Report

Evaluation of the 2004-2005 RightLights Program

Program Number: 1445-04

Prepared for:
Ecology Action

In Partnership with the
Center for Energy and Environment

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Executive Summary

Ecology Action's RightLights Program offers Pacific Gas & Electric (PG&E) customers within Santa Cruz, Monterey, San Mateo, Santa Clara and San Benito Counties an opportunity to increase the energy efficiency of their lighting systems through a turnkey process of evaluation and installation of lighting retrofit measures. Ecology Action designed and implemented the program in partnership with Center for Energy and Environment (Program design, engineering technical assistance, software modification) and Lighting Wizards (Auditor training and marketing, lighting technical assistance, specifying for medium customers, lighting technology selection). Hard-to-reach non-residential customers are targeted for the Program through an initial site audit, installation of a Quick Saver Package (QSP), followed by recommendations for comprehensive lighting efficiency measures to be installed and subsequent lighting retrofits.

The QSP measures (screw-in compact fluorescent lamps (CFLs) and/or LED Exit Sign upgrades),valued at up to $250, are free to customers. Incentives are provided based on the total amount of expected energy savings from additional lighting upgrades and the customer's rate schedule.

As of March 15, 2006, the program has completed retrofits for 2,488 of the estimated potential 74,000[1]eligible small businesses, translating to 3.4% market penetration and 101% of the program goal of 2,474 participants. Initial goals also included 21,032,767 kWh in energy savings, and 5,178 kW in demand savings.[2] The actual energy savings was 29,832,161 kWh (142% of goals), and actual demand savings was 5,633 kW (109% of goals).

The program evaluation consisted of

- A review of the Program tracking database
- Verification of specific parameters in savings algorithms not considered deemed values
- Verification of achievement of unit-based marketing activities
- Verification of the quantities and types of equipment installed
- Determination of verified peak kW and kWh impacts

The database review concluded that the deemed values used for each of the market sectors/business types were consistent with those approved for the California Express Efficiency Program, which targets small and medium nonresidential customers.

Quantec verified that both the coincident demand savings and the energy savings equations were being properly calculated in the program database, FACET© (Facilities Evaluation Tool).

Quantec staff conducted 101 site visits to verify that the measures from the Program database were installed and operating as predicted under the *ex ante* assumptions. We then calculated the

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1 From: http://www.rightlights.org/program_info/eligibility.html

2 From: http://www.rightlights.org/program_info/program_details.html

verified energy and demand savings based on the results of our site visits. The overall savings realization rate is 98%. Table 1 compares expected Program energy savings to evaluated savings by measure type.

Table 1. Evaluated Program Energy and Demand Savings by Measure Type

Measure	Energy Savings		Demand Savings		Realization Rate %
	Expected (kWh)	Evaluated (kWh)	Expected (kW)	Evaluated (kW)	
CFLs	8,012,456	7,582,707	1,484	1,404	95%
Tubular Fluorescents	21,073,936	21,049,982	4,028	4,023	100%
LED Exits and Misc.	745,769	712,278	121	116	96%
Total	*29,832,161*	*29,344,967*	*5,633*	*5,543*	98%

Based on our review of the calculations and databases, we offer a few recommendations:

- ***Continue instructing auditors to assign hours-of-use by area***. Self-reported hours-of-use estimates by area were found to be the most reliable for estimating savings. Auditors should refrain from assuming a single hours-of-use estimate for an entire business.
- ***Regularly review the approved equipment list***. Although several contractors pointed out that RightLights is already starting to move in the direction of a broader array of approved lighting equipment and technologies, they still see this process as ongoing. If the staff is able to find new and better lighting equipment, the Program can continue to find new participating customers and will be able to find enough work to be able to continue for several years beyond the 2006-08 program cycle.
- ***Refine or eliminate the energy information packet***. As is common with in energy efficiency programs, few participants used or even recalled receiving the energy information packet. The Program should consider revising or eliminating this aspect.

We found that RightLights is implementing a successful mix of marketing activities to exceed its target population of small, nonresidential customers. The Quick-Saver Package is a successful tool for winning the attention and trust of participants and should be continued. Overall, customer satisfaction is very high due to the ease of participation, professional manner of installers, and significant realized energy savings.

I. Introduction

Program Description

The RightLights Program (Program) provides lighting efficiency improvement services to nonresidential electrical customers with demand less than 500 kW in Santa Cruz, Monterey, San Benito, Santa Clara, and San Mateo Counties.

In order to implement energy-efficient lighting solutions in the hard-to-reach small business market, the Program is designed to provide a complete package of services through a single, objective point of contact for the customer. Program participants benefit from a turn-key process supervised by a trusted source and maximized energy savings through comprehensive lighting retrofits.

A RightLights Lighting Specialist (e.g., auditor) visits potential participants, performs a detailed analysis of the current lighting system, and identifies inefficiencies. The data are then entered into FACET©, a proprietary software program that computes the potential energy savings and costs of the project. A complete report detailing retrofit costs, rebate amount, annual utility savings, payback period, and energy savings is generated by the software and provided to the business. When the customer accepts the proposed project scope and cost[3] and decides to participate in the Program, the process of project installation begins.

The Program also offers a Quick-Saver Package (QSP) of screw-in compact fluorescent lamps (CFLs) and/or LED Exit Sign upgrades, valued at up to $250 including installation. Any site participating in a RightLights lighting analysis is eligible for this package, which is installed at the time of the initial lighting analysis at no cost to the participant.

Ecology Action is the designated implementer of this Program. Subcontractors include the Center for Energy and the Environment and Lighting Wizards.

The first iteration of the RightLights Program began delivering services in October 2002 of the 2002-03 program cycle. The program was approved for 2004-05 funding and completed a total of 2,488 small business retrofits between March 1, 2004, and the program's ending date of March 15, 2006. Ecology Action estimates that there are 74,000 eligible small businesses in the Monterey Bay Region, translating to 3.4% market penetration in the two-year period.

[3] Proposed project customer cost is the total project cost less customer rebate. The rebate rate varies by rate schedule, and the total dollar savings is calculated from expected energy savings due to project installation.

Evaluation Approach

The goals of this evaluation are to:

- Evaluate the Program tracking database to ensure that the *ex ante* estimates were calculated properly (i.e., formulas are correct and deemed parameters were input appropriately)
- Verify the quantities and types of equipment installed
- Verify specific parameters in the per-unit kW and kWh savings algorithms that are not considered deemed values
- Verify peak kW and kWh impacts based on deemed savings and installed quantities
- Verify achievement of unit-based marketing activities

In order to fulfill the goals of this study, Quantec conducted a number of research activities, including:

- A technical review of the Program database to prepare preliminary gross energy and peak demand savings calculations
- Review of marketing materials and status reports in order to carry out a review of all activities conducted to reach Program goals
- Interviews with Program implementation staff, installers, and marketing partners in both 2004 and 2005 to provide ongoing Program feedback regarding implementation activities
- Surveys with Program participants in 2004 and 2005 to assess customer satisfaction and Program implementation
- Verification of measure installation via site visits
- Metering of a sample of Program participants to verify hours of operation
- A billing analysis on a sample of participants
- Quantification of non-energy benefits

II. Review of Savings Calculations

Quantec carefully reviewed the Program database to verify that:

- The inputs for *ex ante* estimates (deemed parameters) are correct
- The formulas to calculate project costs and expected savings are being calculated properly

Program Database

The RightLights Program continues to use a customized Microsoft Access database called FACET©, which has a proprietary front end developed by the Center for Energy and Environment (CEE) that automates the process of calculating the costs and savings for energy efficiency projects. As with the version used in the 2002-03 RightLights Program, users enter a new property name, an area (e.g., office, hallway, etc.), and the measures to be installed; FACET© then calculates the following:

- ***The cost of the project***. Participating RightLights Program Installation Contractors (Installers) have agreed to fixed labor rates, equipment markups, and labor factors, which are included in the database and allow the Program to deliver fixed-price bids to the customer. As a result of Ecology Action's previous negotiations with the Installers and equipment suppliers, both the cost of the hourly labor rate and the equipment are often well below market rates. Participants pay the Installer only for the price of the project less the rebate, thereby getting the rebate "up front." Ecology Action pays the rebate amount directly to the Installer once the work is complete, which acts as an additional quality control mechanism. Ecology Action then invoices the utility for the amount of the rebate.
- ***Rebate amounts***. The rebates are based on the estimated energy savings. Rebate amounts for the 2004-2005 RightLights program are the same as the 2002-03 Program.
  - *Rate schedule A1 and A6, less than 100 kW demand*: 13.5 cents per first-year kWh saved, with a maximum rebate of 100% of the project costs
  - *Rate schedule A10, E19S, and other rates for customers with peak demand of less than 100 kW*: 13.5 cents per first-year kWh saved, with a maximum rebate of 85% of the project costs
  - *Customers with over 100 kW in peak demand*: 9 cents per first-year kWh saved, with a maximum rebate of 80% of project costs

Participation to Date

Table 2 and Table 3 summarize Program participation and rebate distribution.[4] While RightLights defines a participant as any business that has received an energy-saving measure,

[4] Based on the final March 15, 2006 version of FACET©

several different types of participants exist within that general definition. As shown in Table 2, 71.1% of the participants elected to install measures through all Program components available to them (for smaller customers there were no additional recommended measures beyond the Quick-Saver Package). The remaining participants accepted only one of the Program's two energy-saving components (QSP) but have rejected or are undecided about the other.

Table 3 provides the average rebate received by customers in each rate class and the total rebates received by businesses in each class. As shown in the table, the bulk of the Program's participants were either A1 or A10 customers, and the average customer incentive was $1,009.

Table 2. Program Participation and Rebate Distribution

Participant Type	Frequency	Percent
Installed all recommended measures (net)	1,770	71.1%
Comprehensive and QSP	228	9.2%
Only Comprehensive Available	1,370	55.1%
Only QSP Available	172	6.9%
Installed partial list of recommended measures (net)	707	28.4%
Comprehensive Only, QSP Rejected	4	0.2%
QSP Only, Comprehensive Rejected	395	15.8%
Comprehensive, QSP Pending	4	0.2%
QSP, Comprehensive Pending[5]	10	0.4%
QSP, Undecided on Comprehensive	305	12.3%
Total	*2,488*	*100.00%*

Table 3. Table Program Participation and Rebate Distribution

Rate Class	No. Participants	% of Program	Total Rebates ($)	Rebate % of Program Total	Avg. Rebate per Site ($/Participant)
A1	1,948	78%	$1,351,127	54%	$694
A6	77	3%	$78,616	3%	$1,021
A10	431	17%	$979,419	39%	$2,272
E19S	27	1%	$98,820	4%	$3,660
HHWP	4	0%	$451	0%	$113
S-TOU	1	0%	$2,364	0%	$2,364
Total	*2,488*	100%	*$2,510,797*	*100%*	*$1,009*

FACET© computes the kWh savings based on the reported hours of operation, but the final Program energy and demand savings are based on the deemed hours of operation. Consequently, the rebate is based on the customers' reported hours of operation, while final Program savings are calculated from the deemed hours of operation.

[5] Only the QSP savings were part of the 2005 program, the remaining NON-QSP measures are part of 2006.

Deemed Parameters

The FACET© database uses deemed values for a number of inputs included in the savings calculation. The deemed values were implicitly defined as part of the cost-effectiveness calculations for the Program Implementation Plan and were formally approved during meetings with PG&E.

Operating Hours, Interactive Effects, and Coincident Diversity Factors

Table 4 shows the deemed values used for each of the market sectors/business types. These values were consistent with those approved for the California Express Efficiency Program, which targets small and medium nonresidential customers. The operating hours vary by business type, except for exit signs, which were assumed to be on continuously at all sites. [6]

Demand and energy savings estimated for the Express Efficiency Program also included savings attributed to the reduction in cooling loads produced by energy-efficient lighting. The RightLights Program included an adjustment for these additional Demand Interactive Effects (DIE) and Energy Interactive Effects (EIE) by market sector. These adjustment factors are averages applied to all sites of the same business type uniformly. Finally, the Express Efficiency Program study included Coincident Diversity Factors (CDFs) to estimate the demand savings that are coincident with peak demand. The values for these three multipliers and operating hours are presented in Table 4. Again, the values remain unchanged from the 2002-03 RightLights Program.

Table 4. Deemed Values for Operating Hours, Interactive Effects, and Coincident Diversity Factors

PG&E Market Sector*	FACET© Business Type	Annual Operating Hours**	DIE	CDF***	EIE
Office	Small office	4,000	1.25	0.81	1.17
Retail	Small retail	4,450	1.19	0.88	1.11
College	Small institutional	3,900	1.22	0.68	1.15
School	Small institutional	2,150	1.23	0.42	1.15
Grocery	Convenience store	5,800	1.25	0.81	1.13
Restaurant	Entertainment	4,600	1.26	0.68	1.15
Health care/hospital	Small institutional	4,400	1.26	0.74	1.18
Hotel/motel	Small hotel/motel	5,500	1.14	0.67	1.14
Warehouse	Warehouse	3,550	1.09	0.84	1.06
Process industrial	Light manufacturing	5,300	1.20	0.78	1.09
Assembly industrial	Light manufacturing	4,900	1.20	0.80	1.09
All other	Other	4,500	1.13	0.76	1.08

* Source: Pacific Gas and Electric Company, Express Efficiency Program, November 2000

** Exit signs were assumed to operate for 8,760 hours for all business types.

*** Exit signs were assumed to have a CDF of 1.0 for all business types.

[6] These values were based on a 1997 study of the Program by Quantum Consulting.

Quantec verified that these approved values were included in the FACET© database.

In addition, the Express Efficiency Program calculates savings using standard values for hours of operation and CDF for all exterior lights, regardless of market sector. Ecology Action has selected, instead, to record the self-reported hours-of-use for exterior lights, the majority of which operate for 12 hours per day. This approach is more precise than the Express Efficiency Program and is acceptable.

Ecology Action adopted a recommendation from the 2003 report by adding a field to the FACET© database to identify exit signs and assigning them operating hours of 8,760 hours/year with a CDF of 1.0.

Fixture Wattages

The FACET© database also incorporated deemed wattage levels for each measure, including the existing and the replacement measures. These levels were based on values from the 2001 Standard Performance Contract Program (SPC) Lighting Fixture Demand Tables.[7] For the few measures that were not included in the SPC tables, CEE used other accepted sources, such as the Advanced Ballast Catalog, to populate the demand levels.

In order to verify that the deemed wattages were correctly used, Quantec selected a sample of ten measures. These measures represented the most common combination of existing and replacement measures. Quantec assessed the wattage values for accuracy and consistency and found that the values were correct and consistent across all sampled measures.

Data entry errors are minimized for the wattage fields because the FACET© database was constructed with fixed wattages for all measures except CFLs and incandescents. In other words, users can only modify wattages for these fixture types.

Cost and Savings Calculations

As discussed earlier, the RightLights Program incorporated both cooling interactive effects and the coincident diversity factor into the savings calculations that are reported in the quarterly reports. The savings are calculated as:

*Coincident (Peak) kW Savings = Connected load kW savings*CDF*DIE*

Where:

- Connected load kW savings = Load of the existing fixture less the load of the new fixture

[7] The SPC program administrators (including PG&E) offer a fixed-price incentive to end users or third-party energy efficiency service providers (EESPs) for measured kWh energy savings achieved by the installation of energy-efficient measures. The utility pays a variable incentive amount to a third-party EESP, or to a customer acting as their own EESP, based on measured energy savings using a mutually agreed upon measurement protocol (the SPC Tables).

- CDF = Coincident Diversity Factor
- DIE = Demand Interactive Effects

And:

*kWh Savings = Connected load kW savings*Deemed annual operating hours* EIE*

Where:

- Deemed annual operating hours = Deemed annual hours based on business sector (with exceptions for exit lights)
- EIE = Energy Interactive Effects

Quantec was able to verify the accuracy of the coincident kW savings and the interactive kWh saving for all of the measures included in FACET©.[8]

[8] Three sites, however, had misclassified market sector information leading to a slight miscalculation of the kW and kWh savings; these sites were subsequently corrected.

III. Interview Results: Staff

Mid-Program Interviews

Quantec interviewed seven members of the RightLights staff between December 2004 and April 2005, including the Program Manager, the Program Coordinator, the Operations Manager, two Lighting Auditors, Ecology Action's Deputy Director & Director of Energy Programs, and the Technical Consultant responsible for designing and assisting with FACET©. Quantec employed mainly open-ended questions to obtain respondents' views of the Program, which permitted us to delve deeply into the respondents' perspectives and to probe for the basis of their perception, resulting in a more complex data set than closed-ended questions would have produced. Although each respondent provided a unique view of the Program, general themes became evident, and the following discussion explores these ideas.

Views of Program Goals and Objectives

The Implementation Team members (the Team members) offered a consistent view of the goals and objectives of the RightLights Program, and all agree that the Program's goal is to serve the smaller commercial business that are often overlooked by the larger energy efficiency programs offered by utilities. While the energy savings potential is clearly less at these smaller sites, the Team pointed out that the objective was to provide them with their fair share of the funds, which they had contributed toward commercial efficiency improvement programs. In addition, one staff member described some of the Program's objectives as "reactive" – stating that they were reacting to aspects of the small commercial programs that RightLights collectively felt were not successful. Controllability and quality of the retrofits were cited as examples.

In addition, another principal objective of RightLights, as one Team member put it, is to implement the Program in an "environmentally responsible" manner. For example, the Program requires that specific Philips lamps be installed because of their lower mercury content and to reward Philips' larger efforts to push the industry toward decreased mercury levels. In addition, the Program requires the Installers to properly dispose of all older lighting equipment – particularly harmful ballasts containing PCBs (polychlorinated biphenyls) – in an environmentally safe fashion.

> "The goal is to save energy by bringing rebates to smaller customers. Usually they have fewer than ten employees, might speak a different language or live in a rural area. Some just don't know that they can do better. Our job is to bring the Program to them."
>
> "The goal is to save the most energy in the small business sector with the dollars we are given and to maximize the comprehensiveness of our jobs . . . . Also, to demonstrate to utilities how small commercial retrofits can be done consistently with high quality and at the lowest possible cost."
>
> "Most [businesses] that we eventually assist are defined as "hard to reach" . . . . Typically these are the businesses that have not been reached by the larger utility-run programs like Express Efficiency and Standard Performance Contract, the types of programs that are geared more for larger institutional customers. We've been able to go ahead and get them to go along with an upgrade."

While the equipment selection, removal, and proper disposal of antiquated and potentially harmful lighting equipment are the primary

means of achieving the goal of environmental friendliness, other aspects of the Program design are also implemented in a manner that minimizes the environmental impact of the Program. Examples include specifying recyclable packaging, ordering lighting equipment from local manufacturers whenever possible, and assigning Program auditors to market in areas close to their homes. Both of the latter examples reduce the amount of driving and, consequently, the amount of greenhouse gas emissions released in conjunction with the Program.

In addition to reducing environmental impacts, these examples provide other Program benefits. For example, by using locally distributed lighting equipment, the Program simplifies and speeds up the replacement process for failed lights under warranty. With regard to the auditors, locating the technicians closer to their homes not only means the stress of commuting is minimized, but also that they are more familiar with the area and have a vested interest in seeing their neighborhood served. In addition, RightLights utilizes its relationship with local manufacturers to ensure that Program participants can buy replacement lamps and parts directly from the manufacturer at a reduced, Program-negotiated cost. The Program has also negotiated agreements with one or more retail stores in each County to stock the most commonly-installed RightLights lamps for purchase by Program customers. These efforts help reduce "snap back" and promote the persistence of installed energy-saving measures.

Views on Program Design

As one Team member responded when first asked about the design of the RightLights Program, "it had to be a turn-key program to get people to participate." The comment clearly alludes to the inherent difficulty in serving the "hard to reach" portion of the commercial sector. The following sections detail the various elements of the RightLights Program designed to overcome the barriers of the "hard to reach" market and provide these businesses with energy efficiency upgrades.

Marketing

While interested facility managers or maintenance crews often solicit programs oriented for larger commercial sites in hopes of utilizing utility rebates or incentives to reduce costs, no such positions exist at the businesses served by RightLights. The vast majority of the participants are owner-operated businesses with limited awareness of energy efficiency options; the visit from the RightLights auditor might be their first introduction to efficiency possibilities.

When describing the marketing philosophy of the Program, one Team member summed it up quickly, stating that "it all has to do with the auditors." All the interviewed Team members mentioned that the auditors were the primary marketing tools for the Program and that much of the Program's success depends on their ability to break through traditional commercial energy efficiency barriers. To do so, RightLights uses an on-foot, door-to-door, cold calling approach where auditors personally visit and present the Program to businesses in eligible areas.[9] Both of

[9] In addition, in a pilot test, one Program contractor was given the opportunity to solicit his own RightLights Program participants and to use the FACET© lighting software. The results of this pilot did not support using contractors to "sell" jobs or input their jobs into FACET©.

the lighting auditors we interviewed spoke at length about the importance of "getting [RightLights'] foot in the door." One stated, "I always present the project in person. Often they aren't familiar with a lot of the energy and payback concepts. Since their instinct as business owners tells them that you do not get things for free, it can seem too good to be true and they will invent a scam. It is my job to convince them that it is true." The other auditor described his job as providing a "human face" for the Program. "Ninety percent of the sales method," he continued, "is being there in person, making sure they understand the support materials and being available to answer any questions."

One of the RightLights respondents attributed part of the success to the auditors' presentation of the Program as a "value proposition." The respondent continued, detailing the Program's proposition as "delamping as much as possible, using intelligent design of the lighting system . . . and utilizing higher output lamps and fewer of them." He also noted that this technique helped maximize the rebate received by the customer and that this sort of approach was not one that the average lighting installers would push if not directed by the Program. As a result, the message a prospective participant receives from RightLights is that the Program is an attractive business option, rather than simply an energy efficiency program.

RightLights also markets the Program through its completed participants. A member of the RightLights staff described one of the Program's marketing techniques (provided in detail to the right) as successfully completing a single job in a new area and utilizing that retrofit as an example of the Program's work. Three of the team members, including both field auditors, noted the marketing benefit of local businesses that can be used as examples for other businesses. One auditor said he often encourages business owners unsure about whether to participate to go and speak with neighboring businesses that have completed their retrofit: "I'm always name dropping, looking for a link to another participant." While not a formal technique captured in the official Program design, this method of "anchoring" has proven effective.

> "The best way to do it is to find an area that is primary Hispanic or Vietnamese and walk around. You can't audit without permission, but you can usually visually check – see if the hours are sufficiently long and its lights are old. Then you get one store to participate. Within a month that store is done and we have someone in the community that can help us reach the rest of the stores – an anchor for the area."

Another marketing technique that has proven successful is the Quick-Saver Package (QSP), a set of CFLs installed by the Program auditor up to $250 in value. The QSP can be used as a marketing tool to convince the business owner to agree to the Lighting Survey or as a comprehensive retrofit at small businesses whose only lighting consists of a limited number of incandescent lamps. Regardless of its use, as a Team member noted, the QSP "helps get you in the door [and] gives you something on hand to discuss." These conversations can help initiate a discussion of energy efficiency that can lead to a commitment to participate.

> "The Quick-Saver Package has worked as a door opener and as a way to achieve energy savings even if ultimately the customer says no to a comprehensive retrofit."

Although both auditors noted the effectiveness of the QSP, each also alluded to the complexity of the agreement form that the customer is required to sign before the bulbs can be installed. Unlike the other RightLights forms, the QSP agreement was described as "intimidating." One of the auditors noted that "[it] is scary for some customers – the legal jargon has scared quite a few away." The other auditor's comments comported with his coworker's, noting that "all of the forms except the QSP are clear. The QSP adds an extra level of complexity." One of the auditors also mentioned that the QSP agreement forced him to be very careful about not appearing to seem like a light bulb salesman. Despite these few detractions, the overall comments of all Team members were positive with regard to the use of the QSP.

As a result of the successful on-foot marketing effort by the Program's lighting technicians, RightLights has not had to rely as much on the other elements of its marketing strategy, including the distribution of marketing materials through allied community partners such as local Chambers of Commerce. Similarly, other marketing options used in the previous RightLights Program, such as media outreach, have not played as large a role in the Program's overall marketing approach to date.

Streamlined Structure

As mentioned above, the overall design of the RightLights is a turn-key program: "across the state, turn-key types of programs are by and large the only ones that are achieving any significant impact in the hard-to-reach market." An important part of the turn-key process was assuring the participants that the project costs were fixed and would not require significant amounts of their time and energy. Since many participants were wary about the Program being "too good to be true," the RightLights staff made a concerted effort to alleviate these concerns through two mechanisms.

> "That's why RightLights had to be a turn-key program – so that all the decision maker had to do was see a fixed price proposal with no surprises and be able to say 'this is how much it is going to cost and this is how much I can expect to save, and all I have to do to make it happen is sign on this piece of paper and you will guarantee that everything will go right.' They can do that."

First, the Program separates the responsibilities of "selling" and "installing" the jobs. While most comparable programs have the installer soliciting participants, RightLights uses its own lighting auditors. As a result of this "extra layer," the customers gain confidence that there are "no motives . . . other than helping the customer save," while, at the same time, the Program can be confident in the quality and consistency of the recommended changes.

Second, the Program places an emphasis on getting the jobs done in a timely manner. From returning the completed audit form for the customer's approval as soon as possible to limiting the Installers to five days to accept a job and approximately a month to complete it, RightLights was able to instill credibility and reassure participants through its timeliness and professional approach. As one auditor shared, "I've found that it is really effective to have a portable printer. I can do the audit onsite and hand it back to them that day. It helps because [of] shorter turnaround time, and the customer sees the effort that we are putting in [on] their behalf. They respond to that." Lastly, additional steps, such as modifications to the initial work plan and price agreement requiring the signature of the owner, help reassure the business owner of the Program's

legitimacy. Overall, the Program's turn-key method minimizes the effort required from the participant while ensuring fair labor prices and quality equipment installations.

Customer Rebates

A related aspect of the Program's design is the level of rebate provided by RightLights and the nature of the rebate itself. Unlike other similar programs, RightLights auditors perform most of the marketing, requiring very little money for outside marketing such as call centers, extensive brochures, or additional literature. As a result, the customer rebate level is seen as the most successful aspect of the Program design. "A lot of money goes into the rebates – more than administration or marketing." This is the result not only of focusing the marketing effort to support the "guys in the field," but also of successful pricing negotiations with local equipment manufacturers. In fact, approximately 30% of the Program's participants receive a comprehensive retrofit free, and overall about 80%-85% of participants' total costs are covered. An auditor noted the impact of these numbers in the field: "When we are able to cover such a large portion, there really is no good reason to say no." In addition, since the incentive is paid directly to the Installer after job completion, the owner is liable only for the out-of-pocket portion of the job cost. Since most hard-to-reach small firms are very concerned with cash flow, this "instant rebate" element of the Program's incentive structure minimizes these concerns and facilitates an affirmative retrofit decision.

Program Changes

All responding Team members agreed that the current RightLights Program compared favorably to the 2002-03 version. The primary change in the new Program was the increase in scale. Indeed, the 2004-05 funding increased more than 300% from the first iteration. With this increase came an expansion of the service territory to include parts of the San Francisco South Bay and Peninsula areas. With the increase of territory came an increase in staff and some structural reorganization, such as the addition of an Operations Manager position. Other programmatic changes included the addition of servicing common areas in multi-family buildings (described as a very small portion of the Program) and the inclusion of the first non-lighting measure, a high efficiency pre-rinse spray valve for qualified food service businesses.[10]

Minor changes to the Program also included the adoption of additional types of lighting equipment. As a team member noted, "It can be frustrating, but you have to keep up with the changing lighting equipment. You'll feel like you have a comprehensive set of measures, then you'll find something you need to add." The same Team member later commented that, since the Program was an "aggressive delamper," it was critical that what they leave behind be of the highest quality. This pursuit led to the addition of several new lighting measures for the 2004-'05 Program, such as high bay and induction fixtures, as well as make ongoing modifications to the eligible equipment list. Overall, other than the increase in scale, there were only minor changes made to RightLights from its 2002-'03 form.

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[10] In January 2005, the RightLights Program received additional funding with the goal of installing 3,240 pre-rinse spray valves by June 2005 (from an original target of only 179).

Program Software

RightLights uses a customized Microsoft Access database called Facilities Evaluation Tool, or FACET©, which has a proprietary front end developed by the Center for Energy and Environment (CEE) that automates the process of calculating the costs and savings for energy efficiency projects. According to the database manager, FACET© has been used in various forms by other small commercial programs serving the Bay Area, including Power Savers and SmartLights, prior to its modification for the RightLights Program.

As several team members noted, there has been a fair amount of "tinkering" with the software to customize it to meet the needs of the RightLights Program. Much of the initial customization centered on enabling FACET© to produce reports that matched CPUC and PG&E requirements. Other adjustments included the addition of data collection capabilities for the QSP and calculations related to peak demand savings. The key element of FACET©, according to the database manager, is its ability to "integrate all of the operations of the Program." Described as a "single tool," it provides RightLights staff with the invoicing, reporting, and tracking capabilities in a single program. As the Team member continued, this ability prevented RightLights from "having to move back and forth from multiple documents and multiple spreadsheets." Lastly, the database manager also noted FACET©'s *de facto* impact on the Program's initial design. Since FACET© was developed prior to RightLights, the Program adopted many of its internal processes during its development.

RightLights utilizes a two-pronged approach in its management of the FACET© database. At its main office, the RightLights Program Coordinator manages the day-to-day upkeep, monitoring, tracking and reporting using FACET©. In addition, when larger programmatic issues arise with the software, RightLights enlists the assistance of FACET©'s developer, the CEE. The Program Coordinator noted having regular contact, both formal and informal, with CEE to maximize the utility of the database.

Although generally considered "relatively straightforward," one auditor did mention that, while FACET© worked extremely well for standardized retrofits, he had experienced occasional trouble conveying the correct message to Installers on jobs that required significant customization. The auditor remarked, "I feel like a lot of the time [Installers] don't get the right message." He cited the fact that the material list only notes that the order is, for example, "CFL – Custom" and that since many of the Installers order straight off that list, they miss the details regarding the customization captured elsewhere on the work order. Other RightLights staff commented, however, that Installers were instructed not to order directly from the materials list, but rather to only use that particular list to locate the appropriate measure on the official Equipment and Price List designed for ordering. In addition, RightLights staff suggested that this problem was more common when the Installers were utilizing newer employees.

While one of the two auditors interviewed felt that this was an issue that complicated the retrofit process, the other auditor did not. While this issue involves FACET©, the confusion also appears to be founded in the Installer's interpretation and utilization of the work plan. Regardless of any initial confusion, discrepancies may be resolved through the Change-order process, and there have not been any problems to date of "wrong equipment" being installed.

Views on Installers

One of the most critical aspects of implementing RightLights is selecting and working with the Program's Installers. These Installers were identified and qualified by RightLights to ensure that they meet the Program's standards. In addition, they had to agree to work using the Program's fixed labor rate and equipment markups. According to a Team member, the most reliable Installers have been independent, smaller local contractors. These individuals – usually General Contractors – appear to be able to respond quickly and competently to Program-allocated jobs. In addition, these types of Installers appear to benefit more from working with the Program and, as a result, seem to be more willing to work within the established parameters. Several of the Installers interviewed as part of the process evaluation noted that the Program had become a vital part of their business.

Equipment Requirements

> "If they do a good job and take the Program seriously, it can become their bread and butter. It doesn't work for some; it works really well for others."

As mentioned previously, RightLights carefully selects its eligible measures based on a balance of equipment quality, energy savings, and environmental impacts. Team members noted that some Installers had contacted them to express displeasure over being told which products to use. One team member mentioned that the Installers would prefer to use cheaper measures and that much of their angst comes from the fact that they are used to the other programs they work with, which have more lax equipment requirements.

Some installers wanted more flexibility in terms of using "comparable" or "equivalent" products, but, during the discussions with the RightLights staff, several questioned the appropriateness of these terms. As a RightLights staff member noted, some Installers consider a cheaper 2,850 lumen T8 "comparable" to the 3,100 lumen Philips T8 specified by the Program. Given the Program's aggressive delamping strategies, however, it is not. In addition to questions regarding efficacy, it is likely that "equivalent" non-Philips lamps will also not comport with the Program's mercury-reduction efforts.

While some of the Installers have contacted RightLights staff on these issues, it has not become a large problem from the Program's perspective. Although some potential installers were unwilling to work within the guidelines, there is still a pool of competent installation contractors willing to partner with the Program. In addition, to ensure the overall quality and efficiency of the Program, RightLights has actually dropped several Installers since its inception that were unable to maintain Program standards.

Communication

Each of the interviewed Team members was asked about the formal and informal channels of communication between the RightLights Program staff, Installers, and participants.

Internal Communication

Each of the Team members commented on the regularity of communication amongst themselves. Several mentioned weekly meetings of staff members in Santa Cruz and Mountain View, as well as monthly meetings where the entire RightLights staff from both offices would gather. The purpose of the meetings is to collect the group's opinions and feedback, and the subjects were said to include what products were and were not working and where various equipment could be utilized, as well as the areas of the service territory that had been reached.

"We all have different strengths, so we are consistently in touch with one another to pool resources. "

One of the auditors noted that each member of the Team had different backgrounds and expertise and, as a result, they often spoke to discuss lighting options, auditing strategies, or other related issues. In addition, two team members said that they had weekly contact with the Implementation Team members at the CEE and Lighting Wizards.

Communication with Installers

None of the interviewed Team members expressed any concern or dissatisfaction regarding the level of communication between themselves and the group of partnered installation contractors. In fact, each of the Team members working in the field mentioned that they were in regular daily contact.

"If the audit is right and the contractor is good, you never hear from them. Some of them call and want to do 'this' instead of 'that' or that sort of thing. A lot of time I left something off or wanted to do something a certain way for a reason, so once we talk about it, it makes sense."

Communication with Participants

Both of the lighting auditors also mentioned that they kept regular contact with many of the Program's participants throughout the installation process. "I always give them my card and ask them to call me at any time if anything comes up," shared one auditor. "It's part of developing the relationship that makes the Program work."

In addition, those working within the Program appear to be enjoying helping the small commercial business in the area. One auditor captured this when he remarked, "The best part about the job is the people – the work is very rewarding."

Views of the Future

Again, each of Team members offered optimistic opinions regarding the future of the RightLights Program for the remainder of the 2004-05 funding cycle, as well as the for the long-term future of RightLights. Each respondent expressed confidence that the current edition of the Program would not only meet but also exceed the participation and energy goals. One Team member further commented that the Program was ready to actively begin enrolling multi-family (common area) participants and installing high efficiency pre-rinse valves. This expectation was supported both by the recent addition of a lighting installer who had previously specialized in working with multi-family housing and by the decision to have contractors, rather than the lighting auditors, install the pre-rinse valves.

Based on past and current achievements, the Team members were hopeful that the RightLights Program would be continued and possibly expanded in future years to include a larger service territory.

Post Program Interviews

To understand the maturation of 2004-05 RightLights Program over the course of its implementation, Quantec conducted an additional five process interviews at the completion of the Program. The intention of the interviews was to follow up on the initial round of process interviews and understand what changes in Program administration, delivery, and implementation took place during the later half of Program's cycle. Four of the five interviews were conducted with RightLights staff members who participated in the first round of interviews. Specifically, the second round of process interviews included: the Vice President – Energy Programs, Program Manager, Administrative & Technical Manager, Program Coordinator, and a Lighting Specialist.

Similar to the first round of interviews, Quantec employed a mainly open-ended survey guide to obtain respondents' views of the changes experienced by the Program, which enabled the interview to delve deeply into the respondents' perspectives and to focus on each respondent's respective area of Program expertise. Although each respondent provided a unique view of the Program, it is possible to glean general themes and topics of importance. The following discussion explores the comments put forth by RightLights staff.

Changes to Program

> ""We were substantially ahead of our kWh goal and a little bit behind on our kW goal for some time . . . because of our concentration on smaller customers with the longest hours of operation. When this started to get out of line, we put some things in place that have helped the auditor go after slightly larger jobs."
>
> "We are essentially the same Program, but in order to reach the customer number and kW goals we had, we needed to target a broader spectrum of businesses."

Each of the five interviewed Program staff noted that RightLights had undergone design changes during its implementation. While the overall goals and objectives of the Program – providing high-quality, comprehensive energy savings – have not changed, the Program began to target larger (but still sub-500 kW) commercial and industrial participants in addition to the small, hard-to-reach commercial sector during the later half of implementation. The shift in approach was the result of internal concerns that the Program may have difficulty reaching its demand savings goal. Although on track to exceed its customer and energy savings, serving exclusively the "smallest of the small" business segment made achieving the desired demand saving problematic. As a RightLights staff member pointed out, the customer and demand savings goals were inherently at odds with each other. To resolve the situation while maintaining the Program's commitments, the Program staff decided to alter its marketing approach and solicit larger sites to supplement its work in the hard-to-reach sector.

Marketing

> "With larger organizations, many of these CEOs know other CEOs, and the jobs tend to roll more one into the other at a higher level than if you had just gone and knocked on a door. We've had to put ourselves in the mix and meet these people- which has meant a higher level of attendance of meetings."

As noted, the decision to target larger participants required the Program to

modify some of its marketing techniques. While in-person, door-to-door visits by lighting auditors constituted the vast majority of the Program's early marketing efforts, those visits were supplemented by marketing to higher level decision-makers during the later half of the Program. According to several members of the Program staff, the auditors on staff were able to transition smoothly into their new roles. The new approach was described as "digging deeper, discovering co-ops and attempting to work with them." This involved both attending meetings and then working with new market actors. Although the Program had worked with larger businesses before, that had primary occurred as the result of word of mouth.

In an effort to further word-of-mouth marketing, the Program began a formal referral program whereby any business that referred another successfully completed business received either ten CFLs, which could be installed at the business or recipient's home, or a $50 dollar gift certificate to Amazon.com. According to interviewees, most of the referral program participants had opted for the CFLs – perhaps indicating that the Program has been successful in educating participants on the importance of energy efficiency. One of the interviewees mentioned that the referral program had generated 13% of the Program's overall participation despite not being launched until half way through 2005. Another respondent noted that the referral program is likely to be continued in some capacity during the next Program cycle.

In addition to acting as a marketing tool, the referral reward serves, as one respondent said, to "expand the Program envelope – we are touching their house now." While the Program does not claim any energy or demand savings from these CFLs, the measures are likely to be generating savings. Although no respondents noted the specific total number of CFLs distributed and it is not known how many have been actually installed, their existence essentially means that the energy and demand savings claimed at the commercial level are actually a conservative estimate of the Program's overall energy and demand impact on the community.

Despite the new marketing approaches, the overall marketing Program philosophy remained as one interviewee described during the first round of interviews: "it all has to do with the auditors." Whether soliciting participation door-to door or giving presentations at meetings, the auditors have continued to be the primary marketing vehicle for the Program." Three interviewees noted that the auditors are more involved now. One respondent said, "the auditors are not just members of the Chamber of Commerce now," rather they have become active, working closely with and utilizing the infrastructure of the organizations to promote RightLights. The same respondent also mentioned that recurring stories about Program participants have been published and disseminated through Chamber of Commerce newsletters and newspaper articles. In addition, several interviewees noted that the Program has participated in several larger events, such as a facility managers conference, that have generated participation.

New Equipment

With the decision to broaden participation to include larger, more diverse sites came a need to expand the existing measure list. Retrofitting the new sites included working with a significant number of new measures including outdoor fixtures, induction lamps, and high intensity

> "About a year ago, we literally started looking higher – to more outdoor lighting and HID applications. We started working with warehouses, larger office complexes, storage and manufacturing facilities. And in doing that, we had to take on a lot of new equipment – identify, price, and get recommendations on certain measures . . . in order to get the best things in line."

lighting. Several respondents noted that, since Program auditors were less familiar with these measures, they were initially faced with a rather steep learning curve. However, the same respondents each noted that Program auditors quickly became comfortable with the new equipment and learned how to properly incorporate the measures into their audits.

Availability of Replacement Equipment

Although RightLights strives to use high quality measures, some measures, regardless of their quality, will inevitably fail. To combat this, the Program offers a one-year warranty on all Program equipment and labor. While the warranty ensures that measures failing immediately can be replaced, the Program staff has taken additional steps to encourage participants to replace later failures with similarly efficient measures. First, the Program staff has worked with its suppliers and arranged for participants to buy directly from those suppliers. Secondly, the Program has negotiated agreements with at least one retail store in each county to ensure that the same high-quality, low-mercury lighting measures installed through the Program are available for purchase locally. Collectively these efforts increase the likelihood that failed equipment – whether they occur now or in several years – can be replaced by the participant with comparable measures, thereby increasing the retention of Program savings and fostering market transformation.

Program Software

While the Program plans to continue using FACET© in the future, it is currently working with CEE to develop a more robust, yet easier-to-use version that will better suit the needs of the Program in 2006-08. As one respondent mentioned, FACET© had been "patched up as many times as it could" and it was time for an overhaul. Specifically, a key task is to upgrade it from its current Microsoft Access 1997 platform.

One shortcoming of FACET© discussed during the first round of interviews was its inability to effectively convey customized audits to contractors. When asked if the problem remained – particularly in light the Program taking on larger, more diverse jobs – a respondent answered that auditors were now including more notes with the invoices to explain such issues. Although perhaps a temporary solution, the same respondent went on to say the new version of FACET© would make communicating such customized orders easier.

Interactions with Contractors

Several of the respondents mentioned that the Program has continued to maintain a positive relationship with its contractors. During the first round of process interviews, the main issue commonly raised by both contractors and Program staff as a source of frustration was the frequency of change orders.

According to respondents, change orders – when a contractor wishes to make a change to the measures prescribed in the audit by the Program for a particular job – have continued in the later half of the Program at a approximately the same frequencies. However, several respondents pointed out during their most recent interviews that the relative stability in the number of change orders between the first and second half of the Program actually constitutes an improvement in

auditor-contractor relations, since change orders are more likely to be requested as the size of projects increase.

While change orders have persisted and are likely to continue, the respondents collectively felt that it had become slightly less of an issue and that it is something that will continue to improve as both auditors and contractors become increasing familiar with the new measures.

Communication

According to each of the respondents, both the formal and informal channels of communication have not changed through the course of the Program, including those within RightLights, with the contractors delivering the Program, and also with the Program participants.

> "The auditors are all very accessible – the contractors know that."

Internal Communication

Respondents noted that the Program has continued its weekly meetings with staff in Santa Cruz and Mountain View, as well as monthly meetings where the entire RightLights staff from both offices gather. The purpose of the meetings is to collect the group's opinions, discuss recent ongoing Program development, and make on-the-fly adjustments to Program design and implementation as needed.

Communication with Contractors

Similar to the first round of interviews, none of the respondents expressed any concern or dissatisfaction regarding the level of communication between themselves and participating contractors. General relationships and lines of communication were said to have improved as the groups continued to work together. It was pointed out that the contractors have the auditor's cell phone numbers and contract the Program staff on a nearly daily basis.

> "The jobs are getting bigger, they are getting more complex and there is just more to see. There are more and different kinds of measures now . . . but our auditors are here to work with them on this."

Views of the Future

Each of the respondents noted that the RightLights Program will be continuing to change as it transitions into the new funding cycle. According to the participants, the primary change is the inclusion of additional non-lighting measures intended to further increase comprehensiveness. Specifically, HVAC, refrigeration, and vending machine measures were noted. Respondents also mentioned that the Program will continue to work with larger customers and explore the networking opportunities generated during the 2006-08 Program cycle.

Overall Program Assessment

All of the Team members stated that they felt that RightLights was successful in achieving its participation and energy goals in an efficient, equitable, and timely manner. Based on the

information provided to Quantec by the Implementation Team, as well as the installers working with the Program, it appears that this assessment is accurate. The communication between contributing parties is excellent, and FACET© is robust and comprehensive.

IV. Interview Results: Installers

Mid-Program Interviews

The following discussion is based on in-depth interviews conducted in January 2005 with eight installation contractors (Installers) who are currently or have at one time worked with the RightLights Program. The sample included three installers who have worked with the Program since its inception, two who were new to the Program in 2004, and three who are no longer actively working with RightLights. This sample constituted approximately two-thirds of the installers who have worked with the Program to date and all three of the installers from the 2002-03 Program that are still working with RightLights. The range of experience with the Program varies from several months to several years.

Roles and Past Experience

While the primary role and responsibility of the interviewed Installers is implementing the retrofits recommended by the Program, several of them have also worked with RightLights on a consulting basis, offering lighting expertise and advice on Program design and technical matters. Several Installers expressed appreciation for being included in the design of the initial Program and for being contacted to provide input for subsequent Program design modifications.

The Installers were asked about their past experience with other utility-run or third-party managed energy efficiency programs. Seven of the eight installers had worked or were concurrently working with other such programs. While PG&E's Express Efficiency was the most commonly cited, several other Bay Area programs were mentioned, including Oakland BEST, Smart Lights, Stockton's Brighter Business Program, and Standard Performance Contracts for SMUD.

Views of Program Goals and Objectives

The interviewed Installers share a consensus view of RightLights goals and objectives. While noting that the primary purpose of the Program was to decrease the amount of energy utilized by small commercial businesses through the adoption of higher efficiency lighting fixtures, almost all of the Installers also mentioned its goal of reaching the underserved, hard-to-reach portion of the commercial market. Three Installers further detailed the importance of reaching this segment, which one described as "small users – mom and pop stores, sub shops, that sort of thing." Each of the Installers commented that many business owners in this group, prior to participating in the Program, were relatively unaware of their energy use

> "The goals are 1) to save energy and 2) to serve the hard-to-reach small commercial market. Really, they are helping business that were unlikely to have made any changes in their energy efficiency due to tight budgets, language barriers, or even lack of awareness with regard to energy usage. It helps bring energy efficiency solutions to those who need it the most."
>
> "Their goal is to go after the small commercial and ethnic stores who cannot afford to do the retrofit themselves, don't know about energy efficiency, or are unable to because of language barriers."

and the possibility of energy-efficient improvements. The barriers cited by these Installers, which the RightLights Program helped overcome, include language difficulties, limited budgets, and general lack of awareness with regard to energy efficiency.

In addition, several Installers noted the Program's ancillary goal of replacing the antiquated lighting measures with new measures that were not only more energy efficient, but also more environmentally friendly. The Program's efforts to install low-mercury lamps and their emphasis on removing and disposing of older, harmful ballasts containing PCBs (polychlorinated biphenyls) were cited as examples.

When asked to elaborate on the Program's underlying design assumptions that facilitated meeting the aforementioned goals, Installers noted that the targeted, in-person marketing appeared to be successful. Although the Installers noted that they were not overly familiar with the marketing aspect of the Program, the majority held the opinion that that Program's current approach appeared effective at enrolling the targeted businesses.

The Program's holistic approach to assisting the small businesses was also mentioned as a successful design element: "They target strip malls; try to push the adoption of CFLs; teach basic energy education in addition to trying to convert all the old T-12 fixtures." This approach, as well as the Program's overall effort to reach those with the greatest need, also served to convince some of the Installers to work with the Program: "I really liked that they go after the small businesses. I thought that was great and was happy to be a part of it." Another respondent noted that RightLights was a good match for his company since they had the same goals with regard to serving the hard-to-reach portion of the small commercial market.

Concerns with Existing Design and Implementation

The concerns expressed by the interviewed Installers fell into two general categories: concerns with the reliability of the work-orders received from Program auditors and frustration regarding the Program's requirements that specific equipment be used when completing RightLights projects.

Discrepancies from the Initial Audits and Walk-through Time

By far the greatest concern of the interviewed Installers was the accuracy and dependability of the audits conducted by RightLights auditors. Four of the eight interviewed explicitly commented that their main concern with the Program was their inability to depend on the results of the initial RightLights audit, while a fifth focused on the difference between his company's auditing philosophy and the Program's.

The concerns of four Installers centered squarely on the frequency of change orders and its direct effect upon the profitability of RightLights jobs. Because change orders were needed on many of their jobs – as high as 80% to 90% according to one particular installer – the four Installers in question became concerned about the additional time and resources necessary to verify the RightLights audit. The comment of one of the Installers captures the sentiments of his peers: "The only thing that I think could be done better is the audits . . . so that when I get there I don't need to do another whole audit."

Some of these Installers also mentioned that they had spoken with RightLights staff about the issue and hoped it would be corrected, in part by increasing the time and labor cost allowed for the initial walk-throughs. The same Installer quoted above further expounded upon this point, saying; "They raised it from $60 to $90, which helped, but . . . they need to either do a better job with the initial audit or they need to up the site visit price again." Another of the Installers – who noted that he had spoken at length with Program staff regarding the issue – mentioned that RightLights has been working to correct the issue and pledged to make the necessary adjustments in the future.

> "Due to the distance for us to travel, it worked out such that it was still profitable if we could do everything in one trip. That meant the audit report we received from RightLights needed to be foolproof. It turns out that wasn't the case. Approximately 50% of the jobs needed change-orders. Basically, if anything went wrong and required a second trip, then it was no longer economically viable to complete the job. After a while we decided it just wasn't worth it to take jobs, so we asked them not to send us any new jobs."

In fact, the overall willingness of the RightLights staff to work with Installers was specifically mentioned by several of the interviewees. One respondent offered an example: "You are asked to visit, to say if you can do it at the price they audited it for. Sometimes you can't even get access to some of this stuff. But, to their credit, you can go back to them and they will ask you 'What do you need to make this work?' and if they can, they will work it out."

Several Installers also noted that RightLights had followed through on its promise to address the issue of walk-through time and that both the amount of time (e.g., labor dollars) allocated for the walk-throughs and certain retrofit sub-components had been recently increased. Overall, the Installers were pleased by this change: "It is all part of the learning curve though, and they've worked it all out. They are just trying to find the best way to do things." Another Installer's comments echoed those sentiments: "There was some concern about the length of time allocated for installer walk-through. That was changed though. [RightLights] have been really good at responding to feedback."

One Installer that expressed apprehension about the audits. "RightLights tends to be more aggressive with regard to generating kWh savings – which is understandable given the type of program it is. When replacing a 75W incandescent in an area that needs a fair amount of light, I would suggest installing a 23W CFL, whereas RightLights requires a 15W. I am content with the 75W to 23W savings and . . . leave it a little brighter for the customer. That tends to lead to more satisfied customers and less callbacks." We note, however, that only one Installer raised this issue, and he also commented that he feels comfortable contacting the Program staff if he considered the lighting levels inadequate for a particular business use.

> "It comes down to having different levels of aggressiveness – we err on the high side (increased wattage) whereas they err on the low side."

Equipment Requirements

While many of the Installers stated that they understand that the intention of the Program's "stringent" guidelines for measure replacement are to ensure the installation of reliable, quality lighting equipment, they also

> "Every other program we have worked with has had backup products – usually three choices for each particular retrofit. But with RightLights there is only one option."
>
> " . . . RightLights told you which products to install. It wasn't a 'this or that' situation; it was just 'this.' In some cases we had trouble getting the required product."

expressed irritation with the additional effort it required. The sentiments of the following Installer captured the feelings of several. "The Program is very, very detailed – to the 'nth' degree. Good for them, annoying for me. I understand why and all the products they want us to use are good ones, but the inflexibility just makes things more difficult."

Another Installer mentioned that, on a few occasions, he had to return to a job site to complete a retrofit because, although he had comparable equipment with the same level of efficiency with him, it was not the specific lamp required by RightLights. While he noted that some of the occasions were his fault for not arriving properly prepared, the inflexibility of not being able to use equivalent pieces of equipment to finish the job caused frustration and financial loss.[11]

"They didn't think [the alternative measure] was an option – I've been doing it for years. To their credit, when I approached them about it, they added it to the list of eligible retrofits. They have their heart in the right place; it's just that their stated goal of achieving the maximum savings can get in the way. I was really pleased they were willing to listen to alternative suggestions, though."

While Installers did express anxiety over the nature of the Program's equipment requirements, several of those same individuals praised the Program staff for their willingness to consider and adopt suggestions for alternate method of retrofitting when offered by the Installers.

Several Installers also noted that the Program inventory of eligible measures had changed several times since they had worked with the Program. "[Some] of the required equipment has been changed – they switched some of the ballasts and a new low-mercury lamp. They seem to be constantly looking for better products." Another installer offered a similar comment, saying, "They have expanded their eligible measures – broadened their range. In addition, they found some better ways to doing certain retrofits – such as 8ft. fixture upgrades."

Opinions were mixed on the impact of the equipment changes. While one Installer stated that "it is important to always use the best products," two others expressed frustration; "we've had to open new accounts to get the required measures . . . . Also, they have changed the measure list several times, which makes it hard to stock." The other Installer also commented on stocking, noting that "switching has been a problem – it has left me with some back stock."[12]

Views on Program Pricing Structure

All but one of the Installers indicated that the Program-stipulated equipment markups and the fixed labor costs were appropriate. Three of the Installers admitted to initially having reservations about the fixed markups and labor

"Initially I had a little concern about the labor rates, but then I realized that they really were really close to where they should be. I think they did a very good job with that."

[11] As noted earlier, RightLights staff believed that the installer definition of "equivalent" was, in fact, not always of equal value compared to Program measures in terms of quality, energy savings, and environmental impact.

[12] The RightLights supplier agreements allow any installer to return all leftover stock for a 100% credit. While each of the Installers were notified of this option at the beginning of their involvement in the Program, it is possible that some have either forgotten or failed to utilize this option.

costs, but these concerns were allayed as their involvement with the Program progressed. Another of the Installers also alluded to the inherent balance in the RightLights structure; "sometimes they haven't allocated enough time to do certain installs . . . . But there is equity built in, you might take a loss on some but on others you make it back." Overall, the sampled Installers felt that the current labor rates and percentage markups were reasonable and fair. One Installer, however, did mention that he hoped the Program would revisit the labor rates periodically to keep up with increases in inflation and the standard of living.

Views on Communication

None of the interviewed Installers expressed any concern or dissatisfaction regarding the level of communication between themselves and the RightLights staff. All of the Installers mentioned that they were in regular contact with Program auditors and managers regarding the status of jobs and modifications to work orders. As one put it, "Communication is not a problem at all. They are much better than most programs I've worked with. We speak frequently about jobs, and they are very good at returning my calls quickly." While the communication process is primarily informal, none of the Installers expressed a need for more formal or regular communication with RightLights staff. In fact, all of the installers interviewed described themselves as either satisfied or more than satisfied with the current level of communication.

> "Usually we talk on the phone or sometimes I receive emails. Nothing formal – just as things arise or as I have questions about a particular job. They are very good about responding. I'm actually surprised at how well they can keep up considering how big the Program is."
>
> "The pipeline is good. I know who to get in touch with if I need something, and if they don't know or can't answer it, they patch me into someone who can."
>
> "I have all of their cell phone numbers, so if I have any questions I can usually get them answered right then."

Views on the Future

The Installers were also asked for their opinion regarding the future of the Program. All eight, including the three installers no longer actively working with RightLights, felt that the Program had a bright future and hoped to see it continue. Several of them used the same phrase, claiming that the Program "had proven itself" and was worthy of renewal. The Installers also noted that, while the Program had "met its goals," there were still a lot of small commercial businesses in the service territory in need of assistance. Two of the Installers specifically mentioned that their participation in RightLights allowed them to consistently employ additional workers. In addition, one of the Installers commented that he hoped that future iterations of the RightLights Program would expand to include other energy efficiency measures such as HVAC and controls.

> "I think the Program will stick around. There are a million small commercial businesses out there, and PG&E could save huge money if [RightLights] can get to them."
>
> "[RightLights] can't do anything but get bigger. I hope it continues being funded. It's a good program and good revenue for myself. The people are really great to work with as well."
>
> "They have a good future. Like with anything, there are some quirks, but they are working hard to take care of them. I'd really like to see them offer more than just lighting – move into HVAC and controls."

Lastly, the Installers were asked if there was anything that might affect their continued affiliation with the Program. Of the five surveyed Installers still working with the Program, two answered that the following factors might cause them to leave the Program: first, if the labor rates did not rise with the standard of living and second, if at some point in the future, the Program was no longer cost effective for their business due to continued problems with the audits.

Overall Program Assessment

While most of the Installers interviewed noted having issues with various elements of the Program's design or implementation, each of them also offered positive comments, often calling RightLights a "good program." In fact, many of those individuals that expressed concern about the audits or the equipment changes were quick to add that such problems were part of the learning curve and that the Program would certainly move past it.

Two of the three Installers no longer participating decided to stop participating due to the smaller scale of the RightLights jobs. Both mentioned that their company focused on larger commercial retrofits and that, while they believed in the Program, RightLights just wasn't a good fit for them. The third installer's company is not based in the Program's service territory, and he noted that the added commute and returns to the site for change orders made participation economically unviable. Despite this, perhaps the best endorsements of the Program came from the three installers who are no longer working with the Program:

> *"It just wasn't the right fit for us. I think they have great intentions and that they are doing a good job, it just wasn't for our company"*
>
> *"I told him regretfully that I had to drop out. It was too bad – RightLights' heart is in the right place. They are the good guys out there. I would have liked to work with them had it been possible."*
>
> *"We are looking into adding a crew in that area, which might make it possible to participate again. We would like to be involved."*

Post-Program Interviews

The following discussion is based on in-depth interviews conducted in February 2006 with six contractors who are currently working with the RightLights Program. The sample included two contractors who have worked with the Program for over two and one-half years and four that ranged from one to two years with the Program. Two of the contractors also participated in the mid-Program interview.

Roles and Past Experience

While the primary role and responsibility of the interviewed Installers is implementing the retrofits recommended by the Program, two have also worked

"I just did a job and it cut the bill in half while adding light to the business. The customer couldn't have been happier. In fact, I was talking with another RightLights contractor the other day about how you really feel like you've helped someone out and done a good thing when you walk away from a RightLights job."

with RightLights on a consulting basis offering lighting expertise and advice on Program design and technical matters. Both contractors expressed appreciation for being included in the design of the initial Program and for being contacted to provide input for subsequent Program design modifications.

The Installers were asked about their past experience with other utility-run or third-party managed energy efficiency programs. Three of the six had or were concurrently working with other such programs (PG&E's Express Efficiency was the most commonly cited). Several other Bay Area programs such as Smart Lights and PG&E's Weatherization program were mentioned, in addition to Stockton's Brighter Business Program and Standard Performance Contracts for SMUD.

Views of Program Design

> "Originally we were only allowed to change T12 fixtures to T8 fixtures and incandescent lamps to CFLs. We have been given more flexibility to install different types of lighting fixtures. One example is that we are allowed to install high bay fixtures now. This design change allows for more flexibility for our customers and makes for a happier customer."

All six contractors emphasized the efficiency of the program design. Helping hard-to-reach small businesses retrofit their lighting benefits small businesses, utilities and the contractors. Two of the contractors reported that with the auditor canvassing participating counties on foot, small businesses that normally do not hear about these types of programs are given an opportunity to participate. One contractor responded that the design process was always very good and only minor adjustments were needed. He also noted that these adjustments and modifications are already being addressed, and spoke about how the lighting options are being increased to allow the contractor to be more flexible in what they can install. Two contractors talked about how everyone (contractor, auditor, and staff) has a very defined role, and the fact that everyone knows their role and what they need to do which makes the program run very smoothly.

> "No, I enjoy participating in the Program. It is a very ethical Program. Not only are they helping small businesses and bringing in business for me, but they are also making the area greener. They are saving energy and are disposing of the old fixtures in the most ethical manner possible."
>
> "The transition between Program years is a little rough. This is not really that big of an issue but I feel as though they had to know that this was going to occur."

One contractor spoke very highly of the program design but thought that some changes were needed. In particular, this contractor felt it was a drawback that only the auditors are educated on the FACET© database. He pointed out that other business owners see his company working on RightLights installations and ask him about retrofitting their businesses. Since he cannot give a price estimate (because of the need to use FACET©), he has to call an auditor to come and give the needed information. This contractor felt that if he was educated on this information, the auditor would not have to revisit the location.[13] We note that this contractor was unaware that Ecology Action had conducted a pilot test in which a contractor was trained to use FACET© and

[13] Ecology Action conducted a pilot test in which a contractor was trained to use FACET© and "sell" their own jobs, but that the test was unsuccessful. Ecology Action determined that restricting the use of FACET© to the auditors was more effective.

"sell" their own jobs, but that the test was unsuccessful and did not support contractor use of FACET©.

Program Delivery

All the contractors felt that the lighting replacement was adequate for light output and quality. Four of the contractors reported that they have never received a complaint about the lighting output. In fact, they have even received compliments from customers talking about how much they enjoyed the new lighting and its high quality. One contractor thought that almost all of the lighting was adequate except for certain specific situations. He gave the example of small women's bathrooms – they have to replace the incandescent with one 17W CFL. It takes time for the CFL to reach full brightness and light output is less than the incandescent.

> "Every time a change is needed, I have to call the auditor, the RightLights staff, and the customer and update them on the changes made. I don't feel like I should be having to do all this work. If it is the auditor making the mistake, why can't I just inform the auditor and then it is his job to inform all the necessary people? He made the mistake."

When asked if they had any concerns about participating, one contractor stated that the Program is ethically good and brings work to his company. He stated that the fixed labor cost is the only way to allow the Program to function and saw no problems in the current rates. Another contractor reported that the fixed labor cost and mark-ups for equipment were not a concern but that the type of installations that he is performing are always very small in scale and that one contractor always gets all of the larger projects in his area. He felt that he was doing more driving then anything else. A third contractor reported that the transition between Program years is a concern as this creates confusion regarding whether a project is to be funded out of the previous Program cycle or the new Program cycle.

One large concern during the first interview was the frequency of auditor change orders. All the contractors reported that this was still a concern, but one said that the staff was trying to deal with it and are improving. One contractor stated that, in some situations, the auditor cannot specify the correct fixture until he gets up on a ladder. Another claimed that the problem is not in the number of change orders, which he felt was an unavoidable situation, but rather the way that they are dealt with. He stated that when an error is made by the auditor, the auditor – not the contractor – is the one who should have to perform the change order steps to correct it. He believed that this would make the auditors more careful in their decision making and more likely to get the specification correct the first time.[14]

Another concern that arose during the first interviewing round involved the amount of time and labor allowed for the initial contractor walk-throughs. As a result, the Program increased the fixed labor allotment for the walk-throughs by 50%. Subsequently, when questioned on this topic during the secondary interviews, none of the contractors reported feeling that they did not have enough time to do a thorough job during the walk-through. One of the interviewees stated that the time adjustment was "right on the money."

[14] Ecology Action staff explained in their interviews that both the auditor and Program Coordinator remain involved in every change order, since it must be input into FACET© and signed off by the customer.

One contractor reported that one of the most common problems that arises during the walk-throughs is missing data on ceiling heights. The contractors are given an extra "access factor" to account for the extra labor required when the ceiling height is more than 17 feet. If this information is not included, the contractor must decide whether to submit a change order or forego the extra money. Another contractor reported that on the larger projects, not all of the voltages are obtained. "The auditors check one box and consider all the other voltages to be the same". He had one job in particular that the auditor had reported one voltage when there were actually two, and if he had not checked this information some of the new lighting equipment would have been installed incorrectly, and the affected bulbs would have almost instantaneously burned out.

There was also a concern noted during the first round of interviews regarding the frequent changes in eligible lighting equipment. In contrast, none of the participating contractors voiced this as a concern during their secondary interviews. Four of the contractors, in fact, reported that the changes in eligible measures was positive, that they are allowed more freedom to install exactly what the customer desires. Two of the contractors reported that the additional measures are positive but felt that it is harder to keep the lighting equipment in stock. They stated that some of the equipment is not used very often and is hard to purchase in bulk, which has brought about struggles with the suppliers; the suppliers still give them the RightLights discount but are not very happy about it. One contractor talked about an unannounced increase in the price of some equipment, but mentioned that he had brought this to the attention of RightLights and the Program reimbursed him for the cost differential.

Program Administration (Communication)

> "The customer is always very happy. They like the new lighting. The cost is minimal. They get a lot of lighting for a small price. They are also going to see savings on their bills. What does the customer have to complain about?"

All of the contractors considered the communication to be very open between the staff, contractors, and auditors; staff answers their calls within a reasonable length of time. Four of the contractors stated that they talk to the auditors on a frequent basis, offering advice on lighting fixtures and discussing any change-order requests. The auditors are very available and respond quickly to any change-order requests. When asked for improvements in communication, only one contractor had a suggestion: that the auditor could inform the contractor of any particular customer concerns (e.g., cleanliness) so that they can be sure to address them. He also stated that this was minor but might be helpful in certain situations.

Customer Response

All of the contractors stated that the customer feedback has been very positive: customers are receiving higher quality lighting and saving on their energy bill. The general consensus was that the Program's strategy and execution gave little reason for the customers to complain. Another contractor commented that the customer is very satisfied with the lighting replaced, but observed that the contractor is not allowed to move, remove, or add any lighting fixtures. This person noted that since these business spaces were often designed for a different application or business

type, adjustments in the placing of some of these fixtures could really benefit the current occupant.

One contractor noted that the only complaint that they have received is that sometimes the bulbs burn out quicker than expected.

Views on the Future

All the contractors seem to be happy to be participating in the Program. They see the RightLights Program continuing into the future. The contractors' one concern is that they will eventually install fixtures into all of the willing participants and saturate the population. Several contractors commented on continuing to increase the number of participating counties so that the Program can continue to help small businesses. Two contractors also pointed out that continuing to augment the lighting equipment list and offering a larger range of fixtures could bring in some of the small businesses that originally declined to participate in the Program.

When asked what could stop their involvement in the Program, every contractor seemed reluctant to answer this question. They were pleased with the Program and believed in its general goals. After some thought, one contractor stated that if the payments from RightLights were delayed like some other programs he has been involved in, this could affect his willingness to participate. Another contractor reported that he might consider removing himself from the Program if the fixed cost for installations was reduced.

Overall Program Assessment

All the contractors seemed to be excited about the Program and eager to begin the new 2006-08 cycle. They felt that the communication was exceptional between the staff, contractors and auditors, and they were satisfied with the modifications in the time allotted for walk-throughs. They believed that the participating customers seemed to be pleased with the Program.

The only concern that most contractors had was with the large number of change orders. They felt that this caused them unexpected time increases and in general made their work much more difficult. While some contractors felt that the auditors were to blame, two installers felt that this problem could not be fixed and that a new method for addressing change orders was more appropriate.

Recommendations for Program Changes

Augmenting List of Approved Lighting Equipment. Although several contractors pointed out that RightLights is already starting to move in the direction of expanding the lighting equipment list, they still see this process as ongoing. If the staff is able to find new and better lighting equipment, the program can continue to find new participating customers and will be able to find enough work to be able to continue for several years.

Optimizing Handling of Change-orders. Several contractors pointed out that the pure volume of change orders is still a concern. They felt that the change order process almost solely falls into

their arms, and noted that they have to call various RightLights staff and then notify the customers of these changes. They feel that this process takes a significant amount of time and is an extra burden that they are not reimbursed for. One installer had the idea of notifying the auditor that originally made the error and letting him or her deal with the change order process. Another idea expressed would be to compensate the contractors for the extra time when a change order is needed.

Enlarging Program Geography. A couple of contractors were concerned about the potential for saturating the participating counties and not being able to find new customers. They mentioned increasing the number of participating counties as a solution. One contractor stated that involving the Oakland area in the Program could bring in a significant number of new customers.

V. Participant & Non-Participant Surveys

One important goal of the evaluation was to assess the effectiveness of the Program in delivering energy efficiency services to small commercial market. In order to address this goal and provide current and continuous feedback through "real-time" evaluation, Quantec conducted surveys with Program participants (telephone surveys and site visit surveys) and non-participants (telephone only). The findings from this component will help determine:

- What factors were most important in driving participation?
- Were participants satisfied with the audit, the installers, the lighting measures, and the overall Program?
- Would participants have installed the measures in absence of the Program? Did they install any additional measures or take any additional actions to reduce energy use because of the Program?
- Are the lighting measures still installed and operating?
- Why did some businesses choose not to have the audit or install any Program measures?

Methodology

Quantec developed separate questionnaires directed at two sub-groups. The first questionnaire was aimed at participants, including full participants who received a complete retrofit as well as those who received an audit along with the Quick-Saver Package (QSP).[15] The second questionnaire was aimed at non-participants, including those who did not have an audit and those that received an audit but did not install any of the recommended measures (including the QSP measures).

The initial participant sampling frame consisted of all 2004 participants – resulting in a list of 836 contacts – half of whom were randomly selected as the sample for the non-energy benefits study and half for this study.[16] For both samples, the participants were nearly equally distributed between QSP-only and complete retrofit participants. The contacts represented many business types, but about half were in retail (Table 5).

Initial participant surveys were conducted in January and February 2005. The 100 phone interviews that were completed were representative of the participants in their distribution by participant status and by industry sector.

Surveys were also completed at 50 of the 101 sites visited for on-site inspections in November, 2005. Common reasons for not completing a survey during the site visit was that the person with

[15] For approximately 37% of the QSP-only participants, however, the QSP was considered a comprehensive retrofit because the facility was very small and there were no other possible retrofit opportunities.

[16] Although there were 1,133 participants in 2004, only 836 participants had populated phone numbers and contact information.

knowledge of the program was not in or the participant indicated that he or she was to busy at the moment.

Table 5. Comparison of Participant Sample with Population, by Business Type

	All Participants for Process Study*			Participant Respondent Sample		
	Participant (n=218)	QSP-Only (n=200)	Total (n=418)	Participant (n=57)	QSP-Only (n=43)	Total (n=100)
Retail	51%	49%	50%	41%	49%	44%
Restaurant	20%	22%	21%	16%	23%	19%
Office	9%	5%	7%	13%	2%	8%
Process Industrial	5%	5%	5%	5%	5%	5%
Grocery	5%	3%	4%	2%	5%	3%
Assembly Industrial	2%	1%	1%	2%	0%	1%
Health Care/Hospital	1%	3%	2%	2%	0%	1%
School	0%	1%	<1%	0%	2%	1%
All Other	6%	15%	10%	19%	14%	17%
Total	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

* Through January 11, 2005. An additional sample of participants was selected for the NEBs study.

The non-participant sample was similarly drawn from 2004 contacts and resulted in a list of 447 contacts (Table 6).[17] Seventy-five interviews were completed in February 2005 with respondents who had received an audit but had not installed any Program measures (11%) and respondents who selected not to have the audit (89% of respondents).

[17] A number of non-participant sites that committed to participating in the Program (i.e., work scheduled but not yet installed) were not included in the study.

Table 6. Sample Disposition for Participants and Non-Participants

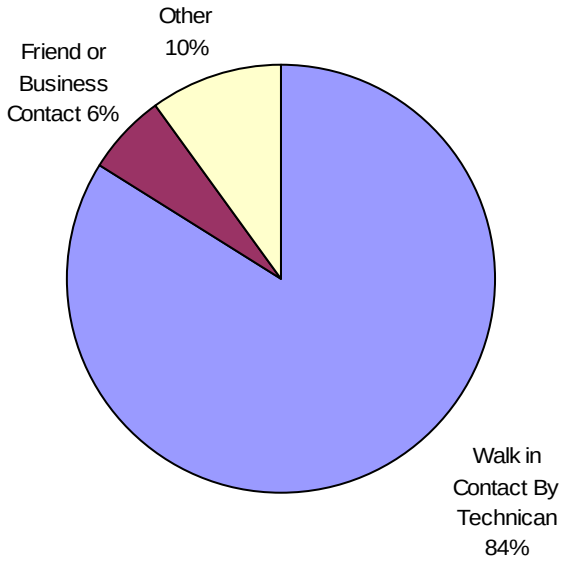
Call Disposition	Participant Survey		Non-Participant Survey	
	N	Percent	N	Percent
Total list	427		447	
Total unused contacts	243		97	
Already had efficient lighting	0		8	
In process of participating	0		10	
Eligible Sample	184	100%	332	100%
Completed Interview	100	54%	75	23%
No answer or Answering machine	14	8%	78	23%
Knowledgeable respondent not available/Too busy/Call back	48	20%	120	36%
Bad number	12	7%	32	10%
Busy signal	2	1%	11	3%
Refusal	11	6%	8	2%
Never had contact with RightLights			2	1%
Language barrier	3	2%	5	2%
Terminated survey	0	0%	1	<1%

Results

Marketing (Participating Phone Survey Results)

As shown in Figure 1, the RightLights Program generates the vast majority (84%) of the participants through walk-in, direct solicitations from a staff technician. The high percentage of walk-in sign ups is to be expected, given that two counties began participating in 2004-05 and that the Program uses minimal marketing efforts other than the technician walk-ins; word-of-mouth, however, would be expected to increase as Program penetration levels increase.

Figure 1. How Participants Learned about the Program



Participant Motivations (Phone Survey Results)

There were clear differences in what motivates full retrofit participants and QSP-only participants. Full participants are curious about energy use and energy efficiency: when asked why they participated in the Program, 71% of the full participants wanted to learn about ways to reduce energy costs, versus only 37% of the QSP-only participants (Figure 2). Similarly, 48% of the full participants wanted to understand more about how energy costs are determined, compared to only 23% of the QSP-only participants. The QSP-only participants, on the other hand, were primarily motivated by the free lighting (56% QSP-only vs. 19% full participants).

This difference was further confirmed by the importance that the two groups placed on the energy cost information provided by the lighting technician: 84% of full participants said it was very important, while only 37% of QSP-only participants said the same (Figure 3).

Figure 2. Reasons for Participation in the Lighting Survey[18]

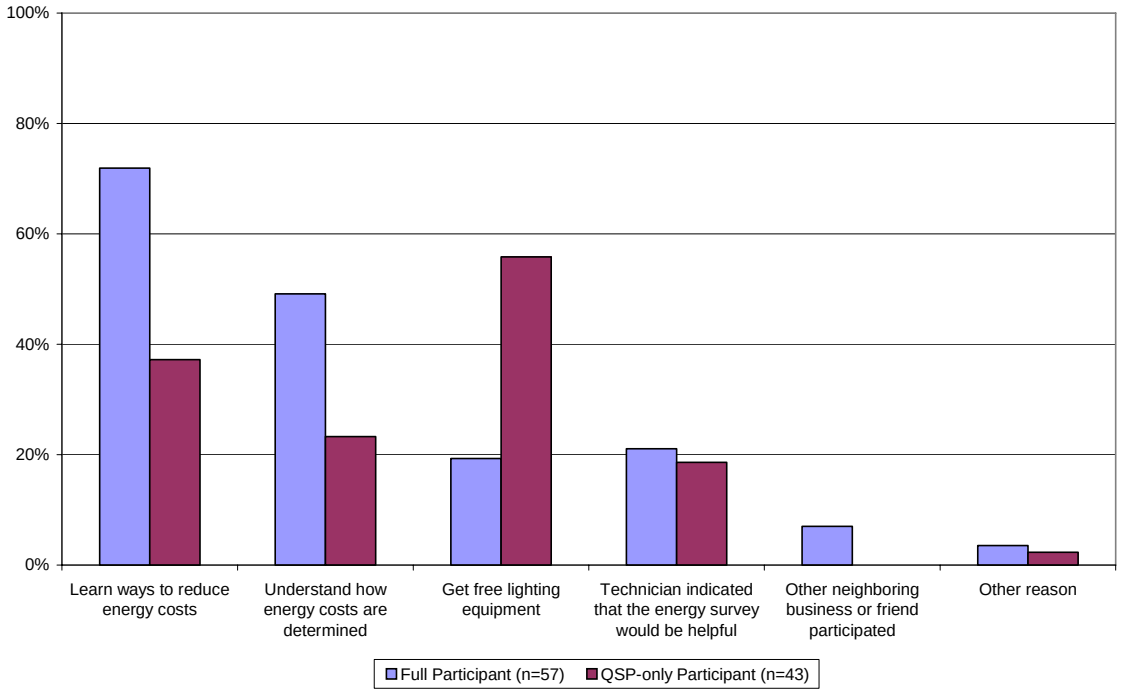
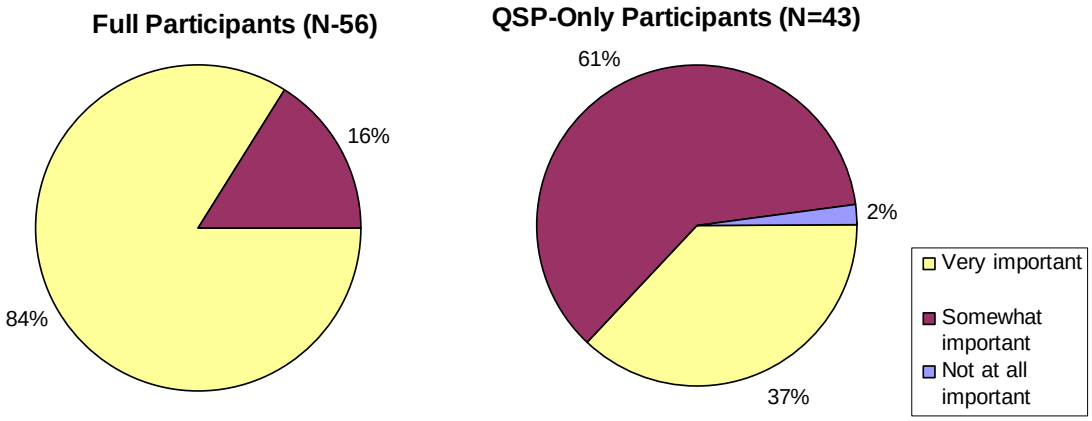


Figure 3. Importance of the Information on the Lighting Retrofit Plan for Deciding to Install New Equipment



Satisfaction with the Audit and Lighting Installation (Phone Survey Results)

Overall, the Program procedures and materials are achieving their intended purposes. The Program materials are widely found to be quite clear, useful, and important in the decision to

[18] Respondents could provide more than one answer.

install Program measures (Table 7). The lighting audit itself has also helped to educate many business owners about how to increase their energy efficiency.

There were notable differences, however, based on participation status. While a large majority of full retrofit participants found the materials to be very clear (88%) and very useful (84%), fewer QSP-only participants had the same opinion (67% and 58%, respectively). And just 62% of non-participants found the materials to be very clear.

Table 7. Clarity and Usefulness of the Lighting Retrofit Plan

	How clear was the information?		How useful was the lighting use information?	
	Full Participants (n=56)	QSP-Only (n=43)	Full Participants (n=56)	QSP-Only (n=43)
Very	89%	67%	84%	58%
Somewhat	11%	33%	16%	40%
Not at all	0%	0%	0%	2%
Total	*100%*	*100%*	*100%*	*100%*

Also, 46% of full retrofit participants said the audit greatly increased their understanding of how to improve their business's energy efficiency, while only 26% of QSP-only participants reported similarly (Table 8).

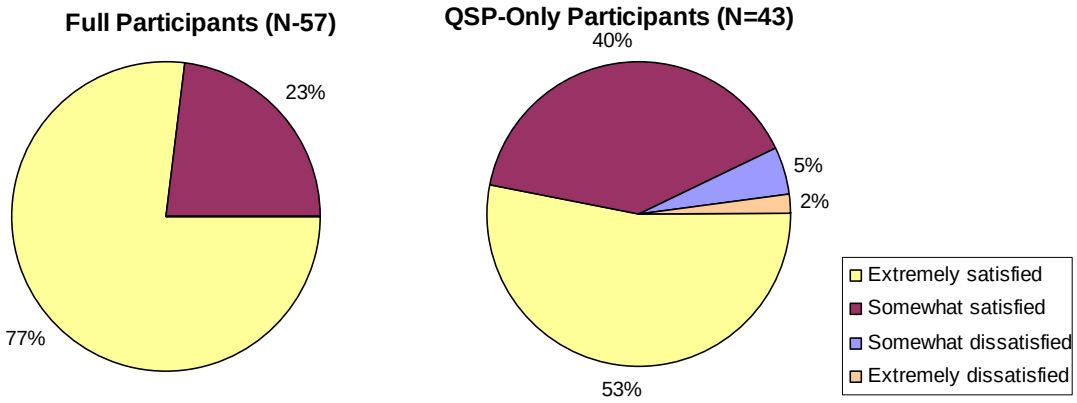
Table 8. Impact of the Lighting Audit on Understanding of How to Improve Business Energy Efficiency

	Full Participant (n=57)	QSP-Only (n=43)	Total
Had no impact	4%	0%	1%
Slightly increased your understanding	5%	16%	10%
Somewhat increased your understanding	46%	58%	52%
Greatly increased your understanding	46%	26%	37%
Total	*100%*	*100%*	*100%*

There were also substantial differences in satisfaction with the audit between the full participants and the QSP-only participants. All of the full participants were either extremely (77%) or somewhat satisfied (23%) with the audit; only 53% of the QSP-only participants, however, were extremely satisfied with the lighting audit (Figure 4). In addition, there were three few QSP-only respondents who were *not* satisfied with the audit. These respondents reported that they were dissatisfied with the cost of the Program and felt that the audit reflected costs that were too high for them to pay. One respondent also mentioned that the initial audit had a major error in it and that the revised audit had costs that increased significantly, causing him to not pursue additional measure installations after the QSP.

As discussed above, the fact that the incentives covered less of the measures costs for the QSP-only sites (43%) compared to the full participant sites (73%) may have also contributed to lower satisfaction levels with the audit among the QSP-only participants.

Figure 4. Satisfaction with the Lighting Audit

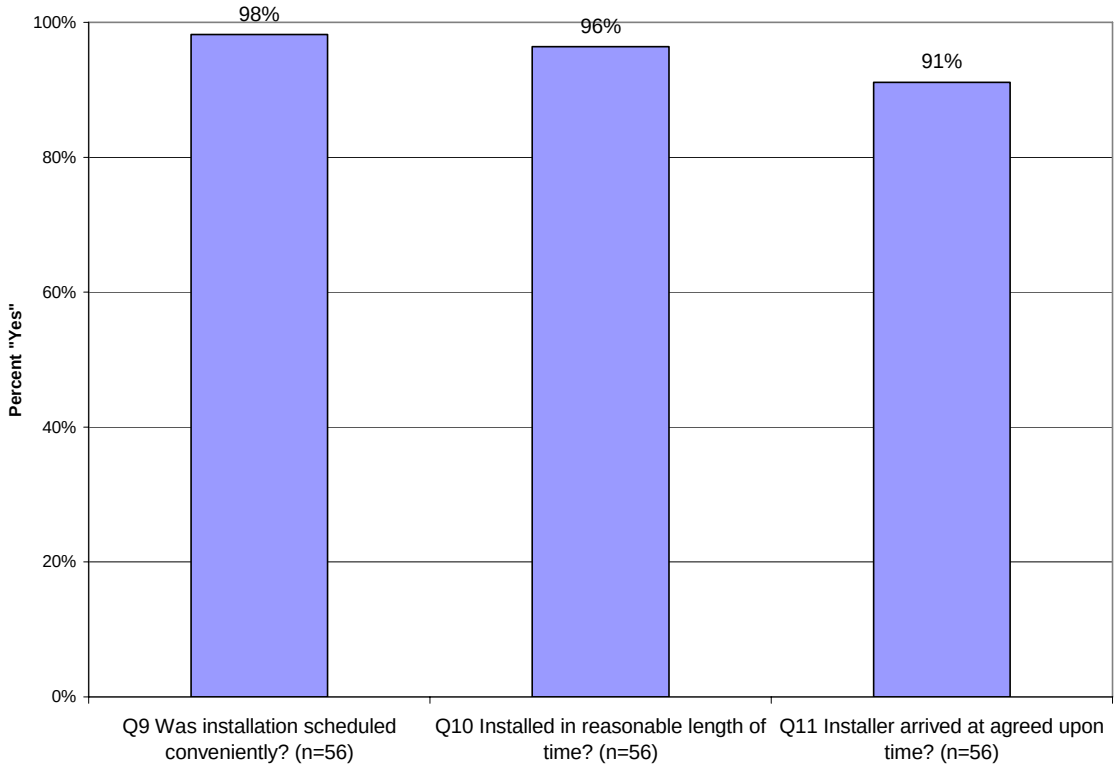


For those participants who received more comprehensive measures beyond the QSP, the installation process went very smoothly. The vast majority agreed that the appointment was scheduled at a convenient time (98%) and that the installer completed the installation in a reasonable length of time (96%) (Figure 5). In addition, 91% of the respondents reported that the installer arrived at the appointed time; in the four instances when the installer did not arrive at the agreed upon time, respondents were notified in advance that they needed to schedule an alternate time half of the time. In general, respondents were extremely satisfied with the technicians and installation process, reporting:

> *"Very professional service all around."*
>
> *"The technician was great."*
>
> *"The energy auditor was very professional and the installer was superb."*

Only one respondent was extremely dissatisfied with the installation, reporting that the "installation was not handled very professionally . . . [they] missed appointments, then brought wrong equipment. More consideration would have been appreciated regarding lighting commercial spaces (spot lighting vs. flood lighting)."

Figure 5. Installation of Comprehensive Retrofit Measures



Retention and Satisfaction with the Lighting (Phone Survey Results)

While the majority of the respondents (94%) reported that all of their lighting was still operating at the time of the survey (January and February 2005) (Table 9), there were a number of respondents, particularly for the QSP-only participants (9%), that reported that some or none of their Program measures were still functioning and/or installed. Four of the respondents reported that some of the installed lighting had burned out and not been replaced, while one respondent stated that a bulb had burned out and been replaced with another efficient lamp from Ecology Action.

Table 9. Retention of Lighting Measures

	Full Participant (n=56)	QSP-Only (n=43)	Total
All	96%	91%	94%
Some	4%	7%	5%
None	0%	2%	1%
Total	*100%*	*100%*	*100%*

Although the majority of the participants are satisfied with the installed Program lighting, satisfaction varies substantially based on the participation level. For example, 86% of the full

participants were extremely satisfied with the lighting, compared to only 53% of the QSP-only participants. Those that were satisfied reported:

"The lighting improved dramatically. Products are now more visible."

"It's great. We can see better and there are no more noisy ballasts."

"We love the lights – our customers love the lighting too. We don't even have to have the customers go outside in natural light to see if they like their hair color."

A few participants from both groups were dissatisfied with the lighting, primarily because they did not like the quantity or quality of light, particularly for their business. These respondents reported:

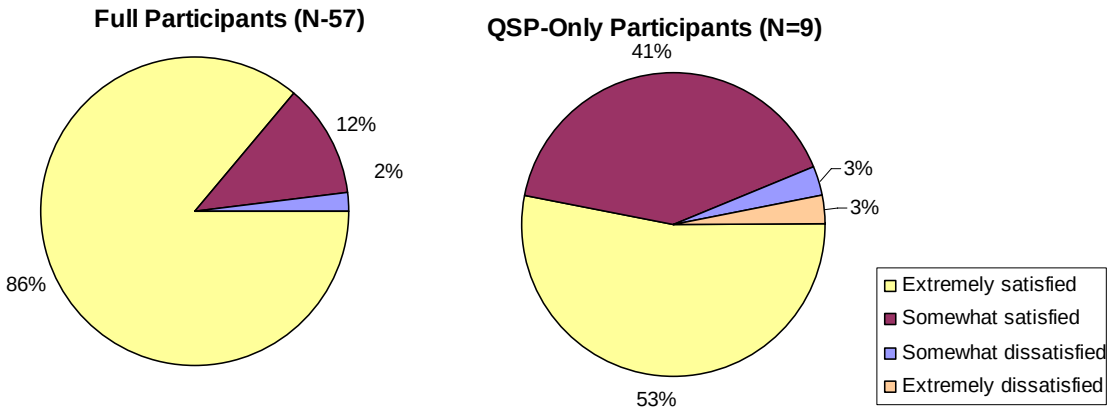
"The lights are not as bright as what we had liked."

"I actually feel as though it is not as bright as it used to be."

"[RightLights needs to] put more forethought into layout of lighting to maximize available light."

"The light is too yellow for a salon"

Figure 6. Satisfaction with the Installed Lighting



Full participants were also far more likely to have noticed savings on their energy bills: 69% of the full participants reported noticing savings, compared to only 19% of the QSP-only participants (Figure 7). Many participants from both groups, however, reported that it was too early to see savings on their bills (27% of the full participants and 29% of the QSP-only participants). Since many of these QSP-only sites received a less comprehensive retrofit, it is not

surprising that fewer of them noticed savings on their bills: the average expected savings at the full participant sites was 15,725 kWh compared to only 1,553 kWh for the QSP-only sites.[19]

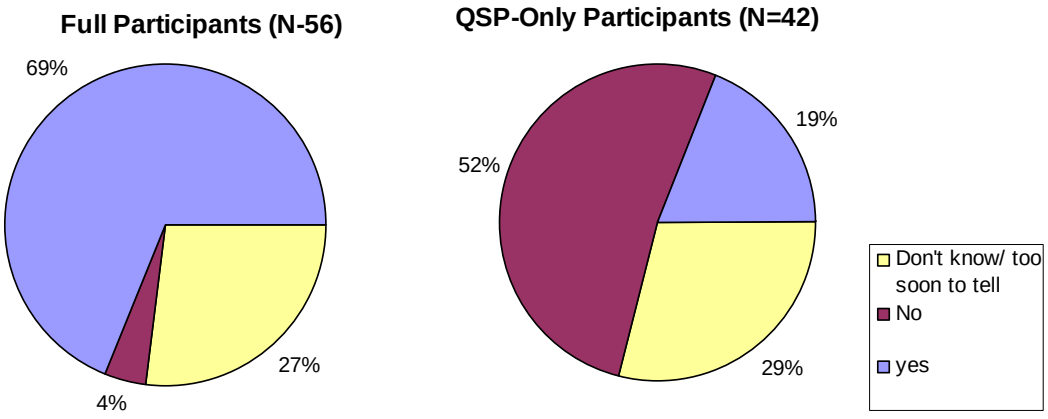
Those respondents that did notice energy savings were also asked how the actual savings compared to the savings they expected to achieve from the Program. Forty-four percent of the respondents stated that the actual savings are *greater* than what they had expected; only 8% stated that the savings were less (Figure 8). Comments included:

"I'm very happy because I was skeptical at first, but I have definitely noticed great savings."

"We appreciate the Program and love the savings."

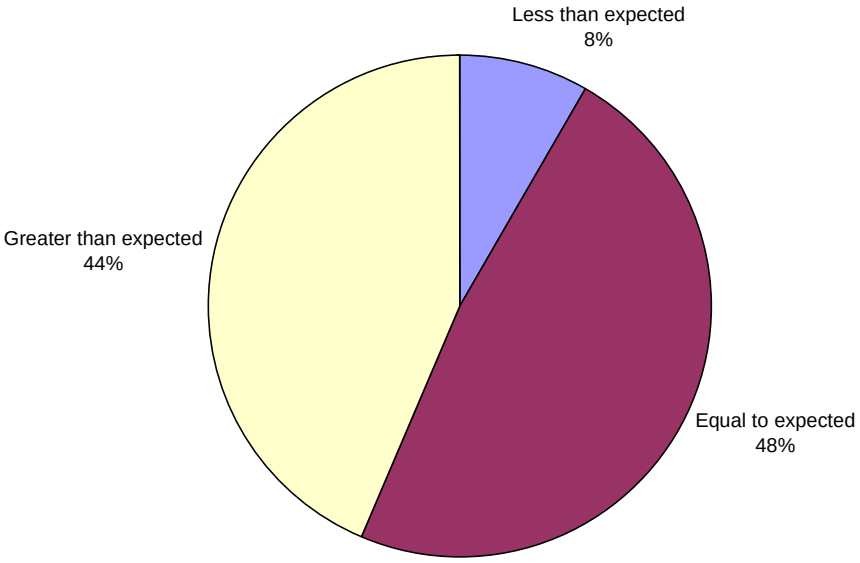
"We save a significant amount of money on our energy bill."

Figure 7. Notice of Any Savings on Customer Energy Bills



[19] Based on the January 11, 2005, version of the FACET© database. The actual percentage reduction in energy bills was not available but is assumed to be lower for the QSP-only sites, since 63% of these had additional lighting energy-saving opportunities that they chose not to pursue.

Figure 8. Actual Savings Compared to Expected Savings (n=47)



Program Influence (Phone Survey Results)

The majority of the respondents (93%) reported that, in absence of the RightLights Program, they were very unlikely to have installed the same high efficiency lighting in the next year (Table 10). The few respondents that might have installed some measures reported that they already had an interest in energy efficiency and were either planning to install, or had already begun installing, CFLs in their business.

Table 10. Likelihood of Installing the High Efficiency Lighting if Program Were Not Available

	Full Participant (n=56)	QSP-Only (n=39)	Total
Very unlikely	96%	85%	93%
Somewhat unlikely	0%	3%	1%
Somewhat likely	2%	13%	5%
Very likely	2%	0%	1%
Total	*100%*	*100%*	*100%*

The approved net-to-gross ratio of 0.96, which includes both the impacts of free riders and spillover, appears to be slightly conservative based on the findings from this study. For example, only 1% of the respondents said that they were very likely to install the measures (assume a free ridership rate of 1), 5% said somewhat likely (assume a weight of 0.66), and 1% of respondents were very unlikely (assume a weight of 0.33). Based on these weights, approximately 4.6% of

the savings might have been achieved in absence of the Program. This translates into a net-to-gross estimate of about 95.4% before adding in spillover.[20]

Additional Energy Saving Actions (Phone Survey Results)

The RightLights Program technicians present each participant with a packet of materials with information on actions other than lighting that could help reduce energy use. Only 19% of the respondents, however, initially recalled receiving this packet of materials. When the interviewer mentioned the "yellow packet" (the packet was in a yellow folder), awareness increased to 65%. Of those aware of the packet, 26% (or 8% of the total respondents) said that they had adopted some of the energy-saving recommendations, including changing thermostat settings, shutting off computers and monitors at night, insulating doors, cutting the use of condensers and refrigerators, and unplugging appliances after hours. An additional 53% of those aware (or 10% of the total respondents) said that they plan on adopting some of these recommendations in the future.

A number of respondents did report, anecdotally, that they are installing additional energy efficiency lights at both their businesses and their homes:

"We actually now install these lights in our residential work due to this Program."

"I actually retrofit my house with the same bulbs after participating in this Program."

"[We installed] new LED exit lights."

On-Site Surveys

During each site visit, we conducted a brief survey on the effectiveness of the RightLights Program. The desired goal was to be able to give RightLights feed back on how participants were introduced to the Program, why they participated, their satisfaction with the audit and installation, the Program influence, and whether any other energy efficient actions were taken because of the Program. We were able to complete surveys at 50 sites.

Marketing (Site Survey Results)

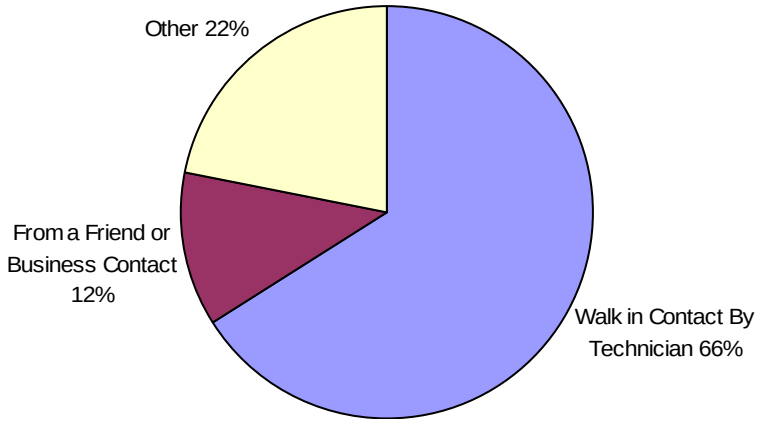
Thirty-three (66%) of the survey participants were introduced to the Program by a RightLights technician walking into the site, giving some brief information on the program and asking about performing a lighting audit on the business (Figure 9). A large portion of the participants commented that this contact was the sole reason for their participation. Some other common

> "I had always known the benefits of CFLs and fluorescent tubes but would not have time in my day to do the necessary research. The RightLights program is great in this regard. A technician stopped by my store and performed a lighting audit without having to schedule an appointment or taking up very much of my time."
>
> *- Participant*

[20] Note the study did not attempt to fully recalculate the net-to-gross ratio and, therefore, did not include more comprehensive questions regarding the quantity, efficiency, and timing of the measures the respondent planned on installing.

responses were phone calls from Program (4), a representative from the Green Business Program (2), information in the mail (2), and an ad in the newspaper (3). Six participants (12%) heard of the Program through a friend or a business contact who had already participated.

Figure 9. How Participants Were Introduced to the RightLights Program (n=50)



Participant Motivations (Site Survey Results)

When asked why they decided to participate in the RightLights Program, 38 people (78%) stated that they wanted to learn more about ways to reduce the energy costs associated with their business (Table 11). This was the most significant response given by participants. Only two respondents (4%) claimed that they got involved for the free lighting equipment. Two other responses attributed their involvement to the Green Business Program, and one respondent stated environmental concerns.

Table 11. Reasons for Participation in the RightLights Program

	Frequency	Percentage
To understand more about how energy costs are	5	10%
To learn more about ways to reduce the energy costs	38	78%
To get free lighting equipment	2	4%
A neighboring business or friend participated	1	2%
Other	3	6%

Satisfaction with the Audit and Lighting Installation

Overall, the Program procedures and materials are achieving their intended purposes. The Program materials are widely found to be quite clear, useful, and important in the decision to install (Table 12). The lighting audit itself has also helped to educate many business owners about how to increase their energy efficiency.

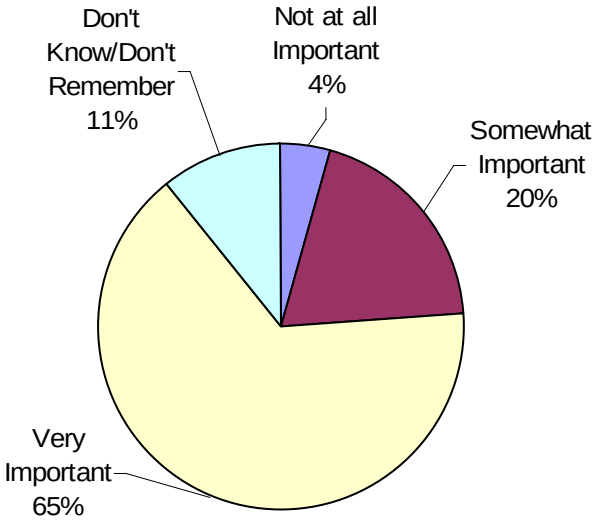
Sixty-eight percent of participants thought that the information received during the audit was very clear, while only 20% believed that the audit was either somewhat or not at all clear. A small percentage (12%) either did not know or could not remember. Sixty-three percent of respondents thought that the lighting information was very useful, while only 29% stated that audit was somewhat useful. No one thought that the information was not at all useful. Eight percent did not know or could not remember.

Table 12. Clarity and Usefulness of the Audit

	Clarity (n =50)	Usefulness (n=48)
Very	68%	63%
Somewhat	18%	29%
Not at all	2%	0%
Don't Know/Don't Remember	12%	8%
Total	*100%*	*100%*

A significant portion of the participants (65%) attributed their participation and willingness to install new lighting equipment to the information that was given during the lighting audit. A smaller portion (24%) stated that the audit was either somewhat or not at all important. Four respondents were busy and asked to skip some questions on the survey.

Figure 10. Importance of Audit Information on Decision to Install New Equipment



Ninety-six percent (47 people) of the survey participants were extremely or somewhat satisfied with the lighting audit. Reasons for their satisfaction included:

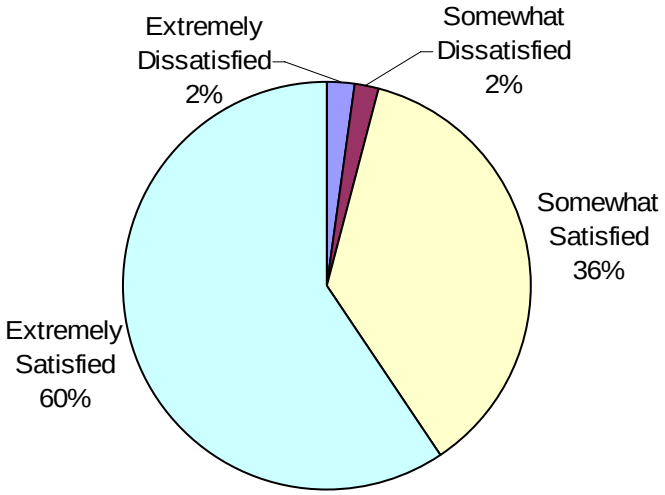
"The technician did not get in my way."

"There was a minimal amount of my time taken."

"The audit appeared to be thorough yet clear and understandable for the participant."

Only 4% (2 people) were somewhat or extremely dissatisfied with the audit. One participant thought that the audit was to short and not thorough enough and one participant stated that the audit recommended CFLs that did not last the advertised time.

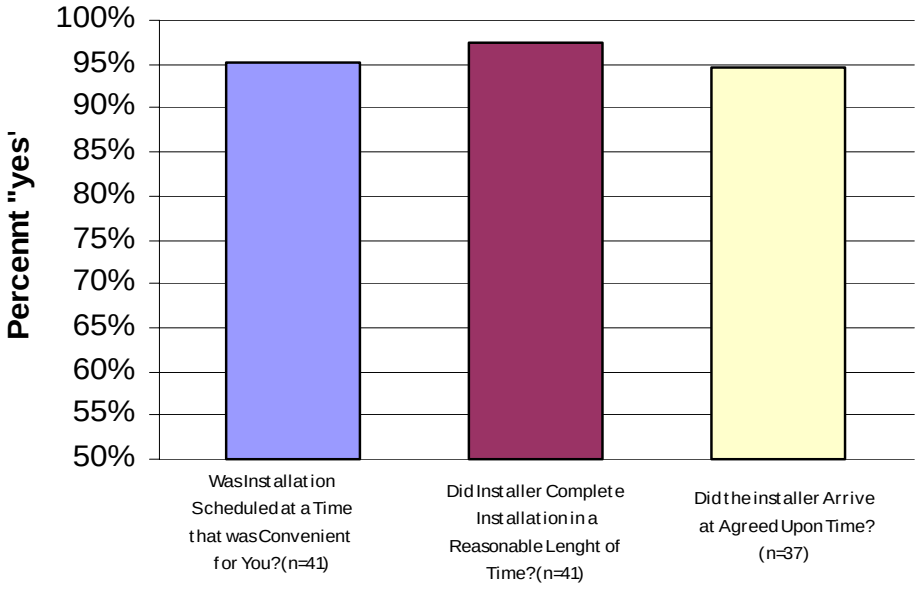
Figure 11. Overall Satisfaction with Lighting Audit



Installation

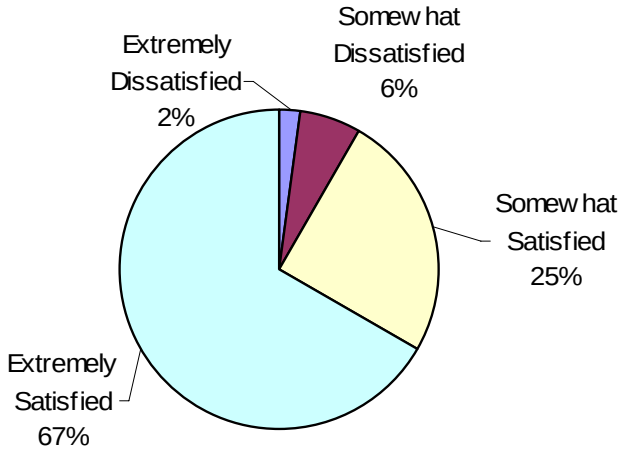
For those participants who had more comprehensive measures beyond the QSP, the installation process went very smoothly. The vast majority agreed that the appointment was scheduled at a convenient time (95%) and that the installer completed the installation in a reasonable length of time (95%) (Figure 12). In addition, 95% of the respondents reported that the installer arrived at the appointed time; in two instances when the installer did not arrive at the agreed upon time (2 respondents), one respondent was notified in advance and asked to reschedule.

Figure 12. Installation of Comprehensive Retrofit Measures



The overall satisfaction with the lighting installed (QSP and Fixture Installation) showed a significant amount of participants were either extremely or somewhat satisfied (92%) while only 8% of respondents (four respondents) were somewhat or extremely dissatisfied. Some reasons for the dissatisfaction with the installation were that the installer got in the way (1) and the participant expected more savings with all the newly installed fixtures (3).

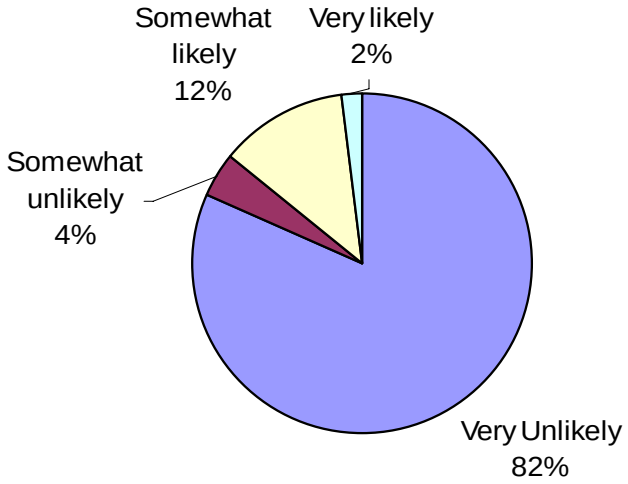
Figure 13. Installation Satisfaction with Lighting Installed in Your Business (QSP and Fixture Installation) (N =48)



Eighty-six percent of the respondents claimed that it is very to somewhat unlikely that they would have installed new lighting at the same efficiency level within the next year without the RightLights Program. Several of these participants stated that they do not even pay that much attention to the lighting. This seemed to be a major attribution to the Program: without

RightLights, most of these participants would have never been exposed to the idea or savings of the lighting fixtures. Fourteen percent (7) of respondents stated that they were somewhat to very likely to have changed their fixtures even in the absence of the Program. Of these, one respondent reported that they had plans on upgrading their T12 lighting fixtures to the more efficient T8 fixtures. The other six reported that they had known about the savings associated with lighting and were planning on upgrading the lighting but had not made any specific plans on new lighting fixtures.

Figure 14. Likelihood of Installing at Same Efficiency within One Year without the Program (n=49)



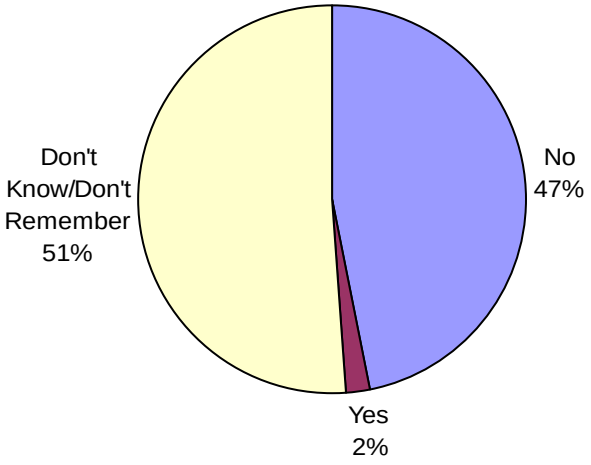
Other Actions

One goal of the Program was to increase the participants' energy efficiency knowledge. RightLights intended not only to install lighting but also to inform participants of other ways to save on their energy bills. There were two approaches attempted: a verbal conversation with the auditor on ways to improve energy efficiency and a yellow information packet given to all customers guiding the customer on other energy efficient techniques.

> "I have to run to the bank. I have to make a work schedule. I have to make sure we have all the necessary supplies. Even if the technician mentioned other ways of saving energy, I would not be able to recall any of this information. The greatest aspect of the RightLights Program is that it takes minimal time for us to participate."

When asked about the verbal discussion of technologies to improve the energy efficiency, nearly all of the participants (98%) either stated that they did not remember receiving or that the technician did not supply any other information. Several of the respondents mentioned their busy schedule as an obstacle in this discussion. The single respondent who reported that he remembered receiving this information said that he was looking into upgrading his HVAC system.

Figure 15. Do You Remember Receiving any other Recommendations to Reduce Energy Costs? (n=49)



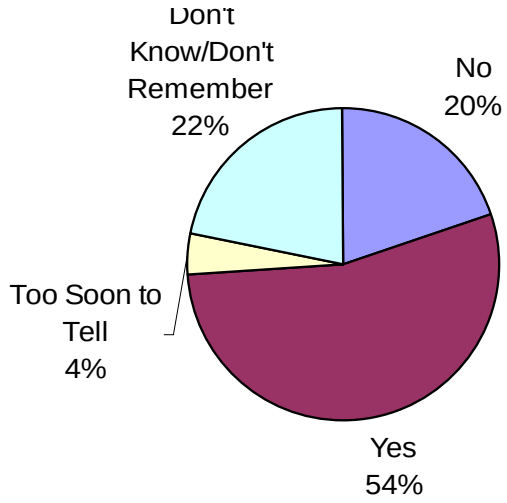
The RightLights technician left an information packet with each customer. When asked whether they received this packet (n=21), 43% of respondents either said no or that they did not remember receiving this package. When reminded that the information came in a yellow folder, fifty-seven percent of respondents remembered receiving this yellow packet but only 27% of these people claimed to have used any of the information in the packet.

Estimated Savings:

Fifty-four percent of the participants have noticed savings on their energy bills since the new lighting fixtures were installed (Figure 16). Twenty-six percent of the respondents either don't know/don't remember or believe it is to soon to tell, while 20% claim to have not seen any savings.

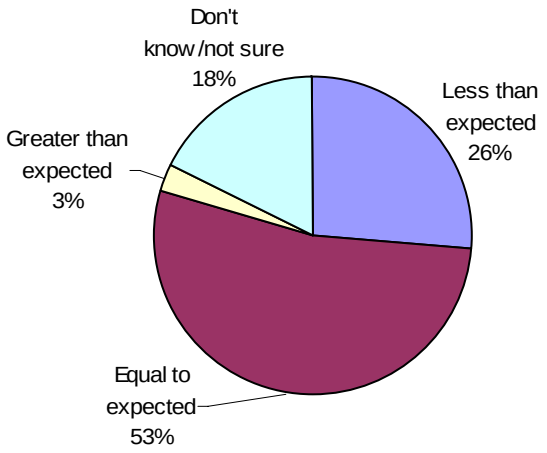
"My energy bill has stayed the same. There has been an increase in the price of electricity though. So I have saved energy but would question if any one else would notice this."

Figure 16. Savings on Energy Bills (n=50)



Fifty-three percent of those who said they saw savings on their energy bills stated that the amount was equal to what they expected (Figure 17). Twenty-six percent of the respondents claimed that they saw savings less than they expected, and 3% claimed that their savings were greater than expected. The increased energy price could account for some of the ten participants who claimed to have savings that are less than expected.

Figure 17. Were the Savings what Was Expected (n=27)



Non-Participants

Cost appeared to be the most common deterrent for businesses that selected not to participate in the RightLights Program (37%, Figure 18). Most of the respondents were concerned with the initial cost alone, but a few seemed more receptive to participation if a better case were made for the eventual savings. For example, one respondent said, "the lighting specialist gave me a report, to show me what I would save, and from the report I decided that my savings would not be worth closing my store for the new retrofit."[21] Respondents, in other words, needed to be more convinced that the savings were legitimate. Third-party endorsements – including green building or certification programs, Chambers of Commerce, current participants, or other trusted sources of information – are one way of easing non-participant skepticism.

Survey respondents reported a number of other reasons for not participating in the Program Figure 18), including being too busy (13%), distrust of the technician/offer (12%), and lack of authority to make the install decision (11%).

Despite these barriers, many non-participants may be open to participating in the future. In fact, 45% indicated that they would be open to future participation (Figure 19). Several respondents said that they had expressed interest but that Program personnel did not follow-up as they had expected. One respondent said: "We thought it sounded good, and we even started, but they

[21] RightLights installations, however, are normally done before or after working hours and do not require the business to shut down during operating hours.

never came and finished." Contact information for these people will be sent under separate cover to facilitate this follow-up.

Figure 18. Reasons for Not Participating

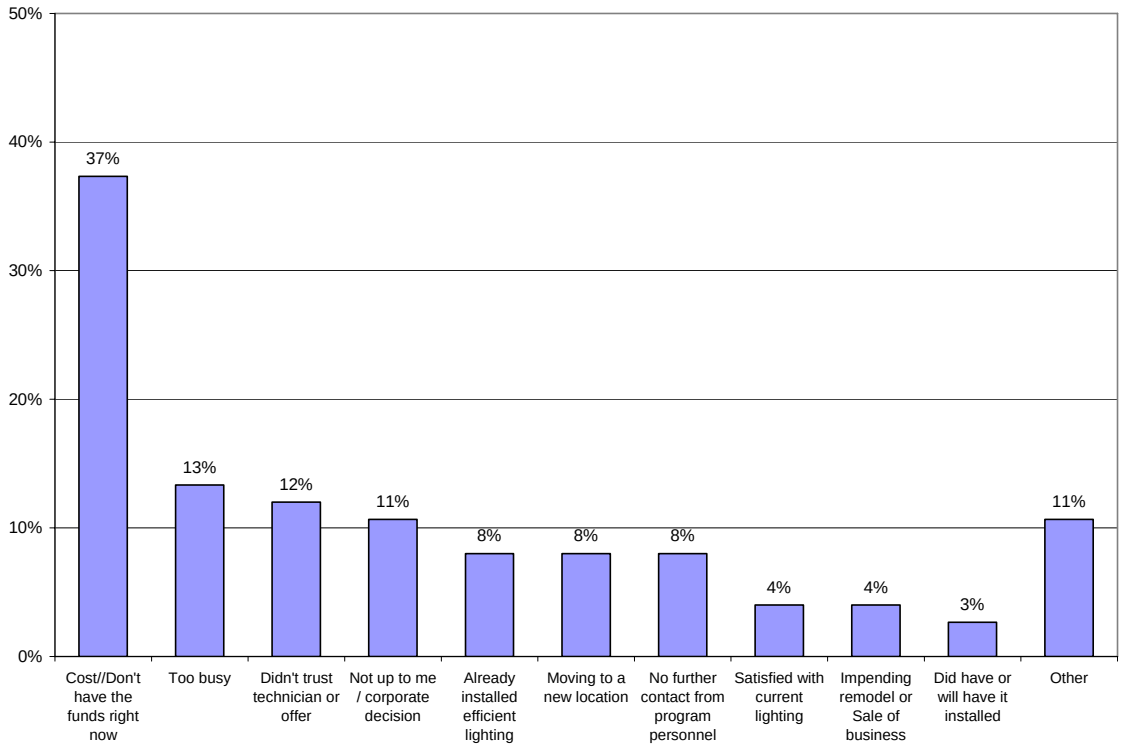
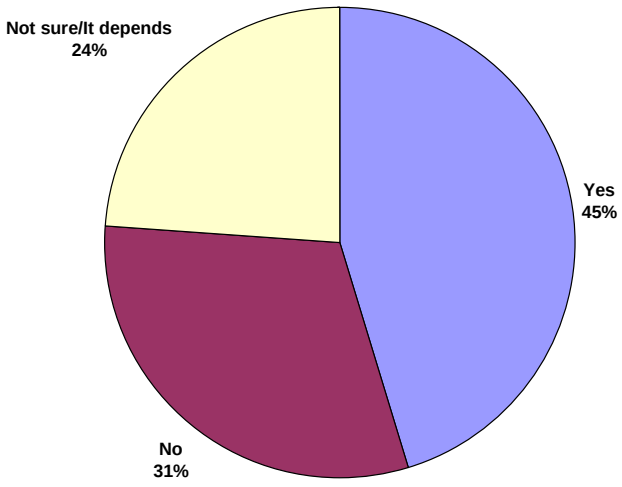
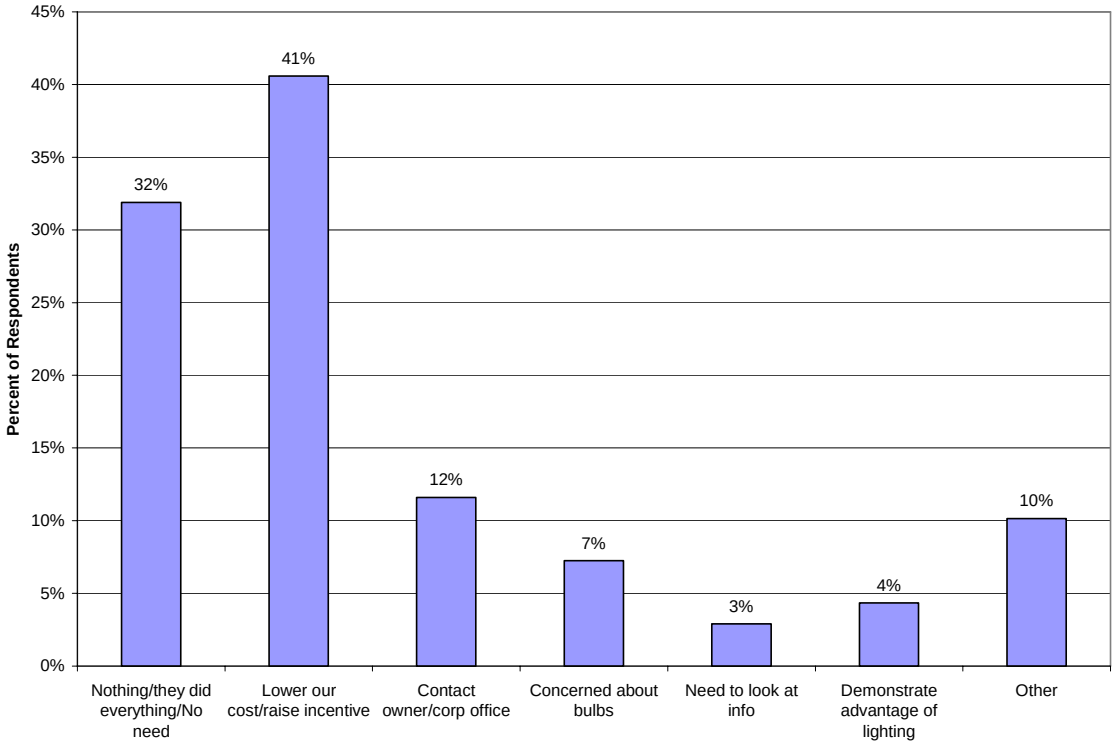


Figure 19. Interest in Future Participation



When asked what Ecology Action could do to interest respondents in participating in the future, cost again appeared to be the primary concern: 41% reported that they would like to see an increased incentive/reduced business cost for the lighting measures (Figure 20). Nearly one-third of the respondents (32%) said that there was nothing Ecology Action could do to entice them to participate in the future.

Figure 20. Ways that Ecology Action Could Take to Interest Respondent in Participating



Overall Program Satisfaction

In general, RightLights participants were extremely satisfied with the Program. Many provided additional comments regarding their satisfaction at the end of the survey:

"Wonderful program and suggested to neighbors."

"We love the Program."

"We are very pleased with the results."

"The Program is great – thanks for the discount."

"More people should know about this Program."

"More information would be great for referral purposes."

"I don't understand why more people don't participate – it's a great program."

"Great program – we wish more businesses would become aware of this Program."

VI. Installation Verification and Savings Analysis

Quantec staff conducted 136 site visits to verify that the measures from the Program database were installed and operating as predicted under the *ex ante* assumptions. We then calculated the verified energy and demand savings based on the results of our site visits.

Installation Verification

Sample Size

The California Public Utilities Commission requested evaluation estimates with a 90% confidence level and 10% precision (90/10), requiring a sample size of 95 site visits. To allow for data cleaning and attrition, we conducted 136 site visits.[22]

Sample Selection and Stratification

To accurately reflect the diversity of the Program's participants while cost effectively focusing on verifying the greatest percentage of estimated savings possible, Quantec implemented a stratified random-sampling approach to select participants for site visits. A total of 136 site visits were conducted using a random sampling from the following three strata:

- Larger sites (estimated energy savings greater than 100,000 kWh) (n=6)
- Sites with pre-rinse nozzles (n=36)
- All other lighting sites (n=94)

The advantage of this stratification scheme is that the final sample represented a greater proportion of expected savings than if a simple random sample was selected. In addition, larger sites often share characteristics that are unique and distinguishable from the remaining population, indicating a need to sample them separately.

As outlined in the evaluation work plan, the sample was further stratified into three components – T8/EB, CFLs/Controls, and Pre-Rinse Nozzles – so that the final estimates can have greater confidence/precision for each of these segments. Based on the calculations detailed in the work plan, we proposed to verify a total of 130 sites including a minimum of 41 sites with T8/EB measures, 43 sites with CFLs, 35 sites with pre-rinse nozzles, and an additional 11 random sites to allow for data cleaning and attrition. A total of 136 site visits were conducted. Due to the fact that many sites had multiple measures, the minimum number of sites with each measure type were greatly exceeded. Table 13 details the number of sites verified with each measure.

[22] The evaluation of the spray rinse nozzles was separated from this RightLights evaluation and is published under separate cover.

Table 13. Proposed and Actual Verification Sites by Presence of Measure Type

Measure*	Proposed	Verified
CFLs	43	87
Tubular Fluorescents	41	55
Pre-Rinse Nozzles	35	36
LEDs	11	11
Total	*130*	*189***

*Many sites had multiple measures

**Based on 136 individual site visits

Scheduling Appointments

Quantec conducted the site visits between November 14 and 18, 2005. For most participants, it was unnecessary to schedule site visits in advance, and we were able to gain customer approval and cooperation in person at the time of the site visit. In addition, the flexibility of a walk-in approach allowed Quantec to cost-effectively visit sites geographically clustered in commercial districts within the Program area. However, for the two larger site visits, we called in advance and scheduled our site visits with the appropriate contact.

Site Visit Protocol

Quantec prepared a site visit worksheet and interview instrument. During site visits, we examined a number of items, including:

- Are the lighting measures properly installed and functioning?
- For measures no longer in place, when were they removed? What were the primary reasons?
- Do the installed lighting measures match the Program database (e.g., is the installed wattage consistent with that recorded in the database)?
- What baseline equipment was replaced by the Program installation?
- Is the customer satisfied with the Program? Does the customer have any recommendations for improvement?

Energy and Demand Savings Analysis

Method

The estimation of net energy and demand impacts was based on the findings from our site visits where we verified the presence of measures and estimated an installation realization rate based

on the verified equipment.[23] The individual installation realization rates were then averaged over similar measures for similar business types within the site visit sample and then extrapolated to the population of participating sites to achieve net energy and demand savings impacts. This subsection discusses each step in more detail and presents the analysis results.

Measure Categorization

Within the Program, customers are offered a wide range of energy-efficient lighting fixtures to best meet their needs. Equipment from several manufacturers with slightly varying wattages was used for the new installations. For overall Program reporting, the Program implementer has grouped the fixtures into three measure types: CFLs, Tubular Fluorescents, and LED Exits and Miscellaneous fixtures such as metal halide, high output fixtures and removal of fixtures (delamping). Table 14 shows the distribution of expected installations by measure across all Program participants and within our site visit sample.

Table 14. Expected Installations by Measure Type

Measure	Fixtures in Program		Fixtures in Site Visit Sample	
	Freq.	%	Freq.	%
CFLs	28,518	38%	1,196	45%
Tubular Fluorescents	44,727	59%	1,415	53%
LED Exits and Misc.	2,339	3%	42	2%
Total	*75,584*	*100%*	*2,653*	*100%*

Installation Realization Rate Calculation

For each measure installation at each site, the quantity and wattage of new fixtures were verified against the expected FACET© database values. Customers were also asked to verify the previous equipment that was replaced by the new installations. The installation realization rate for each measure was calculated based on the verified data.

Our estimate of the installation realization rate was affected by customers' responses to failed fixtures. If we observed failed lights or fixtures and a customer said they intended to replace them with similar equipment, no penalty was noted. On the other hand, if the customer indicated that they had no intention of looking for an energy-efficient replacement, the installation realization rate was decreased. In cases where we observed fewer efficient fixtures or lights than expected, we inquired whether the customer had gone back to the original equipment. If so, the rate was decreased appropriately.

If, for example, the Program documentation at a site indicated that ten CFLs were installed to replace incandescent bulbs and ten CFL fixtures of the expected wattage were observed and

[23] The installation realization rate indicates what share of the expected installed measures was observed during the site visits. The rate could be less than one (if measures were not actually installed or had been removed) or greater than one (if the site visit count indicates that more of the same measures were observed than expected).

operating, this measure received an installation realization rate of 100%. However, if we observed that the customer had reinstalled one of the original lights or fixtures, the installation realization rate would be 90%.

Installation Realization Rate Estimates

The results for each measure at all 101 sites were grouped together into a matrix of average realization rates per measure per business type. A few of the original business categories were combined together due to of similarities or because the number of installations was very small. The results are shown in Table 15.

The results for all sites combined are based on the estimates for individual business types, weighted by the expected number of installations in each. The installation realization rate was 90% or higher for all measures and business types except for Healthcare, which had a rate of 86% for CFLs. For the complete sample, the realization rate ranged from 95% to 99%, and was the smallest for CFLs (Table 16).

Table 15. Installation Realization Rate by Measure and Business Type

Business Type	No. Customers	CFLs	Measure Category	
			Tubular Fluorescents	LED Exits and Misc.
Small Retail	1,028	94%	100%	94%
Entertainment/ Restaurant	460	102%	100%	98%
Small Office	297	93%	98%	95%
All Other**	262	91%	100%	95%
Convenience Store/Grocery	169	93%	100%	97%
Light Manufacturing	164	100%	100%	96%
Healthcare	64	86%	100%	96%
Small College and Other Schools	44	95%	99%	96%
All Buildings	*2,488*	*95%*	*99%*	*96%*

Note: Expected and verified measures in a few cases were 0 since the measures had not yet been installed at the sites we sampled. LED Exits and Misc. installations at all sites were either exactly the expected quantity or the expected and verified quantities were both 0. All calculated realization rates met the "90/10" statistical requirement.

** Motels, Warehouses, and Assembly were combined with the original Other category because the installations in these buildings were a very small proportion of the total.

The site visit sample included just over 4% of the sites participating in the Program and represented 4% of expected energy savings. Using the corresponding results from Table 15, an adjusted quantity of fixtures was calculated for each measure in the FACET© database. This adjusted fixture quantity was then used in the calculations for adjusted energy and demand savings listed in Section 2 under Cost and Savings Calculations, resulting in net program savings. The connected load kW savings are described as a per-fixture savings. To get total savings per customer, the connected load kW savings were multiplied by the adjusted quantity of fixtures.

Results

The overall savings realization rate is 98%. Table 16 compares expected program energy savings to evaluated savings by measure type.

Table 16. Evaluated Program Energy and Demand Savings by Measure Type

Measure	Energy Savings		Demand Savings		Realization Rate %
	Expected (kWh)	Evaluated (kWh)	Expected (kW)	Evaluated (kW)	
CFLs	8,012,456	7,582,707	1,484	1,404	95%
Tubular Fluorescents	21,073,936	21,049,982	4,028	4,023	100%
LED Exits and Misc.	745,769	712,278	121	116	96%
Total	*29,832,161*	*29,344,967*	*5,633*	*5,543*	98%

The evaluated energy savings by business type are shown in Table 17, along with the energy savings realization rates in order of savings. For those business types that were combined during the site visit data analysis, the resulting combined realization rate was applied to each individual type. Entertainment/restaurant and light manufacturing process show the highest energy savings realization rates at 100% or greater of expected savings. Table 18 compares expected program energy savings to evaluated savings by program year.

Table 17. Evaluated Program Savings by Business Type

Business Type	Savings		
	Expected (kWh)	Evaluated (kWh)	Realization Rate %
Small Retail	9,699,493	9,555,057	99%
Entertainment/Restaurant	4,081,215	4,112,768	101%
Small Office	3,509,362	3,415,105	97%
All Other	3,231,934	3,107,357	96%
Convenience Store/Grocery	2,473,301	2,449,246	99%
Light Manufacturing Process	2,305,321	2,303,045	100%
Light Manufacturing Assembly	1,141,145	1,133,716	99%
Warehouse	1,250,258	1,236,127	99%
Small Motel/Hotel	908,833	875,820	96%
Small Institutional Healthcare	918,464	851,427	93%
Small Institutional School	266,209	259,032	97%
Small Institutional College	46,626	46,267	99%
All Buildings	*29,832,161*	*29,344,967*	98%

Table 18. Evaluated Program Energy and Demand Savings by Program Year

Program Year	Energy Savings		Demand Savings		Realization Rate %
	Expected (MWh)	Evaluated (MWh)	Expected (MW)	Evaluated (MW)	
2004	11,726	11,569	2.23	2.20	98.7%
2005	18,106	17,776	3.40	3.34	98.2%
Total	29,832	29,345	5.63	5.54	98.4%

Billing Analysis

Quantec conducted a billing analysis of a sample of the participants in an attempt to further verify the savings estimations. During the course of the analysis it became apparent that there was a significant inconsistency between the billing data that we received and the projects that were installed. In many cases the billing data indicated usage that was less than even that of the baseline fixtures that were replaced. Due to the difficulty in obtaining the billing data sample, we did not attempt to expand the sample to determine the nature of the inconsistency. Thus, the results of the billing analysis are inconclusive. What follows is a description of the methodology employed.

Data Collection and Analysis

In order to obtain the billing data, Quantec asked customers to sign a billing release form during the metering portion of the study. Of the 60 sites that were visited for metering, 45 agreed to release their billing data.[24] Although a few customers refused to sign the release because of confidentiality concerns, the majority that did not sign indicated that they needed clearance from either a corporate headquarters or an owner/manager that was not present at the time. Quantec attempted to follow-up with these customers to obtain a signed copy of the release.

For the 45 sites, PG&E was able to obtain billing data for 35 separate meters at 34 of the properties.[25] The billing data included monthly kWh usage from January 2002 through April 2005. Quantec then merged the billing data with the Program database to identify a pre- and post-retrofit period. In order to minimize "noise" in the analysis, a number of steps were taken:

- The month of installation was treated as a treatment period and was not included in either the pre- or post-retrofit periods
- Post-retrofit months were matched to a pre-retrofit months to minimize any impacts of seasonality. For example, if the post-retrofit period included January through June, the pre-period was limited to the same six-month period in the previous year

[24] There were actually 44 sites, but because one property had two separate meters, we began with a total of 45. Two more sites subsequently signed the release, but their billing data were not obtained.

[25] Some customers had incorrect account numbers and could not be located, and PG&E searched by address but still could not locate the business.

- Customers who had summer or winter use that was greater than 120% of shoulder use were assumed to have electric cooling or heating. For these customers, the months of July, August, and September (for electric cooling), and December, January, and February (for electric heating) were removed.
- If available, expected savings was computed using metered data. Where not available, self-reported hours-of-use were used to estimate savings.[26] In addition, interactive effects were not included because, as noted above, sites with electric cooling were limited to shoulder months only.
- An outlier property with very high consumption was removed.
- After these cleaning measures, properties for which we had at least three post period and three corresponding pre period months were included.

Following the data cleaning, a total of 29 sites were left. A regression analysis was then run to determine the realization rate of the actual compared to the expected savings. Data were available both across facilities (i.e., cross-sectional) and over time (i.e., time-series). For this type of data (commonly referred to as panel data), a fixed-effects approach is typically used to control for differences between the facilities. In this approach, the model specifies a binary variable for each participant, which captures differences in business and facility characteristics that cause variation in the level of energy consumption.

In addition, because the participation (installation) date varies for each facility, the pre- and post-installation periods are unique for each participant.

The final model took the form:

$$ADC = \alpha + \beta_1 WTR + \beta_2 SMR + \beta_3 POST + \beta_4 PROP + \varepsilon$$

Where:

- ADC = average daily kWh consumption
- WTR = binary variable set to 1 when the month was December, January, or February
- SMR = binary variable set to 1 when the month was July, August, or September
- POST = binary variable set to 1 when the month occurred after installation of measures
- PROP = binary variables for each participant in the model to capture "fixed effects"

Findings

The results of the regression analysis indicated that the realization rate was only 36%. This is a highly unusual finding for a commercial lighting program and prompted further analysis of the

[26] The metering study determined that self-reported hours and metered hours-of-use are comparable, while deemed hours-of-use are significantly higher.

data. A number of steps were conducted in an attempt to investigate the relationship between the billing data and expected savings values, including:

- Follow-up survey with participants to see if they could identify changes in their businesses. This was conducted to examine changes in operating assumptions that might impact energy use. We reached a total of 22 properties and found six that had some changes that might have had an effect on consumption; however, none of these showed the biggest discrepancies between actual and expected savings.
- Review of answers from process survey regarding noticed savings. The process evaluation survey asked respondents if they had noticed any energy savings on their utility bills. Only seven of the metered sites had also participated in the process survey, and the awareness of savings was not correlated to the billing data (e.g., one participant claimed to have noticed savings yet the billing data did not reveal any reduction in energy use).
- Peer review of data analysis. We had a peer reviewer spot check the billing data to ensure there was not a problem with the SAS (Statistical Analysis Software) code that was used for data manipulation and analysis. The peer reviewer indicated that the manual computed results matched the SAS output.
- Check the incentive levels versus the savings estimates. We verified that the incentives paid matched the calculated incentive levels (expected kWh multiplied by the program incentive level as determined by rate class) as an additional check on the integrity of the data.
- Verification of measure installation. During the site visits, measures were inspected to see that they were installed and working properly; 96% met these criteria. Also, the properties that had lower percentages of verified measures were not among those with the larger discrepancies between actual and expected savings. This verified that the measures in the database (and expected savings) are associated with the proper sites.
- Check for multiple meters. Ecology Action had their staff review whether there were any multiple meters. Only one was identified, which had already been accounted for in the analysis.
- Have auditors review the findings. Ecology Action had their auditors review the raw data files to see if they could present any information that might help explain the findings. The results indicated that, in a couple of cases, there may have been burned out bulbs in the pre period that showed consumption only after the measures were installed. And in one case, the customer may have installed additional lights after the measures were installed. However, these were not at properties that had the larger discrepancies between database and billing records.
- Reviewed the model. We re-ran the model after excluding several properties viewed as outliers based on the large discrepancies between their database consumption and their billed consumption. This had little effect on the model.

Ultimately, it was determined that the savings estimates from the Program were consistent with the fixtures replaced. It was also determined that the wattages and hours-of-use were correct since the sites were verified through site visits and metering. Consequently, we analyzed the

billing data itself. We determined that much of the billing data were inconsistent with the known physical observations. For example, in several cases the billing data indicated total usage at the site that was less than that of the fixtures replaced. Due to the small sample size and the difficulty obtaining the billing data, we were not able to reconcile these differences and abandoned the analysis.

VII. Operational Hours Comparison

In an effort to apply a more rigorous application of the International Performance and Measurement and Verification Protocol (IPMVP) Option A (verification of deemed values), the Quantec and Summit Blue team installed lighting loggers in a sample of RightLights participant facilities. The goal of the study was to investigate differences in lighting hours-of-use – a significant input for estimating annual kWh savings – between metered hours-of-use and two additional data sources:

- ***Self-reported hours-of-use***: The customer is asked at the time of participation to estimate annual hours-of-use for different space types, or "assets," within their facility. The self-reported hours-of-use are used to estimate Program savings for the calculation of the customer incentive level.
- ***Deemed hours-of-use***: These are approved values based on the PG&E Express Efficiency Program and are specific to each of 12 businesses sectors (Table 19). The deemed hours-of-use are used to estimate gross Program savings for Program reporting purposes.

Table 19. Deemed Hours-of-use by Market Sector

PG&E Market Sector*	FACET© Business Type	Annual Operating Hours**
Office	Small Office	4,000
Retail	Small Retail	4,450
College	Small Institutional	3,900
School	Small Institutional	2,150
Grocery	Convenience Store	5,800
Restaurant	Entertainment	4,600
Health Care/Hospital	Small Institutional	4,400
Hotel/Motel	Small Hotel/Motel	5,500
Warehouse	Warehouse	3,550
Process Industrial	Light Manufacturing	5,300
Assembly Industrial	Light Manufacturing	4,900
All Other	Other	4,500

* Source: Pacific Gas and Electric Company, Express Efficiency Program, November 2000

** Exit signs were assumed to operate for 8,760 hours for all business types.

Methodology

The Quantec team developed a strategic installation plan, capturing a representative sample of business and space types.[27] The final sample included 184 meters (102% of goal) at 60 participant facilities (100% of goal; Table 20). The loggers, which record hours-of-use, were

[27] The sampling plan is described in detail in the "Metering Sampling Plan" memo, February 2, 2005.

installed for at least four weeks in retail, process industrial, offices, restaurant, and grocery facilities.

Table 20. Installation Distribution for Lighting Metering

Business Sector	No. Sites	No. Meters
Grocery	4	12
Office	5	18
Process Industrial	7	22
Restaurant	12	38
Retail	32	94
Total	*60*	*184*

For each site, the number of loggers was selected to cover areas representing 80% of the saved energy. The loggers were installed in a way that captured operational variations between space types within a facility, such as differences in run hours between common area lighting, operational/retail areas, administrative areas, etc. Careful placement of loggers avoided contamination of the results with daylight.

The evaluation team was able to recover usable data from 59 sites and 160 meters. The meter data were matched to the appropriate "asset" (location within the business) for each of the 59 participants. Due to a number of measures within similar assets, there were a total of 115 unique comparisons of metered hours-of-use with both self-reported (at the time of the audit) and deemed hours-of-use. The raw data for each of the comparisons can be found at the end of this section.

An annualization model evaluates each data point to determine if it is within the monitoring period and if the lights are on or off. A pivot table is used to determine the average lighting hours of operation for weekend and weekdays. The annual operating hours are then determined with the following formula:

*Annual Hours = [(Avg % of time ON)Weekend *(days/yr) Weekend +*
*(Avg % of time ON)Weekday *(days/yr) Weekday] * 24 hrs/day*

The results are thus valid even if the monitoring period includes a disproportionate number of weekdays vs. weekends.

Results

As shown in Table 21, the logger data indicate that the average hours-of-use for the metered sites was 3,560 hours/year, 168 hours (5%) lower than the self-reported annual hours-of-use for the same areas and 1,039 hours (29%) lower than the deemed annual hours of operation. There was no statistical difference (at the 95% confidence level) between the metered data and the self-reported data, although the difference between the metered data and the deemed annual operating hours were statistically different.

Table 21. Annual Hours-of-use Comparison for Lighting Metering

Data Source	Average Expected Annual Hours-of-use	Difference in Annual Operating Hours	Percentage Difference*	Significant Difference at 95% Confidence Level?
Metered data	3,560			
Self-reported	3,728	168	-5%	No
Deemed	4,599	1,039	-29%	Yes

* Based on the difference of metered data to self-reported or deemed values.

We investigated the results for meters that differed substantially from the self-reported hours of operation. As shown in the detailed output of Table 22, the difference was often caused by the use of one single estimate for the whole facility, which actually had varying daily use depending on the fixture and location. For example, Site 34, a retail facility, had self-reported hours-of-use for a storage area and sales area of 2,372 hours/year, yet the metered data estimated very few annual hours for the storage area (525) compared to the sales area (2,671).

Further investigation of the Program database revealed that many participants had a single estimate for hours-of-use for all retrofitted measures. The assignment of more than one estimate for hours-of-use varied by auditor, though all auditors assigned multiple hours-of-use for some portion of the audits they performed (Table 23). All RightLights auditors should continue to carefully probe for differences in use by measure, ensuring that the rebates (which are based on savings using self-reported hours-of-use) are as accurate as possible.

Table 22. Comparison of Self-Reported (at Audit), Deemed, and Metered Annual Operating Hours-of-use

Unique Comparison	Site Number	Market Sector	Space Category	Annual Operating Hours		
				Self-Reported	Deemed	Metered
1	1	Office	Office / Conf	2,607	4,000	2,288
2	2	Process Industrial	Production / Mfg	2,633	5,300	8,760
3	2	Process Industrial	Production / Mfg	2,633	5,300	4,513
4	3	Retail	Retail Sales	3,285	4,450	3,298
5	4	Retail	Retail Sales	2,972	4,450	2,776
6	4	Retail	Office / Other	2,972	4,450	3,210
7	5	Grocery	Food Display / Sales	4,067	5,800	7,214
8	6	Retail	Retail Sales	3,128	4,450	3,190
9	7	Office	Office / Conf	2,112	4,000	3,176
10	7	Office	Restroom	2,112	4,000	146
11	7	Office	Office / Conf	2,112	4,000	1,357
12	8	Grocery	Food Display / Sales	2,972	5,800	4,918
13	8	Grocery	Storage	2,972	5,800	1,361
14	8	Grocery	Storage	2,972	5,800	2,380
15	9	Process Industrial	Production / Mfg	3,076	5,300	2,754
16	9	Process Industrial	Storage	3,076	5,300	2,749
17	10	Retail	Retail Sales	3,363	4,450	2,653
18	11	Retail	Retail Sales	2,776	4,450	2,637
19	12	Process Industrial	Production / Mfg	3,194	5,300	3,155
20	13	Retail	Retail Sales	5,032	4,450	8,760
21	13	Retail	Retail Sales	5,032	4,450	4,719
22	13	Retail	Retail Sales	5,032	4,450	4,795
23	14	Process Industrial	Office / General	3,128	5,300	2,948
24	14	Process Industrial	Production / Mfg	3,128	5,300	4,047
25	14	Process Industrial	Storage	3,128	5,300	2,912
26	15	Process Industrial	Production / Mfg	2,672	4,000	2,027
27	15	Process Industrial	Storage	2,672	4,000	933
28	16	Retail	Retail Sales	3,024	4,450	3,501
29	17	Process Industrial	Production / Mfg	3,259	5,300	2,985
30	18	Process Industrial	Production / Mfg	2,998	5,300	1,111
31	18	Process Industrial	Production / Mfg	2,998	5,300	2,834
32	19	Retail	Retail Sales	3,441	4,450	3,503
33	19	Retail	Retail Sales	3,441	4,450	3,503
34	19	Retail	Retail Sales	3,441	4,450	3,503
35	20	Restaurant	Restroom / Other	5,683	4,600	758
36	20	Restaurant	Dining	5,683	4,600	1,367
37	21	Restaurant	Dining	4,562	4,450	4,020
38	21	Restaurant	Dining	3,128	4,450	3,563
39	22	Retail	Office / Other	3,910	4,450	3,477
40	22	Retail	Retail Sales	3,910	4,450	3,559
41	23	Retail	Retail Sales	4,328	4,450	4,092
42	24	Retail	Retail Sales	2,972	4,450	3,049
43	24	Retail	Storage	2,972	4,450	469
44	25	Retail	Retail Sales	3,806	4,450	3,429

Unique Comparison	Site Number	Market Sector	Space Category	Annual Operating Hours		
				Self-Reported	Deemed	Metered
45	26	Retail	Retail Sales	3,963	4,450	1,450
46	26	Retail	Office / Other	3,963	4,450	1,463
47	27	Retail	Retail Sales	2,972	4,450	2,650
48	27	Retail	Storage	2,972	4,450	2,651
49	28	Retail	Exhibit / Display	3,337	4,450	2,833
50	28	Retail	Office / Other	3,337	4,450	1,751
51	28	Retail	Retail Sales	3,337	4,450	2,929
52	28	Retail	Retail Sales	3,337	4,450	8,760
53	29	Retail	Retail Sales	3,076	4,450	2,905
54	29	Retail	Restroom	1,460	4,450	210
55	29	Retail	Retail Sales	3,076	4,450	2,905
56	30	Retail	Retail Sales	2,972	4,450	3,351
57	31	Office	Office / Conf	8,760	4,000	8,760
58	31	Office	Office / Conf	2,868	4,000	2,812
59	32	Retail	Storage	3,128	4,450	3,504
60	32	Retail	Retail Sales	3,128	4,450	2,710
61	33	Retail	Storage	3,624	4,450	673
62	33	Retail	Retail Sales	3,624	4,450	2,689
63	33	Retail	Office / Other	3,624	4,450	299
64	34	Retail	Storage	2,372	4,450	525
65	34	Retail	Retail Sales	2,372	4,450	2,671
66	35	Restaurant	Dining	5,566	4,600	5,156
67	36	Grocery	Storage	5,475	5,800	7,119
68	36	Grocery	Food Display / Sales	5,475	5,800	5,770
69	36	Grocery	Office / Other / ME	5,475	5,800	7,700
70	37	Retail	Retail Sales	6,752	4,450	6,583
71	37	Retail	Retail Sales	6,752	4,450	6,642
72	38	Grocery	Food Display / Sales	3,963	5,800	5,549
73	39	Retail	Retail Sales	4,197	4,450	4,090
74	39	Retail	Retail Sales	4,197	4,450	4,077
75	39	Retail	Storage	4,197	4,450	4,109
76	40	Restaurant	Kitchen / Food Prep	3,858	4,600	3,694
77	41	Office	Office / Conf	2,216	4,000	2,323
78	41	Office	Office / Conf	2,216	4,000	2,323
79	41	Office	Office / Conf	2,216	4,000	2,323
80	41	Office	Restroom	261	4,000	76
81	42	Retail	Exhibit / Display	4,328	4,450	8,760
82	42	Retail	Retail Sales	4,328	4,450	4,115
83	43	Retail	Retail Sales	3,181	4,450	2,353
84	43	Retail	Restroom	730	4,450	55
85	44	Restaurant	Kitchen / Food Prep	4,380	4,600	5,187
86	44	Restaurant	Kitchen / Food Prep	4,380	4,600	5,146
87	44	Restaurant	Restroom / Other	4,380	4,600	8,760
88	44	Restaurant	Kitchen / Food Prep	4,380	4,600	5,185
89	45	Restaurant	Kitchen / Food Prep	5,840	4,600	3,443
90	45	Restaurant	Dining	5,840	4,600	2,381
91	46	Restaurant	Restroom / Other	4,015	4,600	2,823

Unique Comparison	Site Number	Market Sector	Space Category	Annual Operating Hours		
				Self-Reported	Deemed	Metered
92	46	Restaurant	Restroom / Other	4,015	4,600	1,838
93	47	Restaurant	Kitchen / Food Prep	4,015	4,600	3,806
94	47	Restaurant	Kitchen / Food Prep	4,015	4,600	3,807
95	48	Restaurant	Dining	4,380	4,600	4,705
96	48	Restaurant	Kitchen / Food Prep	4,380	4,600	4,584
97	48	Restaurant	Dining	4,380	4,600	4,526
98	49	Retail	Retail Sales	4,484	4,450	4,497
99	50	Retail	Retail Sales	2,920	4,450	3,319
100	51	Restaurant	Dining	3,754	4,600	4,008
101	51	Restaurant	Kitchen / Food Prep	3,754	4,600	4,007
102	52	Retail	Storage	1,095	4,450	4,079
103	52	Retail	Retail Sales	4,745	4,450	3,212
104	53	Restaurant	Dining	8,760	4,600	8,760
105	53	Restaurant	Kitchen / Food Prep	8,760	4,600	5,399
106	54	Retail	Retail Sales	2,529	4,450	2,393
107	54	Retail	Storage	2,529	4,450	4,491
108	55	Retail	Retail Sales	5,475	4,450	4,153
109	55	Retail	Retail Sales	5,475	4,450	2,079
110	56	Retail	Retail Sales	2,477	4,450	2,308
111	57	Office	Office / Conf	3,728	4,000	2,709
112	57	Office	Office / Conf	3,728	4,000	1,860
113	58	Retail	Retail Sales	3,128	4,450	2,940
114	58	Retail	Retail Sales	3,128	4,450	3,540
115	59	Restaurant	Dining	4,745	4,600	5,751
Average				*3,728*	*4,599*	*3,560*

Table 23. Variation in Operating Hours across Project Areas Types, by Auditor[28]

	Variation in Operating Hours across Area Type	No Variation in Operating Hours across Area Types	Not Considered, Only One Area Type	Total No. Audits Conducted by Auditor
Auditor 1	1	0	0	1
Auditor 2	1	1	0	2
Auditor 3	108	38	38	184
Auditor 4	3	2	1	6
Auditor 5	20	5	8	33
Auditor 6	89	28	22	139
Auditor 7	22	4	3	29
Auditor 8	133	48	56	237
Auditor 9	114	30	35	179
Auditor 10	1	0	0	1
Auditor 11	9	0	0	9
Auditor 12	13	3	3	19
Auditor 13	141	67	36	244
Auditor 14	37	31	26	94
Auditor 15	1	1	0	2
Auditor 16	73	31	64	168
Auditor 17	57	107	66	230
Total	*823*	*396*	*358*	*1,577*

[28] Based on he January 11, 2005, version of the program database (FACET©).

VIII. Non-Energy Benefits

While the primary purpose of most energy efficiency programs is to save energy or reduce peak demand, by their nature these programs lead to a host of effects beyond these outcomes, commonly called Non-Energy Benefits (NEBs).[29] There are three main types of net non-energy benefits based on who the beneficiary is:

- ***Utility/agency benefits*** – things that benefit or affect ratepayers and the utility and reduce revenue requirement
  - Lower arrearages, lower line losses, power quality issues, and reduced labor cost from fewer bill-collection-related calls
  - These are generally valued at utility (marginal) costs
- ***Participant benefits*** – things that benefit or affect the participants *beyond* energy savings
  - Comfort, improved ability to pay bills, and a wide variety of factors included in the tables below
  - These are valued in terms relevance to the participant
- ***Societal benefits*** – things that benefit or affect the greater society or that can't be attributed directly to the utility/ratepayers or participants
  - These include emissions/environmental benefits/health benefits, direct and indirect economic multipliers, water system benefits (if they need fewer treatment plants, etc.), or similar items
  - These are valued as appropriate to the benefit category

This study focuses on the following:

- Participant benefits – the value of the benefits recognized by participants from the RightLights program
- Societal benefits – specifically, the economic/job creation benefits and value of mercury reductions from the Program

Skumatz Economic Research Associates (SERA), under contract to Quantec, LLC, developed and analyzed a telephone survey instrument directed at identifying NEBs accruing to Program participants, including those receiving either the Quick-Saver Package (QSP) or a more comprehensive retrofit. The sampling frame consisted of all 2004 participants who were randomly selected for the telephone survey, with a total of 100 completed surveys conducted in January and February 2005.

29 We most commonly call them "net non-energy benefits" to account for the negative benefits as well. We have also called them non-energy impacts, non-energy effects, non-utility benefits, and others, but the commonly accepted term in the literature is NEBs.

Participant Impressions of Energy Use and Energy Savings

Both energy use and energy savings, as reported by participants, are integral to our analysis of NEBs. Our valuation techniques make explicit use of respondents' perceptions of their energy savings, as well as the importance of NEBs in relation to those savings. For this reason, it is important to have an overall idea of how Program participants view energy use and savings. As noted in the participant surveys, 69% of the full participants noticed energy savings on their energy bills and 27% said it was too early to tell. Of the QSP-only respondents, 19% noticed energy savings, 52% did not, and 29% said it was too early to tell.

A similar question was asked in NEBs survey. When asked whether they believed their energy bill had decreased as a result of participating in the RightLights Program, nearly half (45%) indicated that their bill had decreased and 30% felt that their bills had stayed the same. Approximately a quarter of the respondents, however, indicated that it was still too early to tell if they had energy savings (Table 24). Again, about half the QSP-only respondents had not noticed a change. These results are generally consistent with responses presented in the previous chapters. The realization of savings is an important element for the NEB analysis included in this chapter as the NEBs are estimated relative to the energy savings they may have realized.

Table 24. Perceptions of Energy Bill Reductions

	Full Participants (n=68)	QSP-Only (n=32)	Total (n=100)
Decreased a great deal	18%	6%	14%
Decreased somewhat	37%	16%	31%
Stayed about the same	19%	52%	30%
Increased somewhat	0%	0%	0%
Increased a great deal	0%	0%	0%
Don't know/too early to tell	25%	26%	25%

Asked whether they believed energy prices will be increasing, decreasing, or staying the same over the next three years, nearly one-third felt that prices would be increasing a great deal and more than half said that prices would increase somewhat. Only one respondent believed that prices would be decreasing (Table 25).

Table 25. Perceptions of Future Energy Prices

	Full Participants (n=68)	QSP-Only (n=32)	Total (n=100)
Increase a great deal	32%	28%	31%
Increase somewhat	62%	53%	59%
Stay about the same	3%	9%	5%
Decrease somewhat	0%	3%	1%
Decrease a great deal	0%	0%	0%

These perceptions regarding energy prices were further expressed through respondents' assessments of the importance of energy bills to their business (Table 26). Using a scale of 0 to 100 (where 0 is not at all important and 100 is among the very highest concerns for the business), the mean score among those surveyed was 59. This would indicate that, while energy use and energy bills are not at the top of the scale, they are significant concerns for businesses.

Table 26. Importance of Energy Bills

	Full Participants (n=68)	QSP-Only (n=32)	Total (n=100)
Average score (0-100)	61	56	59

Perceptions of NEBs – Positive and Negative Impacts

Participants were asked two open-ended questions at the start of the survey in order to gain initial impressions about the Program. The majority (87%) of respondents answered "no" or "none" when asked, "Are there any negative impacts that you feel the Program provides or leads to?" Negative impacts noted by the remaining 13% included burned-out bulbs or blown ballasts.

When asked a similar open-ended question about whether there were any positive Program benefits, two-thirds indicated that there were. Of those who gave an answer, the most common response was that there was more or better-quality light with the replacement bulbs, though answers varied widely. One respondent even said that his plants were growing better under the new lights.

Following the open-ended questions, respondents were asked whether the Program had any impact on a variety of NEB categories.[30] Responses to these categorized questions are summarized in Table 27 and Table 28. Respondents rated doing good for the environment as the Program's most positive non-energy benefit (cited by 88% of the respondents), followed by quality (55%) and quantity of light (49%). In addition, more than one-third of the respondents (38%) saw a positive benefit in the fact that their utility was offering a program to small commercial customers, a traditionally underserved population.

Few categories received any negative effects, although there were a number of respondents (13%) who perceived the Program impacts on quantity of light as negative (compared to the 49% that perceived this is as positive).

[30] While our research attempts to create an independent set of NEB categories, it is often useful to check theoretical underpinnings with empirical results. Only 9% of interviewees felt that some of the NEB categories overlapped. Ninety-one percent of the respondents, therefore, indicated that the categories were clearly separated, which suggests that aggregation across benefit categories is a legitimate technique for estimating overall percentage and dollar levels of NEBs.

Table 27. Positive and Negative NEBs
(All Program Participants, n=100)

Lights	Positive	No Effect	Negative	To Soon To Tell
Equipment maintenance	20%	57%	5%	18%
Equipment lifetime	24%	46%	4%	26%
Quality of Light	55%	36%	9%	0%
Quantity of light	49%	38%	13%	0%
Building safety	14%	85%	1%	0%
Impact on sales/productivity	15%	81%	3%	1%
Noise	20%	79%	1%	0%
Control over the bill, ability to control energy bill, understanding of energy use	10%	83%	0%	7%
Flicker*	35%	63%	1%	0%
Doing good for the environment	88%	11%	0%	1%
Sick days	0%	100%	0%	0%
Improved satisfaction from having a program available to them/previously underserved by programs	37%	60%	1%	2%

* The valid sample size for the "Flicker" question is 68, rather than 100. This reflects the fact that the lighting equipment affected by the QSP-only package was incandescent, which does not flicker. Although some QSP respondents provided answers to the questions, they were considered inapplicable for the purposes of analysis.

There were noteworthy differences in positive and negative perceptions by participant type. Substantially more participants with comprehensive retrofits perceived positive NEBs from the Program lighting. For example, Table 28 shows that nearly twice as many full participants (65% and 57%) perceived positive effects on the quality and quantity of light than did QSP-only respondents (34% and 31%). Almost one in five (19%) of the full participants reported positive effects on sales and productivity, compared to only 6% of the QSP-only participants. Similar levels of positive benefits were reported for maintenance and lifetimes for equipment.

Table 28. Positive and Negative NEBs by Participant Type

Benefit category	Full Participants (n=68)				QSP-Only (n-32)			
	Positive	No Effect	Negative	Too Soon to Tell	Positive	No Effect	Negative	Too Soon to Tell
Equipment maintenance	22%	54%	4%	19%	16%	63%	3%	19%
Equipment lifetime	24%	44%	4%	28%	25%	50%	3%	22%
Quality of Light	65%	31%	4%	0%	34%	47%	19%	0%
Quantity of light	57%	32%	10%	0%	31%	50%	19%	0%
Building safety	18%	81%	1%	0%	6%	94%	0%	0%
Impact on sales/productivity	19%	78%	1%	1%	6%	88%	0%	6%
Noise	24%	75%	1%	0%	13%	88%	0%	0%
Control over the bill, ability to control energy bill, understanding of energy use	12%	82%	0%	6%	6%	84%	0%	9%
Flicker	35%	63%	1%	0%	N/A	N/A	N/A	N/A
Doing good for the environment	87%	12%	0%	1%	91%	9%	0%	0%
Sick days	0%	99%	0%	1%	0%	100%	0%	0%
Improved satisfaction from having a program available to them/previously underserved by programs	41%	54%	1%	3%	28%	69%	0%	3%

Importance of NEB Categories

Table 29 outlines the share of NEBs that are attributable to each benefit category. These shares are further broken down by participation type (i.e., full participants versus QSP-only). To obtain estimates of the NEBs, we asked the participants if they experienced any positive or negative effects associated with each of the benefit categories (equipment maintenance, equipment lifetime, etc.) following their participation in the RightLights program. If they responded that they had, we asked them to estimate their benefits (value or cost) relative to the energy savings that they received. In cases where a respondent said that he had not noticed savings or that it was too soon to tell, the NEB for that category was counted as zero (no gain, no loss) and the participant was included in the analysis.

Table 29 demonstrates that the NEBs for each individual category are perceived as positive with the exception of impacts on sales/productivity for the QSP-only participants, for whom there was a net loss of 2% of the value of NEBs. Overall, however, respondents reported a net gain in sales/productivity of 4% of total benefits. Moreover, the negative 2% of total NEBs estimate ultimately derives from only three QSP-only respondents giving non-zero answers to the question. The size of the sample makes the point estimates obtained from it unreliable.

Across the board, the most valuable benefit category was doing good for the environment, which accounted for 27% of overall NEBs, 23% of full participant NEBs, and 46% of QSP-only participant NEBs. For the full participants, quality and quantity of light benefits had the second and third largest shares, respectively. For QSP-only participants, however, equipment lifetime

and equipment maintenance were the benefit categories offering the second and third largest share of total benefits.

Table 29. Share of Participant NEB Value by Participant Type

Benefit Category	Full Participants	QSP-Only	All Participants
Equipment maintenance	6%	8%	6%
Equipment lifetime	6%	11%	7%
Quality of light	16%	4%	14%
Quantity of light	14%	7%	13%
Building safety	5%	2%	4%
Impact on sales/productivity	6%	-2%	4%
Noise	5%	4%	5%
Control over the bill, ability to control energy bill, understanding of energy use	3%	3%	3%
Flicker	8%	N/A	7%
Doing good for the environment	23%	46%	27%
Sick days	0%	0%	0%
Improved satisfaction from having a program available to them/previously underserved by programs	10%	12%	10%
Total share of benefits	*100%*	*100%*	*100%*

Overall Importance of NEBs to Participants

Interviewees were asked to rank the overall importance of all the NEBs on a 0-5 scale (0 = not important at all; 5 = extremely important). Respondents ranked a mean score of 3.2, indicating that they place a fair amount of importance on these benefits (not shown in table).

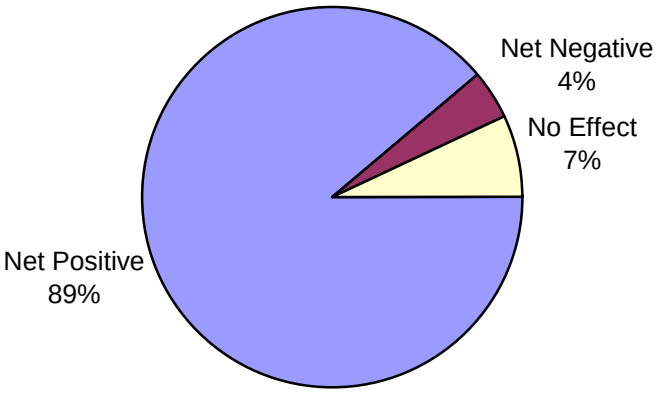
When weighing the NEBs resulting from the energy-efficient lighting against the energy savings, the majority of participants (63%) felt that the energy savings were more valuable than the top three NEB categories (Table 30). However, 32% of the respondents indicated that at least one NEB was actually *more* important to them than the energy savings.

Table 30. Importance of Energy Savings Relative to Top Three and NEBs

	Full Participant (n=68)	QSP-Only (n=32)	All participants (n=100)
Energy savings #1	62%	66%	63%
Energy savings #2 (1 NEB more important)	16%	3%	12%
Energy savings #3 (2 NEBs more important)	9%	9%	9%
Energy savings # 4 or lower	10%	13%	11%
No answer	3%	9%	5%

When asked to give a net rating of all of the positive and negative effects that the Program provided *beyond* energy bill savings, the response was overwhelmingly positive: nearly nine out of ten participants felt that the Program NEBs were an overall positive (Figure 21).

Figure 21. Net Assessment of NEBs (Both Participant Types, n=100)



Valuing the Participant NEBs

A key objective of this research was to "value" previously unvalued or undervalued benefits of participation in RightLights (and similar programs). Extensive field experience and a wide body of literature suggest that, for programs such as RightLights, the value of the NEBs experienced by participants can be as much as, or more than, the energy savings that occur due to program effects.

NEB Valuation Methodology

Three different measurement methods were used to estimate values for participant NEBs:

- ***"Willingness-To-Pay/Willingness-To-Accept" (WTP/WTA)***. This method requires respondents to estimate the dollars they might be willing to pay to gain specific Program benefits (e.g., for the added comfort or other benefits associated with the Program measure). As a follow up question, respondents were asked how much they would require to be paid to them in exchange for giving up the benefits that they experienced. In this survey, we only used the WTP/WTA approach to ask about the total of the NEBs associated with the Program.
- ***Relative Comparison Value***. We asked respondents about NEBs in terms of their *relative value*; responses were translated into numeric values. Respondents were asked about the value of the benefits relative to energy savings using a five-point scale (much less valuable, somewhat less valuable, same value, somewhat more valuable, and much more

valuable).[31] The relative values were then scaled to percentage-of-energy-savings values obtained from other empirical research and academic scaling literature. Because these questions are more quickly answered than percentage responses – and because time on the surveys was limited – this was the approach used for valuing individual NEB categories as well as the overall totals.

- ***Direct Comparison Value***. This approach is similar to the relative approach described above. We asked respondents to provide an assessment of the overall (across all subcategories) NEBs that they accrued in terms of their energy savings. We also asked respondents to report their response as a percentage of the energy savings that they experienced.

One potential problem associated with each approach is the issue of "adding up." Generally, the total value of individual benefits is greater than the figure that respondents provide when answering a question about the total of all the benefits. That is, the sum of the parts is greater than their estimated totals. The issue is addressed by normalizing the individual benefits – reducing their values proportionally to add to the estimated total benefits as valued by the respondents. Both individual and total benefits were asked in association with estimating the NEBs for the Program to allow for this normalization.

One final methodological issue relates to the issue of net non-energy benefits. The figures estimated are "net" in two ways. First, both positive and negative impacts are explicitly requested – for each individual NEB and for the total of all NEBs – there is no presumption of a positive effect. The results are the combination of positive and negative valuations. Second, the respondents are asked to specify the net NEBs from the energy-efficient equipment installed through the Program – above and beyond the effects they would have realized from installation of a standard efficiency model. While this may be somewhat difficult for respondents to answer, it is the appropriate comparison for the Program to make. It is important to note, however, that it is also a conservative approach. Some percentage of the participants would not have replaced the equipment at all without the Program; in those cases, it might be argued that all the non-energy benefits realized compared to the old equipment could be attributed. Care was taken to assure that the non-energy benefits that were attributed to the Program were not intentionally overstated or biased.

NEB Valuation Results. Initially, we asked how much respondents would be willing to pay, independent of the Program, for the total of the NEBs that they accrued and reported. The average of their responses was $803 (Table 31). As a follow up, we asked how much respondents would require in exchange for our taking away the NEBs that they reported. Here, the average answer was $807; the responses to the two questions were virtually identical.[32]

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[31] For items with negative value (e.g., non-energy costs) the respondents are asked if the non-energy effects are much more costly, somewhat more costly, same value/cost, somewhat less costly, or much less costly than the energy bill savings. The total benefit for each respondent was then calculated as the sum of benefits, minus the sum of costs.

[32] Fifty comprehensive participants and 20 QSP-only participants answered the WTP/WTA questions. An alternative coding scheme would entail setting the WTP/WTA values to 0, then taking the average. Under this scheme, the WTP and WTA would be $598 and $601, respectively, with 100 responses to each question.

Both WTP and WTA averages were more than twice as high for full participants ($952, $955) than QSP-only participants ($431, $436). In fact, despite the valuation technique used, interviewees that participated in the comprehensive RightLights program reported far greater NEBs than the QSP-only participants. This phenomenon is most likely a combination of the comprehensive Program's greater attendant energy savings and the fact that those participating reported higher levels of satisfaction with the Program.

Table 31. Valuations Provided Using WTP/WTA Questions

	Full Participants	QSP Only	Total
Willingness to pay for overall NEBs	$952	$431	$803
Willingness to accept in exchange for having all reported NEBs taken away	$955	$436	$807

The other key method we applied in measuring the value of overall NEBs was comparative or scaling questions. Although the literature is full of references to the use of WTP in the measurement of hard-to-measure (HTM) impacts (like recreation), field experience made it clear to us that WTP questions were very difficult for respondents both to answer and to understand. Our relative verbal scaling approach is informed by the idea that, while respondents might not be able to assign a value directly (WTP), they might be able to say whether the NEB was more valuable or less valuable than something for which we had a dollar value. Our specific methodology for this line of questioning is outlined in the introductory section above.

Certainly, the percentage questions can be more difficult for many respondents to answer – and a bit more time consuming. However, they might be expected to be more "precise" or accurate. Verbal scales such as "more valuable" can be simpler and faster to answer, but concerns might arise about how to translate these to percentage or dollar values. We have developed multipliers based on extensive secondary research and our own experience on many past projects. Table 32 makes it clear that our relative scaling method yielded results very similar in magnitude and direction to the self-reported NEB values (given as a percentage of energy savings).

The dollar savings predicted using these multipliers is also an important component of the NEB valuation work. For those cases in which energy savings is the value used for comparison, the average energy savings can be computed and valued using the marginal tariff for the relevant customer class. In this case, the per-site average annual energy savings were estimated to be 15,725 kWh annually for full participants and 1,553 kWh for QSP-only participants, and were valued at the marginal commercial rate of $0.12/kWh. Using these rate and saving assumptions, we computed average NEB dollar values, which are presented along with the percentage values in Table 32.

Table 32. Average NEB Estimates by Self-Reported and Scaled Multipliers

Question Type	Value of Total NEBs Multiplier	NEB Value for QSP-Only Participants Using Average Savings*
Percentage value relative to energy savings (all)	115%	$1,191
Full participants	115%	$2,170
QSP-only participants	115%	$214
Translation of verbal scaling into multiplier terms (all)	104%	$1,240
Full participants	104%	$1,962
QSP-only participants	104%	$194

* $1,887 full participants, $186 QSP participants, $1,036 all participants, on average.

Using these estimates of energy savings, along with our tabulations of self-reported and translated percentage-of-energy-savings multipliers, we estimated the NEBs associated with the comprehensive RightLights Program to be between $1,962 and $2,170; we estimated the NEBs of the RightLights QSP-only to lie between $194 and $214. As a consequence of the higher energy savings received by full participants, the NEBs (measured using our scaling methods) for those participants were roughly ten times those experienced by QSP-only participants.

A final consideration when evaluating NEBs obtained using either WTP/WTA or relative or direct comparison approaches is the issue of free ridership. If there are participants that would have purchased the same equipment in the Program's absence, then the NEBs associated with that equipment should not be attributed to the Program, as the benefits that accrue to free riders are not unique to the Program.

Because respondents may be hesitant to report that they would have purchased the same equipment without the Program, free ridership can be difficult to estimate accurately. In the interest of being conservative, we report values for a band of free ridership levels, ranging from 0% to 4.6%.[33] Table 33 presents NEB dollar value intervals for direct and comparative valuation methods, after accounting for potential free ridership.

Table 33. Average NEB Estimate Ranges after Accounting for Free Riders

Valuation Technique	Full Participant	QSP-Only	All Participants
Direct Valuation			
Willingness to pay	$908-$952	$411-$431	$766-$803
Willingness to accept	$911-$955	$416-$436	$770-$807
Comparative			
Percentage value relative to energy savings	$2,070-$2,170	$204-$214	$1,137-$1,192
Translation of verbal scaling into multiplier term	$1,872-$1,962	$185-$194	$1,028-$1,078

[33] This range derives from the estimated net-to-gross ratio, reported from the process evaluation survey, of 0.954 before accounting for spillover effects.

As the results in Table 34 illustrate, even after accounting for free ridership of 4.6%, the average NEB dollar estimates still reflect a high degree of non-energy benefits.

Table 34. Use of NEBs to Encourage Installation of Program Measures

	Full Participants (n=68)	QSP-Only (n=32)	Total (n=100)
No	37%	34%	36%
Yes	54%	50%	53%
Don't Know	9%	16%	11%

Finally, we asked respondents, based on their responses to the NEB questions, to assess the effectiveness of using information regarding NEBs to market the Program to retailers.

For each category of participants, a majority (53%) indicated that NEBs were used to help convince them to install the energy-efficient Program measures; 36% said that NEBs were not used to help convince them. Eleven percent were unable to say for sure whether these arguments were used.

The respondents were also asked which NEB categories were most important or convincing in that discussion. By far the most important factor mentioned was quality of light, mentioned by 29 of the 51 responding to this question. Two-thirds of the full participant respondents also mentioned the quality of the new energy efficient lighting equipment. Other factors that were often mentioned as important included environmental benefits, lifetime, and quantity of light.

Valuing Societal NEBs from the RightLights Program

The RightLights program also provided benefits above and beyond energy savings and NEBs to direct participants. The Program led to positive impacts on the local economy, as well as societal benefits from improved disposal methods for lighting equipment and, consequently, reduced improper disposal of mercury-containing lamps.

Economic Impacts

The Program funded the majority of the cost of the replacement lighting equipment: the total measure installation costs were $1,343,064, of which $1,018,732 (76%) was paid out in rebates and $324,332 (24%) was paid directly by participants.[34]

The respondents were asked what would have happened to the funds they spent on the Program if they had not invested in the lighting equipment (Table 35). Many would have invested the funds back into the business; others would have paid energy or other bills, purchased lighting equipment, or other applications. The table also shows the estimates of the contributed funds that would have been applied to other uses, sharing the results to all 1,133 participants. The vast

[34] Based on the January 11, 2005, FACET© database.

majority (43 of 48 respondents) stated that their expenditures would have been local as opposed to regional or out of state.

Table 35. What Participant Contributions Would Have Been Spent on Instead of RightLights Equipment

	Full Participants (n=48)	Dollars that would have been spent elsewhere
Pay electric bills	16%	$51,893
Operating capital/put back into the business/into inventory	30%	$97,299
Pay other bills	15%	$48,649
Put into unrelated items (house, vacation, car, etc.)	15%	$48,649
Put into other lighting equipment	18%	$58,379
Other	6%	$19,459
Total	*100%*	*$324,332*

As noted above, total expenditures on energy efficiency measures totaled over $1.3 million. SERA has conducted extensive work using input output models and other methods to identify the job creation and economic multiplier effects of expenditures on DSM measures.[35] These estimates identify the impacts of dollars transferred from power generation to the repair and maintenance type expenditures. The net multipliers and resulting job impacts from an investment of $1.3 million in DSM programs are provided in Table 36. In addition to the incentive dollars, additional economic impacts are realized through direct employment: RightLights employs four full-time equivalent staff on-site at Ecology Action and nine full-time auditors.

Table 36. What Participant Contributions Would Have Been Spent on Instead of RightLights Equipment

Economic Multiplier Impacts of RightLights Expenditures	Total
Multiplier*	
Output	0.492
Employment (Jobs per million dollars)	15.9
Labor Income	0.436
Economic Impacts of RightLights Program Measure Expenditures	
Output	$660,788
Employment	21.4 jobs
Labor Income	$585,576

*Source: Imbierowicz & Skumatz, 2004[36]

[35] Imbierowicz, Karen and Lisa A. Skumatz, 2004. "The Most Volatile Non-Energy Benefits (NEBs) – New Research Results "Homing In" on Environmental and Economic Impacts," *Proceedings from the ACEEE Summer Study* in Asilomar California, American Council for an Energy Efficient Economy, Washington DC.

[36] Unlike other literature, this source estimates the net impacts of expenditures, the proper comparison. The results show the total impact from direct, indirect, and induced multiplier effects. Note that RightLights attempts to purchase lighting equipment from local manufacturers, wherever possible, so actual multipliers might even be higher.

Disposal/Mercury Issues

One of the goals of the Program was to assure that the fluorescent lamps removed by the Program received proper treatment and disposal. The participants were asked to identify how they would have disposed of their existing lamps if the Program had not removed and disposed of the lamps properly. Based on responses to the survey, the Program helped avoid improper disposal of the lamps for 81% of the respondents. The analysis only addressed full participants, and the results are shown in Table 37.

Table 37. Likely Disposal Methods for Old/Removed Fluorescent Lamps without RightLights Program

	Full Participants (n=68)
Would have put in the garbage for regular collection	81%
Would have had them removed by certified contractor who disposed correctly	5%
Would have recycled them	3%
Don't know/ refused	11%

This information was combined with responses to the number of lamps removed, the number that were fluorescent, and the age of the lamps. The results (shown in Table 38) imply that through 2004 the Program has helped remove about 74,000 mg of mercury from landfills.[37] Subsequent installations through the close of the Program bring the estimated total mercury mitigation to 226,000 mg.

Table 38. Avoided Improper Bulb and Mercury Disposal

Fluorescent Lamps Replaced	Scaled up to 1,133 participants
Average number of fluorescent lamps five years old or older that would have been disposed in the landfill	1,847 bulbs
Average mg of mercury per lamps (assumes "older" lamps, 4' length)*	40 mg
Avoided mg of Mercury disposal from landfills	74,000 mg

*Source: Clark County web site on proper fluorescent light disposal.

[37] Information on the specific cost associated with mercury in the landfills has not been found; however, articles describe health risks to humans and animals, and one article noted the special risks of putting mercury in landfills because of additional processes that take place in a landfill situation (Raloff, "Landfills Make Mercury More Toxic," *Science News*, July 7, 2001, Vol. 160, Number 1). Note also that as of February 2006, even small quantity generators in the State of California will be required to use proper disposal methods, so presumably, the number of lamps diverted from improper disposal for this Program may fall.

Summary of NEB Results

This chapter provided estimates of three major types of NEBs associated with the RightLights program:

- Participant impacts
- Economic and job creation impacts
- Mercury diverted from landfills

The participant benefits were estimated using detailed surveys of a sample of full participants and QSP-only participants. The results showed that, overall, participants realized approximately $1,000-$1,100 of NEBs from the Program. NEBs for full participants were estimated as $1,900-$2,000 per participant per year, and QSP-only participant NEBs were estimated as $185-$195 per participant per year.[38] The most highly valued benefit was doing good for the environment, followed by improved quality and quantity of light, which were especially valuable for the full participants.

The expenditures on the RightLights Program also has related positive impacts on the economy. The combination of Program results in the DSM investments results in $660,788 in economic impacts, approximately 35 new jobs (including RightLights full-time equivalents and additional job creation), and $585,576 in labor income.

Finally, the results indicate that, through December 2004, the Program has resulted in the proper disposal of 74,000 mg of mercury that might otherwise have ended up in landfills across California. Based on subsequent lighting retrofits through Program end, overall mercury diversion attributable to RightLights totals 226,000 mg.

[38] The results using a WTP approach resulted in values on the order of $700-$800 overall, $900-$1,000 for full participants and about $400-$450 for QSP-only participants. Results from previous research indicate that the WTP estimates are more volatile than the comparative estimates cited above.

IX. Conclusions and Recommendations

The database review, interviews with Program staff and installers, and participant and non-participant surveys provided valuable insight into the RightLights Program. A summary of findings, along with recommendations where applicable, is provided in this section.

Database Review

A comprehensive review of the FACET® Program database indicated that the inputs for ex ante estimates (deemed parameters) are correct and that the formulas to calculate project costs and expected savings are being calculated properly.

Staff and Installer Interviews

Nearly all respondents communicated a full understanding and commitment to broad Program goals. The majority of the respondents expressed genuine passion for saving energy, assisting small commercial customers, and protecting the environment. To them, working with RightLights was fulfilling and valuable work. Even the three surveyed Installers that no longer work with the Program expressed their admiration, "You really feel like you've helped someone out and done a good thing when you walk away from a RightLights job."

Communication between RightLights staff and Installers is excellent. The Installers offered praise for the accessibility and responsiveness of RightLights staff. Urgent issues were typically resolved immediately through a call to a staff member's cell phone, while more deeply rooted concerns regarding equipment options and walk-through times were being discussed with RightLights management staff.

The door-to-door marketing approach is extremely effective. All the interview respondents – Team members and Installers alike – commented that the Program auditors' on-foot, door-to-door, cold calling approach has been successful in breaking through traditional commercial energy efficiency barriers. As a result of this success, RightLights has not had to rely as much on the other, more traditional elements of its marketing strategy (e.g., local Chambers of Commerce and media outreach), thereby preserving more Program funding for rebates and associated energy savings.

The increase in the allowed walk-through time to review and modify the lighting audits has alleviated one of the biggest contractor concerns. Four of the eight Installers consulted in the first round of interviews believed that they needed more time to review and modify the RightLights audits. The additional time spent doing this, including filing change-orders from the original audit, was squeezing their margins. RightLights increased the allowed compensation for walk-through technical consultations. The second round of interviews confirmed that this issue is no longer a concern for the contractors.

Installers are concerned with the stringency of the list of approved measures but acknowledge the flexibility that RightLights staff has shown to modifying the list. Although the goal of using the most reliable, environmentally friendly products was lauded, many of the Installers interviewed early in the Program commented that the pool of eligible measures for certain retrofits was limited and led to increases in the number of visits or difficulties obtaining the required products. These installers requested more flexibility in the Program in terms of allowing equivalent or comparable measures. RightLights staff maintains that the list of approved products is carefully selected to represent those measures of highest quality, greatest energy savings, and lowest mercury content, and thus the comparably more limited selection of energy efficiency measures (compared to other programs) is, in fact, a Program attribute. In addition, changes in the accepted Program products created frustration among some installers in terms of inventory and stocking inefficiencies; these installers, apparently, are not aware that RightLights has a policy that requires suppliers to provide 100% refund for return of unused inventory. The second round of interviews indicated that the RightLights staff have approved additional measures to meet the contractor's needs.

Despite some concerns, Installers are generally extremely satisfied with the RightLights Program. In fact, many of those installers who had expressed concern about the audits or the equipment changes were quick to add that such problems were "part of the learning curve" and that the Program would certainly move past it.

Participant and Non-Participant Surveys

Direct "walk in" solicitations continue to be the primary way people learn about the Program (92%). Word-of-mouth participation, however, are expected to increase as Program penetration levels increase, and this could reduce Program administrative costs.

Reducing/understanding energy costs and free lighting equipment are the primary drivers of participation. Those participants that received more comprehensive retrofits were more curious about ways to reduce and understand their energy costs; the QSP-only participants, on the other hand, were more attracted to the option of receiving free lighting equipment.

Satisfaction with the audit, installation, and lights is extremely high, but differed between the full participants and the QSP-only participants. Nearly all of the respondents were either somewhat or extremely satisfied with the audits. Respondents were also extremely satisfied with the technicians and installation process, reporting that the work was done conveniently and professionally. Finally, nearly all the respondents were either somewhat or extremely satisfied with the lights. QSP-only participants, however, were less satisfied with the audit than the full participants, reporting that the information from the audits was less clear and less useful. The direction of causality, however, cannot be certain; in other words, it is possible that the QSP-only participants simply paid less attention to the audits and, therefore, were less satisfied (and thus those that had the option did not do a more comprehensive retrofit), or they may have generally been less satisfied with the audit and thus chosen not to participate further. QSP-only sites were also less likely to report being extremely satisfied with their lights compared to the full participants, but once again this may be related to the fact that they received fewer measures compared to the full participants rather than the fact that they did not like the lights themselves.

A related factor that may have contributed to these differences is the fact that those participants that were eligible for and installed the recommended measures from the QSP and comprehensive audit received incentives worth 74% of the measure costs; the QSP-only sites, however, were only offered incentives covering 43% of the measure costs.

The majority (94%) of participants reported that the Program measures are still installed and operating. The QSP-only participants had a higher percentage of failures (9%) compared to those participants that had more comprehensive retrofits (4%).

The majority (69%) of full participants noticed savings on their energy bills, but few of the QSP-only participants had noticed savings; just under half of these (44%) said the savings exceeded their expectations. Only 19% of the QSP-only participants, however, noticed savings on their bills. Since many of these QSP-only sites received a less comprehensive retrofit, this is not unreasonable: average expected savings at the full participant sites was 15,725 kWh compared to only 1,553 kWh for the QSP-only sites.[39]

The Program is successfully reaching businesses that were not likely to install energy-efficient lighting on their own. The majority of the respondents (92%) reported that, in absence of the RightLights Program, they were very unlikely to have installed the same high efficiency lighting in the next year. Those that would have installed lights most likely would have done a far less comprehensive retrofit, generally installing CFLs in their business. This confirms the Program theory that small commercial customers are not likely to install comprehensive energy-efficient lighting measures on their own and that the Program is fulfilling an important niche opportunity.

A limited number of participants are taking additional energy saving actions. Eight percent of the total respondents said they had adopted some of the energy-saving recommendations from the packet of materials that is left behind after participation. An additional 10% said they plan on adopting some of these recommendations in the future. A number of other respondents reported installing additional energy-efficient lighting equipment in their businesses and homes. In addition, many of the Program's recent customer referral program participants opted for the ten free CFLs bonus, most of which were likely installed in their homes. This spillover energy savings is not being directly claimed by the Program but is factored into the approved net-to-gross ratio of 96%.[40]

Cost appeared to be the most common deterrent for businesses that selected not to participate in the RightLights Program. Thirty-seven percent of the non-participant respondents said that cost was the main reason they chose not to participate in the Program. Most of the respondents were concerned with the initial cost alone, and several non-participants also mentioned that their first impression upon being approached was that there must be some kind of catch or that they generally treated this contact as a salesperson with a pitch. Respondents seemed more receptive to participation if a better case were made for the eventual savings, particularly though a trusted

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[39] Based on the January 11, 2005, version of the FACET© database. The actual percentage reduction in energy bills was not available but is assumed to be lower for the QSP-only sites, since 63% of these had additional lighting energy saving opportunities that they chose not to pursue.

[40] The approved net-to-gross ratio of 0.96, which includes both the impacts of free riders and spillover, appears to be slightly conservative based on the findings from this study.

third-party endorsement such as green building certifications or programs, Chambers of Commerce, word of mouth, or participant referrals. Finally, a few non-participant respondents said they had expressed interest in participating but Program personnel did not follow-up as they had expected. RightLights should make a point of recording and following up with those respondents that initially refuse, as many of them (45%) had an interest in participating in the future.

Summary of NEB Results

Assessment of the participant benefits, estimated using detailed surveys of a sample of full participants and QSP-only participants, showed that, overall, participants realized approximately $1,000-$1,100 of Program-induced NEBs. NEBs for full participants were estimated as $1,900-$2,000 per participant per year, and QSP-only participant NEBs were estimated as $185-195 per participant per year.[41] The most highly valued benefits were doing good for the environment, followed by improved quality and quantity of light. The lighting quality and quantity were especially valuable for the full participants.

The expenditures on the RightLights Program also have related positive impacts on the economy. The combination of Program results in the DSM investments results in $660,788 in economic impacts, approximately 35 new jobs (including RightLights full-time equivalents and additional job creation), and $585,576 in labor income.

Finally, the results indicate that through December 2004 the Program has resulted in the proper disposal of 74,000 mg of mercury that might otherwise have ended up in landfills across California. Based on subsequent lighting retrofits through Program end, overall mercury diversion attributable to RightLights totals 226,000 mg.

Recommendations

The program has been continually refined since its inception in 2002. We offer these recommendations based on our evaluation to further this refinement.

Continue to instruct auditors to assign hours-of-use by area. Self-reported hours-of-use estimates by area were found to be the most reliable for estimating savings. Auditors should refrain from assuming a single hours-of-use estimate for an entire business.

Regularly review the approved equipment list. Although several contractors pointed out that RightLights is already starting to move in the direction of a broader array of approved lighting equipment and technologies, they still see this process as ongoing. If the staff is able to find new and better lighting equipment, the Program can continue to find new participating customers and

[41] The results using a WTP approach resulted in values on the order of $700-$800 overall, $900-$1,000 for full participants and about $400-$450 for QSP-only participants. Results from previous research indicate that the WTP estimates are more volatile than the comparative estimates cited above.

will be able to find enough work to be able to continue for several years beyond the 2006-08 Program cycle.

Refine or eliminate the energy information packet. As is common with in energy efficiency programs, few participants used or even recalled receiving the energy information packet. The Program should consider revising or eliminating this aspect.

Appendix A. Interview Instruments

- Staff Interview Guide (First and Second Rounds)
- Installer (Contractor) Interview Guide (First and Second Rounds)
- Participant Survey
- Non-Participant Survey
- Non-Energy Benefits Survey

Interview Guide: Ecology Action – Staff
RightLights Process Evaluation

The purpose of the interview is to explore your experience with the RightLights program. Please feel free to let me know when there are areas that you do not have experience with so that we can move on to those areas in which you've worked most closely.

Roles and Responsibilities.

1. What is your role in RightLights?

2. How long have you held this position?

3. Have you held other positions in the program, and if so, what were they? Other positions with similar programs?

4. What program issues (design, delivery, administration, customer response) are you familiar with?

Program Design.

1. What are the goals/objectives of the RightLights program? How have these changed over the life the program? (Probe: different in 2002-2003 than in 2004-2005)?

2. Who was involved in the program design?

3. What was the history and context of Program development? (Probe: whose idea? why needed? factors at work?)

4. What are the *underlying assumptions* behind the Program? What *activities* were designed to address these "problems"?

5. What assumptions about this market affected the Program design? Has the market changed over time (i.e., in 2004-2005)?

6. Were there any problems during the design process that were difficult to resolve? How were they resolved?

7. What benchmarks/indicators did you identify to assess how the program is progressing or what has been achieved?

8. Has the program changed in response to issues/concerns from this original design? Are there still changes that you think are needed?

9. What do you think were the most successful and least successful aspects of the program design process?

Program Delivery.

1. What are the delivery procedures for each of the Program *activities*?

2. What are the roles of various parties involved in delivery? What are staffing requirements and duties of the various staff members? What are the qualifications for staff and contractors?

3. How were the technical partners chosen? (Probe: was it a bid process? Did Ecology Action have experience with these firms from past programs? Other?)

4. What training, if any, was provided to staff? To partners? What training, if any, is still desired or required?

5. What role have the Regional Energy Authorities played to date? How does their activity compare to that expected?

6. What role have community partners (e.g., Chambers of Commerce) played to dated? How does their activity compare to that expected?

7. How were contractors recruited?

8. What do customers experience as program activities?

9. How have the planned delivery procedures worked in the field?

10. Have you used different delivery mechanisms over the life of the program? If so, how did they work?

11. What works particularly well about program delivery? (Probe: at each stage – marketing, pre-installation visit, installation, inspection) What most needs to be changed?

Program Administration.

1. What are the contractual requirements? Are they being achieved? Are there any problems with the contracting process? How are problems resolved?

2. How do customers apply for the program? How is compliance with program requirements ensured? How are internal inspections/verification conducted (if at all)

3. What are key issues for each?

4. What are the reporting processes? Are these timely? Are they providing the information needed to monitor program implementation/identify issues?

Program Implementation.

1. What is the number of participants to date? (By phase of implementation – may verify with database)

2. What was the expected participation rate for the same time period? What explains any discrepancy between expected activity and actual?

3. How was the marketing approach implemented? What are the most effective promotional activities? What has not worked and why? (Probe: role of Chambers of Commerce, Regional Energy Authorities in promotion)

4. How is communication between stakeholders conducted? (probe: formal and informal) How are stakeholders informed of program changes?

5. How do you get feedback on the program from contractors/agencies/end users?

6. How effective and accurate is the data-tracking and data collection system? Are data entered and reported in a timely fashion? Have any of the contractors had difficulty with the data tracking systems? (Probe: use of FACET; effectiveness)

7. How would you describe the effectiveness the processes for payment of the incentives? To Quick-Saver Package? To financial incentives for comprehensive jobs?

8. What has worked well, what has not, and why? What has been the relationship with the organizations/actors involved? Have these relationships changed over time? If so, how and why?

Customer Response.

1. Who are the core decision-makers in determining program involvement? (e.g., building owners, management agencies, other) Are there different decision-makers involved in different aspects of program participation (determining which buildings and how many; which improvements)? If so, who are these decision-makers?

2. What has been the response of customers to the program?

   What do you think they would say about the program?

3. Has program participation varied by areas of the state? By type of business? If so, why has this been the case?

4. What has been the response received from customers to the follow-up mail survey? Is this feedback recorded or tracked? What feedback, if any, from customers has led to changes in program implementation? If so, can it be made available?

5. What have customers liked best/least about the program? Have there been any major problems or complaints?

6. Do you think that eligible customers are aware of the program? What challenges exist for customer participation?

Future trends.

1. What do you see as the future of the RightLights program?

2. What, if anything, might affect future scenarios?

3. Any other comments or areas we did not cover on which you like to add your views?

Interview Guide: Ecology Action – Staff (Second Round)

RightLights Process Evaluation

The purpose of the interview is to follow up with the Interview that we conducted with you regarding your participation in the RightLights program. Please feel free to let me know of improvements made in the program since your prior interview, or of issues and concerns that still remain that I may not ask about. Some of the questions will be the same as the first interview in order to provide a background.

Roles and Responsibilities.

1. What is your role in RightLights?

2. How long have you held this position? Has the position changed during the 2004-2005 program cycle?

3. Have you held other positions in the program, and if so, what were they? Other positions with similar programs?

4. What program issues (design, delivery, administration, customer response) are you familiar with?

Program Design.

1. Have there been any changes in the goals/objectives of the RightLights program during the 2004-2005 cycle?

   What precipitated these changes?

   How have the changes affected the program?

2. Has the market changed over the 2004-2005 time?

3. What benchmarks/indicators did you identify to assess how the program is progressing or what has been achieved?

4. What do you think were the most successful and least successful aspects of the program design process?

Program Delivery.

1. Our interviews with the contractors raised a couple of key points that we would like your comments on:

   Have the eligible measures changed during 2004-2005? How frequently? Do contractors understand the changes?

   Another issue that was raised was 1) the amount the contractors' walkthroughs were allotted ($90), and 2) the large percentage of change orders that frequently result.

   Has this length changed?

   What causes the change orders?

   Have the auditing procedures changed?

   Has the reimbursement amount changed?

2. It was noted that sometimes communicating customized jobs to the contractors was difficult due to the use of FACET, specifically the materials list. Has this process improved? What changes have been made?

3. What issues have the contractors brought to the attention of the RightLights staff? What has been the staff's response?

4. What do you feel is working particularly well about program delivery? What most needs to be changed?

Program Administration.

1. Program administration, (internal and external communication, reporting) were noted as working well in the first round of interviews.

What do you feel is working particularly well about program administration? What most needs to be changed?

Program Implementation.

1. How was the marketing approach implemented? What are the most effective promotional activities? What has not worked and why? (Probe: role of Chambers of Commerce and other stakeholders in promotion)

2. How is communication between stakeholders conducted? (probe: formal and informal) How are stakeholders informed of program changes?

3. How effective and accurate is the data-tracking and data collection system? Are data entered and reported in a timely fashion? Have any of the contractors or PG&E had difficulty with the data tracking systems? (Probe: use of FACET; effectiveness)

8. What has worked well, what has not, and why? What has been the relationship with the organizations/actors involved? Have these relationships changed over time? If so, how and why?

Customer Response.

1. What has been the response of customers to the program?

   What do you think they would say about the program?

2. Has program participation varied geographically? By type of business? If so, why has this been the case?

3. What has been the response received from customers to the follow-up mail survey? Is this feedback recorded or tracked? What feedback, if any, from customers has led to changes in program implementation? If so, can it be made available?

4. What have customers liked best/least about the program? Have there been

any major problems or complaints?

5. Do you think that eligible customers are aware of the program? What challenges exist for customer participation?

Future trends.

1. What do you see as the future of the RightLights program?

2. What, if anything, might affect future scenarios?

3. Any other comments or areas we did not cover on which you like to add your views?

Interview Guide: Contractor
RightLights Process Evaluation

The purpose of the interview is to explore your experience with the RightLights program. Please feel free to let me know when there are areas that you do not have experience with so that we can move on to those areas in which you've worked most closely.

Roles and Responsibilities

1. How long have you been involved with the RightLights Program?

2. Have you held other positions in the Program, and if so, what were they? Other positions with similar programs?

3. What program issues (design, delivery, administration, customer response) are you familiar with?

Program Design

1. What are the goals/objectives of the RightLights program?

   Were you involved in the 2002-2003 program? If yes, have these goals/objective changed over the life the program? (Probe: different in 2002-2003 than in 2004-2005)?

2. What are the *underlying assumptions* (about the market) that underlie the Program? How do you think the program *activities reflect these assumptions?*

3. Has the Program changed in response to issues/concerns from its original design? Are there still changes that you think are needed?
4. What do you think were the most successful and least successful aspects of the program design process?

Program Delivery

1. How did you first learn about RightLights? Why did you decide to work with the Program?

2. What concerns, if any, did you have when you were considering participating? (Probe: fixed labor costs and mark-ups for equipment, other)

   How were these concerns overcome?

3. What types of training were you provided before beginning installations? (Probe if needed: field activity, technical specifications, data entry in FACET, other?)

4. How would you rate the usefulness of the training you received? What training, if any, is still desired or required?

5. Would you briefly walk me through the steps in the program delivery process, starting with receiving a project referral from Ecology Action to filing for and receiving the rebate?

6. What issues, if any, have arisen with the program processes? (Probe: project referrals, working with customers, scheduling installations, lighting equipment, collecting payment})

Program Administration

1., How is communication between Ecology Action and your company usually conducted? (Probe: both formal and informal) How are you informed of program changes?

2. To what extent is the level of communication satisfactory? Do you have any suggestions for improving communication?

3. What mechanisms exist for you to provide feedback to Ecology Action staff on the Program? To what extent has program staff been responsive to your

ideas/feedback?

4. What are the contractual requirements? Are there any problems with the contracting process? How are problems resolved?

5. What are the tracking and reporting processes? Are these reasonable? Have there been any difficulties with the data tracking systems? (Probe: use of FACET; effectiveness)

Customer Response.

1. What has been the response of customers to the program? What do you think they would say about the program?

2. What have customers liked best/least about the program? Have there been any major problems or complaints?

3. From your perspective does program participation vary by area or type of business? If so, why do you think this the case?

Future trends.

1. What do you see as the future of the RightLights program?

2. What, if anything, might affect your continued affiliation with the Program?

3. Any other comments or areas we did not cover on which you like to add your views?

Interview Guide: Contractor (Second Round)

RightLights Process Evaluation

Follow-up Interview

The purpose of the interview is to follow up with the Interview that we conducted with you regarding your participation in the RightLights program. Please feel free to let me know of improvements made in the program since your previous interview, or of issues and concerns that still remain that I may not ask about. Some of the questions will be the same as the first interview in order to provide a background.

Roles and Responsibilities

1. How long have you been involved with the RightLights Program?

2. Have you held other positions in the Program, and if so, what were they? Other positions with similar programs?

3. What program issues (design, delivery, administration, customer response) are you familiar with?

Program Design

1. Please describe your understanding of the program design. Have you noticed any change in the design over the 2004-2005 time frame?

2. Do you think the changes have improved the design?

3. Are there still changes that you think are needed?

4. What do you think were the most successful and least successful aspects of the program design process?

Program Delivery

1. Do you have any concerns participating in the program? (Probe: fixed labor costs and mark-ups for equipment, other)

   Have these concerns been addressed?

2. Have you found that the audits are accurate?

3. What issues have arisen during your walkthroughs? Have you let the RightLights staff know of your concerns? How have they responded? [Probe for: Has the allotted time been adequate to review the proposed job and verify the audit?]

4. Another concern that was raised was the frequency of change orders. Have you found this to be an issue? How has the RightLights staff addressed this issue?

5. Do you feel that the lighting replacement criteria are adequate, for example does the program's suggested lighting replacement meet the customer's needs for light output and quality? If you feel it is not adequate, have you raised the issue with the RightLights staff? How have they responded?

6. In the first round of interviews several contractors indicated that the program's inventory of eligible measures has changed frequently. Do you agree? If so, how has this affected you?

6. Are there any other issues that have arisen with program processes? If so, have you raised the issue(s) with RightLights staff, and do you feel the issue(s) are being addressed? (Probe: project referrals, working with customers, scheduling installations, lighting equipment, collecting payment})

Program Administration

1., To what extent is the level of communication satisfactory? Do you have any suggestions for improving communication?

Customer Response.

1. What has been the response of customers to the program? What do you think they would say about the program?

2. What have customers liked best/least about the program? Have there been any major problems or complaints?

3. From your perspective does program participation vary by area or type of business? If so, why do you think this the case?

Future trends.

1. What do you see as the future of the RightLights program?

2. What, if anything, might affect your continued affiliation with the Program?

3. Any other comments or areas we did not cover in which you would like to add your views?

Participant Survey
RightLights Program

INTRO

Insert customer name:

Hello, my name is _____. I'm calling on behalf of Ecology Action. We are following up with customers who received energy efficient lighting equipment in the last year as part of their RightLights Program. Our records show that [AUDITOR NAME] visited your business in [MONTH/YEAR] to talk to you about energy savings from efficient lighting and that [CONTRACTOR] installed [LIGHTING EQUIPMENT] in your facility in [MONTH/YEAR].

(If not certain, ask for alternative contact that may be familiar with the Program.)

A. Are you the person who worked with the RightLights Lighting Specialist?

Yes .....1 [GO TO INTRO]
No 0

B. When that person will be available? What is the best way to contact him/her?

_____

We are conducting a survey of customers who received Lighting Surveys, and various types of energy efficient equipment, to learn about their experience with the RightLights Program. This information will help determine the energy savings achieved through the Program and improve similar publicly funded efforts to help small business customers like you. All information will remain confidential. IF NEEDED: This survey will take about 10 minutes.

C. Is this a good time to talk?

Yes .....1 [GO TO Q1]
No .....0 [Schedule callback]

BACKGROUND

1. First, I'd like to ask how you learned about the RightLights Program? [DO NOT READ, CHECK ALL THAT APPLY]

   Walk in contact by technician 1
   From a friend or business contact (word-of-mouth) 2
   Other (Specify: _____) 3

2. Why did you decide to participate in the Lighting Survey?

   To understand more about how energy costs are determined 1
   To learn more about ways to reduce energy costs 2
   To get free lighting equipment (the Quick-Saver Package) 3
   A neighboring business or friend participated 4
   A competing business participated 5
   Technician indicated that the energy survey would be helpful 6
   Other (Specify:_____) 7

THE AUDIT

The Lighting Specialist provided you information to help you understand energy costs and ways to manage them. I'd like to ask you to rate this information.

3. First, the technician showed you a report on lighting energy use in your business and how you could save energy (a comprehensive lighting retrofit plan, including free measures, and information on rebates available). How clear was this information? Would you say it was:

   Not at all clear 1
   Somewhat clear 2
   Very clear 3
   Don't know/don't remember .....9 (DO NOT READ)

4. How useful was this information about lighting energy use in your business? Would you say it was:

   Not at all useful 1
   Somewhat useful 2
   Very Useful 3
   Don't know/don't remember .....9 (DO NOT READ)

5. How important was the information on this form in helping you decide to install the new equipment? Would you say it was:

   Not at all important 1
   Somewhat important 2
   Very important 3
   Don't know/don't remember.....9 (DO NOT READ)

6. Overall, how satisfied were you with the lighting audit? Would you say you were…

   Extremely satisfied .....4 [GO TO Q8]
   Somewhat satisfied .....3 [GO TO Q8]
   Somewhat dissatisfied 2
   Extremely dissatisfied with the audit.....1

7. Why were you dissatisfied with the audit?

   _____

   _____

8. What impact did the lighting audit have on your understanding of how to improve your business's energy efficiency? Would you say it…

   Greatly increased your understanding 4
   Somewhat increased your understanding..... 3
   Slightly increased your understanding, or 2
   Had no impact on your understanding of how to improve your business's energy efficiency?..... 1
   DK/Not Sure ..... 9 [DO NOT READ]

INSTALLATION

[FOR PARTICIPANTS THAT ALSO HAD COMPREHENSIVE RETROFIT IN ADDITION TO QSP]

Now, I would like to ask you about the installation of the lighting or other equipment.

9. Was the installation of equipment scheduled at time that was convenient to you?

   Yes 1
   No 0
   Don't know/Don't remember.....9

10. Did the installer complete the installation in a reasonable length of time?

Yes 1
No 0
Don't know/Don't remember.....9

11. Did the installer arrive at the agreed upon time?

Yes .....1 [GO TO Q13]
No 0
Don't know/Don't remember.....9

12. Did they call you to inform you of the change in time?

Yes 1
No 0
Don't know/Don't remember.....9

RETENTION AND SATISFACTION

[ASK OF ALL RESPONDENTS]

Our records show that you had a variety of new energy efficient equipment installed in your business, including [READ LIST]. I would like to ask you a few questions about this equipment.

13. How much of the lighting equipment installed is operating in your business at this time?

All .....3 [GO TO Q15]
Some 2
None.....1

14. *For those not operating:* Why is this equipment not operating at this time?

_____

_____

15. How satisfied have you been with the lighting installed in your business? Would you say have been:

Extremely satisfied .....4 [GO TO Q17]
Somewhat satisfied .....3 [GO TO Q17]
Somewhat dissatisfied 2
Extremely dissatisfied 1

16. Why are you dissatisfied with your lighting? [DO NOT READ LIST]

Poor lighting quality 1
Poor appearance.....2
Some bulbs/lights did not last.....3
Other 4
(Specify:_____)

PROGRAM INFLUENCE

17. What is the likelihood that you would have installed the same high efficiency lighting in the next year if this program had not been available? Would you say it was [PROBE FOR QUANTITY AND EFFICIENCY LEVELS]:

Very likely 4
Somewhat likely.....3
Somewhat unlikely.....2
Very unlikely .....1 [GO TO Q19]
Don't know/not sure .....9 [GO TO Q19]

18. [IF VERY LIKELY, SOMEWHAT LIKELY, OR SOMEWHAT UNLIKELY IN Q17 THEN ASK RESPONDENT TO EXPLAIN] What measures were you planning on installing, and when? [PROBE FOR QUANTITY AND EFFICIENCY LEVELS]

_____
_____
_____

OTHER ACTIONS

19. The technician may have mentioned or you may have been given materials on other actions, beyond the lighting equipment, that could help reduce your energy costs. Do you remember receiving any other recommendations or materials?

Yes 1
No .....0 [GO TO Q24]
Don't know/not sure .....9 [GO TO Q24]

20. Have you adopted any of those recommendations to improve energy efficiency?

Yes 1
No .....0 [SKIP TO Q22]

21. What actions have you taken?

_____

_____

22. Do you plan to take any of these actions the future?

Yes .....1 [GO TO Q24]
No 0
Don't know .....9 [GO TO Q24]

23. Why have you decided not to do the recommended action(s)?

_____

_____

24. Did the technician refer you to other Programs that might assist you in making other recommended energy efficiency improvements (e.g., HVAC, refrigeration, other)?

Yes 1
No 0
Don't know/don't remember.....9 [DO NOT READ]

24b. Do you remember receiving a yellow packet of information from the lighting technician?

Yes 1
No 0
Don't know/don't remember.....9 [DO NOT READ]

24c. Have you used any of the materials from the yellow packet?

Yes 1
No 0
Don't know/don't remember.....9 [DO NOT READ]

24d. What materials have you used? Were these helpful? In what way?

_____

ESTIMATED SAVINGS

25. Have you noticed any savings on your energy bill (compared to the same period in the year before your lighting upgrade)?

Yes 1
No .....0 [GO TO Q27]
Too soon to tell .....2 [GO TO Q27]
Don't know/not sure [DO NOT READ].....9 [GO TO Q27]

26. Are these savings greater than, equal to, or less than what you had expected?

Greater than expected 3
Equal to expected.....2
Less than expected.....1
Don't know/not sure 9

27. Can you tell me the typical lighting hours of operation on weekdays? This would include any hours when someone is in your facility with the lights operating, and may be longer than the hours you are open to customers because of opening and closing procedures, cleaning crews, etc. What about on weekends?

Weekdays: Open_____ Close_____ Total Hours/Day: _____

Weekends: Open_____ Close_____ Total Hours/Day: _____

28. Do you have any comments or suggestions about the RightLights Program?

_____

_____

Those are all the questions I have for you today. I would like to thank you for your time and for participating in the RightLights Program.

Non-Participant Survey
RightLights Program 2/8/05

SAMPLE TYPE
Audit only
True non-participants

INTRO

SHOW COMPANY NAME, CONTACT NAME, AUDIT DATE, FOR VERIFICATION

Hello, may I please speak with < contact name>?

IF NO CONTACT NAME OR NO LONGER WITH COMPANY: May I speak to the person who would have spoken with someone who visited your company to talk about energy efficient lighting?

Hello, my name is _____. I'm calling on behalf of Ecology Action and the RightLights Program. We are following up with businesses that were visited by program staff during the last year to recommend some energy-saving lighting equipment they could install.

IF WRONG COMPANY AND WRONG PERSON, VERIFY PHONE NUMBER.

A. Are you the person who was contacted by the RightLights Lighting Specialist?

[IF NEEDED: Do you remember if a RightLights Lighting Specialist stopped by your business and offered to check your lighting system for ways to save energy? They may have told you about some low-cost or no cost lighting products that could be installed.]

Yes .....1 [GO TO C]
No 2
Not sure.....3
Don't remember /No memory.....4
Refused 5

B. Is there someone else I should speak with instead?

Yes	1	[GET REFERRAL & REINTRODUCE]
No	2	[VERIFY INFO AND TERM]
Not sure	3	[GET REFERRAL & REINTRODUCE]
Don't know	4	[VERIFY INFO AND TERM]
Refused	5	[VERIFY INFO AND TERM]

WORD RECALL BASED ON SAMPLE TYPE

Audit only – ask about "energy efficient lighting equipment"

True non-participant – ask about "the free lighting audit and the energy efficient lighting equipment

C. We are contacting businesses that chose not to receive <the energy audit or> energy efficient lighting equipment through Ecology Action's RightLights Program. This is part of the Program's formal evaluation process, and all information will remain confidential. The survey will take only about 5 minutes and will help improve public energy programs that serve small businesses like yours. Is this a good time to talk?

Yes 1

No .....2 [Schedule callback]

1. If you can think back to when the Lighting Specialist called on you, what were your initial thoughts when you heard about the availability of a free lighting audit and energy efficient lighting? CLARIFY. MULTIPLE OK

_____

_____

2. Did the technician leave any information with you about the program?

Yes 1

No .....2 [GO TO Q4]

Don't know/don't remember.....3 [GO TO Q4]

3. Was this printed information….? (READ 1-3)

Not at all clear.....1

Somewhat clear.....2

Very clear.....3

Don't know/don't remember.....4

4. What is the main reason you chose not to <[FOR TRUE NONPARTS: have the lighting survey or]>install the equipment offered? OPEN-END. ONE RESPONSE. (CODES NOT VISIBLE TO INTERVIEWER)

Already installed efficient lighting 1

Didn't trust technician/offer.....2

Too busy.....3

Satisfied with current lighting.....4

Other (SPECIFY).....5

5. And for what other reasons did you chose not to <[FOR TRUE NONPARTS: have the lighting survey or]> install the equipment offered? OPEN-END. MULTIPLE RESPONSE. (CODES NOT VISIBLE TO INTERVIEWER)

Already installed efficient lighting 1
Didn't trust technician/offer.....2
Too busy.....3
Satisfied with current lighting.....4
Other (SPECIFY).....5

6. Would you be interested in participating if you were offered a free lighting audit and efficient lighting equipment again?

Yes .....1 [GO TO Q8]
No 2
Not sure/it depends 3
Refused .....4 [GO TO Q8]

7. [if no or not sure then ask] What could Ecology Action do to interest you in participating in an efficient lighting Program such as this? What else? PROBE AND CLARIFY.

_____

_____

8. Aside from the energy savings, what other benefits do you think that energy efficient lighting provides compared to standard equipment? What else?

_____

_____

9. Besides cost, what negative impacts do you believe result from energy efficient lighting equipment compared to standard equipment? What else?

_____

_____

10. Do you have any fluorescent bulbs in your facility? IF YES, Are some or all of your bulbs fluorescent?

No .....1 [GO TO Q12]

Yes, at least some of them 2

10a About how many of them are fluorescent? _____

OPEN-END. NUMBER, %, OR RANGE OK.

Yes, all of them.....3

10b. About how many fluorescent bulbs do you have? _____

OPEN-END. NUMBER, %, OR RANGE OK.

Don't know 4

11. What do you do with the fluorescent bulbs when you remove or replace them? MULTIPLE OK. CODE LIST VISIBLE. PROBE TO FIT.

Put in garbage or dumpster for regular collection 1

Have them removed by a certified contractor that disposes of them in a special way.....2

Recycle them 3

Take to hazardous waste site.....3.....4

Other (describe:_____) 5

Don't know 9

12. Do you have any comments or suggestions about how Ecology Action might help your businesses be more energy efficient?

_____

_____

STATEMENTS IF NEEDED BY INTERVIEWER:

* We are not selling anything. This is strictly a survey for research purposes.
* I work for Gilmore Research Group, an independent survey research firm.
* If you would like to verify this call and get more information, you may call my supervisor at 800-573-4498 ext. 151.
* The purpose of this survey is to how to better provide small businesses with energy efficient lighting services.
* If you would like to contact (CLIENT), please call XXXX at XXX-XXX-XXXX.
* This interview will take about 3-5 minutes.
* All responses will be kept confidential.

RightLights Non-Energy Benefits Participant Survey

Participant Name:_____

Business Name:_____

Interview Date:_____

Interviewer:_____
Comments:

PARTICIPANT END-USERS

Hello, my name is _____. I'm calling on behalf of Ecology Action. We are following up with customers who received energy efficient lighting equipment in the last year as part of their RightLights Program. Our records show that [AUDITOR NAME] visited your business in [MONTH/YEAR] to talk to you about energy savings from efficient lighting and that [CONTRACTOR] installed [LIGHTING EQUIPMENT] in your facility in [MONTH/YEAR].

INTRO1. Do you recall that?
0. No
1. Yes ➔ skip to Intro3
2. Don't know

INTRO2. [If no or don't know, continue with] – did your lighting equipment get changed out within the last __2__ years?
0. No ➔ thank and terminate
1. Yes
2. Don't know ➔ thank and terminate

INTRO3. We are evaluating the Rightlights program, and are interested in getting feedback on some of the negative and positive effects associated with the equipment and the program. I hope you might have a few minutes now so we could discuss that – are you free for about 10 minutes?
0. No ➔ try to schedule for another, more convenient, time _____-
1. Yes ➔ go to NEB1
2. Don't know ➔ well, let's start the survey and you can let me know if we need to stop…

NEB1. Are there any negative impacts that you feel the program provides or leads to? (open-ended)

NEB2. Aside from possibly energy savings from the program, are there any other benefits that you felt the program provided? (open-ended)

We'd like to ask you about a variety of impacts that are sometimes associated with energy efficient lights of the types covered under the RightLights Program.

NEB3. Did you experience any negative or positive effects associated with changes in __(read from table)_____ **from the energy efficient measures included under RightLights above the impacts you would have achieved from standard / replacement equipment – or was there no effect of this type that you noticed (read each in table in turn)?** (circle +1 for positive, 0 for no effect, and -1 for negative effect and T for "too early to tell" in the table below)

NEB4-NEB5. [If they answered positive or negative impact] – Thinking about the value you experience from this benefit -- would you say it is more valuable to you or less valuable to you than the energy savings from the program? If the impact is negative, please let me know if it is more costly or less costly than the energy savings.

[NOTE IF they say they say they have NO energy savings continue with this question in the following way:
NEB6. "Please let us know how important any of the following potential benefits were to you? Put a 0 for "not important at all", 5 for "extremely important", or any number in between."]

Possible negative or positive effects associated with the energy efficient Rightlights equipment compared to standard replacement equipment.	NEB3. Pos/no effect / neg, too early to tell	NEB4. IF POS: is the effect more valuable or less valuable than the energy savings… [1]	NEB5. IF NEG: is the effect more costly or less costly than the energy savings[2]	NEB6. (IF they can't answer and say no savings put 0-5 in blank at right)
Lights				
a. Equipment maintenance	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
b. Equipment lifetime	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
c. Quality of Light	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
d. Quantity of light	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
e. Building safety	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
f. Impact on sales / productivity	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
g. Noise	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
h. Control over the bill, ability to control energy bill, understanding of energy use	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
i. Flicker	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
j. Doing good for the environment	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
k. Sick days	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
l. Improved satisfaction from having a program available to them / previously underserved by programs	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5
m. Other: (specify) _____	+1 0 -1 T	MLV SLV SV SMV MMV	MLC SLC SC SMC MMC	0 1 2 3 4 5

[1] Codes MLV SLV SV SMV MMV follow in order: much less valuable, somewhat less valuable, same value, somewhat more valuable, much more valuable.
[2] Codes MLC SLC SC SMC MMC follow in order: much less costly, somewhat less costly, same value, somewhat more costly, much more costly.

NEB7. Do any of these categories "overlap" for you – or do you have trouble sorting out the values separately for any of these categories?

0 no
1 yes ➔ which ones? _____
2 don't know

NEB8. Which of these benefits would you say are the most valuable to you? (put letter for top 3)

_____ _____ _____

NEB8a. Where would you rank the value of the energy savings in relation to these benefits? Above? Below? Inbetween? (get which ranking)

1 above the top three NEBs
3 after the first one, before the others
4 after the second one, before the third
5 below these high NEBs
9 don't know

NEB9. Thinking about the combination of all the positive and negative effects you received from the program beyond the energy bill savings… would you say that the combination of these benefits are positive, negative, or no effect? (T=too soon to tell)

a. lighting +1 0 -1 T

NEB10 – NEB 11.

NEB10. [IF NEB9 positive]. Thinking about the combination of all these effects (which you indicated were positive overall) – would you say this total is more valuable or less valuable to you than the energy bill savings? How much more (or less) valuable (do not read). (record below)

10a. MLV SLV SV SMV MMV ➔
10b. [IF 10a not="SV"]. The other benefits are about how much more (or less) valuable than the energy savings?

[(record the multiplier that you translate that provides the multiplier that should be applied to the energy savings to represent the NEBs – so if they say NEBs are twice as valuable as the energy savings, put 200%; if they say energy savings are twice as valuable as NEBs, put a 50%, etc.; translate into percentage terms; put 100% if "SV"] [circle letters in NEB10a, code percent in 10b;]

_____% NES DNK
[use NES if no energy savings and can't answer, use dnk for Don't know]

NEB11. [IF NEB9 negative]. Thinking about the combination of all these effects (which you indicated were negative overall) – would you say this total is more costly or less costly to you than the value of the energy bill savings? How much more (or less) costly (do not read). (record below)

11a. MLC SLC SV SMC MMC ➔ if not="SV" "

11b. [IF 11a not="SV"]. The other benefits are about how much more (or less) costly than the energy savings?
[(record the multiplier that you translate that provides the multiplier that should be applied to the energy savings to represent the NEBs – so if they say NEBs are twice as valuable as the energy savings, put 200%; if they say energy savings are twice as valuable as NEBs, put a 50%, etc. translate into percentage terms; put 100% if "SV"] [circle letters in NEB11a,code percent in NEB11b]

_____% NES DNK
[use NES if no energy savings and can't answer, use dnk for Don't know]

NEB12. Thinking about the combination of all the positive and negative effects you received from the program beyond the energy bill savings… how important would you say they are to you? Put a 0 for "not important at all", 5 for "extremely important", or any number in between.
lighting ____

NEB13. Thinking about the combination of all the negative and positive effects you received from the program beyond the energy bill savings… if we took away all these extra effects, can you estimate what you might be willing to pay to gain back these features, as an annual dollar amount?
lighting: $ _____

NEB13a. Thinking about one last way, can you estimate what amount might we have to pay to you in compensation if we took away all these extra benefits, as an annual figure?
Lighting $_____

NEB14. Did the program staff, contractors, installers, or other professionals you worked with on this project use non-energy benefits to help convince you to install energy efficiency measures as part of this project?

0 no
1 yes, lighting ➔ which were most important / convincing in that discussion? _____
2 don't know / refused

[section on removals]

NEB15. About how many total bulbs (or fixtures) would you estimate were replaced?
_____**bulbs** _____ **fixtures**

NEB16. Were the original bulbs that were replaced fluorescent?

0 no
1 yes, at least some of them ➔ about how many of the bulbs that were replaced were fluorescents? (range ok) _____
2 yes, all of them ➔ about how many bulbs that were replaced were fluorescents? (range ok) ____
3 don't know

NEB17. IF NEB16=yes, approximately how old were the bulbs you replaced? (code 0=no, 1=yes; if a mix, try to put the share that were each age).

a. 1-2 years old ➔ a_1. share _____%
b. 3-4 years old ➔ b_1. share _____%
c. older than 5 years old ➔ c_1. share _____%
d. don't know

NEB 19. Please describe how you disposed of used bulbs before the program, or what you would have done if the contractor hadn't removed and disposed of the bulbs. [do NOT read, just for coding purposes]

1. put in garbage / dumpster out for regular collection
2. had them removed by a certified contractor that disposes of them in a special way
3. recycled them
4. other (describe) _____-

[section on economic area]

NEB20. Approximately how many employees are there in this firm? (range ok) _____

NEB21. Approximately how many offices does your company have? (range ok) _____

NEB22. Where does this firm operate?

1 Local
2 Regional within state, but less than statewide
3 Statewide
4 Regional, multiple states
5 Nationally
6 Nationally and internationally

NEB23. If the firm had not invested in this lighting equipment, can you speculate what would have happened with the funds? (open ended)

NEB 24. [even if they can't answer above] **Can you speculate whether those would tend to be local expenditures or expenditures out of the state?**

NEB25. Did the program cause you to replace this equipment earlier (or later) than you might have otherwise?

0 No
1 Yes, earlier ➔ how much earlier (in months) _____
2 Yes, later ➔ how much later (in months) _____
3 Would never have done ____
4 Don't know / refused

NEB26. Compared to the same period in the year prior to installation, do you believe your energy bills decreased, stayed the same, or increased because of the program? (circle one answer)

1 Bills decreased a great deal
2 Bills decreased somewhat
3 Bills stayed about the same
4 Bills increased somewhat
5 Bills increased a great deal
6 Don't know

NEB27. Can you estimate about how much your monthly electric bills changed *because of the program*? $_____/month ___ savings ___ extra paid

NEB28. Do you believe energy prices will be increasing, decreasing, or staying the same over the next 3 years? (if increasing or decreasing, ask increasing / decreasing somewhat or a great deal?)

1 Energy prices will increase a great deal
2 Energy prices will increase somewhat
3 Energy prices will stay about the same
4 Energy prices will decrease somewhat
5 Energy prices will decrease a great deal
6 Don't know

NEB29. On a scale of 0 to 100, where 0 means energy bills / energy use are not at all important to your business, and 100 means they are among the very highest concerns of importance to your business, where would you rate energy use / energy bills?

_____ (enter number from 0 to 100, or DNK for refusal)

NEB30. Do you have any comments you want to make about the program?

That's it for the survey – we're done! Thank you very much for your time – we appreciate your assistance.

END OF NEB SECTION – participant end-users

Appendix B. Energy Impact Reporting Table

PG&E Program Energy Impact Reporting for 2004-2005 Programs

Program ID*:	ID-1445-04							
Program Name:	RightLights							
	Year	**Calendar Year**	**Gross Program-Projected MWh Savings**	**Net Evaluation Confirmed Program MWh Savings**	**Gross Program-Projected Peak MW Savings**	**Evaluation Projected Peak MW Savings****	**Gross Program-Projected Therm Savings**	**Net Evaluation Confirmed Program Therm Savings**
	1	2004	11,726	11,569	2.23	2.20	0	0
	2	2005	29,146	28,687	5.51	5.42	0	0
	3	2006	25,529	25,252	4.85	4.79	0	0
	4	2007	21,988	21,923	4.19	4.17	0	0
	5	2008	21,901	21,840	4.17	4.15	0	0
	6	2009	21,820	21,762	4.15	4.14	0	0
	7	2010	21,820	21,762	4.15	4.14	0	0
	8	2011	21,820	21,762	4.15	4.14	0	0
	9	2012	21,820	21,762	4.15	4.14	0	0
	10	2013	21,820	21,762	4.15	4.14	0	0
	11	2014	21,820	21,762	4.15	4.14	0	0
	12	2015	21,820	21,762	4.15	4.14	0	0
	13	2016	21,820	21,762	4.15	4.14	0	0
	14	2017	21,820	21,762	4.15	4.14	0	0
	15	2018	21,820	21,762	4.15	4.14	0	0
	16	2019	21,820	21,762	4.15	4.14	0	0
	17	2020	13,096	13,051	2.50	2.49	0	0
	18	2021	0	0	0.00	0.00	0	0
	19	2022	0	0	0.00	0.00	0	0
	20	2023	0	0	0.00	0.00	0	0
	TOTAL	**2004-2023**	**363,403**	**361,707**	**69.08**	**68.74**	**0**	**0**

*Please complete this form for the PG&E program ID included in the evaluation.

**Please include the definition of Peak MW used in the evaluation.

Definition of Peak MW as used in this evaluation: *MW Savings = Connected load MW savings*Coincident Diversity Factor*Demand Interactive Effect Factor*