter and summer weekend curves overlap almost exactly.

Figure 3-2. Load profile for T8 retrofits installed in the Office market sector

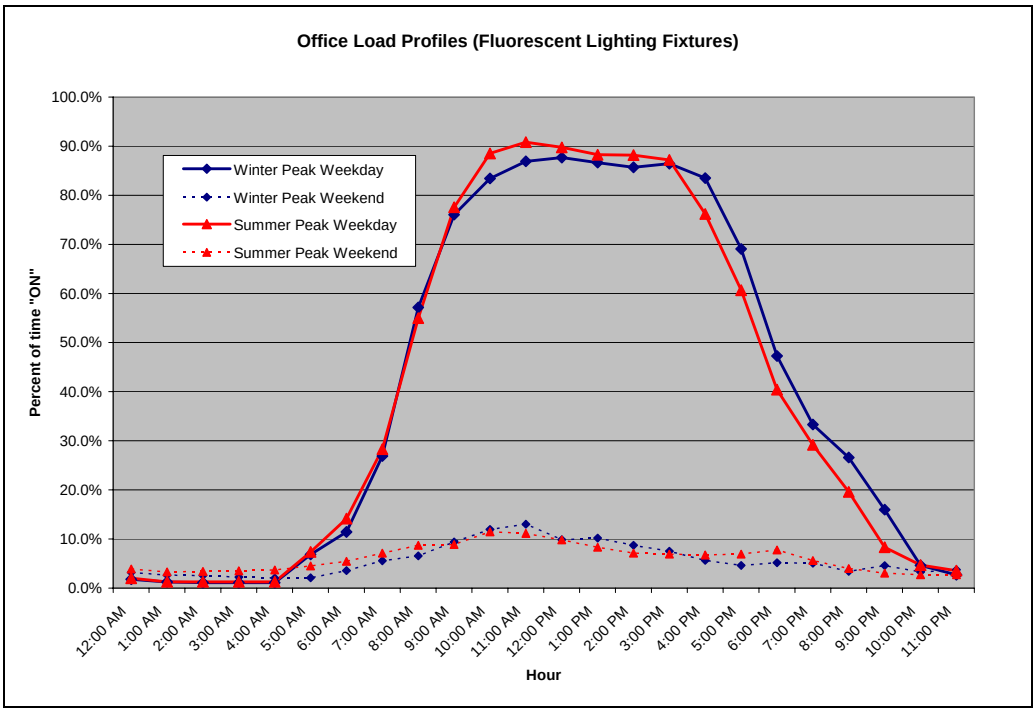


Figure 3-3. Load profile for T8 retrofits installed in the Retail market sector

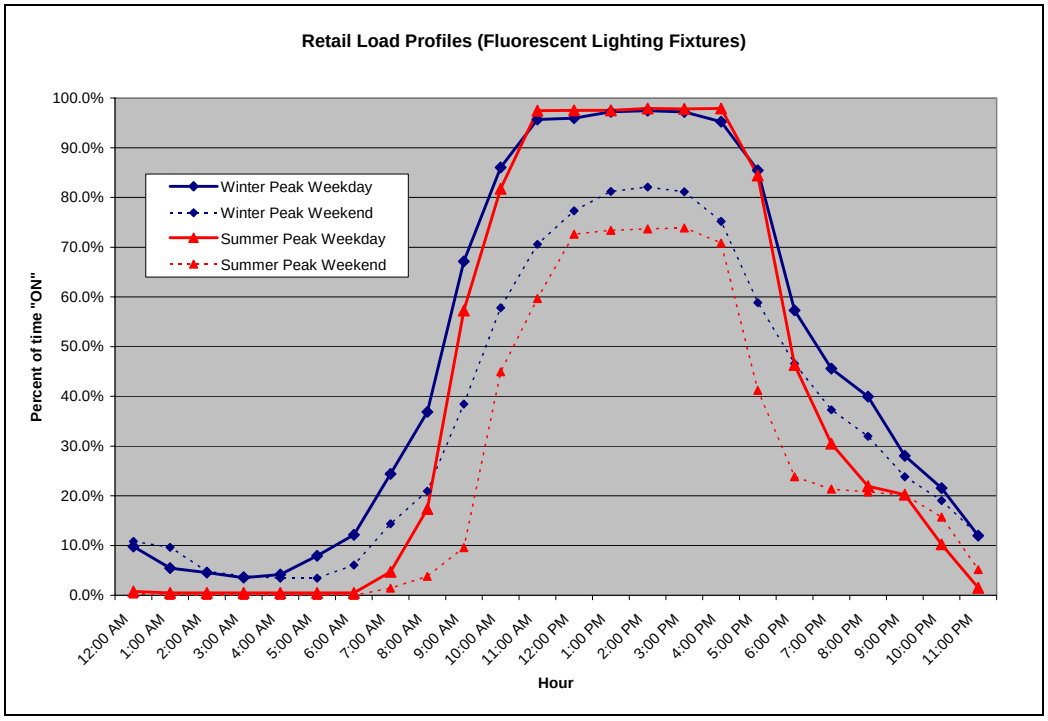


Figure 3-3 presents the typical load profile for a T8 lighting retrofit installed by the program in the Retail market sector. As with the office sector, this figure shows that the magnitude of the peak demand was similar for both summer and winter periods. The magnitude of the weekday peaks was roughly 100% of fixtures monitored. Weekend demand is about 80% of the weekday peak.

All sectors logged showed that winter peak and summer peak are virtually identical. While this does not account for the presence of a winter peak in San Francisco, it does support the observation that a winter peak exists, and that this peak is of the same magnitude as a summer peak. It is likely that the widespread use of electric heating also contributes to a winter peak; however an evaluation of the impact from electric heaters was not included in the scope of this report and should be the subject of a separate research effort.

The data gathered from the lighting loggers were then used to verify the annual operating hour assumptions used in the lighting workpaper that are the basis for CRB program ex-ante savings. This verification required several steps:

1. Review the relationship between the hours of use for customers who received dataloggers *and* who also provided self-reported run time estimates.

2. Use the relationship between the measured hours (logger data) and self-reported hours for the larger verified sample (for those participants in the 'nested' sample that has both metered and self-reported data) to develop a 'Ratio Estimator' to define our best estimate of what the hours of use are for the entire population of participants in each market sector.

3. Compare the ratio estimator 'best estimate' values to the average runtime hours estimates for *all* logger data for each measure, along with secondary sources of information on runtime - to develop a recommendation on adjustments to run hour estimates used to develop the ex-ante savings estimate by market sector.

Table 3-6 presents the analysis results for the sample of 36 customers that had both run-time loggers on their installed L290 measures, and had self-reported data on runtime hours. This exhibit shows the hours of use by market segment obtained from the loggers and the customers' self-reports. It also shows the 90% confidence interval surrounding these values, and the resulting ratio between the logger hours and the self-reported hours.

This table indicates that:

- In most cases, there are statistically significant differences between the hours of use across market segments, with Groceries having the longest hours (4,519), followed by Retail (3,443). Note that the results for the "Other" segment has a relatively large distribution which spans both the results found for Offices, Retail, and Hotels[25].

- The customer self-reported hours of use are very similar to the measured hours of use, with the ratio between the two generally being very close to one.

Table 3-6. L290 hours of use, run-time metered sample (for 36 customers that also had self-reported data)

	Logger Hours of Use				Self-Reported Hours of Use				Ratio
Market Sector	**Avg. Hours**	**Standard Deviation**	**90% Lower Bound**	**90% Upper Bound**	**Avg. Hours**	**Standard Deviation**	**90% Lower Bound**	**90% Upper Bound**	**Logger/SR Avg. Hours**
Grocery	4,519	397	4,193	4,845	4,368	775	3,731	5,005	**103.5%**
Hotel/ Restaurant	3,220	N/A			2,600	N/A			**123.8%**
Office	2,429	382	2,207	2,651	2,437	497	2,148	2,726	**99.7%**
Other	3,091	1,706	2,313	3,870	3,285	1,714	2,503	4,067	**94.1%**
Retail	3,443	643	3,109	3,778	3,383	623	3,058	3,707	**101.8%**
Overall	**3,204**	**1,226**	**2,868**	**3,540**	**3,225**	**1,232**	**2,887**	**3,563**	**99.4%**

The next step in the analysis was to use the relationship between the logger (measured) hours and the self-reported hours found in the metered sample to develop a more precise estimate of the hours of use for the population based upon the self-reported hours for the larger verified sample (182 customers). This was accomplished through the use of the Ratio Estimator, which essentially assumes that the ratio between the measured and self-reported hours of use is consistent across all customers, so that this ratio can be applied to those customers with self-reported hours but no measured hours to estimate what their measured hours of use would be.

Table 3-7 below presents the result of applying the ratio estimator to the non-metered but verified sample. Note that:

- The use of the ratio estimate increases the hours-of-use for each segment, though the increase is generally small.

[25] There was only one hotel that had both logger data on L290 and self-reported data, thus there is no distribution associated with the measured hours of use.

- Grocery still have the longest usage of 5,055 hours, followed by Retail at 3,744 hours.
- All the estimates are very precise because this approach takes advantage of the correlation found in the metered sample.

Runtime hour data available from the telephone survey sample were not consistent enough to develop a ratio estimator for. Finally, the average annual run hours for the logger data for each market sector was compared to secondary sources (Tale 3-8) to identify discrepancies between the study sample and broader market views.

Table 3-7. L290 hours of use (for on-site verified sample of 182 customers)

Market Sector	Self-Reported Average from verified population	Ratio of Logger hours to Self-Reported from Logger sample	Ratio Estimated Population Hours of Use	90% Lower Bound	90% Upper Bound	Relative Precision
Grocery	4,886	103.5%	5,055	4,634	5,138	**5.2%**
Hotel	5,200	123.8%	N/A26	N/A	N/A	**N/A**
Office	2,539	99.7%	2,531	2,438	2,641	**4.0%**
Other	3,342	94.1%	3,145	3,297	3,386	**1.3%**
Retail	3,678	101.8%	3,744	3,642	3,714	**1.0%**
Overall	**3,766**	**99.4%**	**3,741**	**3,747**	**3,784**	**0.5%**

Table 3-8. L290 Logger Data Compared to Secondary Sources

Market Sector	Average Winter Operating Day	Average Summer Operating Day	Average Annualized Operating Day	Sample Estimated Annual Operating Hours	2005 DEER Update Operating Hour Assumptions	PY 2004 / 2005 PG&E Lighting Work paper
Grocery	11.8	12.6	12.2	4,448	5,824	5,800
Hotel/Restaurant	11.8	19.2	15.5	5,662	6,776	5,050
Office	6.9	6.9	6.9	2,510	2,616	4,000
Other	7.1	6.7	6.9	2,524	3,673	2,537
Retail	11.5	9.4	10.5	3,820	4,117	4,450

After developing these comparisons, the evaluation team reviewed all data sources and developed the following recommendations for hours of use to be used *specifically for adjusting the savings associated with 4' T8 lamps in San Francisco*. Recommended values are highlighted in Table 3-9. Note that in some cases the ratio estimator values are higher than the PG&E workpaper values, and in other cases lower. In

[26] The estimated hours-of-use for Hotels is suspect because only one Hotel was metered. Therefore, the self-reported hours are probably the best estimate of the actual hours of use.

all cases, the values are somewhat lower than the 2005 DEER update values. A couple of notes on these results:

- For the Grocery sector, participation in SFPEP (and subsequent EM&V metering activities) involved stores that on average are much smaller than those in other parts of California. Thus operating hours for the stores tends to be less than for larger stores around the state.

- Similarly, for Retail stores, much of the emphasis of the SFPEP program was to reach out to small business owners, who by nature in the urban setting of San Francisco tend to have shorter operating hours than larger retailers located in suburban shopping malls, who may make up a larger portion of the statewide estimates for run-time hours.

Table 3-9. Recommended annual hours of use [Measure L290: 4' T8 Lamps]

Market Sector	Self-reported hours of use for participants with data loggers	Logger data for participants also self reporting	Self-reported average from verified population	Ratio estimated population hours of use	Logger data for all sector participants	2005 DEER Update Operating Hour Assumptions	PY 2004 / 2005 PG&E Lighting Work paper
Grocery	4,368	4,519	4,886	5,055	4,448	5,824	5,800
Hotel/Restaurant	N/A	N/A	5,200	N/A*	5,662	6,776	5,050
Office	2,437	2,429	2,539	2,531	2,510	2,616	4,000
Other	3,285	3,091	3,342	3,145	2,524	3,673	2,537
Retail	3,383	3,443	3,678	3,744	3,820	4,117	4,450

* = no ratio estimator value was calculated for the hotel sector as only one site had both self-reported data and metered data

Table 3-10 provides the recommended percentage changes to the annual run hours estimates for L290 measure installations, and by extension, to the ex-ante energy (kWh) savings attributable to this measure.

Table 3-10 Recommended changes to run-time hours in PG&E Workpapers

Market Sector	% change in annual run hours
Grocery	-12.8%
Hotel/Restaurant	12.1%
Office	-36.7%
Other	24.0%
Retail	-15.9%

3.1.3 Verification of Other Cash Rebates Measure Savings

Verification of L299 [8' T8 lamps] Measure Installation Rates

The comparison between the number of installed L299 measures in the program database and the on-site survey are presented in Table 3-11. Unlike the L290 measure, this table indicates that the number of verified installations is less than the number reported in the program tracking database. Results were also quite varied across installations. The evaluation team was not able to discern a reason for the variation from program records. This measure did not account for a significant portion of the program savings, thus was inspected primarily at sites that also had L290s [4' T8] installed. The small number of sites and the large variation across sites results in relatively low precision in the average installation, so *there is no statistically significant difference between the average installations in the two groups*. Therefore, these results indicate that there is no need to change the number of installations found in the program tracking database.

Table 3-11. Installed L299 measures

Market Sector	Program Database			Verification Results			Ratio Verified to Program
	Total Installed	Average	Precision of Average	Total Installed	Average	Precision of Average	
Grocery (1 site)	10	10	N/A	0	0	N/A	*0*
Hotel (6 sites)	82	13.7	±8.6	67	11.2	±6.7	*82%*
Office (2 sites)	45	22.5	±6.6	17	8.5	±6.2	*38%*
Other (5 sites)	46	9.2	±7.12	33	6.6	±7.8	*72%*
Retail (8 sites)	252	31.5	±18.4	237	29.6	±22.3	*94%*
Overall (22 sites)	**435**	**19.8**	**±7.8**	**354**	**16.1**	**±6.6**	**81%**

Verification of L299 Annual Operating Hour Assumptions

The analysis of the hours of use for measures L299 and L83 differs from the previous analysis for the L290 measure because the number of metered sites is significantly smaller (2 and 7, respectively), and there is no self-reported hours of use for these same metered sites (i.e., no nested sample). Thus, we cannot develop an appropriate ratio estimator.

For L299 [8' T8 Lamps], we found that:

- The average hours of use for the metered sample for the Retail segment was 4,234 hours (1 site) and 3,302 hours for the "Other" segment (1 site).
- The self-reported hours for the verified but not metered sample was 3,501 for Retail customers (11 customers), with a 90% precision of +/- 241 hours. The eleven "Other" customers reported an average hours of use of 2,707 hours +/- 707 hours.
- Self-reported hours of use for the other segments were 8,760 for Hotels (1 customer), 3,876 for Grocery (3 customers with a precision of +/- 187 hours), and the two Office customers reported an average of 1,386 hours, with a precision of +/- 2,780 hours.

Verification of L83 Measure Installation Rates

For the L83 measure, information from the on-site inspection of installed measures was only available for five customers (one Hotel, two Offices, and two "Other"). Except for one Office where 27 measures were verified while 28 were installed, the number verified was equal to the number indicated in the program database. Therefore, *there is no need to alter the number installed in the program tracking system.*

Verification of L83 Annual Operating Hour Assumptions

Figure 3-4 shows the typical load profile for wall and ceiling mounted occupancy sensors installed across all market sectors. Occupancy sensor installations account for over 18% of all CRB program ex-ante savings. In general, occupancy sensors were placed on light fixtures that had also received an L290 measure retrofit. As such, the 'baseline' lighting run hours applied to the analysis of L83 measures are the same as the run hour estimates developed for L290 measures. [Note: this may underestimate baseline usage in garage facilities where many of the loggers were installed. Anecdotal evidence indicates that, at least in the parking garages, the lights may have been left on 24/7 before the installation of occupancy sensors]

Figure 3-4. Load profile for occupancy sensor installations across all market sectors

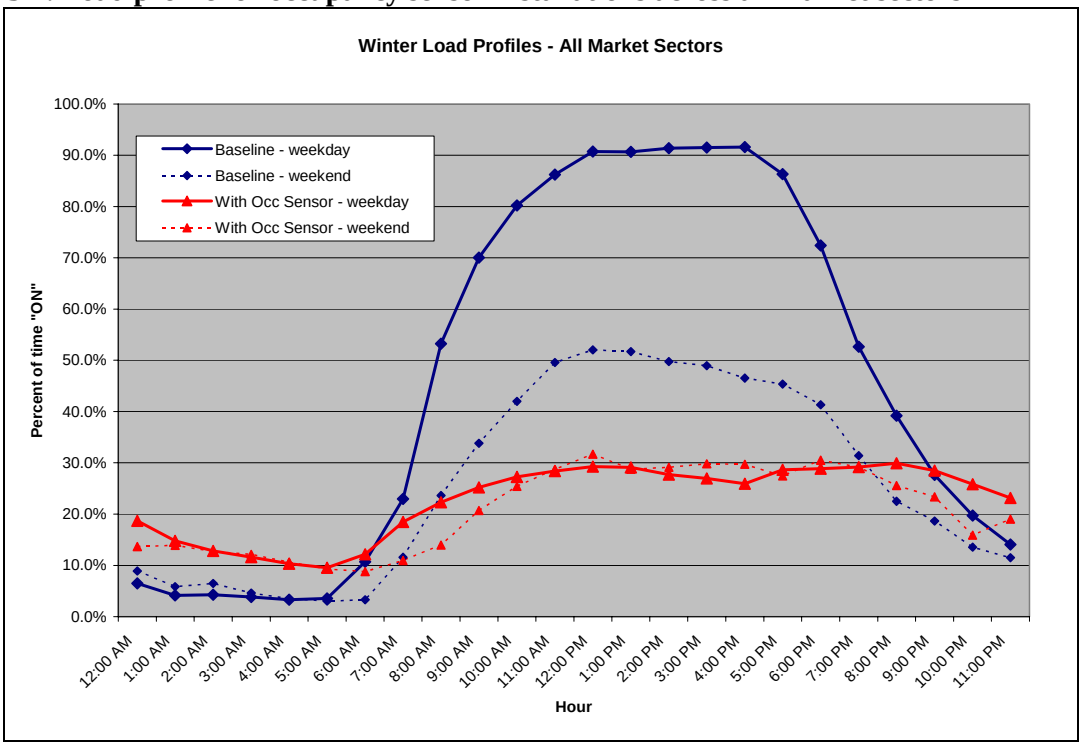


Figure 3-4 provides the percent of lighting circuits in our sample that were 'on' at any given hour during a typical weekday and weekend day for the winter peak period. The percentage 'on' corresponds to the time when an area is occupied (and the lights are on) and represents the aggregate demand created by the lighting systems monitored. Because our sample of participants included over 50% of the sites where this measure was installed, it is likely that this analysis applies to the majority of program participants who installed occupancy sensors. This figure shows that peak demand was reduced by 60% during the weekday and 20% on weekends. *[Note: It is important to remember that for the largest installation, some*

of the loggers were installed in parking garages, some in common areas and hallways, and others in mechanical rooms and stairwells. Other sites included office space, on which the workpapers are based] Results of the summer field data collection activities are virtually identical and are presented in Appendix C-4.

The relatively small number of loggers installed, and limited self-reported data suggest that the results for the above analysis should be viewed as pertinent to the sites monitored only, and probably should not form the basis of any significant changes in program assumptions. More detailed study of occupancy sensors by space type is recommended, as this measure has significant peak reduction potential.

3.1.4 Recommended Amendments to Cash Rebates for Business Program Records and Ex-Ante Impacts

Our review of program records indicated that several adjustments to program records should be undertaken.

1. Recalculate the unit installation data for measures R50 (refrigeration door gaskets) and R2 (strip curtains for walk-in coolers).

Program records over-counted the unit installations of refrigeration door gaskets and strip curtains for walk-in coolers. The reported unit installation for door gaskets of 27,948 linear feet is likely to be only 14,850 linear feet, while the unit installation of strip curtains, currently reported as 49,103 square feet, is likely to be only 24,648. Program records initially misinterpreted the workpaper[27] used to calculate savings for door gaskets. A subsequent revision to program records corrected this error and the evaluation team confirmed that the calculations used in program records are now consistent with those recommended in the workpaper. Also, SFE implementation staff inspected a significant percentage of installations to confirm accuracy of contractor records and adjusted program records accordingly. Based on these activities, there is no recommended adjustment to ex-ante demand or energy savings estimates for these measures.

2. Addition of LED open sign savings.

The SFPEP paid for and distributed 450 LED open signs that were not credited in PG&E program records. While these were funded from SFPEP budgets, program records did not track items that were not *rebated*. The open signs were distributed by CTS auditors when making initial site visits to small businesses in San Francisco. Open signs are typically small neon signs which are hung in store windows and used by businesses to advertise that they are open for business. Traditionally these signs consist of about 10 feet of neon tubing operating at about 6 to 8 watts per linear foot. LED open signs provide a neon-like appearance at the same or higher brightness levels, with 6 to 8 times the efficiency of neon tubes using magnetic transformers.

Table 3-12 provides the estimated kW and kWh additions to the program records that we feel accurately reflect the distribution of 450 LED open signs through the program. The net additional kW and kWh impacts represent a 0.96 NTG factor used for the C&I elements of the SFPEP.

[27] PY 2004 / 2005 PG&E Refrigeration Workpaper.

Table 3-12. Incremental ex-ante impacts of the LED Open sign distribution

Signs Exchanged	Estimated NET Annual kW Reduction	Estimated NET Annual kWh Reduction	GROSS Annual KW Reduction	GROSS Annual kWh Reduction
450	65.8	236,684	68.6	246,546

The field work conducted for this study reviewed over 60% of the L83 measures installed through the program. A review of the workpaper used to estimate ex-ante savings of L83 measures revealed several discrepancies with this field sample, including the following.

1. The workpaper states that the occupancy sensor is assumed to control eight 4-foot 2-lamp fluorescent fixtures with 34 watt T-12 lamps and energy saving magnetic ballasts with a noncoincident demand of 72 watts per fixture, including ballast). All of the L83 controllers verified in the study field research controlled one fixture equipped with T8 lamps (L290), though the number of lamps per fixture vaieied from 1 to 8, as shown in Table 3-13.. The coincident demand varied per fixture, depending on the number of lamps controlled. It is likely that improvement in control technology, and decreases in control prices, have reached a point where it is economically feasible to install occupancy controls on smaller loads than currently prescribed by the PG&E lighting workpaper, and that the number of configurations offered in the lighting workpaper should be revised and expanded. For example, the use of occupancy controls to operate a single fixture with T8 lamps for parking garages (with long run hours) has been a successful installation for the Fillmore Center, and should be considered as a standard configuration discussed in the workpaper.

2. The workpaper uses a baseline of 2,600 total run hours per year in their model, with a net reduction of 53% in annual run hours, including the impact of manual switching. This analysis uses a baseline of 2,712 annual run hours with a 60% reduction in annual run hours. This analysis does not include the impact of manual switching. In general, the controllers installed served common areas (parking garages, hallways, where no viable manual switching configurations were observed. This yielded a net annual operating hour reduction from 4,505 to 8,168 hours, versus 1,170 annual run hour reduction noted in the workpaper. The average reduction in run hours varied by fixture location and application, as shown in Table 3-13.

3. Savings from L83 installations were achieved in 2 ways. First was the reduction in demand achieved when through the replacement of T12 lamps with T8 lamps. These are recorded in Table x-x as ‘Lamp on savings’ and are accumulated during periods when an area is occupied and lamps are on. These savings are based on the reduction in demand similar to those achieved in an L290 retrofit. A review of program records indicates that these savings were not recorded in the L290 measure savings report and accounted for 14 kW in net savings. The second means through which savings were achieved was through the activity of the controllers. These savings, noted in Table x-x as ‘Lamp off savings’, totaled approximately 131 kW and are based on the demand reduction that takes place when the base technology, an ES T12 lamp, would be shut off during periods of vacancy.

Table 3-13. Measure L83 savings, by fixture application.

Fixture description and location	Lamp on savings			Lamp off savings		
	Annual on hours	Net demand savings (kW)	Net energy savings (kWh)	Annual off hours	Demand savings (kW)	Energy savings (kWh)
One sensor to control a 2L fixture (2 x 4 foot 1 lamp T8 fixtures)	592	1.2	704	8,168	48.6	397,007
One sensor to control a 4L fixture (4 x 4 foot 2 lamp T8 fixtures)	4,255	10.1	42,991	4,505	31.7	142,788
One sensor to control a 1L fixture (1 x 4 foot 1 lamp T8 fixture)	592	0.1	42	8,168	2.9	23,853
Blinky (one 4' T8 and one 5 watt CFL)	1,355	0.2	270	7,404	3.2	23,883
Blinky (one 4' T8 and one 5 watt CFL)	1,355	2.4	3,275	7,404	39.1	289,755
Blinky (one 4' T8 and one 5 watt CFL)	1,355	0.4	479	7,404	5.7	42,359
Total	**NA**	**14.3**	**47,760**	**NA**	**131.3**	**919,646**

Based on these observations, it is recommended that the demand and energy savings attributable to L83 measures be reduced from the levels indicated in the program records. Table 3-14 compares the ex-ante and recommended ex-post values for L83 installations. This includes a slight increase in the number of units installed based on field observations and a review of invoicing data, and are applied only to L83 savings recorded at the Fillmore Center. As noted previously, the Fillmore Center accounted for 60% of L83 measures installed by the program. Savings from other L83 applications were not adjusted. Also there is no difference in summer and winter operation of L83 measures.

Table 3-14. Measure L83 ex-ante and ex-post net energy and net demand savings estimates

Savings Estimate	Units Installed	Coincident Net Demand Reduction (kW)	Net Energy Savings (kWh)
Program records (ex-ante savings)	3,456	1,265	2,616,518
Recommended values (ex-post savings)	4,004	657	2,025,824
Change	548	(608)	(590,694)

4. Revise L290 savings estimates

Table 3-15 provides the recommended ex-post energy savings. These ex-post energy estimates reflect changes attributable to revised operating hours estimates and to adjustments in measure installation rates, by market sector.

Table 3-15. Measure L290 ex-ante and ex-post energy savings estimates

Market Sector	Net Ex-ante kW	Net Ex-ante kWh	% change in ex-ante kWh	Ex-ante net kWh adjusted for recom-mended annual run hours	Ratio of verified in-stallation to program records	Recommended ex-post net kWh values	Net % change to ex-ante values
Grocery	138	880,404	-12.8%	767,317	102%	782,664	-11%
Hotel/Restaurant	89	636,722	12.1%	713,885	106%	756,718	19%
Office	1,176	5,529,845	-36.7%	3,499,010	101%	3,534,000	-36%
Other	446	2,418,372	24.0%	2,997,943	109%	3,267,758	35%
Retail	354	1,693,167	-15.9%	1,424,543	102%	1,453,034	-14%
Total	**2,203**	**11,158,510**	**-15.7%**	**9,402,698**	**NA**	**9,794,173**	**-12%**

Table 3-16 provides a summary of net CRB program ex-ante estimates from program records and ex-post savings estimates based on the recommended adjustments. Measures installed through the CRB program impact summer and winter peak are comparable, and as such there are no recommendations made to report separate summer and winter peak demand savings values.

Table 3-16. Summary of CRB program ex-ante and ex-post savings estimates

Savings Element	Gross kW	Net kW	Gross kWh	Net kWh
Ex ante savings	7,166	6,880	39,814,673	38,222,086
Addition of LED open sign savings	69	66	246,546	236,684
Revise L83 savings estimates	-633	-608	-615,306	-590,694
Revise L290 savings estimates	0	0	-1,421,184	-1,364,337
Total Ex-post savings	6,602	6,338	38,024,729	36,503,739
Percent change	-7.8%	-7.8%	-4.5%	-4.5%

3.2 Standard Performance Contracts

3.2.1 Review of SPC Program Records

The standard performance contract program element contributed approximately 24% of SFPEP program demand savings and 29% of energy savings. Table 3-17 shows the SPC Program activity projected in the original PIP workbook planning document targeted over 95% of program demand savings from non-lighting measures. While significantly more applications were received, 34 applications were approved and paid by PG&E.[28] It is unclear whether this was due to funds running out or if applications were not approved for other reasons.

[28] It is common for attrition to occur in SPC, due to oversubscription or applicants dropping out during the project review process.

Table 3-17. Original SPC program planning net savings goals

Measure /Activity Name	Projected Net Coincident Peak Demand Reduction (kW)	% Of Projected Net Coincident Peak Demand Reduction (kW)	Projected Annual Net kW h Savings	% Of Projected Annual Net kW h Savings
Lighting	98	5%	1,054,191	16%
Commercial HVAC/Refrigeration	1,927	92%	5,019,926	77%
Commercial Process/Other	75	4%	450,772	7%
Total	2,101	100%	6,524,889	100%

Table 3-18 presents the results of the SPC Program provided in final PG&E program records. The SPC Program exceeded both power and energy saving targets established in the original PIP workbook. Of particular note is that recorded energy savings exceeded planning estimates by a factor of roughly 2.6.

Table 3-18 also presents a summary of the high impact measures that yielded 78% of program demand and 81% of program energy savings. When compared to the original program plan, lighting played a larger role in savings than was planned, accounting for over 26% of ex-ante demand impacts. Adjustable speed drives for both process and HVAC applications were also an important measure classification, collectively delivering over 13% demand and 32% of energy savings. A review of the program budget figures shows that $1,991/kW was actually paid against an original budget target of $1,328/kW, while $0.27/kWh was paid compared to an original budget estimate of $0.43/kWh. The demand savings presented in Table 3-18 are net summer peak values. The program records provided by PG&E did not account for winter peak demand savings, as discussed in Section 3.2.2.

Table 3-18. Summary of recorded program net savings and high impact measures

Measure Description	Rebate Paid	% of Rebate	Net Summer kW	% of net kW	Net kWh	% of net kWh
Total Program	**$4,500,504**	**100%**	**2,260**	**100%**	**16,608,394**	**100%**
High Impact Measures						
Incandescent to Fluorescent – Indoor	$143,985	3%	137	6%	751,895	5%
T-8 Fluorescent Lamps	$495,499	11%	453	20%	2,689,065	16%
Process Adjustable Speed Drive	$382,053	8%	79	4%	2,248,964	14%
Add High Efficiency Chiller	$481,170	11%	163	7%	1,298,221	8%
Change/Add Other Equipment	$799,199	18%	498	22%	2,601,574	16%
HVAC Adjustable Speed Drive (ASD)	$929,723	21%	212	9%	3,070,480	18%
Insulate Building Shell (Ceiling, Walls)	$283,183	6%	223	10%	779,171	5%
Total High Impact Measures	**$3,514,811**	**78%**	**1,765**	**78%**	**13,439,370**	**81%**

Our approach in verifying the SPC Program savings included several observations and assumptions:

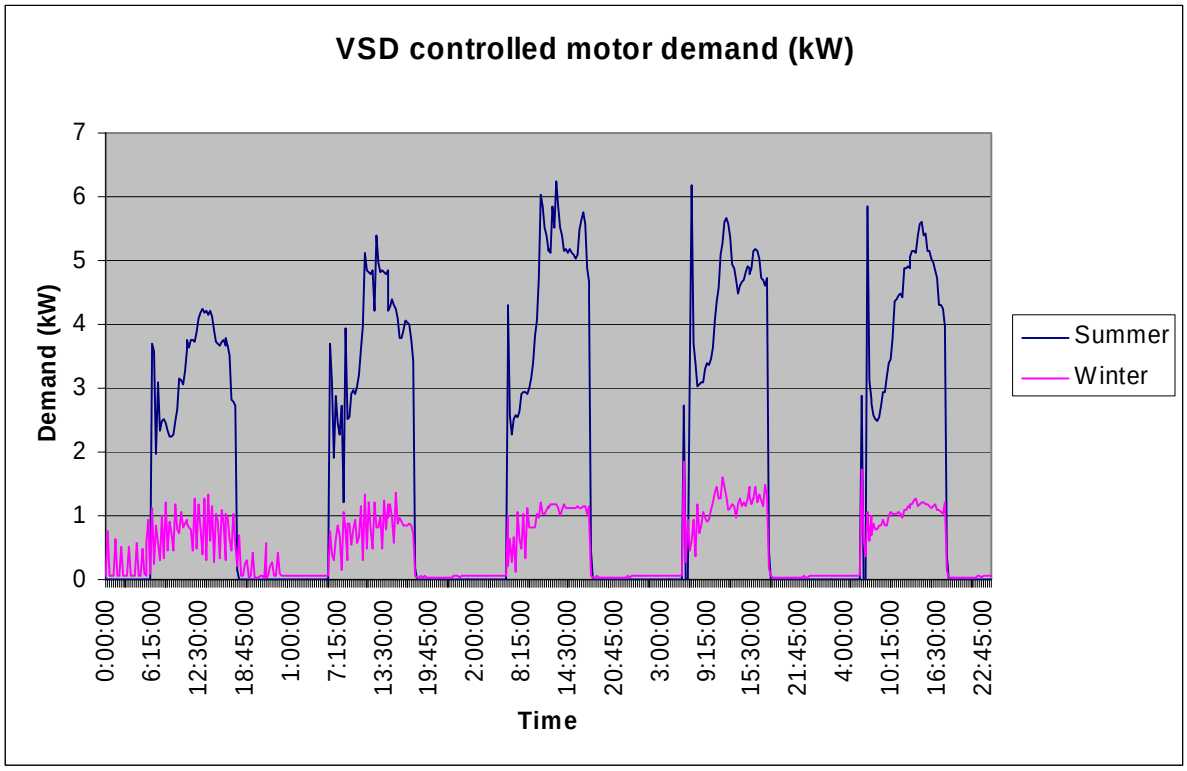
- For SPC, impacts are significant, but each SPC site already receives substantial site verification of measure installation as part of the program implementation process – including a pre-installation baseline confirmation, and post-installation inspection. From this, we concluded that all measures installed through the program had been thoroughly documented and accounted for in the M&V reports.

- That data logging on adjustable speed drives could provide useful information on both adjustable speed drives, and also on adjustable speed chillers where these chillers had been installed with adjustable speed drives associated with chilled water distribution.

Our research plan called for sites to receive a ‘spot check’ to focus on verifying savings estimates associated with the installations. We selected the sample of projects to represent the business sectors that reflect the overall SPC participant population and completed a due diligence review of savings calculations for these measures. After this review, we chose to place dataloggers on adjustable speed drives (ASD) as discussed in Section 2 of this report.

Adjustable speed drives played an important role in the program savings because of their ability to impact high use motor loads. To illustrate this, Figure 3-5 provides a load profile for a typical motor load for a one week period for both the winter and summer logging periods. This motor, equipped with an ASD and supporting a chilled water cooling tower fan with a rated demand of 8.6 kW, yielded power and energy saving during both the winter and summer logging periods. This operating profile is typical of ASDs logged during the course of our research.

Figure 3-5. Operating profile of typical ASD data logger sample



3.2.2 Recommended Amendments to SPC Program Records and Ex-Ante Net Impacts

Our data collection activities on variable speed drives tended to support the demand savings estimated in the M&V reports. Based on 10 motors at 5 sites for which power data were logged in the winter and summer, we found that our sample generated approximately 106% of the demand savings that program records approved for the summer peak period. Similarly, we found that our sample generated about 96% of demand savings approved by program records for the winter peak period, as shown in Table 3-19. [29]

Table 3-19. SPC gross demand savings comparison for ASD power logger data

Demand	Summer Gross kW saved	Winter Gross kW saved
Approved (paid) application kW savings on ASDs sampled	15.66	49.66
Estimated kW savings on ASDs sampled	16.64	47.78
Percent of approved application savings	106%	96%

[29] Based on logger data and final post installation reports for ASD projects at Macy's West-Stonestown (2K3CCSF014) and Starwood Hotels and Resorts (2K3CCFF084)

In reviewing final post installations M&V reports for 4 of the sample projects, it was concluded that the ratio of winter to summer demand savings (kW) on HVAC ASD installations is 2.2:1. The summer gross impacts from these projects is 92kW, and the winter gross demand impact is about 201kW. [30]

Based on these observations, this evaluation recommends that winter net demand savings attributable to ASD applications of 466 kW (net) be included in a summary of program impacts, as shown in Table 3-20.

Table 3-20. Total SPC winter and summer NET demand savings attributable to ASD installations

Measure Description	Net Summer kW	Net Winter kW
HVAC Adjustable Speed Drive (ASD)	212	466
Total	**212**	**466**

At the program level, in comparing energy savings from our sample to approved program records, we found that approximately 70% of savings approved by the program had been achieved (Table 3-21). This may be due in part to our finding that actual motor run hours tended to be lower than projected in the M&V reports for post installation savings estimates. Because these lower run hours may be attributable to the commissioning of the new controls and the interactive effects of other energy conservation measures installed (for example, high efficiency lighting) we tend to discount this discrepancy. As a result of this observation, and because the kW savings calculated through the verification process exceeded the estimates presented in the M&V reports, it is not recommended that energy savings reported on VSD installations achieved through the SFPEP SPC Program be adjusted.

Table 3-21. SPC energy savings comparison for ASDs

Energy	Annual Gross Energy Savings (kWh)
Approved application savings	497,642
Estimated savings (Baseline - logged usage)	347,625
Percent of approved application savings	70%

Based on the analysis of the sample of five sites reviewed for this evaluation, it is recommended that additional gross and net demand savings be adjusted for the winter season to account for additional demand savings achieved by ASD applications, as presented in Table 3-21. There are no recommended changes in ex-ante energy savings estimates. In addition, as the sites reviewed were intended as a 'spot check' on existing procedures and estimates, it appears that there is a need to calculate winter savings potential on a broader sample of ASD-related measures – such as ASD equipped chillers. Remaining issues include the following:

- Whether it is appropriate to apply the adjustments to lighting measure savings from the Cash Rebates for Business analysis in the previous section to SPC customers.

[30] Based on final post installation reports for ASD projects at Macy's West-Stonestown (2K3CCSF014), Transamerica Pyramid (2K3CCSF067), Starwood Hotels and Resorts (2K3CCFF084) and 555 California St (2K3CCSF046)

- No review of therm savings was undertaken for this evaluation. Given recent volatility in natural gas markets, PG&E may want to consider a review of therm savings.

Table 3-22. Summary of SPC program ex-ante and ex-post savings estimates

Savings Element	Gross Summer kW	Net Summer kW	Gross Winter kW	Net Winter kW	Gross kWh	NET kWh
Ex ante savings	4,264	2,260	NA	NA	31,336,592	16,608,394
Ex-post savings	4,264	2,260	4,730	2,507	31,336,592	16,608,394
Difference	***0.0%***	***0.0%***	***NA***	***NA***	***0.0%***	***0.0%***

3.3 Single Family Direct Install

3.3.1 Review of Program Records

The analysis included a view of program records, and also a due diligence review of calculations methodology used. Verification results and calculations methodologies are discussed in the following sections. Regarding the completeness of program records, it was observed that program records were complete for all measures except torchiere exchanges. These measures included full contact records of participants receiving benefits from the program, including identification of installation contractors where appropriate. The torchiere component presented several issues. First, there was a discrepancy noted between the number of torchiere exchanges recorded by the SFE and records provided by PG&E, however this discrepancy was corrected and the correct value, provided in the SFE records, are now included in PG&E records. The second issue was a lack of contact information for end use customers who participated in some of the exchanges that took place early in the program.

3.3.2 Verification of SF Measure Savings

The Single Family Direct Install Program planned to provide for the installation of four lighting measures and a programmable thermostat, as well as facilitate the recycling of appliances. Table 3-23 provides the original program savings target and the results presented in the final PG&E tracking database. This table shows that the program recorded ex-ante savings exceeded the demand and energy savings goals by a minimum of 48%.

Table 3-23. Single Family Direct Install NET savings from original program records

Record	Net kW	Net kWh	Net Therm
Planned	217	1,640,404	48,363
Recorded	235	1,790,977	53,546

Table 3-24 provides a breakdown of savings by four measures recorded through the program tracking data bases. This includes a revision to program records on the impact from the torchiere exchange program, discussed in Section 3.3.3 of this report. Of particular note is that Energy Star rated Interior Hardwired CFL Fixtures accounted for 69% of rebates and yielded 33% of program demand savings, while other lighting measures requiring 17% of rebate expenditures delivered over 62% of program demand savings.

Table 3-24. Single Family NET measure savings

Measure Description	Number of Units	Net Rebate Paid	% of Rebate	NET kW	% of NET kW	NET kWh	% of NET kWh
CFLs - 20 Watt	6,873	$44,675	6%	53	20%	429,778	21%
ES Interior Hardwired CFL Fixtures	8,773	$526,380	69%	87	33%	698,189	34%
Energy Star Torchiere Turn-ins	3400	$85,000	11%	110	42%	889,099	44%
Energy Star Programmable Thermostat	2,081	$104,050	14%	14	5%	9,260	0%
Total	**21,127**	**$760,105**	**100%**	**264**	**100%**	**2,026,326**	**100%**

In our review of the Single Family component of the program, we investigated the relationship between the values for key inputs in the program tracking system with survey responses and on-site audits. Our efforts concentrated on two areas: 1) hours of use, and 2) number of units installed or used. The results of this analysis is presented below for screw-in CFLs, CFL hardwired fixtures, and thermostats.

Verification of CFL Measure Installation Rates

The next aspect of the CFL component we investigated was the number of CFLs installed. Since the on-site inspector was able to measure this information accurately, the on-site information can be viewed as a separate measure of the installed units and can thus serve as a check of the information reported in the telephone survey. There were only five customers who received an inspection and also answered this question during the telephone survey. For those five customers, the program database, the on-site survey, and the telephone survey were in total agreement (with two CFLs for each customer).

Expanding the sample to all customers who received on-site inspections, the inspection found that 32 CFLs were installed by the 17 customers (thus averaging 1.9 CFLs per customer). The tracking database indicated that each of the 17 customers received two CFLs, for a total of 34 CFLs. This result implies that 94% of the CFLs have been installed and are being used.

Further expanding the sample to the surveyed customers, 128 customers reported the number of installed CFLs, with a total of 237 CFLs (1.9 CFLs per customer). The program database indicated that these customers had 258 CFLs (2.0 CFLs per customer). This result implies that 92% of the CFLs have been installed and are being used, which is consistent with the result found from the on-site sample. Table 3-25 summarizes these results, and shows that these differences are statistically significant. Some of these CFLs not being in place could be due to persistence or burnout, while a limited number could be due to issues surrounding data tracking.

A similar analysis was conducted for CFL fixtures, comparing the results from the on-site inspection and telephone survey to the program database for hours of use and installed fixtures. However, the on-site inspections where able to collect only limited information about fixtures from many of the visited sites.

Table 3-25. Installed CFLs, Single Family

Sample	Reported Installed CFLs	Program Database CFLs	Ratio
On-site (17 customers)	32	34	0.94
Average	2.0	2.0	
Precision of Average	±0.24	No variation	
Telephone Survey (128 customers)	237	261	0.92
Average	1.85	2.04	
Precision of Average	±0.07	±0.05	

Table 3-26 compares the information collected from the telephone survey on the installed fixtures and hours of use to information in the program database.

Table 3-26. Hardwired CFL fixtures installed and hours of use

	Telephone Survey	Program Database	Ratio
Hours of Use	4.9	3.5	1.4
Abs. Precision	±0.56	No variation	
Installed	120	127	0.94
Average	1.90	2.02	
Abs. Precision of average	±0.06	±0.03	

These results show that customers report higher hours of use than is assumed by the program database, and that 94% of the fixtures are installed and used. These results are consistent with the results found for the CFLs presented above.

Verification of Annual Operating Hour Assumptions

The first phase of the analysis compared the hours of use reported by the customer in the survey to the hours of use reported by the on-site inspection. For most characteristics of an installed measure, the on-site inspection gives a trained, impartial, third party estimate of that characteristic. As such, it is generally assumed to give a value that is closer to the actual value than is found by using customer surveys. For hours of use, however, this is not the case, as the on-site inspector does not have the ability to measure this information, and must rely upon the customer's self-reported hours of use. Therefore, comparing the results from the survey and the on-site inspection provides only a limited insight into the actual hours of use.

There were eleven customers who received the on-site audit *and* who also provided CFL hours of use in the survey. Table 3-27 presents the distribution of these self-reported hours of use.

Table 3-27. Reported CFL Hours of Use

Observation	Reported Hours of Use	
	On-site	Telephone Survey
1	0	2
2	0	3
3	0	5
4	0	7
5	0.5	4
6	1	7
7	2	7
8	3	14
9	3	8
10	4	9
11	6.5	18
Average	1.8	7.6
Absolute Precision (90% Confidence Level)	±1.0	±2.3
Correlation	0.89	
Probability that the means are equal (90% Conf. Level)	0.00% (i.e. difference in means is stat. sign.)	

This table shows that the hours used in the program tracking database (3.5) are between the hours reported within the on-site and telephone survey. Looking closely at these numbers, there are indications that the on-site results may be biased downward, given the large number of zero reads, and the survey results may be biased upward due to some very large hours of use. However, the high correlation between the two suggests that customers are consistent in stating the relative magnitude of how often they use their CFLs, even though the difference between the averages across the group is statistically significant.

The next step was to compare the hours of use found from all surveyed customers and all audited customers to the 3.5 hours of use in the program database. From the on-site sample of 17 customers, CFL hours of use are available for 15 customers, with an average of 2.0. Of the 165 surveyed customers, 108 customers reported their hours of use, with an average of 5.7. Once again, the program assumed hours value of 3.5 is consistent with these results, suggesting that 3.5 is a reasonable assumption.

Verification of Programmable Thermostat Operation

The analysis of the programmable thermostat measure was similar in spirit to the analysis of CFL and hardwired fixtures. We compared the results from the on-site inspection and telephone survey to the program database for whether or not the customer uses his or her thermostat. Of the seven people who received an on-site inspection and who answered whether or not they use their programmable thermostat, 71% (with a 90% confidence interval from 41% to 100%) stated that they did not program their

thermostats, while the on-site inspection indicated that 86% (with a confidence interval from 63% to 100%) of these people program their thermostats. Based on the confidence intervals, the difference is not statistically significant.

If we compare the results from the telephone survey to the program database, 87% (±8% at 90% confidence level) of the 46 people who answered the question reported that they program their thermostat. The results of the on-site inspections and telephone surveys both seem to indicate that 13% of participants do not program their thermostat.

3.3.3 Torchiere Analysis

As discussed in Section 2 of this report, our research plan included data logging on torchieres in order to verify program assumptions about the demand and energy reductions resulting from the torchiere distribution component of the program. Our research indicates that the annual operating hours for torchieres are:

- 856 summer operating hours, annualized
- 882 winter operating hours, annualized
- 871 Average annual operating hours.

Figure 3-6 and Figure 3-7 show the load profiles for our sample of 20 sites for the winter and summer data logging periods. These figures show nearly identical usage rates between winter and summer. It is important to note that the approximately 80% of sites logged in the winter were also logged in the summer, and so it maybe assumed that usage patterns for all participants in the torchiere exchange program are similar. Torchiere usage and resulting demand tended to peak around 9:00 P.M. during both the winter and summer logging efforts. Figure 3-8 provides a summary of both logging periods and may serve as an average usage pattern for all weekend and weekday operating hours.

Figure 3-6. Torchiere Winter Load Profiles

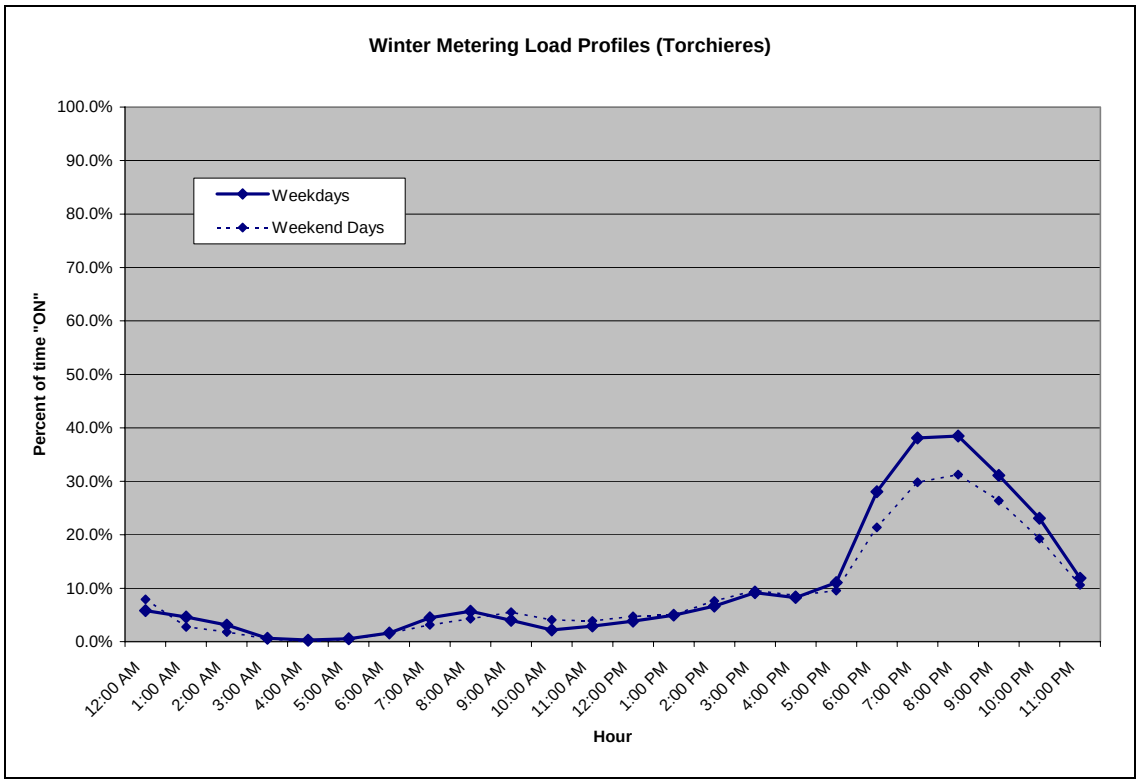


Figure 3-7. Torchiere Summer Load Profiles

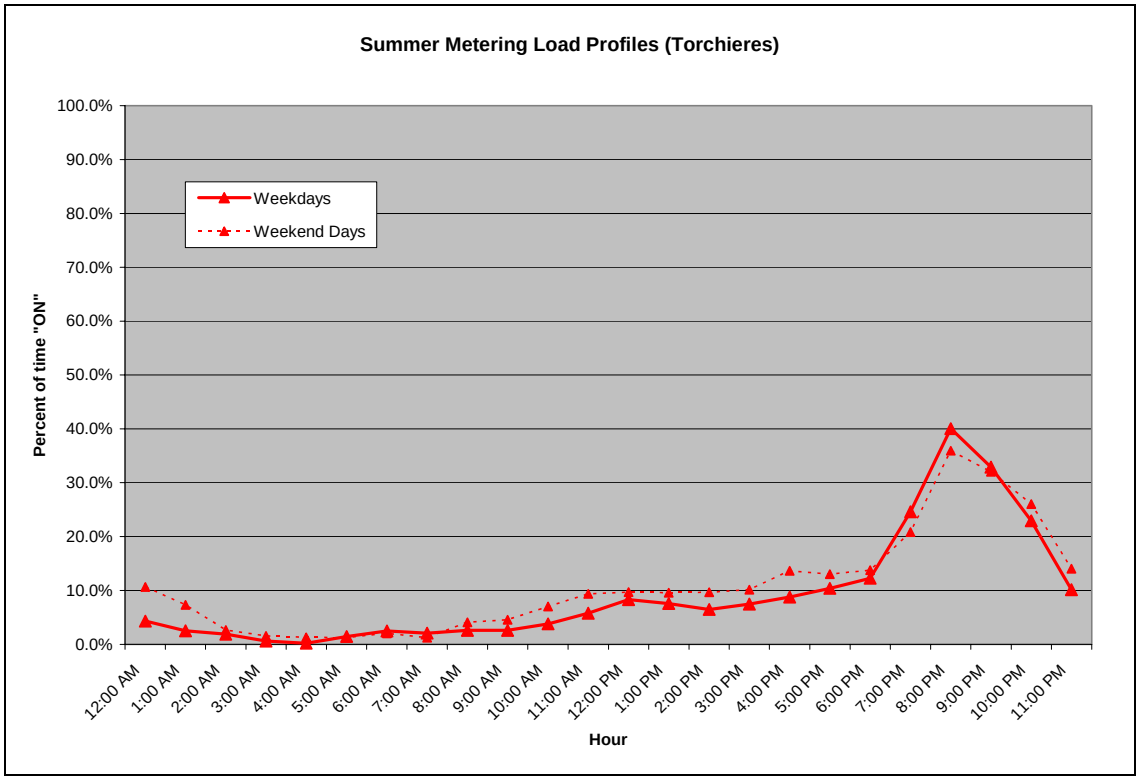
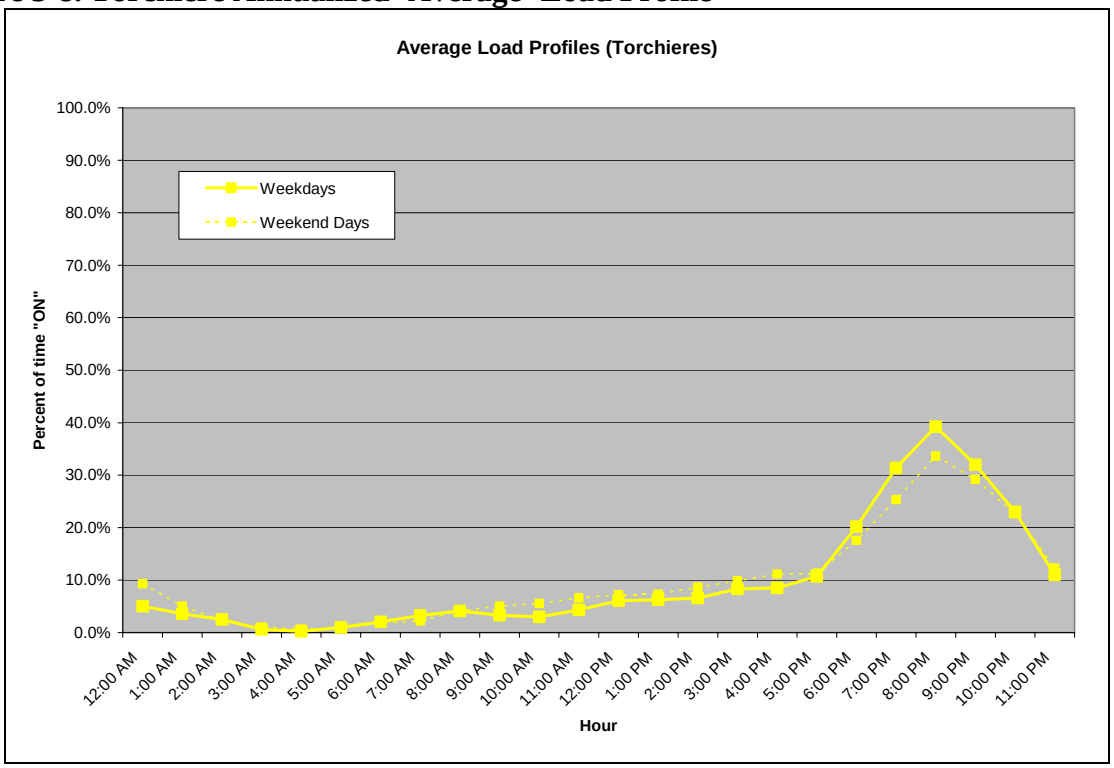


Figure 3-8. Torchiere Annualized 'Average' Load Profile



3.3.4 Recommended Amendments to SF Program Records and Ex-Ante Net Impacts

Addition of the Distribution of 900 Additional Torchieres

The SFPEP paid for and distributed 3,400 torchieres while PG&E program records show only 2,500 units distributed. The unaccounted for torchiere distributions took place between June and December of 2004. Table 3-28 provides the estimated kW and kWh additions to the program records that we feel accurately reflect the distribution of the additional 900 torchieres through the program. The NET additional kW and kWh impacts include a 0.89 NTG factor used for the residential elements of the SFPEP by PG&E in their program tracking database.

Table 3-28. Incremental Impacts of the Additional Torchieres

Additional Torchieres	Additional net kW	Additional net kWh
900	29.2	235,349

Seasonal Peak Impact of Torchieres

The net peak kW reduction for torchieres provided in PG&E program records is calculated by multiplying the annual electric energy savings (kWh/yr) by PG&E's capacity h-factor for lighting measures of 0.000124, and adjusting for for net-to-gross values. The workpaper calculated demand savings of 0.0324 kW per torchiere is as follows;

Summer peak net kW = 235.1 kilowatt hours saved / torchiere x .000124 h-factor / 0.8 base NTG x 0.89 NTG (NTG for local partnership and direct install programs) = 0.0324 / torchiere

The load profiles previously discussed demonstrate that winter torchiere peak usage actually occurs more closely with the winter peak period as defined from 5 – 7 PM. This implies that the h-factor for winter usage is approximately 3 times greater than a summer peak h-factor of .000124. For this reason it is recommended that a winter h-factor for torchieres of 0.000372 be applied to account for the true demand savings realized by torchieres during the winter peak period. This winter h-factor is based on the observation that more than 30% of torchieres become active between 5:00 PM and 7:00 PM during the winter, with peak usage occurring around 8:00 The following equation uses an h-factor of 0.000372 to concluded that the winter peak impact of the exchange of 3400 torchieres as 330 kW (including 87 kW form the additional 900 torchieres and 243 kW from the 2400 torchieres noted in the original program documents).

Winter peak net kW = 235.1 kilowatt hours saved / torchiere x .000372 estimated winter h-factor / 0.8 base NTG x 0.89 NTG (NTG for local partnership and direct install programs) = 0.0973 / torchiere

Table 3-29 shows the recommended adjustments to the single family program based on the addition of 900 torchieres, and also provides recommended summer and winter ex-post demand savings.

Table 3-29. Summary of SF program ex-ante and ex-post savings estimates

Savings Element	GROSS summer kW	NET summer kW	GROSS winter kW	NET winter kW	GROSS kWh	NET kWh
Ex ante savings	***264***	*235*	***NA***	***NA***	2,012,332	1,790,977
Addition of 900 torchieres	32	29	98	87	264,437	235,349
Application of winter h-factor to 2500 torchieres	***NA***	*NA*	***273***	***243***	NA	NA
Ex-post savings	***296***	*264*	***543***	***484***	2,276,769	2,026,326
Percent change	***12.3%***	*12.3%*	***NA***	***NA***	13.14%	13.14%

3.4 Multi-Family Rebate

3.4.1 Review of Program Records

The review of Multi-Family program element records was similar to the Single Family analysis. Verification results and calculations methodologies are discussed in the following sections. Regarding the completeness of program records, it was observed that the program database provided by PG&E was lacking customer information for a significant number of entries. Of particular note are the records for 30 Watt Energy Star Certified Interior Hardwired CFL Fixtures. Of the 17,763 fixtures reported to have been installed, 9,871 units (56%) have no customer name or service address associated with the SA ID (contract) number. Of the installations lacking records, 86% are associated with 2 contractors. Also of note are Energy Star Programmable Thermostats where it was observed that 45% of units installed have no customer name or service address associated with the SA ID (contract) number. Of the installations lacking records, 87% are associated with 1 contractor. While these records may exist in other program documents, the evaluation team was not able to conclude that the records are complete based on the data provided. This made verification of installed units difficult.

3.4.2 Verification of Multi-Family Measure Savings

The Multi-Family Rebate Program planned to provide for the installation of 10 lighting measures and a programmable thermostat, as well as facilitate the recycling of appliances. Table 3-30 provides the original program savings target and the results presented in the final PG&E tracking database. One reason savings were lower than expected may be that while the MF program was successful in installing CFL fixtures with an average of 3.5 run hours / day, efforts to install CFL lighting in long run hour common areas were not as successful, achieving only 1.6% of original kW savings goals for that measure.

Table 3-30. Recorded Multi-Family Direct Install Net savings

Record	Net kW	Net kWh	Net Therms
Planned	403	3,202,850	41,502
Recorded	210	1,630,223	28,739

Table 3-31 provides breakdown of savings by the measures installed through the program, as recorded in the PG&E database. Of particular note is that Energy Star rated Interior Hardwired CFL Fixtures accounted for approximately 85% of demand and energy savings, while making up roughly 72% of planned program savings.

Verification of MF Measure Installation Rates

There is little analysis that can be completed for the measure counts since the "expected" number to be installed in each apartment is unknown (program records indicate only the total number of fixtures installed at a particular facility).[31] For example:

Jerrold HUD Facility:

- Program tracking database installed fixtures = 8.1 per apartment
- On-site inspection installed fixtures = 8.31 per apartment (90% C.I. of +/- 0.55)
- On-site inspection working fixtures = 7.86 per apartment (90% C.I. of +/- 0.54).

This implies a 95% persistence rate. However, the difference between on-site installed and working is not statistically significant.

Oakdale HUD Facility:

- Program tracking database installed fixtures = 7.0 per apartment
- On-site inspection installed fixtures = 6.81 per apartment (90% C.I. of +/- 0.46)
- On-site inspection working fixtures = 6.52 per apartment (90% C.I. of +/- 0.45)

This implies a 96% persistence rate. Again, the difference between on-site installed and working is not statistically significant. The bottom line in terms of installed measures - the program tracking system appears to be accurate, and 96% of the installed fixtures are working.

[31] Participant data were provided from the MDSS system, and delivered to the evaluation team as an Excel file extract from that system (CCSF-MF, received in December 2004). In addition, the team interviewed PG&E program management and HUD representatives regarding installations at individual apartment units. Installation data at the unit level were not recorded or available, it appears.

Table 3-31. Multi-Family Program Element Measure Savings

Measure Description	Number of Units	Rebate Paid	% of Rebate	NET kW	% of NET kW	NET kWh	% of NET kWh
ES Interior Hardwired CFL Fixtures (16 Watts) 3.5 hrs	1,623	$97,380	8%	10	5%	81,194	5%
ES Interior Hardwired CFL Fixtures (30 Watts) 3.5 hrs	17,763	$1,064,580	85%	175	83%	1,413,647	87%
ES Interior Hardwired CFL Fixtures (16 Watts) for Common Areas	29	$1,740	0%	1	1%	9,948	1%
ES Interior Hardwired CFL Fixtures (30 Watts) for Common Areas	9	$314	0%	1	0%	4,912	0%
ES Exterior Hardwired CFL Fixtures (13 Watts) 8.2 hrs	319	$9,570	1%	4	2%	31,440	2%
ES Exterior Hardwired CFL Fixtures (27 Watts) 8.2 hrs	395	$11,850	1%	10	5%	76,807	5%
T-5 or T-8 Interior lamps with electronic Ballasts - (4 feet)	76	$456	0%	1	0%	5,073	0%
T-5 or T-8 Interior Fixtures for garage areas	25	$1,500	0%	0	0%	1,676	0%
Energy Star Programmable Thermostat	1,242	$62,100	5%	9	4%	5,527	0%
Total		**$1,249,490**	**100%**	**210**	**100%**	**1,630,223**	**100%**

Verification of Annual Operating Hour Assumptions

The total self-reported hours of use for the fixtures from both the on-site inspection and the survey were reviewed. The results are as follows:

- Average hours of use from on-site inspection = 4.64 hrs/day, with the 90% C.I. being +/- 0.48 hrs.
- Average hours of use from telephone survey = 2.99hrs.day, with the 90% C.I. being +/- 0.21 hrs.

So the 3.5 hrs used in the program database again seems reasonable.

Recommended Amendments to Multi-Family Program Records and Ex-Ante Net Impacts

Based on the analysis of the Multi-Family Program, there are no recommended changes in ex-ante savings estimates as presented in Table 3-32.

Table 3-32. Summary of MF program ex-ante and ex-post savings estimates

Savings Element	Net kW	Gross kW	Net kWh	Gross kWh
Ex ante savings	210	235	1,630,223	1,831,711
Ex-post savings	210	235	1,630,223	1,831,711
Total	***0.0%***		***0.0%***	

3.5 Summary of Impacts

A summary of the program planned, recorded (ex-ante), and evaluation adjusted (ex-post) estimated energy and demand impacts are contained in the tables below. The original program goals[32] were developed as GROSS targets, the program reported savings (ex-ante) are recorded as NET by PG&E in their databases[33], and savings adjustments were applied during the EM&V process to the *ex-ante* numbers at the measure level, then summed for each program. These ex-post NET savings were then '*grossed up*' by dividing the adjusted net savings by the NTG ratio previous applied – producing the GROSS savings outlined in Table 3-33 (Gross) and Table 3-34 (Net) below. It is recommended that reported demand savings be reduced by 951 kW (10%), primarily as a result of the reduced impact from occupancy sensors, measure L83, installed through the CRB program. Ex-post energy savings attributable to the program are approximately 4% less than program records due to mostly to reductions in the annual run hours estimates used to calculate the savings from 4-foot T8 lamp installations. A reduction in energy savings attributable to occupancy sensors also contribute to this revised value.

[32] Based on values presented in program PIP version 1.1.5 [1501-04_SFPEP_PGE_PGE_PIP_v1(1).5]. More recent PIP filings [SFPEP Monthly Rpt 0905 V2.1] indicate revisions in both the program kW and kWh goals; however these revisions could not be confirmed for inclusion in this report as of the submittal date.

[33] Based on PG&E and SFE program records received September 2005 [CCSF_9_16_05_Summit_Blue] that present final program activity as of Q1 2005.

Table 3-33.Comparison of GROSS program goals and ex-post savings

Program Element	GROSS MW (goals)	Summer GROSS MW (ex-post)	Winter GROSS MW (ex-post)	GROSS MWh (ex-post)
Cash Rebates for Business	18.65	6.60	6.60	38,025
SPC	2.10	4.26	4.73	31,336
Single Family	0.15	0.29	0.54	2,277
Multi-Family	0.40	0.24	0.24	1,832
TOTAL	**21.32**	**11.40**	**12.11**	**73,470**

Table 3-34. Comparison of NET program goals, ex-ante and ex-post savings

Program Element	NET MW (goals)	NET MW (ex-ante)	NET Summer MW (ex-post)	NET MWh (ex-ante)	NET MWh (ex-post)	Ex-ante Therms	Ex-post Therms
Cash Rebates for Business	17.90	6.88	6.34	38,222	36,504	0	0
SPC	1.11	2.26	2.26	16,608	16,608	0	0
Single Family	0.13	0.23	0.26	1,791	2,026	48,154	48,154
Multi-Family	0.36	0.21	0.21	1,630	1,630	28,739	28,739
TOTAL	**19.50**	**9.58**	**9.07**	**58,251**	**56,768**	**76,893**	**76,893**

While the stated summer and winter demand reduction target was a minimum 16 MW gross demand reduction, EM&V activities indicate that about 71% of that goal was achieved in the summer, and about 76% in the winter – *for the 2004 program year*. However, several measures and community outreach efforts showed promise for future success. Two energy efficiency measures contributed particularly to increased winter peak reductions. These were adjustable speed drives on HVAC equipment in the commercial sector and torchieres for residential lighting.

There are several reasons why the CRB, SF, and MF programs did not reach their savings goals. One important reason is that many measures for which the program had established savings goal were not installed at all or in a very limited fashion. For example, in the SF program 9 out of 11 measures fell below their kW savings target, while 60 out of 72 measures included in the CRB program did not achieve their installation goals.

Table 3-35 provides a review of measures that provided the highest contribution to savings by program, and also a view of measures that had low contribution rates, in spite of having significant savings goals. Appendix C-7 provides a table of all measures promoted by the Single Family, Multi-Family, and CRB programs, and the ex-post installation values. The SPC Program is not included in this table as this program element met the planned savings goals.

In reviewing Table 3-35, it can be observed that while the Multi-Family Program was successful in installing CFL fixtures with an average of 3.5 run hours / day, efforts to install CFL lighting in long run hour common areas were not successful, achieving only 1.6% of original kW savings goals. While the SF program was successful at installing a large number of CFL lamps, the program did not record any

installations of ES Interior Hardwired CFL Fixtures (16 Watts) operating at 3.5 hrs. These fixtures accounted for nearly 8% of program savings goals.

In reviewing the CRB Program, approximately 17% of measure types reached or exceeded 100% of planned savings, while 83% of measures fell below 100%. Measures that exceeded goals include High Performance 4-foot T8/T5 System, 6-foot High Display Case-Strip Curtains for Walk-ins, Delamping, and Cooler/Freezer Solid Door Gaskets. Five measures totaling nearly 70% of planned program savings failed to reach 10% of planned installations, including three lighting measures. This indicates that there may be a market preference for certain lighting configurations, while other configurations may be excluded from future program planning without impacting program performance.

Table 3-35. Review of measures contributing and not contributing to program NET savings

Program Element	Measure / Activity Description	Program Unit Goals	Program kW Goals	Program kWh Goals	Units Installed	Ex-post kW Savings	Ex-post kWh Savings	% of kW target Achieved
Multi-Family Rebate								
Highest contributing measures								
ES Interior Hardwired CFL Fixtures (30 Watts) 3.5 hrs		1,600	15.8	127,341	17,763	175.3	1,413,647	1110.2%
ES Interior Hardwired CFL Fixtures (16 Watts) 3.5 hrs		1,600	9.9	80,043	1,623	10.1	81,194	101.4%
Energy Star Programmable Thermostat		132	0.9	587	1,242	9	5,527	989.0%
Lowest contributing measures								
ES Interior Hardwired CFL Fixtures (16 Watts) for Common Areas - 24 hrs		2,400	102.1	823,300	29	1.2	9,948	1.2%
ES Interior Hardwired CFL Fixtures (30 Watts) for Common Areas - 24 hrs		2,400	162.4	1,309,795	9	0.6	4,912	0.4%
Single Family Direct Install								
Highest contributing measures								
Energy Star Torchiere (70 watts) Turn-ins		2,540	82.4	664,221	3,400	110.3	889,099	133.86%
ES Interior Hardwired CFL Fixtures (30 Watts) 3.5 hrs		2,000	19.7	159,177	8,773	86.6	698,189	438.7%
ES Screw-in CFL (14 to 20 watts) for calc. use 20 Watts		4,000	31.0	250,135	6,873	53.3	429,778	171.8%
ES Programmable Thermostats		1,800	12.4	8,010	2,081	14.4	9,260	115.6%
Lowest contributing measures								
ES Interior Hardwired CFL Fixtures (16 Watts) 3.5 hrs		2,000	12.4	100,054	0	0.0	0	0.0%
Cash Rebates for Business Customers								
Highest contributing measures								
High Performance 4 foot T8/T5 System (from T-12)		45,000	464.4	2,583,295	199,266	2,203.5	9,794,173	474.5%
Occupancy Sensors (L83)		6,183	2263	4,681,461	4,004	657	2,025,824	29%
6-ft High Display Case-Strip Curtains for Walk-ins		100	5.1	44,640	24,621	1,256.5	11,003,050	24648.4%
Delamping-Removal of Lamps, Lamp Holders, and Ballasts-4 foot lamp removed		5,000	184.9	1,028,534	6,356	261.8	1,238,009	141.6%
Food Service Refrigeration-Cooler/Freezer Solid Door Gaskets		100	22.9	200,736	720	170.4	1,490,484	742.5%
Lowest contributing measures								
Screw-in Compact Fluorescent Lamps - 14-26 watts (Modular)		100,000	4,901.6	27,268,116	10,310	473.1	3,117,069	9.7%
Screw-in Compact Fluorescent Lamps - >=27 watts (Modular)		75,000	4,450.2	24,756,579	3,672	215.8	1,296,107	4.8%
Reflective Window Film		843,173	1,821.3	10,069,514	3,516	7.8	41,989	0.4%
Fluorescent Fixture Conversion frm Incandescent >90 watts		2,000	660.4	3,674,020	1	0.3	2,311	0.0%
Booster Water Heater Conversion, Electric to Gas		2000	480.0	1728000	0	0.0	0	0.0%

3.6 Impact Based Recommendations

- More detailed study of occupancy sensors by space type is recommended, as this measure has significant peak reduction potential. As noted in Section 3.1.3 above, the workpaper states that the occupancy sensor is assumed to control eight 4-foot 2-lamp fluorescent fixtures, while most of the L83 controllers verified in the study field research controlled one 2-lamp fixture. It is likely that decreases in control prices have reached a point where it is economically feasible to install controls on smaller loads than currently prescribed by the PG&E lighting workpaper, and that the number of configurations offered in the lighting workpaper should be revised and expanded. For example, the use of occupancy controls to operate a single fixture with 2 T8 lamps and long run hours has been a successful installation, and should be considered as a standard configuration discussed in the workpaper.

- Measures with high winter peak reduction should be considered. All sectors logged showed that winter peak and summer peak are virtually identical. While this does not account for the presence of a winter peak in San Francisco, it does support the observation that a winter peak exists, and that this peak is of the same magnitude as a summer peak. It is likely that the widespread use of electric heating contributes to a winter peak; however an evaluation of the impact from electric heaters was beyond the scope of this report and should be the subject of a separate research effort. The list of measures should be reviewed and measures that have a high potential to impact electric peak (summer and winter) should receive increased marketing / program support. For example, the program provided incentives to convert Booster Water Heaters from electricity to gas. The program set a goal of installing 2,000 units with a potential to save 480 kW and 1,728,000, yet no installations of this measure were recorded even though this measure would likely impact peak.

- In support of the previous recommendation, a review of electric heating loads in the City of San Francisco should be undertaken, and an analysis of achievable potential for retrofitting those loads be completed

- An investigation of whether the operational characteristics of SPC lighting installations are similar enough to those evaluated for the Cash Rebates for Business element, to determine whether it is appropriate to apply the ex-post lighting measure savings from the Cash Rebates for Business analysis to SPC customers.

- Given recent volatility in natural gas markets, PG&E may want to consider a review of therm savings for program elements that produce gas savings.

- More complete program records should be kept by direct install field contractors for Single Family and Multi-Family Program elements. For example Multi-Family Program records indicate that 17,763 ES Interior Hardwired CFL Fixtures (30 Watts) 3.5 hrs were installed against an original program goal of 1,600 units. Of the 17,763 units, 9,871 (56%) have no customer name or service address associated with the SA ID (contract) number. Also, 1,242 thermostats units were installed against a goal of 132. Of the thermostat installations 45% have no customer name or service.

- The list of measures that contributed to success of the program should be reviewed, and measures for which there was either no market or program support should be dropped. For example, the CBR program provided support for 72 measures of which 39 (54%) did not record any activity. Reducing the list of qualified measures may help reduce program overhead and help focus on

measures for which there is market and contractor support. This effort to rationalize the product offering may also exclude measures for which there may be a market, but for which the program goals are not significant. For example, program planning documents set a goal installing 5 Floating Head Pressure Controllers-Evap Coolers with a targeted savings of 0.1 kW and 3,771 kWh. While no such devices were submitted to the program, it is possible that the overhead needed to support any submittal would have offset the benefits of this measure.

4. PROCESS EVALUATION RESULTS

This chapter presents the findings from the process evaluation. Section 4 presents the findings from the partnership interviews conducted with program staff, community, and business organizations, including other involved CCSF departments, and implementation contractors. Specifically, Section 4.1 outlines the partnership context, Section 4.2 compares the SFPEP program to energy efficiency program best practices, Section 4.3 summarizes evaluation findings by key issue areas, and Section 4.4 provides detailed findings that support the summary information on the partnership planning effectiveness. Section 4.5 provides detailed findings on implementation effectiveness, and Section 4.6 provides details on program management, administration, and information management. Section 4.7 presents the findings from the participant telephone surveys that were conducted to elicit feedback on the various program elements and customers' experiences with those elements. The over-arching process recommendations viewed by the evaluation team that would have the greatest impact on future program efforts are summarized below:

Over-arching program recommendations:

- Allow more time – partnerships require time to develop. A one-year program is not sufficient, particularly given the time required for initial program planning and approval.
- Separate social goals from program impact goals by providing separate funding for training, and community outreach efforts.
- Keep it Simple! A simpler program structure would not only reduce the regulatory reporting requirements for program budgeting and expense accounting, some program elements (like codes and standards or emerging technologies) may not be appropriate for a first-time partnership.
- Better coordinate measure incentive levels and eligibility with statewide programs. While a relatively small percentage of program participants were aware of the statewide program, there was confusion about eligibility among some customers.

4.1 The Partnership Context

The San Francisco Peak Energy Program was formally rolled out in December 2003 at City Hall by the Mayor of San Francisco and the CEO of PG&E, after nearly a year of planning and regulatory approval. The program evolved when PG&E initiated discussions in 2002 to develop a partnership program, and together with San Francisco's Environment Department presented to the CPUC a proposal for the SF Energy Efficiency Pilot Program. This resulted in an April 2003 CPUC approval of the concept for San Francisco, and the development of implementation plans by PG&E and SFE in the spring of 2003. These plans were submitted as the SF Peak Energy Program (SFPEP) in June 2003. The implementation plan was approved in July, though subject to several significant caveats, including a 150% cap on incentives above PG&E's statewide programs (regardless of PEP measures' cost-effectiveness), requiring 50% of installed CFLs in the program to have modular ballasts, that CFL impacts could only be counted for CFLs installed directly by the program, and that administrative costs could not exceed 20% of total program costs. Updated energy savings targets were filed by PG&E in November 2003.[34]

[34] 2003 Energy Efficiency Quarterly Report Narrative, San Francisco Peak Energy Pilot Program, Pacific Gas & Electric Co., May 2004, and discussions with Project Advisory team.

The planning involved many iterations, including four regulatory filings at various intervals over the course of 2003: the initial program concept, the program implementation plan (PIP), the revised PIP resulting from the initial regulatory review, and a further revised PIP when incentives issues were sorted out between PEP and the statewide programs.

The primary goal of the program was to achieve a *minimum* of a 16 MW (gross) load reduction coincident with the city's summer daytime peak, and to achieve similar reductions in winter evening peaks by 2005. Demand-side resource potential was analyzed in the Electricity Resource Plan conducted by the City of San Francisco. The ERP indicated that a demand-side management program was key to ensuring adequate capacity reserves in the city by limiting projected load growth. The partnership estimated that a total of 24.4 MW was achievable through the program, with the majority of the potential in the commercial sector. The Program has projected (planned) savings of 23.2 MW gross peak reduction in the summer, and 18.4 MW during the winter peak.

A significant part of the partnership strategy was to play to each organization's strengths in planning, marketing and outreach, administration, and other program functions. Throughout the program's life cycle, part of the challenge and learning experience for both organizations was figuring out how to utilize their respective strengths, and then putting them to the most effective use. PG&E already had the infrastructure in place to process program applications and incentives, as well as having existing contracts in place with local contractors who could be deployed to provide similar efficiency services for SFPEP. PG&E administered the program budget and planning process. PG&E also had existing relationships with large customers through their key account reps that could be leveraged to promote the SPC program element. SFE, on the other hand, had established relationships with many small business owners, cultural groups, and neighborhood associations that could be leveraged to provide outreach to key market sectors. This led to SFE taking a larger role in marketing and outreach, and in implementing the CTS program element and in promoting the Cash Rebates element to small business customers.

PG&E took the lead on program planning efforts using their extant planning and development processes. SFE provided comment and suggestions regarding various program element details, including selection of efficiency measures, incentive levels, methods for marketing and outreach, etc. PG&E staff believe, in hindsight, that SFE ought to have been more involved in the *initial* planning effort than they were. SFE staff felt frustrated by the PG&E planning process, its apparent bureaucracy, and its seeming lack of flexibility. *There was a sense on the part of SFE that PG&E wanted to avoid significant alterations to the statewide programs PG&E already had in operation*, and whether *true or not* that *impression* both limited and predisposed the development of SFPEP and its various elements' features. An example of this concern can be seen in the way in which refrigeration measures were promoted, specifically the effort to replace worn or missing gaskets on walk-in cooler doors. SFE recognized that, due to the high number of restaurants operating in the City, this measure had the potential to reduce winter peak, and sought to increase the incentives for contractors installing this measure above that being offered by the statewide program. For most of the program, this did not occur. But when incentives were doubled for this measure late in 2004, SFPEP saw a surge in the replacement of gaskets, and significant additional savings accrued to the program.

The partnership involved a blend of market actors in the San Francisco bay area. PG&E and SFE were the primary partners, but there were several secondary partners as well, who were engaged to help carry out the program efforts. There were no formal partner agreements with other organizations that were involved with PEP, except the existing contracts for the installation contractors PEP used and that had been in place previously with PG&E. PG&E staff noted that initially they were unsure how other organizations would specifically be used, so leaving those relationships informal was somewhat intentional.

These other organizations and individuals primarily provided marketing and outreach assistance, but also facilitated workshops, helped exchange equipment and otherwise catalyzed the program effort. Data collection efforts focused on getting a perspective from each of the groups represented in Figure 4-2. The appendix contains a list of all stakeholders interviewed. Given the number of actors and institutions involved, it is not surprising that the program experienced a rather convoluted course of development.

4.2 Energy Efficiency Program Best Practices and SFPEP

The process evaluation used a variety of data collection methods and auxiliary information to analyze the effectiveness of the overall partnership between SFE and PG&E, and the effectiveness of program delivery for each of the key program elements. In reviewing the effectiveness of planning, program tracking, marketing and outreach efforts, and oversight, the evaluation team sought to keep program best practices in perspective. Figure 4-2 summarizes best practices concepts typically found in energy efficiency programs. These provide a useful benchmark for examining the Peak Energy Program.[35] The columns following each best practice indicate whether the SFPEP partnership *worked well* in regard to this best practice, had problems in this area, or made a *good effort* that didn't necessarily work out as intended. The last column in the table directs the reader to the section in this report that discusses the material in more detail.

4.2.1 Best Practices – SFPEP Strengths

The partnership attempted to utilize a number of these best practices to plan and implement the program, although not explicitly and with mixed success.

- The program was based on a clearly articulated theory: a partnership approach that would work to the strengths of each partner with a localized focus on achieving impacts to address San Francisco's unique energy resource needs.
- It linked the strategic approach to resource planning objectives and constraints, especially the time frame in which resources were needed.
- Feedback from program operations guided program evolution over the course of the program's tenure.
- It tried to understand and address local market conditions in terms of impacts to be achieved.
- It had a written program implementation plan. Through the regulatory review process its scope was expanded to address hard-to-reach customers.
- Program responsibilities were defined contractually and through daily interaction of the partners to coordinate roles and responsibilities.

[35] Source: National Energy Efficiency Best Practices Study, Volume S – Crosscutting Best Practices and Project Summary. Quantum Consulting for the California Best Practices Project Advisory Committee, December 2004.

Figure 4-1. San Francisco Peak Energy Program Partner Relationships

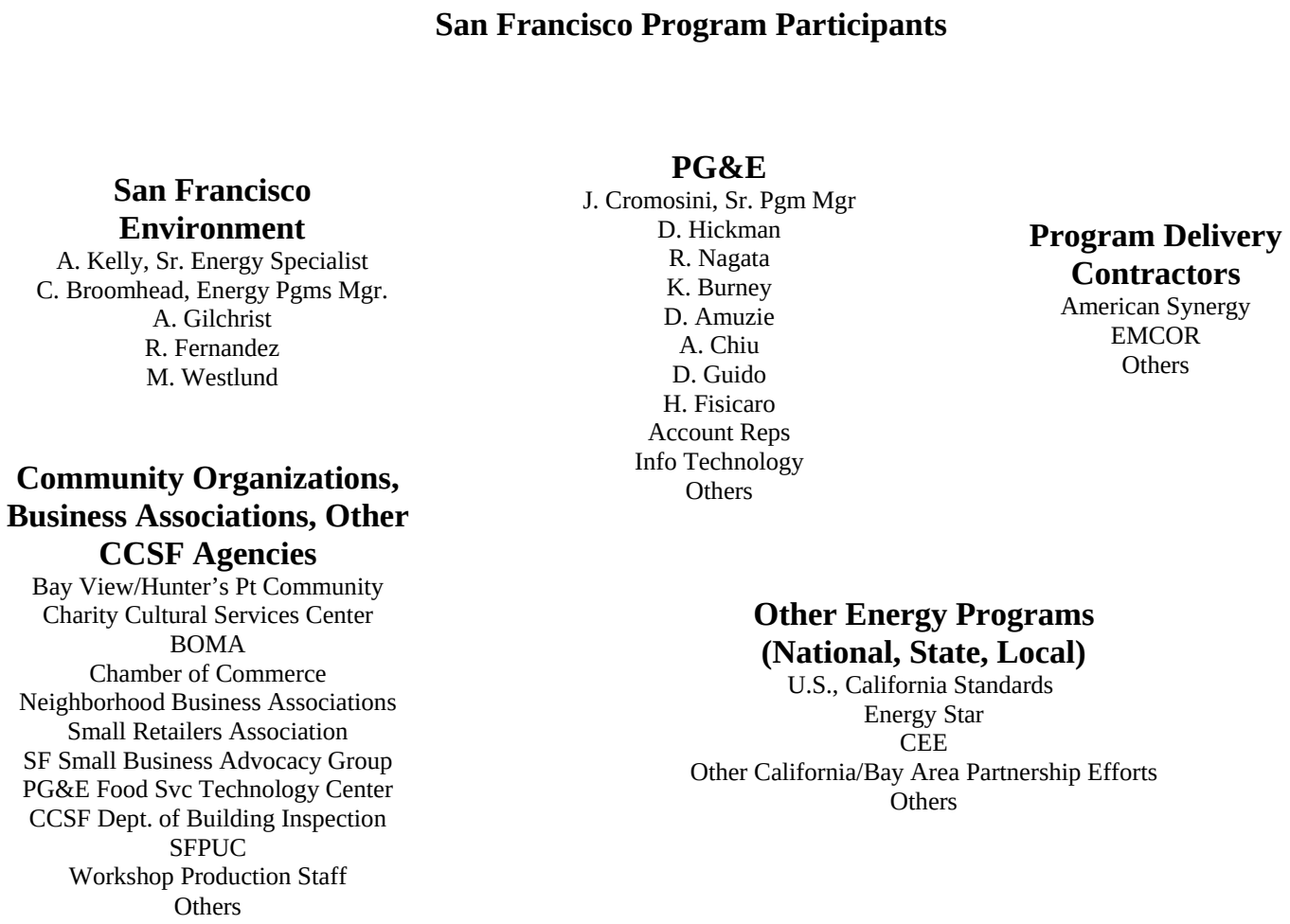


Figure 4-2. Energy Efficiency Program Best Practices

EE Program Best Practice	Worked well	Problematic	Good effort/didn't always work out	Section where addressed
Program Theory and Design				
• Develop a sound program plan; if possible have a clearly articulated program theory			X	4.4.1
• Link strategic approach to policy objectives and constraints			X	4.4.2
• Build feedback loops into program design & logic	X			4.4.3
• Do not over-promise results		X		4.4.2
• Understand local market conditions	X			4.4.4
• Conduct sufficient market research				
• Maintain program design flexibility to respond to changes in market & other factors			X	4.4.5
• Put process plan (including program management) in writing			X	4.4.5
• Define & locate hard-to-reach customers & target programs accordingly, as appropriate	X			4.4.3
Program Management: Project Management				
• Clearly define program management responsibilities to avoid confusion as to roles and responsibilities			X	4.5.2
• Use well-qualified engineering staff (for technical programs)	X			4.6.1
• Delegate responsibility based on risk versus reward			X	4.6.1
• Reward high performing staff and link staff performance evaluations to tangible measures		X		4.4.5
Program Management: Reporting and Tracking				
• Define and identify key information needed to track and report early in the program development process			X	4.6.3
• Clearly articulate the data requirements for measuring program success			X	4.6.3
• Design program tracking system to support evaluation as well as program staff			X	4.6.3
• Use Internet to facilitate data entry & reporting; build real time data validation systems that perform data QC functions		X		4.6.3
• Automate, as much as is practical, routine functions (e.g., monthly program reports)		X		4.6.3
• Develop electronic application processes				
• Develop accurate algorithms & assumptions on which to base savings estimates			X	3.2
• Conduct regular checks of tracking reports to assess program performance			X	4.6
• Balance the level of tracking planned against program resource availability			X	
• Document tracking system & provide manuals for users			X	

- Appropriate staff was deployed to support technical as well as other program functions. Information needing to be tracked was identified in program planning, as were data requirements for measuring program success, including use of a program tracking system.
- An internet website was established, though its function was primarily informational.
- Savings estimates were based on pre-existing algorithms and assumptions, and tracking reports were utilized regularly to check progress.
- Overall, program resources were managed to focus on achieving success in the field and to avoid becoming too focused on non-productive data tracking and marginally useful functions.

4.2.2 Best Practices – SFPEP Weaknesses

There were significant difficulties trying to implement these practices, however, whereby the program was not able to fully succeed in carrying out a best practices effort.

- The program plan as finalized and implemented reflected a dual-purpose theory of resource acquisition and local economic development that strained the program's limited resources.
- Expectations of some community members for the program's social objectives that were added during the course of program planning implied that the program over-promised results for that aspect of the program. This also meant that the resource impact results of the program were made more difficult to achieve, and so became a results promise that was more difficult to achieve.
- The program plan was undercut by developments in statewide programs that were not adequately coordinated up front, with significant consequences for the program's impact results. Though the regulatory process brought due diligence to consideration of community needs for hard-to-reach residential customers, the resulting dilution of program resources made it more difficult to successfully address both the impact and social objectives set forth for the program.
- The program roles and responsibilities laid out in the contract between SFE and PG&E specified too many tasks given the limited resources available to the program. As extensively detailed as the contract was, however, there still were functional gaps and misunderstandings that had to be worked out as the program moved along.
- There was not enough technical staff available to fully carry out the CTS program element, for example, as those resources had to be redirected to other activities to serve local community needs identified in the revised Program Implementation Plan.
- There was some disagreement about the role SFE would have with promoting the program to large C&I customers, whereby the partners generally agreed PG&E would take the lead with large customers. SFE felt they should have had a larger role than they did and PG&E felt SFE should have had a smaller role than they did.
- PG&E felt they were assuming the primary risks in the program and saw their responsibilities accordingly, while SFE felt their role was made secondary even though they viewed the program as being their initiative.
- There was no apparent reward for high performance, nor any clear link observed to tangible, pre-agreed measures developed jointly by the program's managers and staff.
- Program tracking was onerous, according to program staff, and not entirely useful for internal program management. The program tracking system used was adequate for most program tracking but it did not enable integrated tracking of CTS cross-marketing effects in PEP's Cash Rebates, SPC, or statewide programs, to allow for evaluating the effects of CTS on customers subsequently installing EE measures.

- There was little automation for data entry and reporting other than what was already in place for PG&E's statewide programs. This was not considered a significant problem for the program.
- Program eligibility and incentive design changes relative to developments with statewide programs caused extensive reworking of program data, marketing collateral and a redoubling of field activities to address the problems caused by the lack of program design coordination between statewide programs and PEP.
- There were disagreements about some of the measure savings and incentive values used for planning, and there were data inaccuracies that were not corrected until after the program had been in the field for some time. These data issues included overstated impacts being recorded and program efforts having to be redoubled to make up the gap. They also caused skewed participation levels for some efficiency measures that short-changed the program's impacts as customers chose to participate in statewide programs instead.

Thus, as the following sections will cover in depth, the program had mixed success with best practices. It can be concluded, however, that despite its difficulties the program benefited from its best practices efforts, which helped overcome many obstacles and enabled PEP to largely meet its aggressive goals.

4.3 Summary Findings by Evaluation Issue Area

The evaluation plan identified a series of issues important to understanding the program's successes and failures. The following tables (Tables 4-1 and 4-2) organize key findings from the evaluation according to each of the issue areas identified in the evaluation plan. *Additional details regarding these findings are contained in an expanded table in Appendix B-11.*

Table 4-1. Partnership key findings summary, by issue area

Partnership Research Issues	Key Findings
SFE/PG&E Partnership effectiveness	o The partnership was greatly challenged by three significant issues: 1) the time the regulatory process took and the consequential shorter time frame the program had to achieve its impact objectives; 2) the additional social objectives the program took on that did not receive additional funding to staff and operate – thus straining the partners' resources; and 3) program measure incentive and eligibility coordination difficulties encountered due to PEP's relationship to statewide programs. To their credit, the program staff at both PG&E and SFE worked diligently, and for the most part successfully, to overcome those difficulties.
SFE/PG&E/Community Organization Partnership effectiveness	o Community organization partnering was informal. More formality to codify roles and expectations earlier probably would have helped. o Roles and responsibilities of most community organizations involved with PEP were primarily to assist PEP's marketing and outreach: event planning and facilitation, implementation support for lighting exchanges, etc. o PG&E's supported the outreach efforts undertaken by the Charity Cultural Services Center, and trained 10 individuals at the company's training center to perform audits, with potential follow-on employment possibilities being explored. A significant, if perhaps under funded, effort to install high-efficiency lighting in moderate-income homes in the Bay View/Hunters Point neighborhood was mounted, as was a major torchiere exchange effort for seniors and ethnic neighborhoods. o Other CCSF agencies' roles as complementary agents having their own missions and efficiency objectives was not as successful (Building Inspections re: codes and standards, and providing a forum for PEP information dissemination; SFPUC re: joint marketing with SFPUC's water efficiency effort). Time limitations and competition for information "space" hampered the joint efforts. o As a pattern, the community-based organizations and individuals interviewed for the evaluation interacted mostly with SFE. This observation reflects how SFE's strengths in community outreach were utilized in PEP.
SFE/PG&E/Contractor Partnership effectiveness:	o PEP piggybacked off PG&E's contractor and low-income weatherization program for the Single Family and Multi-family program elements. The approach caused concern among some community organizations, however, that local training and job creation opportunities were lost. PG&E subsequently supported an effort to train interested community individuals to help with energy audit work in the future. o SFE undertook a significant effort to work with selected contractors to promote refrigeration measures such as gaskets and strip curtains. Contractor expectations of using such PEP measures to cross-market maintenance contracts and other equipment sales did not materialize, however, causing some alienation among the contractors. o SFE's mini-audit services to support contractors and customers were useful in providing a neutral perspective on measures contractors were recommending to customers.

Partnership Research Issues	Key Findings
Efficiency of the partnership implementation	o While PG&E and SFE held differing views regarding the speed in which the third party program originally proposed by SFE could have been implemented, SFPEP got implemented in about the same time SFE staff had originally projected they would have launched their originally proposed program. How much different the program effectiveness might have been with SFE's original program concept can only be speculated.
Effects of SFPEP differences from Statewide programs	o PEP's program elements had many similarities – structurally, promotionally and administratively – with PG&E's statewide program portfolio because that portfolio was used as the planning basis for the SFDI, MF Rebate, SPC, and Cash Rebates for Business elements. o Incentives and eligibility adjustments took time and effort away from achieving the program's impact goals. For example: SPC and Cash Rebates customers were confused about program eligibility. Statewide program incentives for some measures were increased to be equal to PEP levels, and eligibility rules were not clear regarding PEP eligibility precedence. Some customers were referred to the statewide program instead. This affected the amount of impact that PEP was able to count toward the resource goal.
Aspects improved by partnership	o Marketing effectiveness was improved by the partnership, and had the program continued over a longer period that effectiveness probably would have further grown. Community outreach was improved by the partnership, particularly in residential and small business segments that utilized SFE's relationship strengths for such efforts as the torchiere exchanges and the CTS effort.
Recommendations for changes to partnership arrangement in future	o Keep the Focus on one key program objective: either focus on achieving cost-effective energy savings or focus on community development, but not both as doing so may mean neither objective is fully met. o Be as clear as possible up front about each partner's roles and responsibilities, but also be willing to adapt those roles and responsibilities as the program situation develops. o Recognize that regulatory oversight likely will add both significant time to the planning cycle and require additional program objectives for which significant added program resources will be required to effectively meet.

Table 4-2. Program Element Partnership interview key findings summary, by issue area

Issues Related to Program Element Implementation	Key Findings
Did the element reach its *efficiency goals* and "Hard-to-reach" *market segment targets*	o Cash Rebates had significant difficulty meeting its efficiency goals, due to a variety of factors ranging from program resource limitations, to coordination difficulties with the statewide Express Efficiency program, to planning assumptions that resulted in lower impacts being achieved than thought. o The SPC element exceeded targets. Higher incentive levels attracted contractors to PEP, with SPC in particular seeing disproportionately large participation (about half the statewide SPC participants in 2004 were through PEP). Other factors include PG&E Key Account Rep efforts in directing customers to PEP. o It is unclear whether the CTS element drove participation in the Cash Rebates and SPC, though anecdotal evidence suggests some effects. o Hard-to-reach markets were served through all the PEP program elements: ethnic, low-income, geographic, and small business markets all were served. o Focused community energy efficiency economic development and retrofit efforts likely would have been more effective than attempting to piggyback on resource acquisition programs.
Customer satisfaction with services and products received and experience	o Restricting the CFL technology to modular ballasted type units was felt by program staff (both SFE and PG&E) to have constrained the impact from CFL measures because of lower market acceptance compared to self-ballasted units. o The programmable thermostats in the Multi-family and Single Family elements proved to be problematic due to their being of lower quality (result of budget constraints) and customers not understanding how to utilize the equipment. o Initially it was unclear whether San Francisco-located customer facilities would be eligible only for PEP or also eligible for the statewide program for measures offered in both programs. Until it was clarified that customers in SF were to use PEP where a given measure was offered in both PEP and statewide programs, customers naturally applied to the program with the higher incentives. This resulted in some measures being counted in the statewide program rather than PEP.
Reasons for *participation*	o Stakeholder interviews indicated customers in the business program elements participated to save money but also to help the city avoid an energy shortage. Stakeholders felt residential customers participated because they were getting free equipment and would save money. This compares with the participant survey findings where saving money was identified by pver 90% of business participants as the key reason for participation.
Barriers to participation:	o A major barrier to participation was the limited time the program had to operate, largely because of the long time involved with planning and gaining full approval of the program. o Funds to install lighting equipment in the Multifamily Rebate element limited the number of units that were installed. Some residents in the neighborhoods where lighting equipment was installed, but who did not themselves have equipment installed in their residences, were disgruntled as a result. o Many restaurant measures were not well accepted, perhaps because of the concerns about comfort and perceived impacts on restaurant operations. o Other market barriers included concerns over payback. This included both

Issues Related to Program Element Implementation	Key Findings
	customers and contractors who viewed some measures (like refrigerator gaskets as 'loss leaders' that could allow them to promote additional services to customers. o Cultural realities appear to have affected the torchiere exchange effort, where one or two residential market segments had few participants because a smaller fraction of the segments own torchiere lamps than other residential segments.
Effectiveness of *marketing*.	o Multi-lingual versions of selected marketing flyers was very helpful in recruiting participants of differing ethnic backgrounds. o Cash Rebates and SPC were promoted in a variety of ways: directly by contractors, through the program's various promotional materials and events, and through the CTS element's activities and measure recommendations. The mix of approaches was needed to achieve the program's goals and were believed by program staff to have been successful. o Single Family and Multi-family elements were operated by contractors, who canvassed target neighborhoods. Community meetings, publicity events, and promotional materials (including website) helped. Promotional flyers did not work well alone, but were helpful when canvassing door-to-door. o CTS services were promoted by SFE directly to targeted segments, particularly food service-related customers. CTS services identified a broad range of measures including those in statewide programs but not PEP. LED "OPEN" signs were a popular foot-in-the-door tactic to generate CTS leads. o Publicity events were seen as a cost-effective way to build awareness, especially for lighting technologies. LED holiday lights, while not eligible to be counted for program impacts because of their temporary nature, were a useful promotional tool for building awareness of energy-efficient lighting. o The short time available for joint outreach efforts with water, building inspection, and other City departments before PEP ended resulted in less activity than could have been realized with a longer partnership.
Effectiveness of program *delivery*:	o Few problems were encountered in processing customers' applications for incentives for the SPC and Cash Rebates elements. The Multi-family element used an electronic application process and saw improved efficiency. o Toward the end of the program there was a lag between funds that had been reserved for measures to be installed, and completing those installations.
Recommendations for *changes* to program design or implementation steps	o Do not assume that existing planning process, data, marketing tactics, or administrative processes are appropriate to the program situation, or that they will necessarily result in faster, more cost-effective program development and implementation. As a corollary, take advantage of existing processes and information to avoid re-inventing things. o Learn how to work with regulators to speed the regulatory process. o Take constructive advantage of potential community relationship development opportunities with the program, but be assertive about *core objectives needing focused resources* to achieve impact objectives. In other words, be clear with regulators if there are concerns that other objectives may negatively affect primary objectives. o Integrate databases as much as possible to enable cross-marketing effects to be tracked, and enable better performance analyses.

Issues Related to Program Element Implementation	Key Findings
Program design	o Higher incentive levels attracted contractors to PEP, with SPC in particular seeing disproportionately large participation o A reservation system was needed as program incentives were limited. Overall, the limited incentive funds constrained the program's ability to reach its goals. o There was not enough budget for lighting equipment to enable full coverage of the target markets for residential lighting retrofits. o The limited budget forced use of lower quality equipment for some measures than was desired. o There was difficulty meeting the program's deadlines. The short time frame in which the program had to operate was a major factor in this, as was having a broader program scope to serve selected residential segments. The program had to apply for an extension as a result.

4.4 Partnership Planning Effectiveness Detailed Findings

Overarching planning concerns arose that affected program activities and eventual achievements. These include the following:

- Program timing – how quickly the program could be developed and fielded in time to address the city's electricity resource needs.

- Program budget, scope, and content – how different the program elements would be compared to statewide programs involving similar efficiency actions.

- Administrative processes – how the program would operate day-to-day, what information needed to be managed and in what ways, etc.

- Use of community-based resources – whether the program would incorporate significant, different mixes of community-based resources than initially contemplated.

This section addresses various aspects of PEP in relation to these issues as learned from the partnership stakeholder interviews.

4.4.1 Planning – General Perspective and Issues

Overall, the planning process was lengthy and complicated. It included both an internal contract development effort and an external regulatory review effort. It reflected historical practices by the institutions involved, resulting in both positive and negative consequences.

The program planning strategy was significantly affected by regulatory policy. SFE's original strategy was to develop a stand-alone, third-party program that was to be funded directly by Public Goods Charge (PGC) money through the California Public Utilities Commission. Thus, the PGC funds would have been utilized solely by SFE for the program, and the program would not have been run in association with PG&E. At the very time SFE applied for those funds, however, the *CPUC made a strategic decision to not fund new third-party programs, but rather directed parties seeking PGC funding to work through utilities like PG&E*. SFE then turned its effort to working with PG&E, which had unspent program funds

available, on a partnership approach as the only viable alternative to its original intent for an independent program.

The planning process, therefore, began well before SFE turned to PG&E to develop a partnership approach for the program, as previous programs and SFE's intentions for PEP as a third-party PGC-funded program set the stage for the partnership developed with PG&E. Indeed, city/utility relations have a long history – some positive, some not,[36] as one SFE staffer noted: "PG&E and the City go back a long time in terms of distrust. Every time PG&E digs up a street, something happens…"

Previously, SFE had wanted to develop a program independent of PG&E's statewide program portfolio, specifically tailored to the electricity resource needs of San Francisco as reported in the city's Electricity Resource Plan (ERP) developed in 2003.[37] SFE had had previous energy efficiency program experience, for example having conducted the ***Power Savers*** program in 2001-2003. From that experience and in light of the ERP that profiled the city's year-round peak energy resource needs, SFE staff had developed various ideas about what would comprise an effective program for the city.

Key issues: Program Planning

- CPUC directed third-party applicants to work with IOUs.
- Both SFE and PG&E felt partnership timing was good.
- The planning process was lengthy and complicated: 4 iterations of the plan were filed with the CPUC before program launch.
- Utility review processes (legal, financial) sometimes slowed decision-making, and CPUC approval cycles exacerbated delays in some cases.
- While SFE felt that fully customized programs for San Francisco were in order, PG&E thought the use of statewide program delivery infrastructure already in place would be more cost effective. Compromises were required.
- Planning data and assumptions required considerable efforts to develop appropriate program impact and cost projections. There were omissions and incorrect data that caused delays while the difficulties were worked out, and there were operational consequences to the program from not having close enough review of the data used.
- ***In the end, program impact goals were overly ambitious for a new partnership.***
- PG&E's staffing emphasis had shifted from direct program development to managing program delivery contracts, so program expertise had to be regrouped.
- Community activists felt the planning process did not fully recognize their concerns.
- ***Partnerships depend on people relationships. They take time and commitment to develop in order to maximize the effectiveness of planning efforts as well as subsequent program operations.***

PG&E came to the partnership with a long history of traditional utility-run energy efficiency programs. The Company's program infrastructure had changed somewhat, however, because of electricity market restructuring in California that had shifted programs to operate under the auspices of the California Board for Energy Efficiency (CBEE). SFE, for example, perceived that PG&E's organizational emphasis had shifted from direct program development and operational management to one of managing program delivery contracts let to energy efficiency service providers. In SFE's view this left PG&E less able to effectively and flexibly plan for a new, unique program such as what SFE had in mind.

[36] While a number of political and financial issues may color some city/utility interactions, it is not the role of this evaluation to research those issues. It is relevant to note, though, that other issues *may affect* organizational interactions.

[37] See "An Energy Resource Investment Strategy (ERIS) for the City and County of San Francisco" – Final Report, Rocky Mountain Institute, December, 2003.

PG&E, for their part, felt their planning process for energy efficiency programs would be appropriate for planning PEP. Using the existing program planning process, they felt, gave the partnership a better chance of meeting the impact goals in the necessary time frame, and it would be less costly and time-consuming than developing a special program from scratch. This may be true as evidenced by the new program elements that were developed, such as the Emerging Technologies element, which indeed took considerable time to get up and running. Also, PG&E does have an extensive amount of program business infrastructure and staffing in place and operating to support various statewide programs.

SFE believed a from-scratch, customized program could have been developed quickly and effectively. Whether that in fact would have been true is uncertain, in part because of the regulatory process and associated delays experienced in planning the program that would likely have taken place to some extent regardless of whether the program was planned entirely from scratch or by using PG&E's existing portfolio and development process as the program basis. In the end, the time that ended up being needed using the PG&E planning process that included extensive internal policy, marketing communications, and legal reviews – along with the regulatory review and approval process – all took nearly a year to play out and the program was launched about the same time SFE staff thought it would have had it been developed as an independent program.

So again, PG&E's program planning process was used to develop PEP. It was based on PG&E's existing program mix, impact estimates, and cost assumptions. SFE staff felt these were not entirely appropriate given that PEP's objectives were different and the market base was different than PG&E's standard programs. PG&E's use of its existing process and programs in SFE's view reflected a certain analytic inflexibility. Initially, PG&E's planners appear not to have considered that PEP might need a different set of analytic data for planning it, or that a different mix of products and services, and impact and economic analysis values, should be specified in the planning process. For example, the initial planning spreadsheet was only populated for CFL participants and did not include participant counts for measures SFE staff had identified and suggested to include in the program impact mix. As a result, the plan in effect assumed impacts only from CFLs being installed and not other measures. The oversight was discovered only after the initial program implementation plan had been filed with the CPUS

Also, impact assumptions for certain measures such as occupancy sensors were based on a standard value set defined in the DEER database, reflecting a summer afternoon peak coincidence value. Those values were not always appropriate for the ***winter evening*** peak that San Francisco experiences, so SFE believed different values should be used. PG&E's avoided cost assumptions on a system-wide basis stated the San Francisco winter peak as only being a partial peak, with lower value than the critical peak – yet the resource needs for San Francisco suggested to SFE that a greater avoided cost value should be utilized. The planning process worked out these and other fairly arcane (to lay people) issues to develop projected program savings and cost estimates. The planning involved many iterations, including four regulatory filings at various intervals over the course of 2003: the initial program concept, the program implementation plan (PIP), the revised PIP resulting from the initial regulatory review, and a further revised PIP when incentives issues were sorted out between PEP and the statewide programs.

Ex-post impact estimates indicate that while statewide program measure savings estimates were appropriate in most cases, significant adjustments were required for some measures and sectors.[38]

[38] See discussion in Chapter 3. It may be that not all adjustments are specific to San Francisco. Some adjustments were required as program application of some technologies were deployed differently than imagined in the work papers (occupancy sensors for example).

Another concern that arose out of using historical planning analytics, (and after PEP had been in operation for a number of months) was the discovery that some impact values for the lighting measures installed in the community were overstated, and thus the program was actually several MW short of its 16 MW goal. The program as a result had to redouble its efforts to make up the difference.

PG&E and SFE both saw the partnership as a well-timed development. It would meet the city's resource needs, give PG&E more experience in working with a local government, and it would be an opportunity to achieve additional energy savings beyond those in PG&E's current program portfolio. PG&E's view was that the impacts sought for San Francisco likely would have been accomplished regardless of whether PEP was undertaken or not[39], but that it would have taken about twice the length of time the electricity resource plan that San Francisco had developed said would be needed to have a timely impact on resource needs. The partnership with SFE to develop and run PEP was seen as a way to double the rate at which impacts would be achieved, and do so cost-effectively with the other benefits noted above. ***Impact results indicate this adoption rate doubling did not actually occur in most cases, and the cost per MW was more expensive than envisioned.***

The partnership timing from SFE's perspective was tight, but all that was available: SFE effectively had no other choice than to approach PG&E and propose a partnership because time was running short on the city's electric resource needs and the CPUC had denied SFE funding for a third-party program.

PG&E believed there was good commitment to the partnership, though they also felt they could have had a greater commitment to it which would have benefited the overall effort. SFE originally did not seek a partnership, but when it became apparent that was the only viable path for a program, they focused their commitment to building and working within the partnership. SFE's view is that PEP was not a full partnership but rather a partial one, with PG&E dominating many of the program functions from planning through implementation. PG&E's view is that by state law the partnership was a collaborative, with PG&E contracting with CCSF for SFE to provide services and, importantly, with PG&E legally responsible for all the risks associated with the program.

With these views about the partnership, it is perhaps not surprising that the partners' relationship took a long time to develop and become fully effective, as the two organizations sought to figure out each other's culture, program concepts, and program functional processes, and find a common path for the program.

Partnership programs are different than standard programs. SFE's original intent was to develop a stand-alone program including all program advertising, promotional and operational collateral, administrative structure, and so forth. SFE staff, when interviewed for this evaluation, stated that the purpose of developing a third-party program (and then a partnership) indeed was to intentionally do something different than previous statewide utility programs had tried to do. SFE's previous experience with the San Francisco Power Savers Program influenced SFE's strategic thinking about how PEP might be different than standard efficiency programs, and how it might effectively target hard-to-reach markets.[40] It also extended to incorporating several program elements whose purpose was to complement the core impact-related elements. These included a Codes & Standards element, an Emerging Technologies element, a Residential Case Studies element, and a Targeted System Energy Audit element.

[39] PG&E staff noted that in recent years they had been achieving 6-7 MW/year of summer peak impact in the city.

[40] See "Impact and Process Evaluation of the San Francisco Power Savers Small Commercial Lighting Program," Final Report. ICF Consulting, November, 2003. The program involved over 6,000 small commercial customer lighting surveys and 4,000 "direct-install" lighting retrofits and achieved 6 MW in demand savings from 2001 to mid-2003.

These complementary elements were not part of PG&E's general program portfolio at the time. The intention was to achieve some short-term savings through these elements, with a longer-term market transformation goal of improving housing and building stocks through codes and standards enforcement, building knowledge of how to achieve greater savings, and encouraging technological innovation.

While SFE did not originally consider approaching PG&E as a partner, when it became necessary to do so the objective from SFE's perspective still was to do something quite different than the standard statewide programs - tailored specifically for San Francisco's climate, population, and building mix. The partnership was faced with underlying differences between the two organizations regarding how to address the resource needs of San Francisco.

In SFE's view, the PG&E program portfolio – developed with PG&E's entire customer base in mind – did not fit the local situation and resource needs of San Francisco.

PG&E staff believed that PG&E's existing programs could be effectively repackaged without major changes to focus on the resource needs in San Francisco. PG&E felt, given the short time frame available, that it would be more efficient to use existing PG&E program structures, in particular the programs' marketing and administration processes. Doing so, it was believed, would take less time than developing an entire program and its processes from scratch, as SFE had originally planned.

SFE staff, in looking back on the effort and time the program took to develop, felt they could have developed the program in about the same time it ended up taking to plan even using the planning strategy of using existing program infrastructure and processes. Perhaps had SFE been more *integrated* in the planning process, planning could have been more accommodating than it seemed to SFE, while still providing the benefits PG&E cited for it.

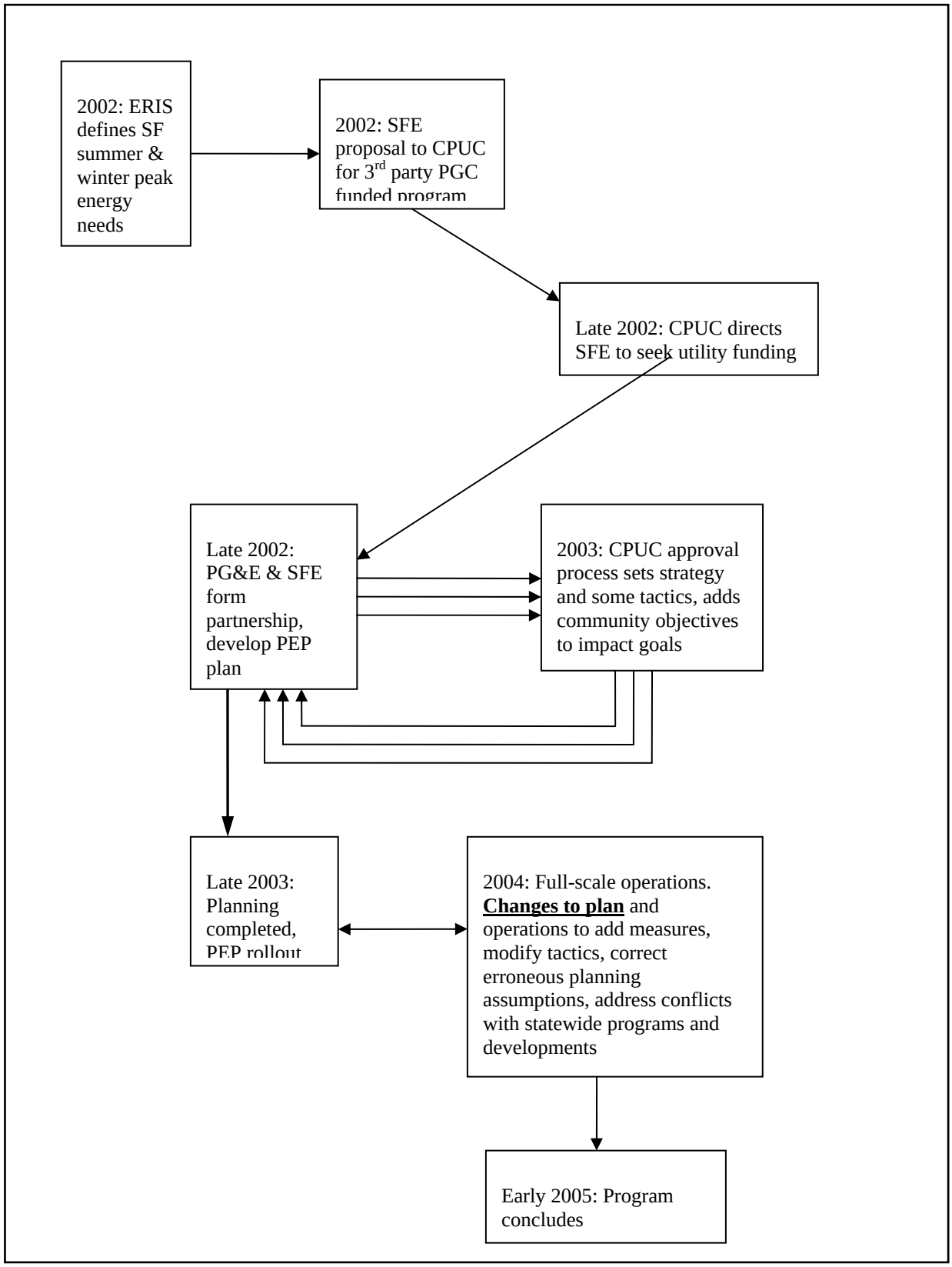
Community neighborhood activists felt the planning process did not fully recognize their concerns. They felt that the marketing and outreach planned did not go far enough to fully reach the market segments they felt important – and which some had argued for in persuading the CPUC during the regulatory approval process to expand the program scope to include energy-related social objectives. On the other hand, *business association representatives felt they didn't need to be involved in the program planning process*, long as the program was supporting their objectives of keeping their businesses economically viable.

4.4.2 Regulatory Process

The regulatory process significantly affected the planning time frame, the program's objectives, its final design, and its achievements. *The planning time frame was stretched significantly because of the due process involved and, perhaps, because regulatory staff were stretched thin.* The program approval filing took numerous iterations involving various intervenors, comments, reply comments, etc., to fulfill the due process requirements for program approval. The program was more broadly scoped, with significant community outreach efforts not originally contemplated. The caveats imposed in the final CPUC decision, that capped incentives, required particular CFL technology choices and impact accounting, and administrative overheads, had direct effects on the program's ultimate performance.

Both PG&E and SFE staff expressed concern about the regulatory role in program planning, in particular the time it took to obtain program approval but also the limiting nature of the regulatory caveats imposed on the program. The time to reach regulatory closure and the program changes that included trying to fulfill local community needs for energy efficiency and employment capacity development, diverted the program's limited resources away from the prime objective of achieving peak energy savings with the greatest cost-effectiveness.

Figure 4-3. Program planning and implementation process



Balancing that view, however, is that the regulatory process is intentionally designed to solicit and consider issues important in the broader social policy arena, and is a mandatory part of the program planning process. Community concerns of improving needy customers' energy efficiency and development of the local economy, that had been active for some time, were vetted within the due process structure of the regulatory review process, thus providing an opportunity to deal with those concerns.

Exacerbating the planning strategy was that political elections were coming up at the same time that the program was to be launched. PG&E, being an active player in the political situation related to utility municipalization in San Francisco, wanted to wait to launch PEP until after those elections. That meant further delay for the program planning process.

While the program delivery cycle was shortened by the lengthy planning and approval cycle, there was also great uncertainty about *what might come next after the program's completion*. Long-term development of service capabilities within the communities served by the program, and consistent program marketing messages over time would serve energy efficiency and social objectives well. For example, one SFE staff noted that if the program had been able to move more slowly there could have been more emphasis on developing local energy auditing jobs, or better continuity for measure installation contractors to stay with the program.

Regulatory Issues

- The program's achievements were different than originally conceived: different market segments were targeted given the social objectives that evolved through the regulatory process.
- The program had to achieve its goals in a much shorter time frame than originally intended, and had structural requirements that limited the program's flexibility to address market conditions such as measure payback (where incentives were capped), technologies (where hard-to-sell CFL technology was mandated), and administrative costs that compromised outreach and marketing efforts, as well as straining program resources to fulfill contract and regulatory reporting requirements.
- Original program focus on commercial customers (where the impacts could be achieved at least cost) was expanded to include social objectives – this affected MW achievements.

Social objectives and effects on program scope. The program scope was affected significantly due to including social objectives along with energy resource and cost-effectiveness objectives in the program's design and operations. Focusing strictly on energy resource and cost-effectiveness objectives suggested targeting larger commercial buildings and customers in downtown San Francisco,[41] yet this conflicted with social objectives that came into the picture through the regulatory process. The program scope was expanded to include selected (lighting) efficiency improvements to selected neighborhoods. The scope also was affected by the regulatory decision to utilize modular-ballasted CFLs instead of self-ballasted CFLs, and by the cap placed on program incentives. The Torchiere Exchange was another added effort.

The social objectives that came into play through the regulatory approval process meant that the program would also need to address community needs beyond the core peak demand focus that SFE and PG&E were planning. Thus, the focus on commercial customers where the most impacts could be achieved at least cost was expanded to include certain social objectives – to PEP's detriment in the view of the

[41] There also was some confusion as to whether the downtown transmission network should be the central target for program impacts, versus impacts gained elsewhere in the city. It turned out that the need was indeed city-wide, but the uncertainty of what geographic area needed the most attention further complicated the planning effort.

program staff, both PG&E and SFE because no additional resources were provided to support the expanded scope.

Community people had a different perception of the problem and solutions. In particular, community advocates wanted to see the program assist energy efficiency needs of residents in the Bay View/Hunters Point neighborhood. Some advocates wanted to see community residents hired to provide program services such as energy audits and energy efficiency measure installations. Illustrating the difficulty of meeting the program's objectives solely through efforts in special-needs community neighborhoods, SFE determined that to meet the program's 16 MW objective would have required that all power demand in the neighborhoods would have to be eliminated – an admittedly unrealistic outcome.

Another difficulty encountered was that some community advocates wanted people from within the community to be hired to perform various program services, whereas PG&E's existing program service staffing already had been decided in their contracting for those services in the statewide program. Changing those service contracts may have been problematic, and in the end such community-level staffing did not occur, though PG&E subsequently has provided energy auditor training to a number of interested people and that process is still being played out. During the course of the program, however, the decision to use existing implementation contractors left some community advocates disappointed that that social objective, creating job skills and jobs in the community, was not achieved – even though it was not part of the program's driving purpose of achieving peak power reduction impacts.

4.4.3 Stakeholder Involvement in PEP Planning

There was relatively little involvement by other market actors in planning PEP, including community organizations and individuals, installation contractors, and other CCSF departments. Mostly this was to be expected because the roles of such entities as measure installation contractors and many community organizations were defined already in some way once the program elements were designed. The installation contractor for PEP's Single Family Direct Installation element, for example, was already under contract to PG&E for such work in other PG&E programs. Outreach to the small business community was planned, as another example, but the nature of the outreach was straightforward and more a matter of recruiting various associations' assistance than needing to involve them in planning. Most of the community people interviewed did not see a problem in their not being involved in the program planning, expecting that to be done properly by the program staff. Their concerns related more to the nature of support they received from the program. Comments from some community members suggested that more involvement of respected community individuals in the program planning process might have minimized outreach problems and resulted in greater program participation. It is unclear whether this would have actually worked to improve program delivery in a way to achieve impact targets. This type of community involvement needs to happen far enough in advance to allow this input to be placed into draft program plan alternatives.

Ironically, the involvement of community advocates and organizations made the planning process, which already was complicated by the regulatory review process, even more complicated. As SFE staff commented, "When the community got involved in it, they didn't want to mention the power plants…So there were a lot of discussions that kind of got stuck in those meetings. They had their own plan in mind; we had a different plan in mind…we did a potential study that showed…that the downtown area was where we had to focus. The community, of course, wanted us to focus on residential and in the Bay View area. So planning got very messy."

Difficulty with knowing if advocates really represent the community. The community advocates who were active in the regulatory and program planning process, and on into the operational aspects of the program, were familiar faces to the SFE and PG&E staffs, as were the community-related issues they communicated. How much credence those issues and associated activities ought to be given in light of the fundamental electricity resource issues in play – and the resulting conflicts in how best to utilize the program's limited resources – caused significant challenges to the program team, however, and took more time and effort to accommodate.

Stakeholder Issues

- One of the power plants cited in the city's electric resource plan as needing to be closed is located in a neighborhood central to community groups' concerns. Such communities should have a greater involvement in planning efficiency program investments, in the view of some stakeholders.
- The partnership indeed did consider the needs of these community members in designing and implementing the program.
- The program conducted torchiere lighting exchange events, installing high-efficiency lighting equipment in homes in the Bay View/Hunters Point neighborhood, and supported the use of community youth to conduct outreach efforts.
- PG&E sponsored energy auditor training for a number of interested individuals from the community, and there may be ways to employ those people in programs in the future.

For their part, individuals from the community who were interviewed and who knew or may be associated with various advocates, expressed some frustration, believing that the concerns of improving needy customers' energy efficiency and developing local energy efficiency services capacity were indeed representative of the community, and that the concerns were given short shrift. There appears to have been a significant disconnect between the impact focus of PEP and the other needs that some community people saw that were not being fulfilled by PEP. This gap in expectations added to the difficulty of bridging PEP with the community and, vice versa, in bridging the issues voiced by some community members as being representative of broader community needs to be addressed.

4.4.4 Other Planning Issues

Budget. The program budget of $16 million to address the resource need was based on PG&E's overall estimate of program costs relative to historical experience: about $1million per MW against a program impact goal of 16 MW peak impact. This budget basis was not initially apparent to SFE staff, who expressed confusion and some frustration over how the program budget was established. Indeed, SFE staff indicated that the budget amount was stated by PG&E in regulatory documents before SFE had had a chance to discuss the amount.

Program staff pointed out that program incentives were capped, such that efficiency measures could not have their incentives priced attractively enough to gain greater program participation. This budget-related limitation may have contributed to the difficulties in achieving the full program goals more rapidly. The budget for PEP work that SFE was responsible for was about 10% ($1.56 million) of the total PEP budget, with the rest directed through PG&E's program structure. Of that 10%, about $200,000 was designated specifically for outreach efforts.

Product/Service Planning. The efficiency measures – both products and services – from which the peak energy savings would come were a significant planning issue. The city's resource needs suggested a different mix of products and technologies, and related services and information, than in PG&E's standard program portfolio. Thus, HVAC measures that focus on summer peak reduction alone would not be appropriate for PEP with its need for winter peak reduction, for example. Lighting measures and others that have year-round peak impact were needed in greater proportion than if the standard/statewide programs were simply duplicated. Also, measures such as refrigeration gaskets, that have year-round peak energy impacts, were emphasized.

Other Planning Issues

- Lighting & other measures that have year-round peak impact were needed in greater proportion than in the statewide programs to meet winter and summer peak reductions.
- Refrigeration gaskets, that have year-round peak energy impacts, were emphasized, but late in the program.
- Eligibility requirements were unclear and incentive levels for some measures were copied in statewide programs, causing customer confusion and requiring further programmatic coordination efforts that sapped resources and caused further delays.
- Quality assurance planning was not explicitly undertaken. Existing administrative and operational process controls were utilized, but "QA" came up short in assuring good coordination of PEP and statewide programs.

Such efficiency measures differentiated PEP from the statewide programs. The Commercial Turnkey Services program element, that built on the small commercial market experience gained in the 2001-2003 Power Savers program, reflected a significant service differentiation as well. In addition, the program elements' features also differentiated PEP from PG&E's other programs. For example, the incentive "kicker" for the SPC element reflected the additional value of winter peak impact for SPC measures having winter impact as well as summer impact.[42]

Thus, as one interviewee put it, the selection of products to use in PEP was challenging to avoid product overlap with other programs, yet still offer a sufficient selection in PEP to offer customers and achieve the program's impact goals.

One consequence of the regulatory process for product selection was that a particular lighting technology was mandated (modular-ballasted CFLs) that was not part of the statewide program technology mix. Both PG&E and SFE found the technology problematic because of the misfit with what customers could obtain through statewide programs, the lower availability of the technology, and its relatively arcane configuration of components compared to what customers are used to. PG&E noted that such CFLs are difficult to sell and that customers prefer self-ballasted CFLs.

There was another consequence of the planning process for product selection that concerned the incentives to be offered for the SPC element. That was the discovery by the program staff, just as the PEP SPC effort was to be launched, that *PG&E's new statewide SPC program incorporated an incentive level that was the same as the PEP SPC incentive was to provide for certain key measures. This caused significant concern among the program staff because there would be less motivation for measure installation contractors to emphasize San Francisco efforts, given the added burdens of doing business in the city.* A flurry of activity ensued to negotiate and realign the incentives and customer eligibility between PG&E's statewide SPC program and PEP's SPC element.

[42] The incentive kicker became problematic when it was discovered that the standard SPC program's analogous measure incentive was changed to the same amount as PEP's SPC incentive, however.

A similar product selection planning coordination issue arose later in the program, with the refrigeration gasket measures PEP had incorporated into its Cash Rebates for Small Business element. There, PG&E announced it would launch its own gasket initiative statewide that would have been much the same as what PEP was already doing with refrigeration gaskets. In that case the CPUC disapproved the PG&E initiative, which was to be reformulated.

Quality assurance. There was not an explicit emphasis on addressing various quality assurance matters when the program was planned. Using PG&E's existing administrative infrastructure for processing fund reservation and incentive applications assured quality though its checks and balances on data being processed through the system. In the field, the use of existing installation contractors for SFDI and Multifamily Rebates and the SPC inspections contractor meant the quality assurance processes already in place with those contractors were utilized.

Some quality assurance issues were not expected, however, and had to be addressed mid-stream in the program. One such issue was not process-related but was related to the influence of poor quality in past program experiences affecting customers' attitudes toward installing measures PEP was promoting. That is, customers who previously had experienced a poorly performing measure were more skeptical about taking further efficiency measures. As SFE staff noted, if the lighting equipment installed by the program was not working as expected (e.g., early lamp burnouts) a grocery store customer tended to look negatively on installing refrigeration gaskets. This issue included customers' experience with previous programs such as Power Savers.

In addition, the above-noted coordination of SPC incentives and refrigeration gasket program structure did not occur up front, but had to be addressed under the duress of when they were being launched in the field. Finally, the program's limited budget forced the use of lower quality measures, such as programmable thermostats, than was desired.

4.4.5 Outcomes of the Program Planning Process

The planning process influenced both the ultimate structure of PEP and the relational dynamics of those involved with the program. Expectations going into the planning process ranged widely, and depended on one's perspective. The program plan and its development process appears to have created as much tension as manage the expectations of those involved with it. Some of those not involved in the process felt left out and relatively powerless to see the program do more for their interests. *By the time the program plan was fully approved it had become somewhat of a compromise between the program's original intent of obtaining peak energy resources and a program to provide community economic and social assistance.* As a result, the program became burdened with a double vision that, perhaps, was unable to fully satisfy either objective.

The PG&E program planning process produced a viable program that survived the regulatory approval process with its core objective and plan intact. However, it was not the program SFE had hoped would result from the planning process. The planning effort emphasized lighting measures, for example, that indeed were the bulk of the program's impacts. But it left other measures that SFE considered to be important out of the picture. When the program was seen not to be meeting its goals, other measures that would produce year-round peak impacts, such as refrigeration measures, that had not been part of the initial planning focus had to be quickly developed and put into action.

The planning process unwittingly used some incorrect impact values for lighting measures. That oversight resulted in a late-program realization that there was less impact being achieved than had been thought, which also caused concern and significant efforts to address that took away from the program's momentum.

As it turned out, while PG&E was well-intended in applying its planning process, the process (not so much individuals) seemed "blind" to SFE's concerns. The PG&E planning process and the resulting program plan had to be modified over the course of the program to better suit the San Francisco market.

The contract became a planning exercise in itself, with numerous iterations. Regarding planning information requests SFE made of PG&E, for example, "They sent email to about 50 people and when you look at them, like data requests go through the same thing. They all read it and they all pitch in and share it and it gets, eventually to the lawyers who file it. They can come back if they have some comments or questions. It's an internal process that I'm not on all the time unless it gets sent over here, you don't know what's going to happen."

Shift from third-party independent program to a partnership was problematic. The chief consequences of this shift were to delay the program and to give it a decidedly "PG&E flavor," as most of the program elements were patterned after PG&E's existing statewide programs.

Commitment to the partnership was mutual but seen in different lights. PG&E in hindsight believes there could have been a greater commitment to the partnership to consider SFE's program ideas, particularly early in planning the program.

As PG&E staff commented, their interpersonal rapport with SFE staff was established quickly and was seen as key to successfully completing planning for and managing a large program portfolio, despite overarching organizational differences regarding efficiency program administration (state- versus utility-run efficiency programs, for example). "…Considering the circumstances, the political sensitivity and the bureaucracy…we have an excellent relationship…we just fit and we all have the same objective in mind, we want to close down that power plant, serve the community, have happy customers…we want this to be a success. [PG&E staff] couldn't run this partnership without [SFE staff], it's too big, there are so many programs…. I can't say enough about the partnership."

Partnership Commitment

- Perhaps the most telling evidence of the partnership's commitment is at the personal level, from comments by both SFE and PG&E staff regarding their respective counterparts on the program: '*individual people worked hard to make the program work, and the partnership along with it – even though many institutional barriers were set against them*'
- A strong commitment to the partnership is one thing; however, actual roles and responsibilities as played out mean the partnership likely will not be fully equal.

For their part, SFE staff commented, "…[All] of us got along fine. Everybody wanted this to happen, so at the table there was that going forward. At that stage, the general planning stage, where you get the megawatts, we were all serious about how you do that and everybody came to the table with that…So from that standpoint you could say [the partnership] was very successful."

Partnerships may be different than standard programs, but this one was not significantly different. PEP was not strongly differentiated from PG&E's standard programs. With the shift to a partnership with PG&E, the program probably took on a far greater "look and feel" of PG&E's existing statewide programs than it likely would have otherwise. Indeed, the situation with the Cash Rebates and SPC incentives levels and eligibility in PG&E's Express Efficiency and SPC programs being made the same as those for PEP's SPC element illustrates the sorts of problems that have to be overcome to achieve a noticeably different program. The intention was that PEP and PG&E's standard programs would be mutually exclusive within San Francisco. There were eligibility loopholes that survived the planning

process, however, which had to be rectified so that PEP would be the sole venue for the efficiency measures covered by PEP.

The complementary SFPEP elements of Codes and Standards, Emerging Technologies, Residential Case Studies, and Targeted System Energy Audits could not contribute to PEP's differentiation from PG&E's programs because of the time it took to get them going and their long-term perspective that resulted in little immediate program impact.

Planned partnership roles took a long time to evolve, and could not be specified fully in the contract. The partnership took a long time to gel as organizational relationships were not effectively cemented until late in the program. SFE staff characterized the partnership as being sporadic and not really a fully joint partnership in decision making terms, in their view taking about a year before there was effective communication and coordination on planning issues. *Working through the conceptual and pragmatic differences added to the time it took to launch the program, and so shortened the time frame in which the program had to achieve its goals.*

These were not issues that could be addressed in the program contract, but rather reflected the organizations' institutional cultures and individuals' expectations for how the organizations should work together on a daily basis. While the contract addressed certain "mechanics" of the partnership, it did not address the partnership's "personality." This is probably appropriate, but is a lesson for other partnerships to consider.

PG&E staff thought that PEP might have better managed some community organizations' expectations for the program had there been a more formal approach to partnering with those organizations than occurred. *The sense that PG&E staff had was that various community organizations would act primarily as marketing and outreach channels*. The expectations of some community advocates, to have a greater operational role (e.g., through job training and local employment capacity development to provide program audit services), went beyond what PEP intended, however. This differing expectation might have been worked out had there been a more formal partnering arrangement with at least some community organizations.

PG&E and SFE staff feel that the partnership generally did play to each organization's strengths, despite differences in cultures, institutional processes and other relationship factors. PEP effectively utilized PG&E's administrative processing strengths and SFE's community outreach strengths, for example.

4.5 Partnership Implementation Effectiveness

The partnership's effectiveness in implementing PEP included how well the product and service mix was implemented, the effectiveness in carrying out the planned marketing and outreach strategy and tactics, the use of marketing collateral and marketing communications channels, and the effort to ensure high quality in the implementation process.

4.5.1 Product/Service Mix

The program ended up with a better mix of products than it began with, in terms of what was needed to meet the city's summer/winter peak energy needs. The originally planned product mix reflected the need to be easy to install, have impacts, be attractive to customers, and have the correct incentive to be visible. The mix emphasized measures such as refrigeration measures so that dual-peak impacts could be achieved. This was even more important when it was discovered that the lighting impact assumption used in program planning and tracking was overstated.

The implementation contractor for the **Single Family Direct Install** element felt that the SFDI's information and product offering was believable and relevant to their energy needs in the Hunter's Point area. There was some concern with customers not thinking the offering was worth the hassle, not wanting to change out just 3 lighting fixtures but all out or none, for example. A better product offering would have been to have the flexibility of providing more fixtures and not be limited to just three. Better marketing on customer expectations informing customers on what to expect from the limited program resources would have helped, too. The programmable thermostats selected were cheaper units, reflecting the limited budget available. Also, many customers had difficulty understanding and using the thermostats.

In the **Multi-Family Rebate** element, lighting was the key measure even more so than other program elements. Because the program emphasized lighting measures to be installed in tenant units and because of the way the lighting incentives were designed, however, the full potential impact of changing out common area lighting from T-12 to T-8 fixtures and lamps did not get achieved. The well-known problem of *split incentives between property owners, managers, and tenants in the multifamily market added to the challenge of promoting lighting measures to this market*.

***Laundry equipment** efficiency measures for the Multifamily Rebate element were offered but did not get takers.* This may be due to the "circuit rider" nature of apartment laundry equipment ownership that discourages early replacement of equipment, especially if energy and water cost savings provide an insufficient payback. It may have been due to lack of equipment failure during the program that otherwise would provide opportunities for efficiency improvements with replacement. Whether the lack of laundry equipment measures was due to these or other factors is not known, though both factors likely had a role.

Product/Service Issues

- It could be helpful to allow some flexibility in determining if additional equipment units would be appropriate to install, rather than an arbitrary limit.
- Limited funds required lower quality equipment to be selected, and end user problems arose as a result.
- Split incentives in rental markets greatly reduce the numbers of even highly effective measures.
- Improving energy efficiency in rental property laundry facilities also remains a significant challenge, regardless of the product offering.
- Some measures selected for PEP were undermined by developments in the statewide programs, which significantly affected the program's product/service mix during the course of the program.
- The complementary offerings in the codes and standards, residential case studies, targeted system audits and emerging technologies were slow getting into the field and made limited contributions to the program's outcome.

The incentive kicker incorporated in the **SPC Program element** for various measures was an appropriate specification relative to the city's dual-peak resource needs and value of meeting those needs, but it was undermined by the introduction of the same incentive level in the statewide PG&E program. The subsequent program changes that had to be undertaken caused more delay and confusion, which points to the need to pay careful attention to and coordinate closely on not only the products and services per se, but also how they are packaged and promoted to the market. SFE had a good point in wanting to differentiate PEP from statewide programs through the product/service selections made for the program, so that customers would clearly see the differences and understand the underlying resource needs associated with the program's offerings.

The **Codes and Standards**, **Targeted System Energy Audits, Residential Case Studies,** and **Emerging Technologies** elements unfortunately did not contribute significantly to the program's immediate impacts. This was partly due to the time it took to get these elements up and running, but also is likely due

to their having a long-term perspective. Were PEP to be continued over the long term elements like these could begin to contribute more significantly to meeting San Francisco's energy resource needs. A significant difficulty for San Francisco, like other cities, is there is a very limited budget for staff training, plus staffing is limited and people are thus extremely busy doing their core job. Thus, getting city staff from, for example, the Buildings Inspection Department to attend energy efficiency training and from that help identify energy efficiency opportunities in the course of their other duties does not happen – and even if they were so trained there may be too little time available to exercise the knowledge to help customers and various trade allies.

The Codes and Standards effort that involved the Building Inspections Dept. made some progress in getting an approach planned and gaining agreement from Building Inspections on the concept. SFE believes there would have been no progress in this area had it not been made possible by PEP funding. Similarly, the Emerging Technologies effort made modest progress, installing some equipment in senior homes.

Coordination Issues

- As the program was implemented, a number of coordination needs arose in addition to those anticipated in the program implementation plan. Incentives and eligibility misalignments had to be rectified, marketing materials modified, community outreach efforts redirected and coordinated with additional market actors, and so forth.
- Trying to balance short-term and long-term goals was very difficult, and tended to leave long-term goals under-coordinated with short-term goals.
- The contract between PG&E and SFE left a number of coordination details unspecified – some purposefully so in that they dealt with working relationships between individuals versus specifiable deliverables coordination – that required on-the-fly efforts to address.
- Program staff took risks to change the program's priorities for measures and market segments in order to address the goal shortfall seen for the program, and through extraordinary coordinating efforts accomplished the change in direction.
- Much of the success in coordinating PG&E and SFE efforts was due to highly-committed people in each organization working diligently and proactively toward a common objective, by being willing to take risks to make various things happen.

4.5.2 Program Coordination

SFE staff commented that there were many people just at PG&E with whom to coordinate. As was noted, this was problematic but PG&E learned from the experience: "…we really tried to set up a system of coordination. You can't believe how many people at PG&E are involved in PEP. We sit around a table with 20 people there. Their communications section, the publicity section, their program people from single-family, multi-family…Plus all the account services [staff], not all of it, select ones. So when there's a full meeting, there's a lot of people to coordinate for coordination purposes. It's just the way they're organized and the way we designed this program with so many elements. They learned from this when they went to the other partnerships. I think they simplified them."

Along with there being numerous people with whom to coordinate planning, staff turnover occurred. That meant the new people had to learn the history of the program development and understand all the nuances being addressed to develop the program. Those situations added to the coordination effort being more difficult than it might have been otherwise.

Given the program's late start because of the lengthy time it took for planning and approval, there was much less time than originally desired to achieve the program's goals. Also, the initial marketing and

outreach efforts, and efficiency measures being emphasized, were not producing the hoped-for results. SFE staff noted that, to PG&E's credit, PG&E staff "…came into a meeting in early September and said 'Hey, we're not making our numbers, let's start doing things differently.' [SFE] been waiting for that to happen, hoping it would happen sooner, but the program had really just gotten off the ground 6 months before so it was pretty clear they were spending the money, they were whipping thru the dollars but not getting the megawatts. So we needed to start thinking creatively about new solutions to problems. But you're still in emergency mode…we've only got 5 months left!... Over the next couple of months we started figuring it out. This refrigeration, we look at the list, where are we gonna get the kilowatt savings…In terms of dollars per kilowatt, refrigeration is the best. So we've gone after gaskets, strip curtains, etc. with a vengeance, and it's being very successful.

Changes to the plan to achieve short-term goals left long-term opportunities unexploited. As SFE staff noted, the program was still a one-off kind of approach: "You're saying, we're desperate for these megawatts, you've got to go in and grab them. You grab them and leave, and what's left? Did you build any infrastructure? Did you leverage any other existing resources? Did you better prepare either the market or yourself for being able to do more capacity creation. And those are the kinds of things that we need to be thinking about doing. If we're going to meet the efficiency goals that the state has for going on into the future, we can't just keep going in and pulling out the low hanging fruit. It disappears, and then the higher hanging fruit…you haven't taken the time to build the ladder so you can get up higher. Or train people to climb the ladder...It's a good question. The next question is, would they be successful at it? Will it actually help their business or find that it detracts from their core capabilities? That's still something that's left to be told. There's still lots of opportunity out there for lighting and refrigeration, window film and chiller replacements and everything else, but it does get harder with each successive time…."

Fulfilling the partnership agreement. PG&E staff felt SFE generally did most of what SFE agreed to do. Things that fell short related to SFE being understaffed initially, and the effort to work with the CCSF planning and building department on codes and standards did not materialize.

SFE believes it did, in fact, accomplish the planning department involvement: "And all the meetings at the Department of Building Inspection have taken place. They've agreed to these things and agreed that they can inspect for it. You have to get their buy-in beforehand, so there were a lot of meetings."

Individual efforts overcame many institutional barriers. Both PG&E and SFE emphasized how it was that individuals in each organization had significant impact on PEP's results. By and large, the people in both organizations worked diligently, and successfully, to overcome institutional barriers that otherwise would have meant widespread program failure. The program as initially planned was significantly changed, yet program staff managed to accommodate the changes in taking the program to the field. It took time to develop the working relationships in the program, but there was widespread agreement among both SFE and PG&E staffs that their counterparts in the other organization for the most part worked hard for the program's success despite the barriers they saw being raised in the regulatory process and within their respective institutional settings. For example, SFE staff noted that PG&E's program manager for PEP was "…just terrific…very proactive about trying to unblock the roadblocks within the company to allow us to do things in the partnership. [Other PG&E senior staff have] been very good about coming into a meeting with the company decision about how to do something and then listening to what we had to say, engaging in the argument, and then changing his mind. He always stayed engaged with a rational process. Sometimes he'd come back again and say 'We can't do it'…he doesn't have the full authority…"

Even so, however, interviews for this evaluation noted that there was some staff turnover and some issues arose because of staff transitions or coordination gaps, such as the situation with PG&E's new statewide SPC program that essentially duplicated the PEP SPC element (and higher incentive for efficiency measures), thus (to use SFE staff's phrase) pulling the rug out from under the PEP SPC element because

SPC contractors found it much easier to work the statewide program outside San Francisco than in the city where permits, parking costs, and other barriers exist that do not exist elsewhere.

Making the best of the partnership situation for the future. There is a strong desire with the partners to continue working on the relationship and build on the current partnership because there aren't any other options. This gets back to the premise of the partnership of utilizing each organization's strengths. SFE staff are optimistic that a strong partnership can continue to be built because of PG&E's upper management commitment through its current staffing. As one SFE staffer noted, PG&E's senior manager in charge of the partnership effort "…has a real commitment to the partnership; I believe it's very real. I like him, and I think that we can develop something that will work for the next program cycle…[We'll] continue to build on this partnership to make it work."

4.5.3 Marketing and Outreach – Perspective

Critical to PEP's success was the ability of the program to creatively market its various elements to key market segments. There was tremendous pressure on the program staff to make up for time lost during the planning and regulatory approval process, because the timing of the resource need wasn't flexible; PEP had to achieve its 16 MW goal by 2005 to enable the power plant shutdown that is a central issue in the city's electric resource plan. The program's marketing and outreach also had to address the added objective to provide lighting retrofits to the Bay View/Hunters Point neighborhood, and to conduct an exchange effort for torchiere lamps and holiday lights. Thus, the program's marketing and outreach efforts had to be expedited as much as possible, which meant numerous meetings in the community with residential and business organizations and individuals.

It was agreed that PG&E would be responsible for taking the lead on developing all of the printed collateral materials and the website, and the City in turn would be responsible for developing the marketing and outreach plan. SFE and PG&E worked together within this arrangement to develop the program's promotional materials, again with PG&E doing the production work for most of the materials while SFE focused on outreach planning. Once the program was in the field, PG&E staff led the marketing efforts for the Multifamily Rebate, Single Family Direct Installation, and SPC elements, and also some larger customer contact work for the Cash Rebates element. SFE staff led the marketing and field services effort for Commercial Turnkey Services, and the effort to promote the Cash Rebates element to the small business segment. Both organizations performed a variety of outreach efforts across the program's target market segments. SFE concentrated more on community groups and neighborhoods, while PG&E concentrated more on business associations, though SFE also worked with those groups as well. On occasion joint promotional meetings and events were held with both partners participating, such as meeting with the San Francisco Hotel Association.

4.5.4 Marketing and Outreach – Strategy and Tactics

General Strategy and Tactics. The various program elements that utilized PG&E's statewide programs as their basis – Single Family Direct Install, Multifamily Rebate, Cash Rebates for Business and Standard Performance Contracting – also utilized many of the same marketing strategies and tactics as the analogous statewide programs. The mailings and other promotional tactics used in the statewide programs were augmented by a variety of community and business outreach efforts that helped promote the program elements to targeted market segments including small businesses and the Bay View/Hunters Point neighborhood.

The CTS program element, being unique to PEP, had its own marketing strategy and tactics. Initially, target market segments for CTS were not clear because it was a new program element, though staff knew the food service market would be important. Staffing limitations existed that prevented some tactics from

being considered – mass mailings, for example – and also constrained the volume of customers that could be served.

The strategy and tactics were documented in a marketing and outreach plan which SFE took the lead in developing. That plan was considered a living document and underwent constant change and updating as the program ran its course through various marketing and outreach successes and failures.

PG&E felt that the program's marketing strategy and tactics were as effective as the program plan intended. When asked to rate this, one person agreed highly (rated 1 on a 1-5 good-bad scale) that the strategy and tactics resulted in the target audiences being widely reached. Nearly as highly rated (a 2 rating) was that information was disseminated, noticed, understood, and believed by the target audiences. That the tactics were effective in raising awareness also was rated highly (a 2 rating). SFE also rated marketing collateral development highly. The *outreach strategy for some market segments such as small business associations did not get the results hoped for, but there were instances such as with Pier 39 where the efforts paid off* and the program got good participation through the association. Similarly, the strategy of *targeting ethnic communities for torchiere exchanges had mixed success*, working better with the Asian-American community than for the Afro-American community.

Marketing and Outreach Issues

- The partners divided the marketing and outreach effort between them. Even with a good initial understanding of each partner's role in marketing and outreach, however, ongoing coordination efforts were needed and adjustments necessary, such as when the Cash Rebates eligibility and incentives issues arose and PG&E account representative staff redirected their efforts to promote the SPC element more heavily.
- Outreach efforts through business and community organizations presented a variety of challenges to find and effectively use outreach partners' resources, with mixed results.
- The marketing and outreach effort initially planned evolved over the course of the program, requiring frequent changes and updates to the marketing and outreach plan.
- Confusion over PEP vs. statewide program eligibility for certain measures caused program resources to be diverted to changing tactics and marketing collateral. This strained program resources and made it more difficult to reach the program's impact goals.
- The program underperformed in reaching some target sectors: restaurants and mid-sized office buildings, for example.
- Outreach to the community of neighborhoods and businesses had greater success when highly committed individuals from the community were engaged to facilitate program marketing efforts, and also when door-to-door canvassing techniques were used.

SFPUC's ***water conservation program for restaurant sprayers*** was seen as a potentially complementary effort given PEP's targeting restaurants with its various measures. That brought the two agencies together initially, though the results were less than hoped for because PEP ended while the PUC sprayer program continued.

The SFDI operation was slow in starting, beginning with about 100 leads PG&E provided. The strategy for SFDI was to leverage the Energy Partners Program, utilizing the same installation contractor. To help accelerate the SFDI element, the installation contractor met with PG&E's staff to explain the program and develop ways to generate more program leads.

The MF Rebate element had a limited amount of rebate funds, and those were reserved early on in the program. As a result, not a great deal of marketing effort was needed for this element, and indeed later in the program some marketing funds were shifted to incentives, to enable more measures to be installed.

The Cash Rebates element changed tactics, from promoting all the efficiency measures available to business customers, to promoting the measures that got the greatest impact for the money available in the program budget. Also, that element shifted from a mass-market promotion strategy to a targeted segment strategy focusing on trade associations and equipment vendors. These changes improved the effectiveness of the Cash Rebates effort.

Community outreach was extensive. From January through October 2004, some 65 community outreach meetings and other activities were conducted to promote PEP generally, in addition to mailings and media coverage to distribute program flyers and other information. These meetings and activities included press conferences, meetings with a variety of business organizations, professional associations and community organizations, participation in various community events and festivals, and so on. According to the program staff, community relations were done fairly well, as the program worked continuously to improve program outreach to the community through its many events and meetings. From some community perspectives, the program could have done better at this and if so there would have been more of a common view of the program's community objectives, and participation among the residential market segments where program services were provided may have been higher.

In addition, the CTS element reported 871 customer contact attempts, plus an additional 900 direct-mail contacts in May specifically with restaurants. The CTS program element, being independent of PG&E's intake process, relied more on cold calls and public presentations to generate participation.

Market segments. According to SFE staff there were two commercial market segments that the program wanted to reach and achieve more impact with, but where *the program underperformed: restaurants and mid-sized office buildings*. There were several efficiency measures for restaurants that for unapparent reasons did not get utilized.[43] However, restaurants are generally known to be even more risk-averse than many other business segments because of concerns for their customers' comfort and the value of providing the desired ambiance being greater than the cost of energy, and even chefs' cooking preferences.

The *mid-sized office market also did not participate as widely as program staff had hoped for*. Historically such facilities have been a "lost" segment along with other medium-to-small commercial businesses because they need customized services that energy efficiency programs have insufficient resources to provide, and which are less cost-effective than larger commercial or industrial facilities to install such measures as were being promoted by the program.

In the residential market, *attached single-family dwellings (duplexes, for example) and rental properties under 5 units in size were not reached as effectively as PG&E's program staff had hoped for*. Here as with larger multifamily properties the split incentive issue is very strong, plus the program's limited resources got focused on other segments.

Also in the residential market, but related to customer income levels, PG&E staff noted that *there was a grey area of customers of moderate income that did not participate in the program*, falling under the level

[43] Review of the evaluation's participant survey suggests that a smaller fraction of restaurants than other facility types have tended to take additional efficiency measures beyond what they had done in the program, and slightly less satisfied with the program than other facility types such as offices or lodging facilities.

served by the Single-Family Direct Install element, yet were not covered by low-income energy assistance programs.

Tactics that worked best. PG&E staff felt the promotional tactics for the SFDI and Multifamily elements worked the best, where those elements *utilized an existing low-income authorization program as an outreach vehicle*, used the *existing statewide program channels* for the multifamily program and involved *localized publicity and promotion*, including *especially door-to-door in-person promotional efforts*.

Another marketing approach cited by PG&E staff as being effective was *using energy audits for small businesses to generate interest in the Cash Rebates element*. A "foot-in-the-door" twist on this tactic was to *offer a one-to-one exchange of old for new, efficient LED "OPEN" signs for small businesses, to generate interest in an energy audit* from which subsequent other efficiency measures could be identified and promoted to the business.[44] These tactics were *supplemented by inexpensive, quick-to-produce flyers* and events that SFE staff produced, that increased the effectiveness of the general promotional effort.

Outreach to the Asian-American community for the torchiere lamp exchange was more successful when *multi-lingual flyers* were used and a small gift offered to entice attendance at the events. Multi-lingual flyers also helped promote the Cash Rebates element to a multi-ethnic small business community.

Promoting measures in a targeted manner, versus a "shotgun" approach promoting all measures equally, helped get the greatest impact for the money. This *worked even better when focusing marketing resources to work with trade associations and vendors* instead of using mass-market promotional means. For example, three vendors were recruited to work with the program to promote and install refrigeration gaskets (one vendor participated throughout the program, one participated early but left partway through the program when PG&E's statewide program started offering the same incentive, and one was brought in later in the program). The vendors called on customers through direct cold-call contacts and was supported by two direct mailings of 3,000 pieces each to target customers, which generated about a 5% response rate to the mailings. Over 800 installations were achieved as a result of this integrated marketing effort.

Tactics that worked least. PG&E felt *the program website was less effective than anticipated*, compared to other tactics the program used. While the website produced a number of visitor "hits," PG&E staff are unsure how effective the website was in getting visitors to go on and participate in the program.

Outreach for the *torchiere exchanges had less success in the Afro-American community and among senior citizens*. These two segments tended not to attend torchiere exchange events, in part, it is believed, because of the low saturation of torchieres believed to exist in those segments. Also, according to some community members, there was not enough use of community leaders and other facilitators to help organize and promote interest in the community. Shifting torchiere exchange tactics for the Afro-American community, for example to promote at churches, did not meet with much success, either, at least in the short time frame available for the program.

The CTS element was successful in conducting its site visits, energy audits and initial follow-up to do post-audit marketing. *Because of the voluntary nature of the recommended actions and because neither vendors nor customers were under any pressure to take actions that would be timely for the program's impact needs, however, many measures were left untaken*. SFE staff felt that future program designs should try to have more pressure applied to vendors and customers to take more actions sooner. They also felt that working more closely with vendors – including qualifying training and some more formal

[44] The old neon, magnetically ballasted signs were collected and recycled.

participation and support requirements – might have resulted in more impacts coming out of the CTS element (through other program elements, for example, via cross-marketing of the CTS-recommended measures).

Outreach to business associations had mixed success, with many meetings with associations held but only a limited amount of participation. The reasons summed up by one association were that small businesses have few capital resources at times when business is slow and one can work on efficiency improvements, but when business and cash flow is good, there is no time to work on efficiency improvements.

4.5.5 Marketing and Outreach – Collateral and Channel Usage

Marketing collateral experience. The program staff from both SFE and PG&E felt the marketing collateral (sell sheets, primarily, but also some media ads) was coordinated well and the resulting materials were easy to understand and well-disseminated. Much of the program's printed collateral (sell sheets and incentive application forms) was actually produced early in 2003, anticipating an earlier program launch. As the program actually evolved, however, and coordination issues with statewide programs' measure offerings were resolved, those *materials had to be modified* to show which measures that had initially been offered in PEP no longer were being offered, with customers directed to the respective statewide program. For example, the brochures for the Cash Rebates program element had to be modified with updated inserts on measures when measure eligibility between PEP and statewide programs finally was resolved. These *changes in measure eligibility and coordination with the statewide programs caused confusion and further delays* in achieving the program's impact goals while program staff modified the collateral and had to educate prospective participants on what measures were covered.

The program's *marketing budget was limited, which in turn limited the types and amount of marketing and outreach collateral* to sell sheets, community newspaper ads, flyers and application forms.

LED "OPEN" signs were utilized as collateral for promoting to small businesses as an enticement to perform energy audits and promote the various program elements. Similarly, LED holiday lights, exchanged for old lights, were used to help promote to small businesses, as well as used to light the city's own tree as part of the program promotional strategy. Both technologies were seen as helpful in building awareness and participation.

The effort to produce the various printed materials was not easy, simple, or quick, as was pointed out by both PG&E and SFE staff when interviewed for this evaluation. Because of the legal, claims-related, and brand-related concerns associated with printed materials, there was a great deal of internal review by both organizations, with legal, communications, and other staff, especially within PG&E. The program could not be launched until the associated promotional materials had been approved, and as a result of the lengthy development and review/approval process the program launch was significantly delayed.

While PG&E staff feel the marketing collateral was properly developed, the target residential markets tended to be challenging and hard to reach and that PG&E staff had less experience dealing with those markets, and thus the collateral did not generate as much participation as had been expected of it. SFE thought that *the inherent nature of the information being conveyed and the underlying structure of the program contributed to the program materials having difficulty getting the message across*. The program staff worked to simplify materials as much as possible and believe that they were able to improve the collateral over time, but that *the concepts involved may never be easy to understand*.

The **SPC** element experienced a significant problem with its promotional material because of the eligibility and incentive situation described in the discussion above on program planning. That problem

caused *significant logistical difficulties in reproducing the flyer, in addition to undermining the SPC element* until the coordination issues with the statewide SPC program were straightened out.

Using low-cost flyers and advertising at community events was effective for the **torchiere and holiday lights exchanges**, plus there was media interest in the torchiere and holiday light exchanges that provided free publicity where there had been no mass media advertising due to the program's limited budget.

Multi-lingual program flyers proved to be an important development for the program's collateral effort. The cultural empathy generated by multi-lingual program flyers helped generate much more interest in such things as the torchiere exchange than would have occurred otherwise. This was shown by the increased level of program inquiries and participation that followed the use of such collateral.

In **CTS**, the small budget meant that marketing collateral had to be limited to community newspapers and word of mouth to various community business groups and the like; large-scale media and mass-marketing tactics were unaffordable and also could have overwhelmed the limited staff with high volumes of inquiries and applications. A *more structured, and larger, marketing budget for CTS would have been helpful*.

The BOMA representative who was interviewed indicated that *many BOMA members found PEP versus statewide program eligibility confusing to them*. This suggests a need for better clarity in program promotional materials' eligibility statements.

BOMA also suggested "***e-marketing***" to its members *in addition to other promotional channels* such as account representatives or direct mailings. The e-marketing effort to businesses could include links to the program's website, electronic versions of promotional materials and application forms, electronic FAQs and other program information posted on line, case studies and showcase facilities to demonstrate program-offered measures, outreach to the local building engineers local union as well as building managers, better outreach to the local Chamber of Commerce, a showcase of and even a seminar with a golf tournament held in conjunction with the seminar.

Regarding marketing to larger customers such as those represented by BOMA, PG&E felt SFE should have had less involvement with large customers, while SFE expressed the opposite opinion, that SFE should have had *more* involvement with large customers.

The ***SFDI*** element initially used flyers, but those alone achieved little participation success so the installation contractor started to *canvass neighborhoods door-to-door*. That generated much greater participation and word of mouth in the neighborhoods being canvassed. The SFDI contractor felt that the flyer used for SFDI had too much verbiage and lacked visual appeal, compared to the flyer the contractor had recommended for use.

Perhaps *the greatest challenge in managing the program's marketing collateral was coordinating incentive levels and eligibility with statewide programs*. Program staff expressed great frustration that measures that could have been promoted exclusively in San Francisco through PEP instead ended up being counted in statewide programs, thus undermining PEP's achievements in the city. These difficulties, which had both budgetary as well as impact accounting and timing implications, likely could have been avoided with more closely coordinated program planning efforts and associated partnership communications.

Community Outreach. SFE staff indicated they would like to have had a greater involvement in the large-customer segments that PG&E's account services staff handled in the program, for example to help with marketing to BOMA members. Where planning for marketing and outreach was effective, sometimes the

plan did not get implemented as intended when people forgot what had been planned and then did something different. SFE staff were praised by business organizations as being very responsive and helpful.

The point made by one SFE staffer sums up well the concept of playing to each partner's community relations strengths: that business-oriented organizations such as BOMA, the Realtors Association, and various merchants associations more often see PG&E as having high credibility in performing outreach, whereas those organizations historically have had some negatives in dealing with the city. Thus, *the utility is perhaps a better outreach leader for most business organizations and channels for reaching them. On the other hand, the utility is often seen as an adversary to many residential community organizations and individuals, with the city seen in a better light*. Thus, the city (in this case, SFE) is probably a better outreach leader for those types of organizations and the outreach channels associated with them such as community newspapers and neighborhood events.

Meetings held in the community had mixed results that appear to be related to how well the events were promoted to the community. For example, the outreach done by the Cultural Charity Services Center for the Torchiere exchange was heavily promoted to the Asian-American community in Chinatown, through multi-lingual flyers, outreach efforts through trained youth, word of mouth and community newspapers, including use of a culturally appropriate small gift as a token of appreciation for attending promotional events. The exchange was highly successful.

Other community events to promote PEP were less well attended, especially by mainstream community members (some meetings tended to have been dominated by known community activists). Also, initial meetings held in the community were difficult because of long-standing energy and economic development issues that the meetings were unable to resolve. After several meetings *a third-party facilitator was engaged to help facilitate the meetings in hopes of making them more productive*. The person brought on to help facilitate the meetings thought the difficulties were in part due to an insufficient outreach effort to community leaders and others before the meetings were held. Had there been *more time spent working in the community through credible facilitators ahead of the events, this individual believes, better participation would have been achieved and also better expectations by the community* as to what the program had to offer and could deliver relative to the issues facing the community. Even so, the *ongoing strained relationship between some parts of the community and institutions like CCSF and PG&E may make programmatic efforts difficult regardless of what level of facilitation is attempted*. Where the stakeholders are at loggerheads, however, good event facilitation and groundwork ahead of time can help frame the issues and conduct discussions of questions more reasonably than a less-structured event would experience. This channel did achieve at least the objective of providing a public forum for the community to voice its concerns and interests.

Outreach to the business community was primarily done through meetings with various small business associations as well as the program's CTS element and its targeted marketing effort. While many of the business association meetings resulted in only modest program participation, Pier 39's effort warrants attention as a success. PEP was seen by Pier 39's operations and marketing staff as an opportunity to augment Pier 39's existing environmental awareness efforts. Having heard of PEP at an information meeting SFE staff conducted at Fisherman's Wharf, Pier 39 contacted PEP to obtain information on high-efficiency lighting equipment. This led to a variety of activities that Pier 39's staff initiated, including press releases, an article in the San Francisco Chronicle, public service announcements, signage around Pier 39, and even sponsorship of the Pier's Christmas tree lighting that involved one of the LED holiday lights manufacturers. *One of the keys to success in utilizing this business association channel was to show merchants how their support and participation in the program, and money spent on related promotions could be more than made up for in sales*. The *greatest concerns for business associations is their merchant members' cash flow and time*: ironically, many small businesses may have good cash flow but

simultaneously have little time to plan and implement improvements because business is busy – yet when time becomes available to consider improvements there often is insufficient cash flow to make an investment. As a result, energy efficiency investments tend to get postponed indefinitely.

Market segments. To better reach target residential segments, community organization assistance was increasingly relied on as the program played out. Promotion in general was targeted to specific market segments including associations, organizations, large C&I customers (via PG&E's account representatives) and residential neighborhoods.

Retail businesses did not attend program events as much as expected, and restaurant efficiency measures were not installed as often as expected even though there was a variety of such measures available to restaurants.

Customers with reach-in and walk-in coolers and freezers were heavily targeted because of the year-round nature of refrigeration efficiency impacts. Utilizing vendors to help sell the measures was critical to the success of the refrigeration marketing effort.

PG&E's Mass Market Support Services: Business Customer Center, Smarter Energy Line, and Website. The program's CTS, Cash Rebates, and SPC elements generated a *noticeable increase in inquiries* to PG&E's Business Customer Center (BCC) from customers who were contacted via the program's marketing and outreach efforts. Coordinating the program's marketing and outreach efforts with the BCC was well managed most of the time, according to PG&E staff. Promotional materials and other information were provided ahead of time to the BCC so they could anticipate customers' information and program participation requests. PG&E staff felt the BCC did a reasonably good job supporting PEP inquiries.

The Smarter Energy Line, that primarily supports PG&E's residential programs, provided similar support to customers as PEP promotional materials, and the PG&E and PEP website pages directed inquiries to the Smarter Energy Line. There were relatively few calls to the Smarter Energy Line for the SFDI element, however, because of the way that element was marketed (door-to-door) and because the implementation contractor was observed to do a good job handling inquiries directly and taking care of customers.

Both PG&E and SFE staff felt that the website developed for PEP was less effective than hoped for. It is uncertain, for example, how many browsers who "hit" the website became actual program participants. The target markets for PEP, that involved segments who perhaps may be less likely to be regular internet users, and the use of other channels as the primary means of promoting PEP may be underlying factors that resulted in the website having limited effect on the program.

4.6 Program Management, Administration, and Information Management

PEP was a significant and complex effort to manage, both structurally and relationally. It had a significant budget, diverse staffing across two core and numerous satellite organizations, and a short time frame in which to achieve both the intended strategic resource impacts and also additional social objectives.

Other functions primarily included technical support to customers via the CTS element, but also technical support in addressing various efficiency measures that were considered for the program. One program function not undertaken in PEP that exists in some other programs was financing. This function was not undertaken because of SFE's previous experience that suggested there would be little additional impact achieved for a disproportionately large program effort to develop and manage such a program function.

These functions included handling inquiries about the program generated by marketing and outreach activities, program intake processing including field activity scheduling for program field services, and a variety of information management efforts including participation tracking, planning, and a variety of information management.

Program Management Issues

- Program management was not equal between the partners, with each organization managing selected pieces of the program, and with PG&E generally taking the dominant management role because of the use of its existing programs as the platform for PEP. SFE felt its management role was subordinate to PG&E's role.
- SFE managed many of the relationships with the community, including small business, while PG&E managed relationships with large business customers. These roles were felt to be appropriate to each organization's strengths and previous relationships with customers.
- Program management was affected by staffing changes, for example with PG&E changing program manager, where the new manager had to get up to speed on the program. SFE's management staff changed early in the program planning process, requiring SFE to regroup its efforts. The CTS element was less effective because of having to utilize staff to work on community outreach for the additional program scope; this affected how the CTS element was managed as fewer customers were being reached.

4.6.1 Program Management

Program management roles. The overall management of the program was a significant effort. SFE's management staff had to quickly adjust their strategy when the program was not given independent funding and development due to the change in the CPUC's PGC funding policy. The change in strategy required development of a different set of institutional and personnel relationships and program management structuring to set up the PG&E partnership. SFE's program management staff took on significantly different roles in planning and running PEP once the partnership was formed. This was because PG&E then took the lead on the program planning process, and PG&E's staff took on much of the program administration and marketing support for the various PEP elements.

Contract and partnership management. A contract had to be developed between CCSF and PG&E, requiring a managerial effort that would not have had to be undertaken had PEP been developed as an independent third-party program. Conversely, there likely were contractual arrangements for measure installation work that were not needed for PEP because of existing contractor arrangements with PG&E for such work. Day-to-day program operations had to be supervised, staff performance assessed and coached, and a variety of internal and external management communications efforts had to be made including program updates and issues resolution.

Community relations. Program management work was needed to cultivate and conduct relations with various community and CCSF organizations and individuals, to recruit those stakeholders' help to conduct program outreach, primarily. These managerial efforts preceded the program's "stock" marketing and outreach activities, but also continued as needed throughout the program. These efforts were to

develop and maintain a working rapport in the field with assisting organizations and individuals, and address various conceptual and operational concerns raised by the assisting organizations.

Staffing Issues. The original PEP manager took on broader partnership coordination responsibilities and a dedicated program manager was brought in for planning and managing PG&E's responsibilities for PEP.

SFE experienced management staff turnover as the original person involved with the planned program left and the current management person became involved. That transition involved additional regrouping efforts given expectations that had been built up under the previous manager. Originally, SFE planned to have two engineers working the CTS program element, but because of other program needs such as the refrigeration gasket development and torchiere exchange effort, the desired staffing level was not reached. This limited the service volume CTS was able to achieve.

Staff Situations. That the program achieved the success it did is a testament to the program staff's dedication and persevering efforts. Several factors combined to make the program more difficult than it may have been otherwise, yet despite those constraints the program appears to have largely met its objectives. The program budget was limited and that constrained the number of people available to staff the program. The program had objectives added to it to address community needs and those objectives had to be addressed within the budget and staffing originally meant for a narrower program scope, where the staff would have been available to focus on core impact objectives. SFE's staff that would have been more focused on delivering the CTS element instead had to shift to help the torchiere exchange and holiday lights effort, for example.

Administration and Information Management Issues

- Existing program administration processes were used for the Cash Rebates, SPC SFDI and MF Rebates elements. A new process for intake and application processing had to be developed for the CTS element.
- A funds reservation system had to be set up because of the limited budget for the program and, especially for the Cash Rebates and MF Rebate elements, because of the market interest in measures covered by those elements.
- PEP achieved some simplification in its administrative processes that helped make elements like MF Rebates and SPC actually go more smoothly than the analogous statewide programs.
- Information management was a significant effort for the program, encompassing the management and coordination of planning information, marketing information, customer billing information and various program participation and regulatory reporting information. Often, changes in information in one area triggered the need to address information either upstream or downstream in the program.
- Program tracking and other information requirements were extensive. Program staff felt they were overly time-consuming and that some reports were not particularly helpful for managing the program.
- PG&E's MDSS data system for program tracking was successfully adapted for PEP, according to PG&E, but SFE thought the system was somewhat cumbersome
- Legal and systems firewall concerns prevented some automation of data transfers between SFE and PG&E.

There also was some staff turnover (manager at SFE early on, PG&E staff at various times) that necessitated learning and orientation time for new staff people.

More subtle, perhaps, was the observation by one interviewee that the broader market restructuring that had gone on in California had dispersed program expertise away from the utilities, thus constraining PG&E's expertise for PEP. The effect of losing staff expertise is often not realized until later on, when program processes are not well understood and so planning and implementation are less efficient than with a higher level of staff knowledge.

All of these factors worked against the program by making planning more difficult and reducing the efficiency and effectiveness of the program in achieving its goals.

4.6.2 Program Administration

Program intake, incentive processing, and product/service fulfillment. Part of the program's administration and information management involved processing program applications presented by the single-family and multi-family direct-install contractors' invoices. The process for handling those invoices is shown in Figure 4-4 below. Similarly, the program administration process dealt with other program elements' intake for Cash Rebates, CTS, and SPC applications, to schedule site visits and installations. The resulting field activity information was then processed through PG&E's Marketing Decision Support System (MDSS) to track key program activities and efficiency measures recommended or installed, and through accounting and billing systems for disbursing incentives.

PG&E had to develop a *reservation system* to manage the program's limited funds for measure incentives. With SFE involved in post-installation measure inspections, some of PG&E's administrative processes had to be realigned as well. MDSS had to be modified to accept PEP data. *These administrative matters required time and some expense to address*, but PG&E felt the outcome was successful. SFE felt the administrative systems and information management were bulky and that PEP did not fit well into PG&E's administrative framework and processes, rating this aspect of the program a "3" on a 1-5 scale.

Program paperwork and *incentive disbursement* turnaround is estimated by PG&E staff to take 6-8 weeks. This is in line with the processing time of the statewide programs. SFE felt that some problems did occur with the processing aspects of the program, resulting in some delays in incentive disbursement.

There was some simplification applied to the statewide program *application forms* when those were adapted for use in PEP. PG&E staff feel this worked well. An electronic version of the MF Rebate element's application form was developed to make the application process go more efficiently, given the contractor orientation of that element and multiple applications being processed for each contractor. PG&E's program manager for multifamily programs felt that the PEP MF Rebate element administration worked more smoothly than the statewide program.

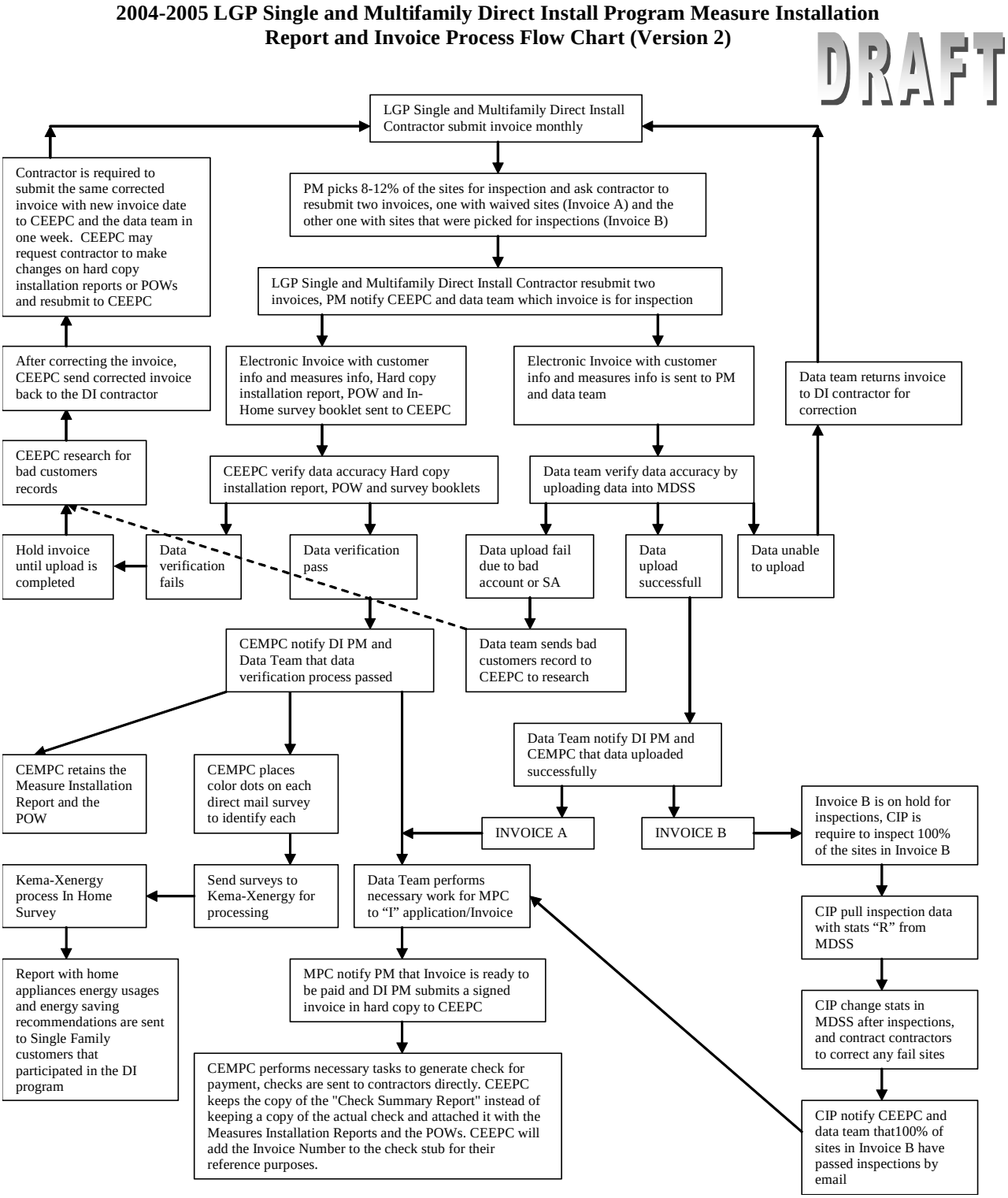
The statewide Express Efficiency intake process and system at PG&E was used for processing applications for the Cash Rebates program element. Legal and firewall problems prevented automating the transfer of data from SFE to PG&E, however, so program staff had to use a manual process to enter application data.

BOMA indicated that *the program intake process is cumbersome for many BOMA members, and that there is a need to get back to building engineers more effectively with program information*.

4.6.3 Program Information Management

Planning information management. The effort to quickly develop the program meant that much planning information used for PG&E's general program portfolio was also utilized for PEP planning, since it was already vetted by regulators. PG&E staff indicated that there was no time, for example, to rework the documentation of the various measures chosen for the program and so existing work papers were utilized. While there has been a subsequent effort to update measure work papers for the 2006-2008 program cycle, there were difficulties in reusing old assumptions and impact values that did not fully reflect the PEP market situation that overstated the program's impacts.

Figure 4-4. Single and Multifamily Direct Install Program Process Flow Chart



There also was *extensive planning information to manage throughout the course of the program's life cycle*. The information needed to be compiled, assessed for use and appropriateness, and reported for the program's reviews both in the regulatory review process and internally at PG&E. This included impact analysis work papers for the various measures being included, cost estimates, program tasks and schedules, etc. Changes in the program during its course meant planning data had to be revisited. It also included regulatory filings to extend the program. Those filings involved exchange of information with intervenors and regulatory staff through comments and reply comments to the program filings.

For example, it appears that, somehow, the incentive "kicker" for PEP's SPC program element, that was designed to reflect the added value of reducing San Francisco's dual winter/summer peak requirements, got adopted as the value for the statewide SPC program. Also, the refrigeration gasket measure in the Cash Rebates program element was closely reflected in PG&E's subsequent program portfolio changes. These involved a change in the statewide SPC program to provide incentives for similar prescriptive measures, where the statewide program came to have higher incentives than PEP's. Customers' eligibility for the statewide program was unclear and left customers confused. The higher statewide measure incentive drove customers to the statewide program, thus clouding whether the impact would be counted in PEP or in the statewide program. Subsequent eligibility and incentive level changes helped rectify the problem, but not without dampening the program's momentum.

These two developments and the general approach and planning information used to expedite the program development effort suggest that *closer scrutiny and coordination of planning information may have helped avoid the difficulties* associated with the efforts that had to subsequently be undertaken to reposition and clarify the SPC and Cash Rebates incentives and eligibility for PEP and PG&E's statewide programs. The examples illustrate the *need to closely coordinate program development information so that programs do not end up conflicting with one another*, and to minimize the time spent dealing with the consequences of inconsistent or otherwise problematic planning information.

Marketing information management. The marketing collateral used in the various marketing and outreach activities was information that also needed to be managed. This process included review by SFE and PG&E and included legal, claims and branding reviews by PG&E. When underlying planning data changed, marketing information also had to be changed, such as the need to reprint the Cash Rebates sell sheets. That problem illustrates how intertwined program information is across planning, marketing and administration in programs, and how great care is needed to avoid problems and domino effects caused by inconsistent or erroneous information.

Customer billing data. PG&E requires a customer-signed waiver to release billing data to third parties, and PEP suffered some difficulties as a result of this *manual process*: slow turnaround time to obtain the waiver signature, a manual extraction process to pull usage or other data to support program marketing and application efforts, etc. This was made more difficult because of the firewall security that prevented directly linking SFE's data systems to PG&E's. Program staff were frustrated by this situation, and never were able to make the administrative and IT systems changes they felt would be needed to automate or otherwise improve the waiver and information transfer process while maintaining the necessary confidentiality of customer information.

Program participation and related information tracking. The program had *significant internal reporting requirements for tracking program activities and performance quality*. For example, each month a comprehensive status report was submitted to PG&E that detailed the various activities, energy effects, and any significant program issues. Other reports were submitted as well, including a detailed marketing and outreach activities report documenting those activities, a staff labor and activities report for SFE, etc. SFE staff reported that the monthly reporting process as required by the contract with PG&E and per CPUC regulatory requirements took about 5 days. They felt that *having the large amount of data*

available was good for various purposes but that the effort was significant enough to be bothersome and that it took inordinate amounts of time away from performing other program duties to obtain energy impacts.

In the CTS element, there was no budget for developing a program database and so SFE staff had to develop the database on their own. There was *no direct link to the PG&E program databases from CTS*. Thus, there was a database gap for the CTS element relative to the other program elements. Measure recommendations made by CTS were tracked, but actual installations that followed from those recommendations were not directly linked, for example to the Cash Rebates database. This left program staff unable to see in the Cash Rebates database which CTS-recommended measures were installed via that program element. *There was a notion to integrate the CTS and CR databases through a common marketing code, but that was not accomplished during the program.* SFE staff noted that it could be difficult to obtain customer billing information needed for program purposes, because of the release waiver requirement PG&E enforces to protect customers' information privacy. The SFE staff also noted they were not able to obtain other customer information such as what programs a given customer had participated in.

MDSS was used for tracking the other program elements' participation, with service code changes made to identify PEP measures and to reflect different incentive amounts for PEP measures. PG&E staff felt MDSS did a reasonably good job tracking PEP participation-related data and that it was flexible for program reporting needs. For the SFDI element, however, because a spreadsheet was used for initial entry of program participation data, from which spreadsheet the data were uploaded to MDSS, it was felt that that approach could be improved. *One problem with the two-step upload approach was that data in the spreadsheet had to exactly match customer data in MDSS*, and where those data did not match extra effort was required to make corrections and do the match-up.

SFE staff saw some difficulties with MDSS reporting, though it was able to provide the data needed to meet the program contract requirements for program reporting. PG&E staff felt there could be some internal data management improvements, but were pleased in general with the modifications made to MDSS to handle PEP information requirements.

Regulatory Reporting. Program staff from both PG&E and SFE noted that the regulatory reporting requirements for PEP were onerous, time consuming, and somewhat disconnected with the information used internally for managing the program. They recommended a simpler program structure as one way to reduce the regulatory reporting requirements, particularly for program budgeting and expense accounting.

4.6.4 Quality Assurance.

The program planning effort, perhaps because it was so occupied with the regulatory review process, ironically appears to have not explicitly considered quality assurance in the planning process itself. This is evidenced by the oversight on analytic values for lighting impacts, on coordinating measure incentives and other aspects of program design, and on program eligibility relative to statewide programs. *When asked about quality assurance planning, the program staff interviewed believed this could have been improved, and would have smoothed the program's implementation.* One example was the torchiere exchange effort, where greater than anticipated demand and hurried roll-out neglected to develop sufficient customer contact information for subsequent evaluation use. This was ameliorated by the Cultural Charity Services Center staff, who undertook an effort to record customer information from people bringing in old lamps to be exchanged. This ad hoc effort provided the information needed to conduct a brief survey of torchiere exchange participants for this evaluation, where that would not have been possible otherwise.

For most other program efforts, PG&E administered the program applications processing, and applications were checked for accuracy prior to being entered into MDSS. Site inspections were completed for all program elements (including for 100% of SPC sites), to ensure that installation contractors were properly installing the program's measures.

PG&E does not prescreen installation contractors, but instead uses its post-installation inspection process to review the work of the contractors. This approach has been successful in managing contractor installation work quality, according to PG&E staff.

One installation contractor expressed *concern about the quality of equipment chosen for the program*, especially thermostats. The program budget did not allow for better quality equipment to be used, unfortunately, and that led to product performance concerns.

PG&E had to establish internal controls to make sure that customers in San Francisco were in fact participating in PEP for measures covered by PEP, and that PEP would receive credit for those impacts. If the measures were not in PEP the controls ensured that customers were participating in statewide programs. Additional quality controls were instituted for the SPC program, including dedicated staffing by PG&E, to ensure the PEP SPC program element was being monitored and managed above and beyond the normal statewide SPC program.

4.7 Program Element Participant Findings

The following section will assess several key process metrics of program elements serving the business, single family, and multifamily customer segments in San Francisco. The Single Family section also includes a brief discussion of the torchiere exchange initiative. Process metrics discussed for these programs include:

- How end-use customers learned about the SFPEP program
- Which information sources were useful
- Why participants chose to participate in the program
- The potential that spillover occurred
- Overall customer satisfaction with the program.

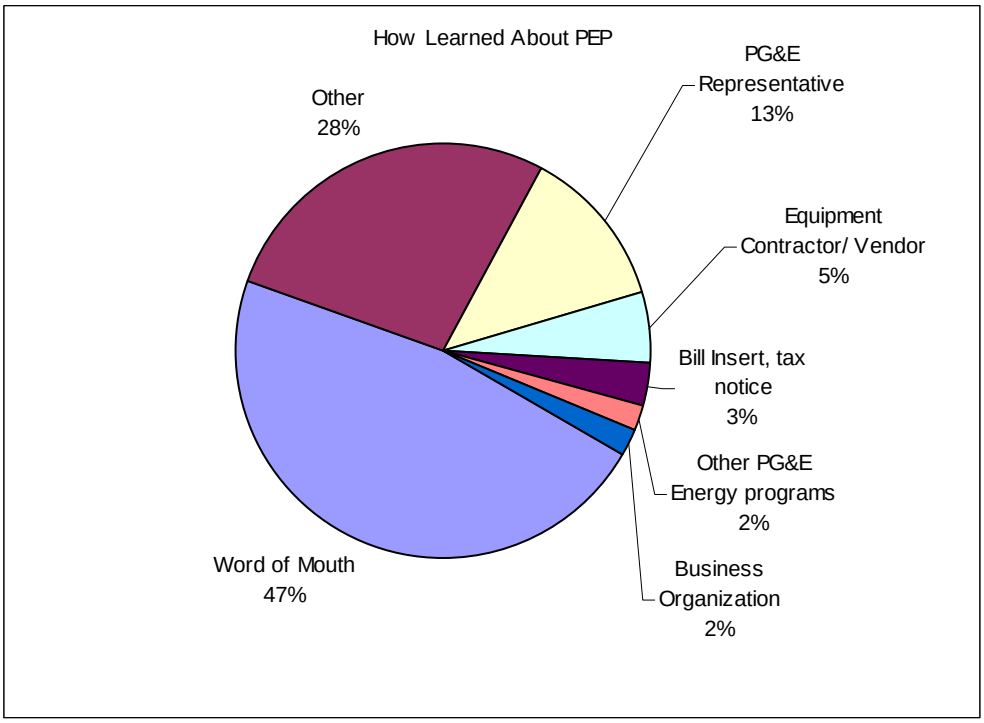
Findings discussed in this section represent the views of participants gathered during the telephone interview process. Note that non-participants were not surveyed for this evaluation effort. Survey instruments used for each customer segment are contained in Appendix B.

4.7.1 Business Participants

The participant telephone surveys included 211 business participants, who were surveyed in Spring/Summer 2005. These survey respondents included 163 *Cash Rebates for Business* participants, 40 *Commercial Turnkey Services* participants, and 8 Standard Performance Contracting participants. This sample is discussed in more detail in chapter two of this report.

The interview began by probing how customers first learned about the Peak Energy Program. This question allowed for multiple responses and provided for a full range of contact types and media, from contact by program staff, mid market participants, and end use customers. Figure 4-5 shows that word of mouth was the most common means through which customers became aware of the program. A detailed review of the broad 'Other' category, the second most common information source, revealed that PG&E

Figure 4-5. How Business participants learn of the SFPEP



was the source of the information in over 50% of cases. Multiple contact points were mentioned, such as the website, a letter not associated with a bill, or a direct call from PG&E, etc. From this it can be concluded that PG&E was the contact point in nearly 30% of cases. Mid market actors, such as contractors and equipment distributors, were mentioned in approximately 5% of responses.

The sample of end use customers interviewed was comprised of various staff positions. Figure 4-6 shows how the different types of information sources was disseminated among these various actors. Verbal communication (word of mouth) was the most prevalent media cited by 3 out of 4 end use customer actor classifications, with senior management citing this in over 50% of responses. It is likely that senior staff was informed about the program through other functionary staff, such as maintenance and engineering. The broad 'Other' category was the second most common information source among all 4 actor types. As noted in Figure 4-6, the 'Other' category can be attributed primarily to a PG&E source not listed in the options offered in the survey guide. Bill inserts, in general, were not a common citation.

When asked what was most useful about the program information that a respondent saw or heard, the opportunity to save money and understand energy were the most common benefits of the information gained, as shown in Figure 4-7. Approximately 94% (187 respondents) received appropriate info and 10 of the 13 who did not were senior management. In total 4 respondents indicated that they received no information and may have initiated participation on their own.

When asked about why they participated, nearly 100% cited the opportunity to save money as being a key reason to work with the program. Respondents were allowed to cite multiple reasons, and it is noteworthy that most respondents cited environmental concerns, comfort, and productivity as being important drivers. The offer of free equipment and the need to help the city were also commonly cited. A separate question asked respondents if they knew that there was a statewide energy efficiency program for the measures that had been installed. *In total, only 38 overall (25%) were aware of the statewide program.*

Figure 4-6. Information source cited by type of end use customer interviewed

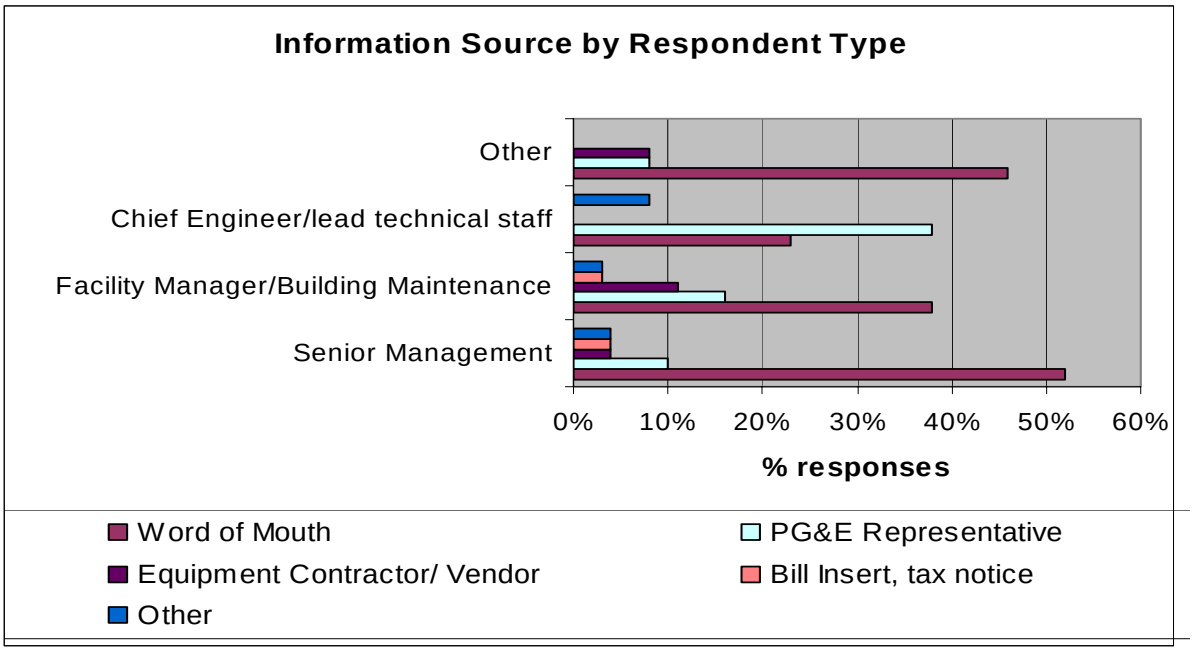


Figure 4-7. Why was information received useful in the decision to participate?

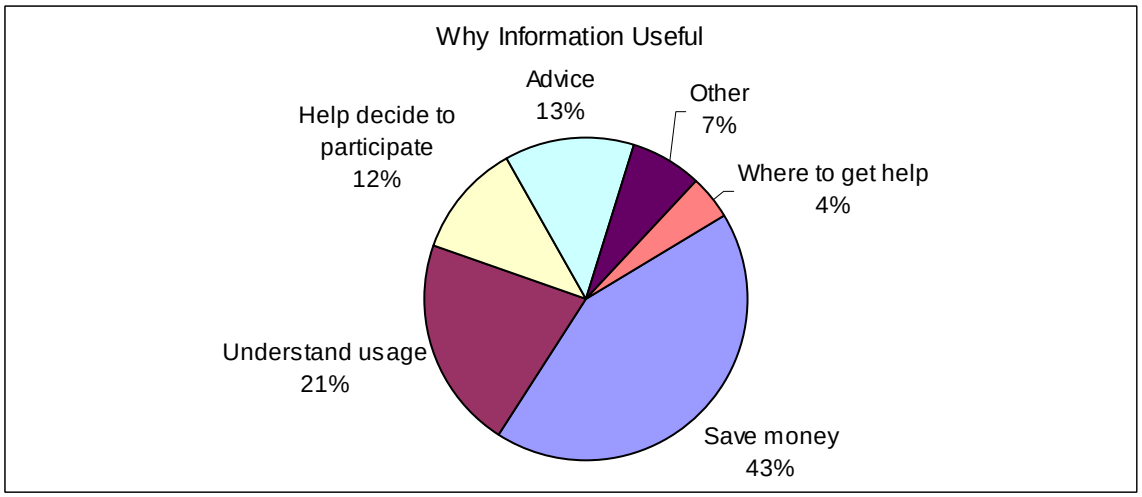
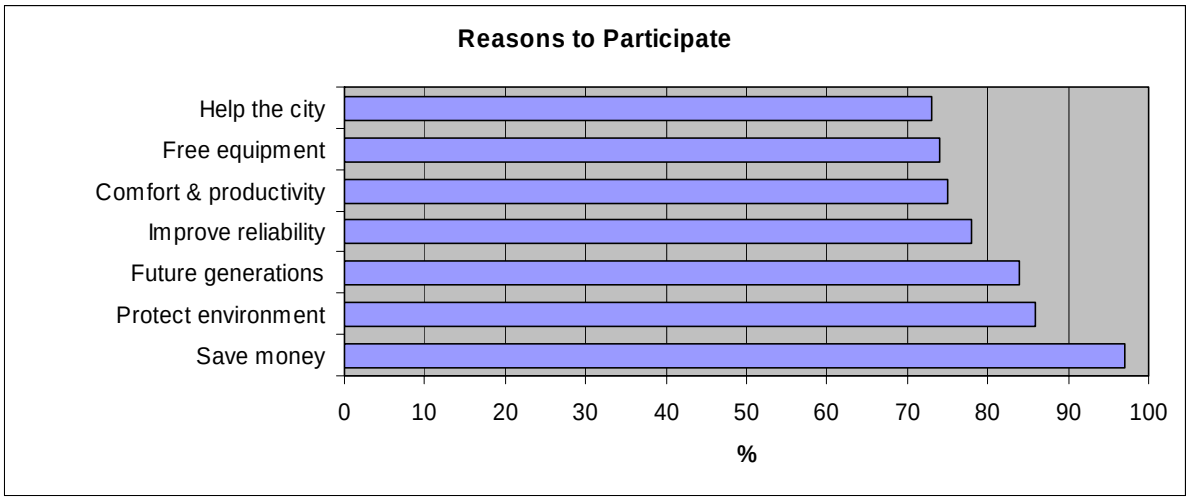


Figure 4-8. Drivers for participation in the program



Respondents were probed about the potential for spillover with several questions, including;

- Have you been influenced by the Peak Energy Program to take any additional energy efficiency actions?

- Have you installed one or more energy efficiency measures because of the Commercial Turnkey Services offering, but not installed when the service visit was made?

25 % of respondents indicated that they had bought other EE equipment and 40% installed same EE equipment elsewhere. Figure 4-9 shows that facility management, engineering and maintenance staffs, and senior management indicated that they had, to varying degrees, installed the same energy efficiency equipment promoted by the program at other locations, either within the same facility or at other facilities. There was some indication that other, non-program-specific energy efficiency equipment had also been installed. While it is not entirely clear that these installations are attributable to program activities, program participation probably increased the likelihood of these actions.

In general, satisfaction with the program was high. On a 5 point scale, 83% were satisfied, with 56% very satisfied (a rating of 1). Overall only 7% were unsatisfied (a rating of a 4 or 5). As shown in Figure 4-10, facility management, engineering, and maintenance staffs were, in general, very satisfied with the program, while the opinions among senior management were more varied.

4.8 Single Family

168 single family participants were interviewed in Spring and Summer 2005. Due to the nature of the program targeting and implementation efforts, all of these respondents were those of 'moderate income'. The interview began by probing how single family customers first learned about the Peak Energy Program. Similar to the business survey, the single family guide allowed for multiple responses and provided for a full range of contact types, from contact by program staff, mid market participants, and end use customers. Figure 4-11 shows that 51% of single family participants learned of the program thorough word of mouth. PG&E was cited in 33% of responses, either through a visit, telephone call, or bill insert. Community organizations were noted in 8% of responses.

Figure 4-9. Spillover effects among SFPEP business participants, by job function

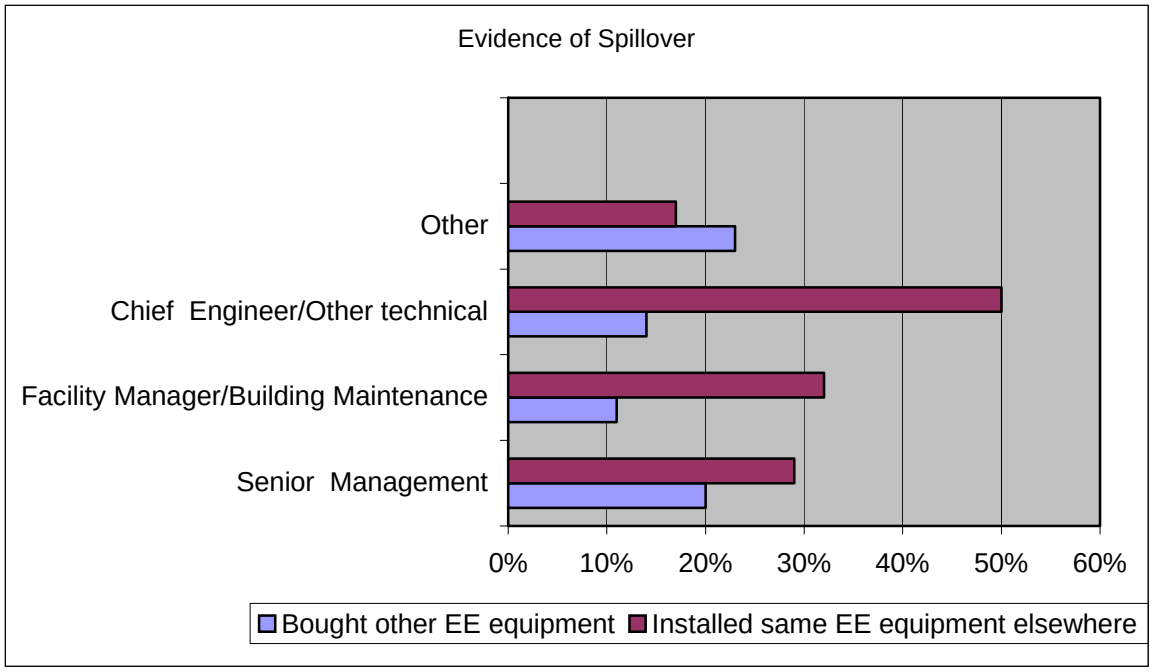


Figure 4-10. Business participant satisfaction by job function

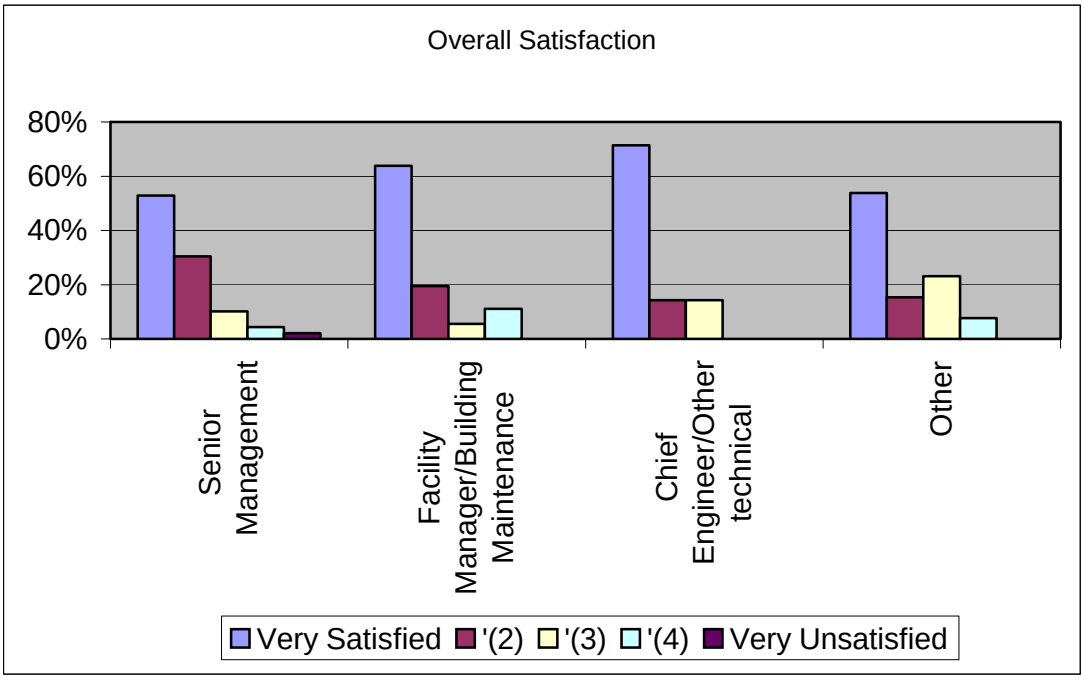
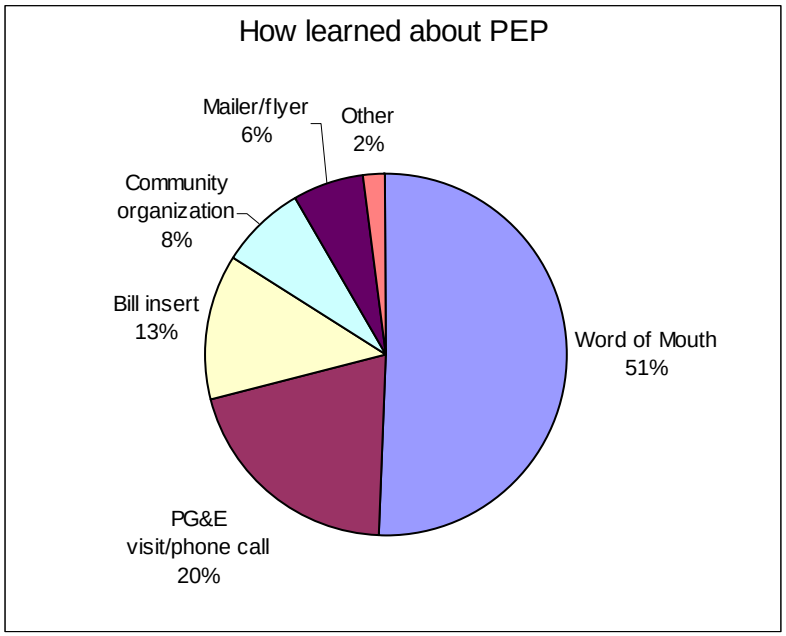
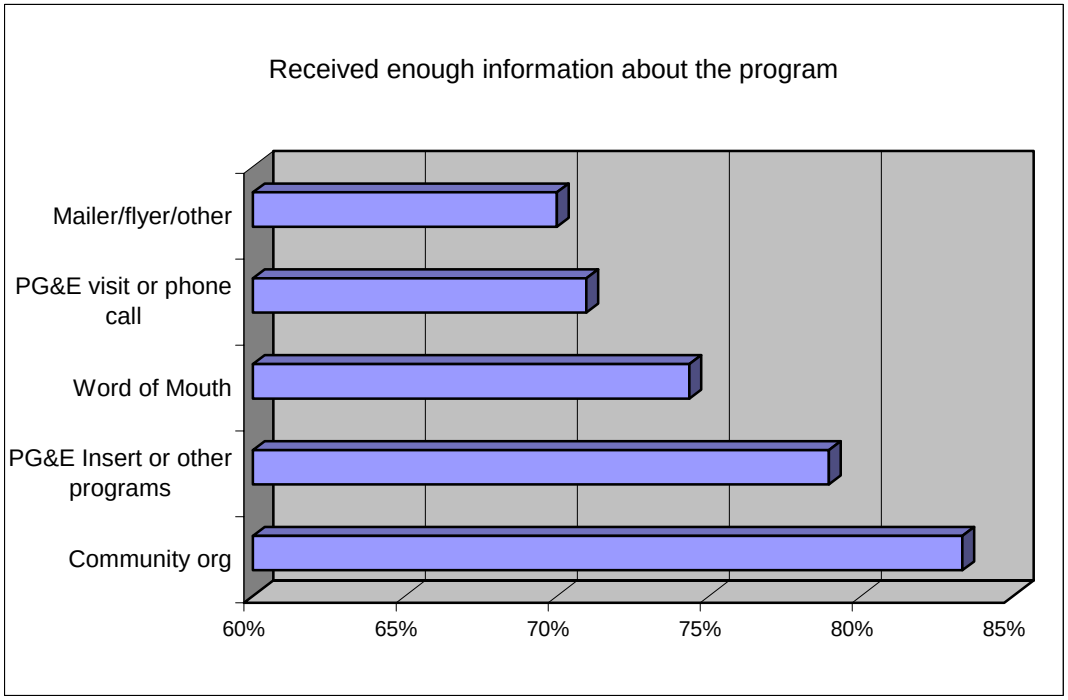


Figure 4-11. How Single Family participants learned of the SFPEP



When comparing how information was obtained and whether enough information was received to initiate participation, in general all of the information sources noted in the survey guide provided good information, as shown in Figure 4-12. Respondents did, however, attribute the greatest influence to community organizations, while written (hardcopy) information from PG&E was also frequently cited. This is in contrast to the observation that community organizations tended to be less frequently cited as sources of information, as discussed above.

Figure 4-12. Adequacy of information received about the SFPEP Single Family program



The sample of single family participants interviewed was asked to identify any potential problems areas with information received about the program. Table 4-3 shows which problems were perceived with the various information sources. This question allowed multiple responses. Verbal communication (word of mouth) tended to have the greatest number of issues. While these problems are small in comparison to participation (even the 'not enough follow-up' only garnered 17 responses out of 168 surveyed), it does indicate that information disseminated through program hard copy media and through community organizations tended to be the least problematic.

Table 4-3. Problems with information received about the SFPEP Single Family program, by information source

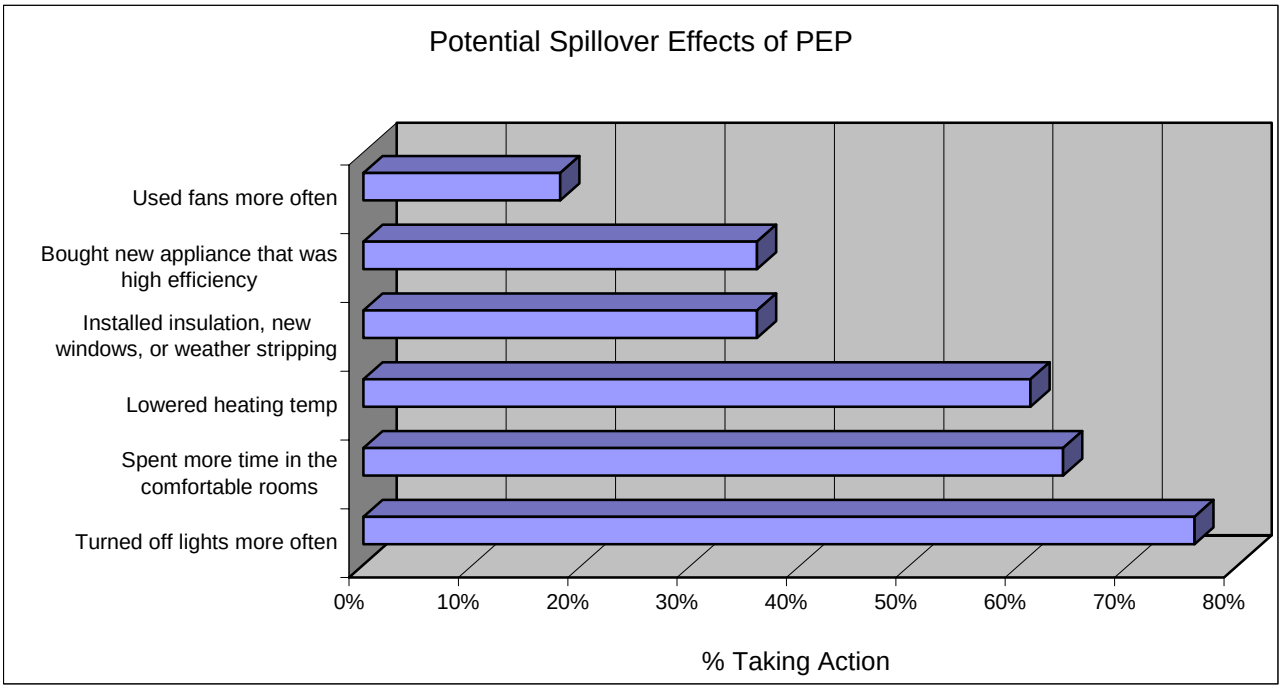
	Problems with information				
	None provided	**Not enough information or follow-up**	**Couldn't understand**	**Not relevant/ believable/other**	**Not appropriate**
Word of Mouth	4	8	2	2	4
PG&E visit/phone call	4	4	2	3	1
PG&E Insert or other programs	0	3	1	1	2
Community org	1	1	0	0	0
Other (include Mailer/flyer)	0	1	2	0	1
Total	**11**	**17**	**5**	**6**	**10**
DK/refused	2	0	0	0	2

Respondents were probed about the potential for spillover with several questions, including;

- Turned off lights more often
- Spent more time in the comfortable rooms
- Lowered heating temp
- Installed insulation, new windows, or weather stripping
- Bought new appliance that was high efficiency
- Used fans more often.

This question allowed for multiple responses. Figure 4-13 presents a graphic view spillover frequency. The most frequent instance of spillover was more action taken to turn off lights when not needed, and lowering thermostat temperatures. It can be observed that interaction with the program *may have* prompted some respondents to purchase more efficient appliances and upgrades to the building shell, including insulation and more efficient windows (note that other factors may have also influenced these decisions). *It was also observed that 44% of participants who very satisfied with CFL products also bought more CFLs and/or fixtures outside of the program initiative.*

Figure 4-13. The potential for spillover in the Single Family program



Single Family participants were probed about their satisfaction with the program.

4.8.1 Torchiere Program

A torchiere exchange was a key component of the Single Family program. While the evaluation budget did not explicitly include a telephone survey with torchiere participants, Summit Blue was able to design a simple survey instrument and utilize the resources available at the Charity Cultural Center to conduct a brief telephone survey of 71 participants within the existing budget. These survey respondents represented a number of exchange events. Again, the survey instrument is included in Appendix C-1.

Participants were asked about their reasons to participate. Figure 4-15 shows that the responses to this question are similar to the responses gathered from CRB participants in that saving money was a key driver to participation, while the concern for the environment was not a significant driver for the single family population. Of note is that less than 8% of respondents indicated that they were exchanging a failed torchiere, indicating that the program successfully replaced inefficient, but operating, fixtures.

In comparing the level of satisfaction with the program by participants in the torchiere exchange initiative, it was observed that 84 % were very satisfied and liked the program.

Figure 4-14. Single Family program satisfaction

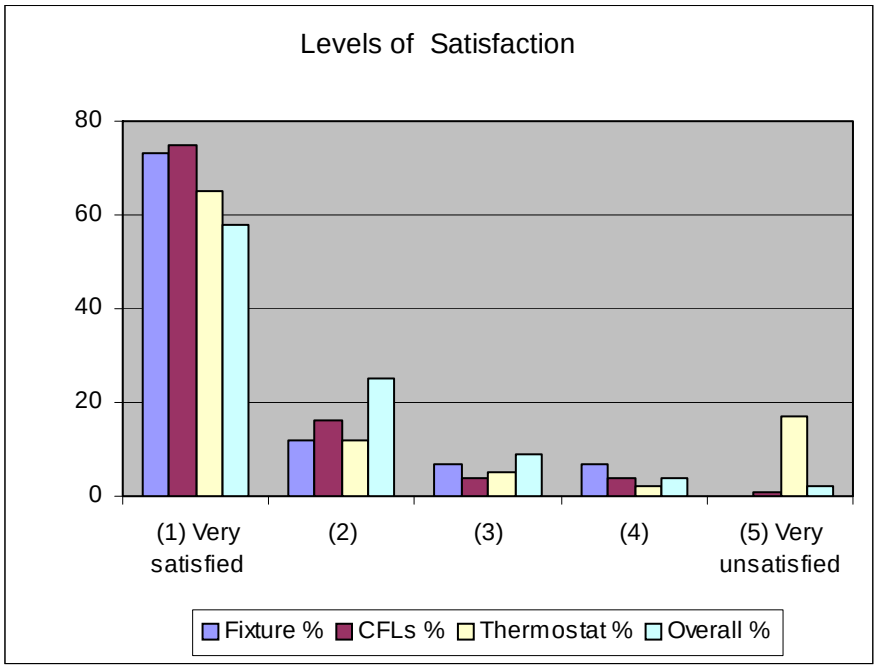


Figure 4-15. Drivers for participation in the torchiere exchange program

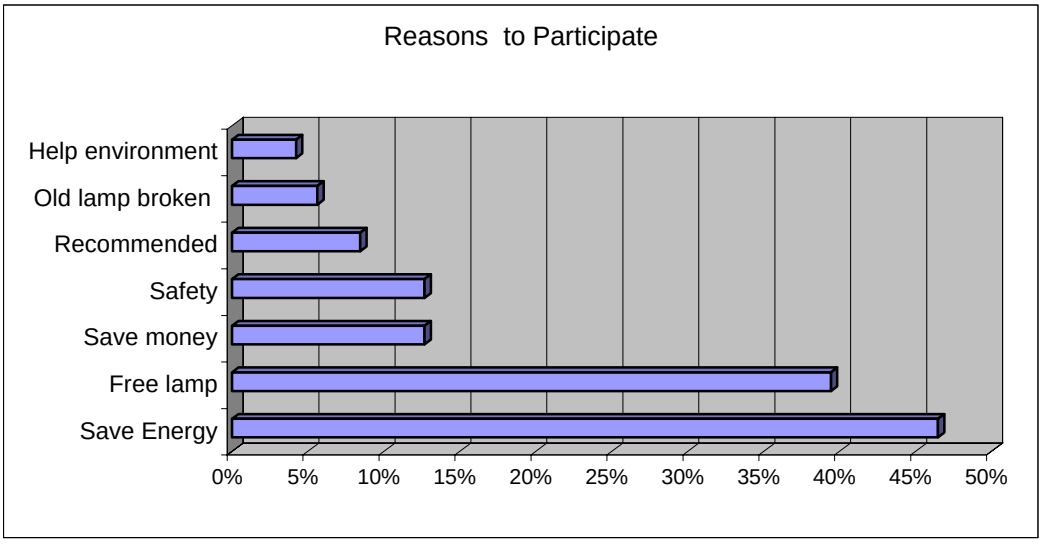


Table 4-4 provides some insight into aspects of the torchiere exchange that participants did not like. In general, issues surrounding the logistics of the exchange, such as long lines were cited. Some respondents indicate that a more expansive product offering would be welcome. In addition to only a small number of areas of dissatisfaction, it was also observed that only 1 participant would not recommend the program. Given that multiple responses were allowed, a total of 25 participants out of the 71 surveyed cited one of more problem, or area of improvement they would recommend to program implementers.

Table 4-4. Problems with torchiere exchange program

Reason	Frequency
Change other fixtures, equipment	8
Line to exchange too long	5
Add delivery	4
Light not bright enough	3
Need more locations	3
Other problems with light	3
Hard to control intensity	2
Increase program time	1

4.9 Multi-Family

A total of 10 property managers and 118 tenants were surveyed about their participation in the program. When asked how they learned about the SFPEP, most property managers indicated that the information had come from the mid-market, as shown in Table 4-5. Because most of the installations were completed by a single contractor, it may be concluded that this contractor was in large measure responsible for the multifamily program achievements.

Table 4-5. How Multi-Family participating property managers learned of the SFPEP

How property managers found out about PEP	Frequency	%
Equipment contractor/vendor	4	40
PG&E representative	2	20
Other	4	40

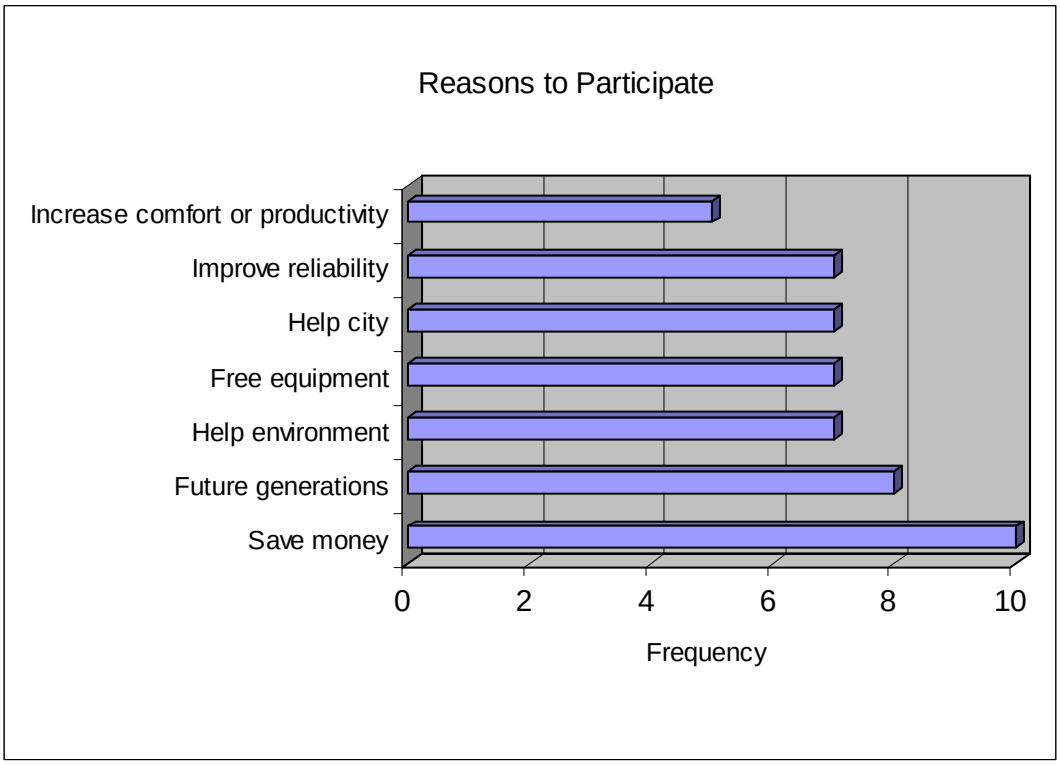
When asked what was most useful about the program information that a respondent saw or heard, all of the categories probed were viewed as useful as shown in Table 4-6.

Table 4-6. How the program information was useful

How the information was useful	Frequency	%
Helped me decide to participate	3	30
Helped understand energy usage	2	20
Showed how or where to get help with energy problems	2	20
Helped save money	2	20

The 10 property managers were also asked about why they participated in the program. All cited the opportunity to save money as being a key reason to work with the program, while concern for the environment and future generations also rated high, as shown in Figure 4-16.

Figure 4-16. Drivers for participation in the Multi-Family program



Property managers were probed about the potential for spillover with several questions, including:

- Installed insulation
- Turned off lights/installed sensors
- Lowered heating temperature
- Increased maintenance
- Installed similar equipment elsewhere
- Installed additional measures.

Figure 4-17 shows that the most frequent instance of spillover was installation of additional insulation. This may indicate a more aggressive initiative at weatherization, though the respondent could have also been including hot water tank insulation in their interpretation of this question. Similar to the single family responses, additional actions included turning off lights when not needed and lowering thermostat temperatures. It can also be observed that interaction with the program may have prompted some respondents to install similar equipment elsewhere, outside of the reported program accomplishments, though to a slightly lesser degree than spillover reported by single family respondents.

Overall satisfaction with the program ranged from very satisfied to very unsatisfied. This range of responses was more evenly distributed in the multifamily program than any of the other SFPEP program elements reviewed. Of the 10 responses, a rating of 3, viewed as neutral, was the most common indication of satisfaction, as shown in Figure 4-18. This wide range of program satisfaction among property managers indicates a need to involve them more in future program planning efforts.

Figure 4-17. Spillover effects in the Multifamily program element

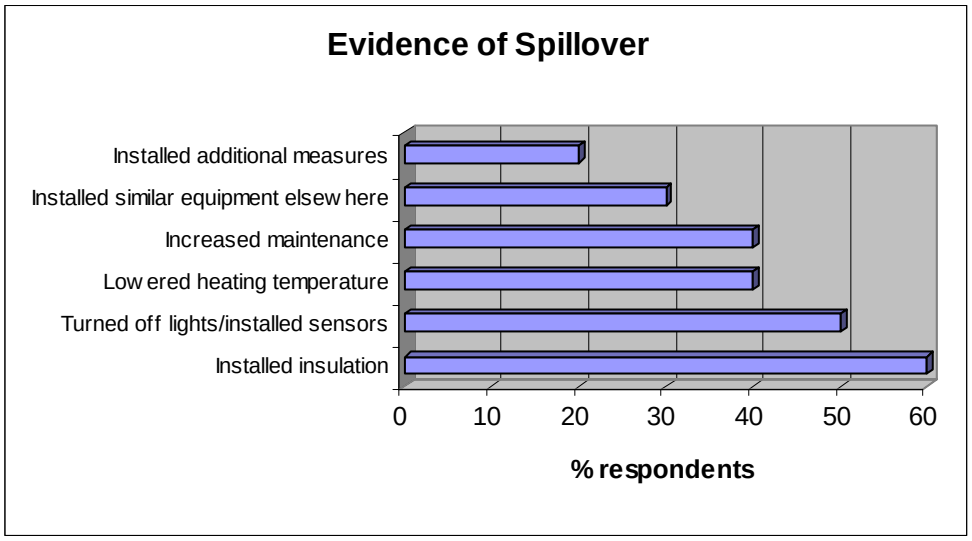
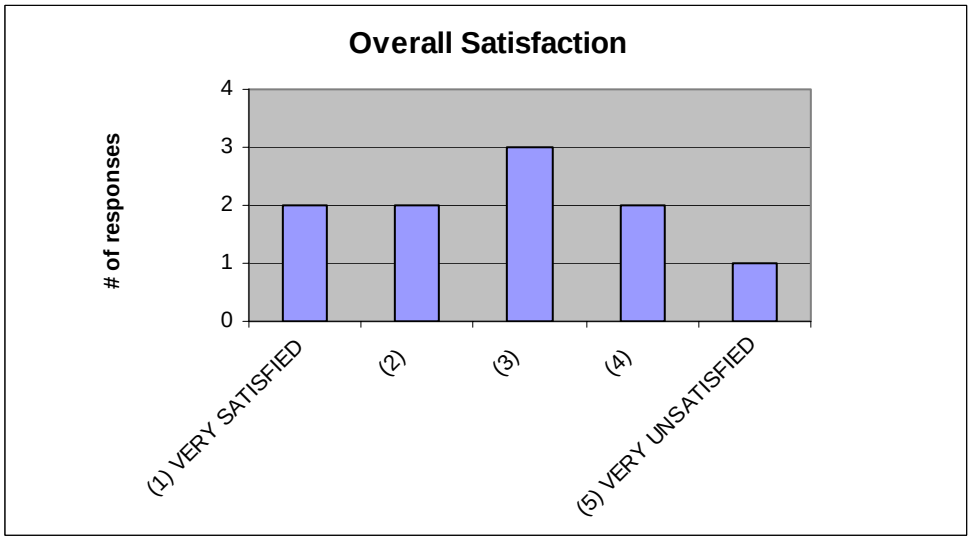


Figure 4-18. Overall satisfaction with the Multifamily program



As shown in Table 4-7, the property managers tended to be satisfied with most aspects of the program. The area that rated the lowest out of 8 aspects of the program researched was expertise of person recommending EE measure. This question allowed for multiple selections and only 50% of respondents indicated satisfaction with this aspect of the program.

Several areas of dissatisfaction were noted, as shown in Table 4-8. The most common area of concern is that respondents do not know where to find the replacement equipment. The second most prevalent complaint was that the fixture did not last long enough. While this represents a relatively small sample, difficulty in replacing (specifically hard-wired CFL lamps) should be viewed as a major concern of the program.

Table 4-7. Satisfaction with various elements of the Multi-Family program

	Frequency	%
Schedule Contractor to assess opportunities	9	90
Application process	8	80
Customer service contacts	8	80
Program Recommendations	8	80
Installation contractor	8	80
Schedule Equipment Installation	7	70
Information received before program	6	60
Expertise of person recommending EE measure	5	50

Table 4-8. Reasons for dissatisfaction with the Multi-Family Program

	Frequency
Repair / Fixture did not last long enough	4
Useful / energy saver	3
Difficult to replace / don't know where to find the replacement	6
Other	2

5. FINDINGS AND RECOMMENDATIONS

5.1 Lessons learned from the Partnership

The partnership between SFE and PG&E has a rich texture of organizational and personal relationship nuances that evolved to cope with resource, political, institutional and regulatory issues as they arose. The key question the evaluation seeks to answer is '*was the partnership worth it?*' While the partnership did not achieve its ambitious MW reduction targets in the relatively short period available – the partnership does show promise as a means to meet longer term energy and demand reduction goals. It takes time to build the trust and working relationships between individuals and organizations that are needed, if a partnership is to achieve goals that are greater than the sum of the parts.

Partnership Lessons

- The relatively short program duration was not long enough for a new partnership to develop and effectively utilize relationships and marketing channels to achieve ambitious energy savings goals. Perhaps the goals were too ambitious for some program elements.
- The planning and regulatory process took nearly a year before final approval. This may be required for a new partnership of this magnitude, but is too long and not cost efficient for a short duration program.
- The regulatory process imposed incentive caps, measure requirements, and community develop objectives that hindered the partnership from achieving energy and demand targets.
- Individuals' commitment and hard work overcame many policy, cultural, and process constraints to achieve program success in key areas.
- There was a concerted effort to play to each organizations' strengths and to supplement weaknesses. This effort was not always successful though.
- There was a sense on the part of SFE that PG&E wanted to avoid significant alterations to the statewide programs PG&E already had in operation, and whether true or not that impression both limited the development of SFPEP and its various elements' features.
- The roles and responsibilities laid out in the contract between SFE and PG&E specified too many tasks given the limited resources available to the program.
- There was no apparent reward for high performance of the program. PG&E felt they were assuming the primary risks in the program, and SFE viewed the program as their initiative. There was not a clearly defined set of risks/rewards for each organization.
- Marketing effectiveness was improved by the partnership, and had the program continued over a longer period that effectiveness probably would have further grown. Producing multi-lingual versions of selected marketing flyers was very helpful in recruiting participants of differing ethnic backgrounds.
- Community outreach was improved by the partnership, particularly in residential and small business segments that utilized SFE's relationship strengths for such efforts as the torchiere exchanges and CTS. This success did not extend to all constituents in the City.

Program Element Lessons

- Hard-to-reach markets were served through all the PEP program elements: ethnic, low-income, important geographic, and small business markets all were served.

- Better coordination between SFPEP and Statewide programs was needed to avoid customer confusion. In addition, program eligibility and incentive changes caused reworking of marketing collateral and tracking systems to meet the needs of SFPEP.

- Participation in Cash Rebates for Business spurred many participants to purchase other EE equipment outside the program.

- Energy efficiency measure measures not available in statewide programs saw market penetration, especially refrigeration measures – though subsequent statewide program developments created some confusion when they offered the same measure incentives.

- In the Multi-family program, difficulty in replacing hard-wired CFL lamps on burnout is concern of program participants.

- SFE's mini-audit services to support contractors and customers were useful in providing a neutral perspective on measures contractors were recommending to customers.

- Commercial Turnkey Services energy audit and follow-up services provided by SFE staff to small businesses filled a gap in PG&E's business program portfolio. Lack of database integration prevented mapping of CTS recommendations to EE measure installations financed through other SFPEP program elements or PG&E's statewide programs.

- Approximately 94% of business respondents surveyed received appropriate information, and 10 of the 13 who did not were senior management, an indication that senior management at business sites could be contacted differently.

- There is a need to assure that field staff (including contractors) who interact directly with business owners, property managers, and other customers have the proper expertise and training to recommend EE measures.

- Not all program partners were initially clear about participant and measure data tracking requirements, thus a number of program elements did not record sufficient information for program evaluation needs.

5.2 Recommendations

The recommendations suggested here are intended to help future partnership efforts *identify and understand* potential strengths, weaknesses, opportunities and threats they may face, and *take appropriate actions* to build on strengths and mitigate problems. The recommendations are organized by those related to program planning and design, organizational roles and staffing, marketing and outreach.

5.2.1 Planning and Program Design

1. Recognize that truly equal partnerships are difficult to achieve, and effective partnerships take time. Work to manage expectations about what can be achieved in a short timeframe. Inevitably, one organization will be the dominant player for legal, financial, or leadership reasons. This is not a sign of fundamental weakness in the SFPEP partnership or of its constituents but simply something inherent about relationships between institutions and individuals.

2. Develop contingency plans and define an efficient process for deciding when to implement them. When planned program achievements are lagging in specific markets, have alternative approaches outlined and ready to go, and/or shift funding to program areas that are achieving targets. A pre-defined process that streamlines decision making will allow mid-stream program corrections to be implemented in a timely manner. Similarly, be ready to exploit unanticipated opportunities that may arise. Contingency budgets should be developed and held in reserve for this purpose.

3. Address community-development needs in dedicated programs instead of attempting to piggyback them on resource acquisition programs. The split responsibilities and dilution of effort that result from attempting multi-purpose programs risk achieving the goals of either purpose effectively. Determine which organization is best suited to lead these programs.

4. Bundle program elements more effectively. A package of energy audits, turnkey installation services and measure incentives can be more effective than operating such elements individually. EE measures that have low savings impact, may still be helpful "*loss leaders*" in gaining community and individual participant support. Use of an LED exit sign exchange as an enticement to small businesses for subsequent energy audits and turnkey services is a good example of such tactics.

5. Some barriers to program success may be insurmountable for certain market and customers. Foremost among these barriers are that:

    a. Energy remains a relatively small fraction of customers' cost of living and doing business, and there is no energy crisis at present,

    b. Simple payback for efficiency measures, even with incentives, continues to be outweighed by perceived risks associated with taking energy efficiency actions. This is especially true for small businesses, who have little spare capital or ability to deal with the difficulties of equipment that does not work properly, and

    c. Split decision making authority in rental facilities (both residential and C&I) will continue to dilute the motivational power of financial incentives.

5.2.2 Roles and Staffing

6. Keep agreements as simple as possible without being vague about roles. Contractual agreements' should be kept simple, but be clear about specific responsibilities. This will focus limited resources, improve clarity of tasks and reduce administrative burdens. Clearly define and communicate *each* partner's role up front if possible (this includes other organizations who interact with the partnership informally). This is critical for marketing and outreach in particular.

7. Assemble and support a high-chemistry mix of dedicated individuals in each organization for the duration of the program. Staff the program with people who are willing, able and have been successful in the past in taking on the multitude of barriers and constraints inherent in a high-visibility and large-scale program effort. Also, be selective about who to recruit as informal partners in the community to promote the program. Look for those who are experienced at delivering similar messages and activities, and who are excited about energy efficiency.

8. Maintain staff continuity as much as possible throughout the program. Building and maintaining relations between the program and various market actors such as community groups and business associations depends greatly on the trust built between people. Staff turnover not only means having to train the new people but also means having to rebuild the individual trust that is central to relationships with market actors.

9. Cultivate long-term relationships with potential partners and program associates. This includes community and business organizations, and also implementation contractors who made need to be asked to flex their operations beyond the strict confines of their program contract to meet unique program needs, market challenges and opportunities.

10. Communicate, communicate, communicate! Communicate frequently – on a daily basis if needed – at all levels of the partnership and with all parties involved, including informal partners. Personal communications in real time, including phone calls, in-person meetings and email exchanges, are far more important than periodic status reports for raising and resolving issues that arise. Formal status reports are more appropriate for documenting program performance and the resolution of problems.

5.2.3 Marketing and Outreach

11. Develop marketing and outreach plans as early as possible, because developing, reviewing, approving and implementing those plans will likely take significantly longer than might be expected. The development effort should include recruiting appropriate community organizations early on, to engage their support and ideas for outreach to their constituents.

12. Focus over time on a few channels and offerings that produce the most "bang for the buck." While reliance on a limited number of marketing and outreach channels and program offerings can be risky, the successfully adaptive program will plan to try a variety of channels and offerings that have potential for success, but be ready to cull poor performing channels [be clear about performance metrics] to focus program resources as cost- and time-effectively as possible.

5.2.4 Other Program Implementation Issues

13. Clearly define data collection and reporting requirements to support program tracking and evaluation for all contractors and partners. For example, tenant names, and measure counts were not recorded for the Multi-family program element. There is also a need to coordinate spreadsheet based tracking systems maintained by SFE with MDSS based program tracking at PG&E. Records between the two systems did not always agree.

14. Keep monthly report filings up to date better. The availability of the updated, accurate data for all program partners and stakeholders is important to making mid-stream program corrections. In the case of SFPEP, inaccurate, or delayed reporting hindered program efforts.