Commonwealth Edison Company
Energy Efficiency/Demand Response Plan
Plan Year 1 (6/1/2008-5/31/2009)
Evaluation Report:
Small C&I CFL Intro Kit

December 2, 2009

Submitted To:
ComEd

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Final Report

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E EXECUTIVE SUMMARY

E.1 Evaluation Objectives

The goal of this report is to present a summary of the findings and results from the evaluation of ComEd's 2008 (PY1) Small C&I Intro Kit program. The main goals of this lighting program are to provide a point-of-entry to ComEd's Smart Ideas for Your Business program and to increase the market penetration of energy efficient lighting by offering free CFL bulbs to hard-to-reach (HTR) small business customers. It also seeks to distribute educational materials along with a mini-catalog of other energy-efficient products in order to increase customer awareness and acceptance of these technologies. The primary objectives of this evaluation are to quantify the gross and net energy impacts resulting from the distribution of the free CFLs and to assess program participants' prior awareness of CFLs and their initial reactions to the mini-catalog.

E.2 Evaluation Methods

Table 1 provides a summary of the data collection activities conducted as part of this evaluation. As this figure shows, the primary data collection activity for this evaluation was a 200-point computer-aided telephone interview (CATI) that was conducted with a random sample of program participants. Data collected during these interviews were essential in calculating both the gross and net program impacts.

Table 1: Data Collection Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	All Small C&I Intro Kit Recipients	Tracking Database	-	All	Ongoing
In-depth Phone Interviews	ComEd Small C&I Intro Kit Program Staff	Contact from ComEd	Small C&I Intro Kit Program Manager	1	May 2009
	Small C&I Intro Kit Program Implementers	Contact from ComEd	EFI Program Implementation Manager	1	May 2009
CATI Phone Survey	Small C&I Intro Kit Recipients	Tracking Database	Random Sample of Small C&I Intro Kit Recipients	200	June 2009

E.3 Key Findings

The goal of this program was to give away 100,000 free CFLs to small businesses within ComEd service territory. A total of 156,883 free CFL offers were mailed and 34,720 customers responded (yielding a response rate of 22%) resulting in a total of 104,160 free CFLs being given away as part of the program.

Table 2 below provides the key gross and net savings parameter estimates (displaced watts, average daily hours of use, installation rate, peak coincidence factor, energy and demand interactive effects and net-to-gross ratio), as well as the program reported and evaluation verified gross and net energy savings estimates. Although the free CFLs were intended for small business customers, approximately one-third of the program bulbs ended up in residential locations which typically turn on their lights for fewer hours per day. Since the telephone surveys were with the small businesses that were the intended target of the program, none of the survey data were applicable to these inadvertent residential participants. Therefore, we applied data from California's 2005 Residential DEER Database to estimate energy savings for these program bulbs. Specifically, we used the DEER residential hours of use estimate (2.34 hours per day) and the DEER residential peak load coincidence factor (0.081). DEER does not currently have estimates of interactive effects for residential installations and thus these were set equal to 1.

Table 2: PY1 Gross and Net Parameter and Savings Estimates

Gross and Net Parameter and Savings Estimates	Program Reported	Evaluation Verified	
	Small Business	Small Business	Residential
CFLs Distributed through the Program	104,160	73,593	30,567
Average Displaced Watts (Delta Watts)	62.9 watts	48.3 watts	
Average Daily Hours of Use[1]	10.4	10.0	2.34
Gross kWh Impact per unit	239 kWh	176 kWh	41 kWh
Gross kW Impact per unit	0.06 kW	0.05 kW	
Installation Rate	90%	32%	
Energy Interactive Effects	1.12	1.12	1.00
Demand Interactive Effects	1.21	1.19	1.00
Peak Load Coincidence Factor	0.84	0.86	0.081
Total First-Year Gross MWh Savings	**25,064 MWh**	**5,025 MWh**	
Total First-Year Gross MW Savings	**7.1 MW**	**1.8 MW**	
Total First-Year Gross Peak MW Savings	**6.0 MW**	**1.2 MW**	
Net-to-Gross Ratio (1-FR)	80%	56%	
Total First-Year Net MWh Savings	**20,051 MWh**	**2,815 MWh**	
Total First-Year Net MW Savings	**5.7 MW**	**1.0 MW**	
Total First-Year Net Peak MW Savings	**4.8 MW**	**0.7 MW**	

[1]*Small Business and Residential daily HOU estimates are taken from DEER.*

The PY1 net claimed energy savings for this program were 20,051 MWh[1], resulting in a net saving realization rate of 14%. We identified three primary drivers for this low realization rate. They include:

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[1] Original goals for the Small C&I Intro Kit program were 16,816 MWh and 3.5 MW.

1. The *Installation Rate* was found to be 32%; 58% lower than program plans (90%). The majority of these uninstalled bulbs are reportedly in storage and will installed when a bulb burns out. The energy savings from these stored bulbs was not counted as PY1 savings, but savings resulting from these future installations will be estimated in the PY2 evaluation.
2. The Hours of Use (HOU) estimate for the CFLs installed in business locations is similar to that used in program planning[2]. However the HOU estimate for Residential locations, where one-third of program bulbs ended up, is significantly lower; just 25% of the business HOU.
3. The self-reported Net-to-Gross ratio was found to be 56%, which is 70% of the estimate that was used for program planning (80%).

Key Process Findings

- Customer satisfaction with the free CFL component of the program was high, with 86% of participants reporting being very satisfied.
- Customers who participated in the free CFL component of this program were typically aware of CFLs *before* receiving the direct mail offer from ComEd (73% of participants). Nearly half of program participants had previously purchased CFLs for their facilities.
- Almost all program participants who had installed at least one of the three free CFLs are "very likely" (64%) or "somewhat likely" (22%) to purchase CFLs for their business in the future.
- Recall of the mini catalog among participants in the free CFL offer was high (46%), showing that including the catalog with the free product is an effective strategy for reaching customers. However, only half of the customers who recalled the catalog had looked through it at the time of the survey and none of the customers we interviewed had made a purchase from the catalog.
- A majority of customers (62%) who recalled the catalog reported that they would or might purchase something in the future, with the most likely item being additional CFLs.
- Only about one-third of surveyed customers are aware that ComEd program offers rebates for the installation of energy efficient equipment to its business customers.

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[2] Program plans and energy savings goals for both the residential and small business lighting programs used HOU estimates from DEER. The final small business HOU estimate used in this evaluation was also based on DEER but was bulb-weighted to reflect the distribution of businesses participating in the program.

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1   INTRODUCTION TO THE PROGRAM

1.1   Program Description

The Small C&I Intro Kit lighting program provides a point-of-entry to ComEd's Business Solutions program and increases the market penetration of energy-efficient lighting by offering free CFL bulbs to hard-to-reach (HTR) small business customers. It also seeks to distribute educational and discounted lighting product materials that will increase customer awareness and acceptance of energy-efficient lighting technologies.

The Small C&I Intro Kit lighting program kicked off in February 2009 with a mailing of brochures containing information on the benefits of energy-efficient lighting to small HTR nonresidential customers.[3] These brochures included a tear-off coupon offering a choice of three free CFL bulbs that could be redeemed by selecting the bulbs desired and placing the postage-paid coupon in the mail. The free CFLs were then mailed directly to customers along with a mini-catalog offering a wide array of discounted lighting technologies as well as water, load reduction, and ventilation products. The goal of this direct mail approach was to help small HTR businesses overcome the barriers they face to energy efficiency program participation in hopes of engaging them in future energy efficiency program offerings.

1.1.1   Implementation Strategy

ComEd hired Energy Federation Incorporated (EFI) to be the program implementer for the Small C&I Intro Kit program. EFI was responsible for handling the printing and mailing of the direct mail brochure that was sent to ComEd customers. After inputting all of the data from the return postcards, EFI assembled the CFL kits and mailed them to the customers that requested bulbs. In addition, EFI was responsible for creating the mini-catalog that was included in the shipment.

Program Delivery Mechanisms

In order to promote maximum customer participation in the Small C&I Intro Kit program, a direct mail approach was used that required little effort on the part of the customers. The offer came attached as a tear-off coupon to an information brochure on energy-efficient lighting, and the customers needed only to choose the type of CFLs they desired (four distinct packages of various wattage spiral and reflector CFLs were available) and return the pre-addressed postage paid postcard to ComEd. Customers also had the option of ordering the CFLs by phone or via EFI's website.

The brochures were mailed in two waves, the first in mid-February and the second in mid-March. In total 156,883 offers were mailed and 34,720 were returned resulting in a response rate of approximately 22%.

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[3] These customers were selected from the ComEd Customer database (CIMS) by rate code and in some instances, due to incorrect rate codes, these offers ended up in residential locations.

Coupon/Bulb Processing

As the program implementer for the Small C&I Intro Kit program, EFI was responsible for tracking all coupons returned by customers and ensuring the free bulbs were distributed to the customers in a timely manner.

Table 3: Distribution of Small C&I Intro Kit Bulbs Requested

Lighting Measures	Bulbs Distributed	% of Overall Bulbs
14 Watt Spiral CFL	23,961	23%
23 Watt Spiral CFL	43,353	42%
15 Watt Interior Reflector	15,672	15%
23 Watt Reflector	21,174	20%
Total	**104,160**	**100%**

Source: Program Tracking Data

While the brochure noted that the free bulbs would be delivered within four to six weeks, the actual distribution of bulbs was delayed until May and June of 2009. The reason for this delay was that the mini catalog, which was shipped with the free CFLs, had not been finalized. However, this delay did not appear to affect customer satisfaction, which was very high (see also the "Barriers to Installing CFLs" Section below). The bulbs were mailed to customers in four waves as shown below.

Bulb Mail Date	%
Week of 5/11	29%
Week of 5/18	42%
Week of 5/25	27%
Week of 6/8	1%

Source: Program Tracking Data

1.1.2 Marketing Strategy

The program used a direct mail approach targeted to ComEd's small business customers. The direct mail piece was the brochure described above: a small flyer with a tear-off return postcard as well as general information about suggested uses and energy savings of the four types of bulbs offered through the program. The flyer also contained a phone number and website link through which the free bulbs could be ordered.

EFI also set up a website domain that was expressly for this program. The primary purpose of this website, was to enable on-line ordering of the free CFLs. The website also provided general information about the energy and environmental benefits of using CFLs.

It should be noted that the website and the flyer provided conflicting information about the likely monetary savings from installing the free CFLs: The flyer noted electricity bill savings from $140 to $225 while the website put this value at $120. While few customers used the website option to order the bulbs, care should be taken to provide more consistent messages in future marketing efforts.

1.2   Evaluation Questions

The evaluation sought to answer the following key researchable questions. Some of the researchable questions will be addressed in the evaluation of PY2.

Impact Questions:

1. What is the level of gross annual energy (kWh) and peak demand (kW) savings induced by the two program elements (free CFL mailing and mini-catalog sales)?
2. What are the net impacts from the program? What is the level of free ridership associated with the two program elements, and how can it be reduced? What is the level of spillover associated with the mini-catalog component of the program?
3. Did the program meet its energy and demand goals? If not, why not?

Process Questions:

1. Has the program as implemented changed from the plan filed on November 15, 2007? If so, how, why, and was this an advantageous change?
2. What is the effectiveness of the catalog sales aspect of the program, including the program design, delivery method, and the marketing and informational materials provided in the mail along with the free CFL bulbs?
3. What is the customer experience and satisfaction with the mini-catalog program?

2 EVALUATION METHODS

This section describes the analytic methods and data collection activities implemented as part of the PY1 process and impact evaluation of the Small C&I Intro Kit program, including the data sources and sample designs used as a base for the data collection activities.

2.1 Analytical Methods

Gross Program Savings

Gross energy and demand (coincident peak and overall) savings resulting from the PY1 Small C&I Intro Kit program were calculated using the following savings algorithms:

Per Unit kWh Savings = Delta Watts * HOU * Installation Rate * Energy Interactive Effects

    where HOU = Hours of Use

Annual kWh Savings = Program bulbs * Per Unit kWh Savings

Per Unit kW Savings = Delta Watts/1000 * Installation Rate *Demand Interactive Effects

Annual kW Savings = Program bulbs * Per Unit kW Savings

Per Unit Peak kW Savings = Per Unit kW Savings * Mean Load Coincidence Factor

    Where Mean Load Coincidence Factor is calculated as the percentage of program bulbs turned on during peak hours (weekdays from 1 to 6 p.m.) throughout the summer.

Annual Peak kW Savings = Program bulbs * Per Unit Peak kW Savings

Table 4 below shows the data sources used to analyze the input parameters in the energy and demand savings algorithms for the Small C&I Intro Kit program. For some parameters there are multiple data sources listed. In these cases the data source shown in bold was used to calculate the final ex post parameter estimate. Each of these parameters is described in further detail below.

Table 4: Gross Savings Parameter Data Sources

Gross Savings Input Parameters	Small C&I Intro Kit Program
Rebated Bulbs/Measures	**Program Tracking Data/Participant Phone Survey**
Delta Watts	Participant Phone Surveys / **RMST[4] Report**
Hours of Use	Participant Phone Surveys / **DEER**
Installation Rate	Participant Phone Surveys
Energy Interactive Effects	DEER
Mean Load Coincidence Factor	Participant Phone Surveys / **DEER**

Program Bulbs

The number of bulbs distributed through the program is a key parameter in the calculation of total gross and net program savings and is derived from the Small C&I Intro Kit tracking database provided to the evaluation team by ComEd. Survey responses were used to determine the percentage of these that were installed in commercial versus residential locations.

Delta Watts

The delta watts parameter is a measurement of the wattage displaced by the newly installed program CFL. To estimate the number of watts displaced by the program bulb, surveyed participants were asked what type of bulb was replaced when the new CFL was installed (Incandescent, CFL, Halogen, other) and asked to estimate the wattage of this prior bulb. Once the wattage of the prior bulb has been estimated, the displaced watts (or delta watts) could be calculated as the difference between the prior wattage and the wattage of the new CFL (which is contained in the tracking data provided by ComEd). A second method of estimating delta watts is to use a lookup table of standard incandescent equivalents to estimate the wattage of the bulb that was installed prior to the program bulb. Due to possible issues of customer recall during phone surveys, the evaluation team decided to use the second approach to estimate the average delta watts for this evaluation (however the difference between the estimates from the two methods was less than 4 watts.

Hours of Use

In order to estimate the energy savings resulting from a newly installed CFL, it is necessary to understand the number of hours the lamp is turned on each day (which can be annualized by multiplying the daily value by 365 days). Assuming you have two bulbs that have displaced the same number of watts, the lamp that is turned on for a greater percentage of time over the course of the year will yield a larger number of kilowatt hours saved. During the phone surveys, participants were asked to estimate the average number of hours per day each of their installed program bulbs was turned on. This data allowed for the calculation of an average self-reported HOU estimate across all installed program bulbs. However, a review of past evaluations,[5,6] which was completed as part of this study found that self-

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[4] RMST report refers to Itron Inc., *California Residential Efficiency Market Share Tracking: Lamps 2007*. Prepared for Southern California Edison, December 2008.

[5] EcoNorthwest, *Evaluation of the SCE 2004-05 Small Business Energy Connection Program*. Prepared for Southern California Edison, April 2007.

reported estimates of hours of use can be highly inaccurate. The self-reported estimates of HOU reported in two of the evaluations reviewed (both collected during on-site surveys) ranged from underestimating actual[7] HOU by 20% to overestimating actual HOU by 40%[8]. Based on this inaccuracy in the self-reported data, it was decided to turn to a more reliable data source. Because the budget for this evaluation did not allow for conducting a lighting logger study, the HOU estimates used to calculate the ex post program impacts were based on the DEER business type HOU estimates[9] that were used to create the ComEd program plans.

Installation Rate

In order for a program bulb to contribute energy savings to the Small C&I Intro Kit program, it must be installed within the program year. All surveyed customers were asked whether or not they had installed (and not since removed) any of the free CFLs they received from ComEd and their responses were used to calculate the PY1 installation rate for the Small C&I Intro Kit program.

Mean Load Coincidence Factor

The mean load coincidence factor allows for the estimation of the average demand savings that occur during ComEd's peak period (summer weekdays from 1 to 6 p.m.). It is can be calculated as the percentage of time customers self-reported each of their installed program bulbs to be turned on during the peak period. Due to the issues stated above regarding inaccuracies in customer self-reported hours of use and an error in the coding of the survey (they peak period was inadvertently set as 3 to 6 p.m. rather than the PJM peak of 1 to 6 p.m.), the evaluation team decided to use the DEER coincidence factor estimates re-weighted to represent the business type distribution of program participants (based on survey respondents).

Energy Interactive Effects

Recent research has focused on the incremental electric savings and gas usage resulting from customers' adoption of CFLs. The cooler temperatures at which CFLs run can lead to decreased air conditioning loads during the peak summer months; however they also can lead to increased electric or gas heating during the winter months. To calculate energy and demand interactive effects for this evaluation, the ex ante DEER estimates (estimated by business type grouping) were re-weighted to represent the distribution of surveyed participants(our best guess at the distribution of business types for the population of program participants).

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[6] Itron Inc., *2003 Statewide Express Efficiency Program Measurement and Evaluation Study*. Prepared for California's Investor-Owned Utilities (PG&E, SCE, SDG&E and SoCalGas), March 2005.

[7] "Actual" hours of use are determined by installing lighting data loggers on all bulbs of interest that capture the exact moment the bulbs are turned on and off.

[8] HOU estimates gathered during phone surveys are believed to be even less accurate than those gathered during on-site surveys.

[9] The DEER HOU estimates are based on lighting logger studies conducted in California.

Net Program Savings

The primary objective of the net savings analysis for the Small C&I Intro Kit program is to determine the program's net effect on customers' electricity usage. This requires estimating what would have happened in the absence of the program. Thus, after gross program impacts have been assessed, net program impacts are derived by estimating a Net-to-Gross (NTG) ratio that quantifies the percentage of the gross program impacts that can reliably be attributed to the program. A customer self-report method, based on data gathered during participant phone surveys, was used to estimate the NTG ratio for this evaluation.

For PY1, the net program impacts were based solely on the estimated level of free-ridership in the marketplace. Participant spillover was not assessed for this first program year because of the delayed distribution of the mini-catalog, close to the end of the first program year. All energy-efficient lighting purchases from the mini-catalog or influenced by mini-catalog or program bulbs will be counted as part of PY2 savings. Once free-ridership (and spillover for PY2) have been estimated the Net-to-Gross (NTG) ratio is calculated as follows:

NTG Ratio = 1 – Free-ridership Rate + Spillover Rate (PY2 Only)

Free-Ridership

Free-ridership for this evaluation was calculated using a customer self-report method. This method calculates free-ridership using data collected during participant phone surveys concerning the following two items:

1) The degree of influence the program had on the customer's decision to install CFLs (Program Influence Score), and
2) What actions the customer would have taken on their own had they not been given the free CFLs (No-Program Score).

The calculation of free-ridership is a multi-step process that calculates a Program Influence score and a No-Program score for each customer and then combines those two scores to come up with a customer-level free-ridership score (i.e., net-to-gross ratio). Both of these scores can take values of 0 to 10 where a lower score indicates a higher level of free-ridership. Program-level free-ridership (i.e., net-to-gross ratio) is then determined by taking the average of the individual customer-level free-ridership scores.

The Program Influence score was estimated based on the self-reported influence level the program bulbs had (on a scale of 0 to 10 where 0 equals not at all influential and 10 equals very influential) on the customers' decision to install CFLs instead of standard efficiency bulbs. The No-Program score was based on a number of factors including:

1) Would the customer have purchased CFLs for their facility if they had not received the free CFLs from ComEd?
2) Would they have purchased the CFLs at the same time?
3) Would they have purchased the same number of CFLs? and
4) How likely is it (on a scale of 0 to 10 where 0 equals not at all likely and 10 equals very likely) that they would have bought the same CFLs had they not been given them for free?

The algorithm used to calculate the No-Program score adjusts the score assigned to customers upward if they indicate that they would have purchased and installed the CFLs on their own in the absence of the program but that the program either accelerated their CFL installation or led them to install a greater number of CFLs.

Once these two scores have been calculated the customer-level free-ridership is equal to:

Customer-level Free-Ridership = 1 – (Program Influence Score + No-Program Score)/20

2.2   PY1 Data Collection Activities

The data collected for the evaluation of the PY1 Small C&I Intro Kit program was gathered during a number of activities; including in-depth phone interviews with ComEd program staff and program implementers at EFI, Computer Assisted Telephone Interviews (CATI) conducted with Small C&I Intro Kit program participants, and ComEd tracking data analysis. Table 5 below provides a summary of these data collection activities including the targeted population, the sample frame, and timing in which the data collection occurred.

Table 5: Data Collection Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	All Small C&I Intro Kit Recipients	Tracking Database	-	All	Ongoing
In-depth Phone Interviews	ComEd Small C&I Intro Kit Program Staff	Contact from ComEd	Small C&I Intro Kit Program Manager	1	May 2009
	Small C&I Intro Kit Program Implementers	Contact from ComEd	EFI Program Implementation Manager	1	May 2009
CATI Phone Survey	Small C&I Intro Kit Recipients	Tracking Database	Random Sample of Small C&I Intro Kit Recipients	200	June 2009

2.2.1 Data Sources

Tracking Data

The tracking data delivered for this evaluation consisted of two databases. The first database was the *Customer Mailed Database* and contained a record for all 156,883 ComEd customers that were mailed the Small C&I Intro Kit offer. This database contained name, contact information (phone and address), account numbers, tariff, business type, and maximum demand (where available). The second database was the *Customer Response Database* and it contained a record for all 34,720 customers who requested the three free CFLs offered by the program. In addition to all of the variables listed above, this database also contained information on the bulb type (spiral or reflector), wattage requested and whether the bulbs were requested via the mail, phone or web. Ninety-three percent were requested via the mail, 4.5% via the phone and 2.5% via the web.

The tracking databases for this program were very thorough and easy to use. The data that was not included in the *Customer Response Database* that would have been helpful was the date the bulbs were mailed out to the customers. EFI did provide this data to the evaluation team as a separate file that was

then merged with *Customer Response Database* so that analyses of bulbs not received by customers and the bulb installation rate could be performed.

Program and Implementer Staff Interviews

Two in-depth interviews were conducted as part of this evaluation. One of these interviews was conducted with the ComEd Small C&I Intro Kit Program Manager (Erinn Monroe), the other was conducted with the EFI Fulfillment Manager (Brad Steele). These interviewers were completed over the phone in May of 2009. The interview with the Small C&I Intro Kit Program Manager focused on program processes to better understand the goals of the program, how the program was implemented, the perceived effectiveness of the program, and also verified evaluation priorities. The interview with the EFI Fulfillment Manager explored the implementation of the program in more detail and also covered areas of data tracking and quality assurance. The interview guide used for these interviews is included in Appendix section 5.1.1.

CATI Phone Survey

A CATI telephone survey was conducted with a random sample of 200 Small C&I Intro Kit participants. This survey focused on questions to estimate the gross and net program impacts and to support the process evaluation. All CATI surveys were completed by Opinion Dynamics Corporation (ODC) in June of 2009.

The CATI survey was directed toward customers who requested free program CFLs via the coupon postcard in the spring and early summer of 2009. These surveys assessed all of the parameters necessary to calculate PY1 gross energy and demand impacts (installation rates; displaced wattages; and hours of use, including peak period usage, as well as free-ridership). Additional data was collected from these participants on topics such as CFL awareness, program satisfaction, mini-catalog purchases and purchase intentions, and business demographics for the process component of the evaluation. The CATI survey instrument used for this evaluation is included in Appendix section 5.1.2.

Sampling

The sample of Small C&I Intro Kit participants was randomly selected from the *Customer Response Database* provided by ComEd. Basic data cleaning steps were undertaken before the sample was pulled from the database so that for example, records with missing or invalid phone numbers were removed. These records could not be included in the surveying efforts but were included in the final impact results. Because we did not stratify the random sample of Small C&I Intro Kit participants, it was not necessary to weight the data collected from these customers in our analysis. In total, 2,000 customer records were sent to ODC in order to complete the survey.

Survey Disposition

Table 6 below shows the final dispositions of the 2,000 participants selected for the Small C&I Intro Kit participant survey. As this figure shows, contact with all but 19% of the sample was attempted at least once and these contacts resulted in 200 survey completes. The survey center was unable to make contact with 29% of customers in the sample for a variety of reasons such as that: no one answered the phone, an answering machine picked up, or the phone line was busy. The phone numbers provided for 11% of the sample had problems such as being disconnected, blocked, an incorrect number, or a cell phone number/refusal.

Table 6: Sample Disposition

Sample Disposition	Customers	%
Sample Pulled	2000	100%
Completes	200	10%
Not Dialed	380	19%
Did Not Receive Bulbs	24	1%
Unsure if Received Bulbs	100	5%
Mistakenly Reported Bulbs Not Received	24	1%
Residential Accounts	135	7%
Refusal	109	5%
Unable to Reach	588	29%
Language Barrier	37	2%
Phone Number Issue	225	11%
Non-Specific Callback/Appointment Scheduled	176	9%

Source: ODC CATI Center

Contact was made with a total of 510 customers, and although surveys were not completed with this entire set of customers, enough data was collected to allow us to more clearly understand and classify the overall Small C&I Intro Kit participant population. As Table 7 below shows, 5% of those we spoke with indicated they never received the bulbs[10], 26% received the bulbs at their residential address, and 5% terminated the interview partway through (but far enough into the survey that we were able to confirm they had received the program bulbs at their small business location).

Table 7: Survey Contacts Disposition

Survey Contacts Disposition	Customers	%
Customers Surveyed	510	100%
Completes	200	39%
Did Not Receive Bulbs	24	5%
Unsure if Received Bulbs	100	20%
Mistakenly Reported Bulbs Not Received	24	5%
Residential Accounts	135	26%
Mid-Interview Terminate	27	5%

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[10] Originally 25% of customers reported they had not received the bulbs. A random sample of these customers was called back to confirm the bulbs had not arrived and only 20% of the callbacks could confirm this was the case. In the remainder of the cases we found that either the bulbs did arrive but the original respondent was unaware they had, they arrived broken, or the address and the phone number in the tracking database did not match (and thus we were calling a location other than where the bulbs were shipped).

In order to estimate program savings it was necessary to come up with an estimate of the percentage of program bulbs installed in commercial versus residential locations, since the hours of use estimates for these two types of locations are significantly different[11]. Using the survey contact disposition from the table above as well as data obtained during 15 of the 200 completed the surveys; the percentage of residential installations was calculated as follows:

135 Residential Prescreened Accounts + 15 Residential Surveyed customers / 510 customers surveyed

= 29.3% of program bulbs installed in residential locations.

Profile of Survey Respondents

Almost 60% of surveyed customers classified their main business activity as either retail/service (35%) or office (24%).

Table 8: Main Business Activity

Main Business Activity	Percent of Respondents (n=200)
Retail/Service	35%
Office	24%
Light Industry	12%
Property Management/Apartment Association	8%
Medical	6%
Agricultural/Farm	3%
Restaurant	3%
Warehouse	3%
Other	7%

Source: Participant Survey

There was a fairly even split between owners (53%) and renters (47%) who responded to this survey. Nearly all customers who rent their facility are also responsible for paying the electric bill.

Most program participants (86%) classify their company as a "small company" relative to other companies in their industry.

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[11] DEER commercial HOU estimates range between 5 and 18 hours per day, whereas the DEER residential HOU estimate is 2.34 hours per day.

2.2.2 Sampling Error

Table 9 below provides the estimated population level sampling errors associated with the participant-level and bulb-level samples selected for the Small C&I Intro Kit survey, as well as for the sample of self-reported installed program bulbs. As this table shows the sample selected for this data collection activity achieves better than a 90/10 confidence interval/precision level for each of these populations. The sampling errors were calculated assuming the data to be normally distributed with a coefficient of variation 0.5 (which is a worst case estimate) and all data points to be independent and identically distributed (IID). We recognize the IID assumption may not be the case in situations where a customer installed all three program bulbs in a single location connected to a single light switch. Under these data assumptions the minimum number of data points required to achieve a 10% level of precision is 68 which in most cases won't be achieved on a segment level (such as customer business type or installation room location) for more than a segment or two.

Table 9: PY1 Sample Size and Population Level Sampling Error[12]

Population	Population Size (N)	Sample Size (n)	Sampling Error (90% CI)
Small C&I Intro Kit Participants	34,720	200	5.8%
Small C&I Intro Kit Distributed Bulbs	104,160	600	3.4%
Small C&I Intro Kit Installed Bulbs	36,456	210	5.7%

2.2.3 Analysis Weights

Because a random sample of all program participants was selected for the survey, it was not necessary to weight any of our analysis results. As Table 10 below shows the distribution of surveyed bulbs and total program bulbs is nearly identical. Each surveyed bulb was representative of approximately 175 actual program bulbs.

Table 10: Distribution of Surveyed Bulbs versus Program Bulbs

Program Bulbs	Surveyed Bulbs (n)	%	Total Program Bulbs (N)	%
14 Watt Spiral CFL	144	24%	23,961	23%
23 Watt Spiral CFL	237	40%	43,353	42%
15 Watt Interior Reflector	93	16%	15,672	15%
23 Watt Reflector	126	21%	21,174	20%
Total	**600**	**100%**	**104,160**	**100%**

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[12] This assumes a normal distribution with a coefficient of variation of 0.5 (upper bound) and the data points are independent and identically distributed (IID).

3 PROGRAM LEVEL RESULTS

This section presents the results of the impact and process evaluations of the Small C&I Intro Kit program.

3.1 Impact Evaluation Results

3.1.1 Verification and Due Diligence

This section provides the results of the evaluation of ComEd's Verification and Due Diligence of the Small C&I Intro Kit program. Under this task, we explored the quality assurance and verification activities currently carried out by program and implementation staff. We compared these activities to industry best practices[13] for similar residential and C&I programs to determine:

1. If any key quality assurance and verification activities that should take place are currently not being implemented.

2. If any of the current quality assurance and verification activities are biased (i.e., incorrect sampling that may inadvertently skew results, purposeful sampling that is not defendable, etc.).

3. If any of the current quality assurance and verification activities are overly time-consuming and might be simplified or dropped.

Data Collection

This assessment primarily relied on in-depth interviews with program and implementation staff and documentation of current program processes, where available.

Results

Direct Mail Postcard

EFI sent a direct mail postcard to ComEd's small business customers (less than 10 kW). The mailing list was based on rate codes within the customer database and customer demand information. Each customer was assigned a reference number, which was printed on the postcard, to allow for easy tracking of orders. The evaluation team is not aware of any quality assurance procedures performed on the customer list, before the postcards were mailed.

Assessment: Based on the participant survey, 26% of the direct mail postcards were sent to residential rather than business accounts. This has a significant effect on program impacts since savings from residential customers are smaller than savings from business customers. We therefore recommend

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[13] See the Best Practices Self Benchmarking Tool developed for the Energy Efficiency Best Practices Project: http://www.eebestpractices.com/benchmarking.asp.

cleaning up rate codes within customer databases to be able to better target residential and nonresidential customers for specific program offers.

Data Entry of Order Information

When CFL kit orders come in, EFI manually enters the reference number on the postcard to document the order. The data entry system auto-fills all other available account information based on that reference number. The only other information EFI has to enter is the type of CFL requested. This system helps cut down on data entry issues, as the employee needs to only input account number and type of kit. EFI has established procedures that dictate what should be done in instances where the customer has not specified which type of bulb they would like, or for those customers who request more than one type.

Assessment: For the free CFL component implemented in Program Year 1, data entry procedures were sufficient. It would have been useful if the date the order was received had also been recorded. We recommend capturing this information for the mini-catalog component of the program, so that the time between receipt and fulfillment of the order can be tracked. For the upcoming mini-catalog component, we also recommend putting in place procedures for random data entry quality checks for the products ordered by the customer.

Fulfillment of Order

When assembling CFL kits, orders of the same bulb type were grouped together. This was done to minimize the probability that an incorrect type of bulb would be delivered to the customer. A manager was responsible for periodically spot checking orders to verify that the bulbs in the kit matched the bulb type on the customer's order form. CFL kits would then be organized by ZIP code to reduce the amount of handling required once the kits leave the facility and to reduce the chance of bulbs breaking.

Assessment: For the size of this program, quality control checks for the fulfillment of the CFL Kit order are sufficient. One issue that was discovered during our evaluation was that a substantial number of participants interviewed claimed that they did not receive the bulbs they ordered (5%) or were unsure that they received the bulbs (20%). This is likely to have been a problem of not having good contact information rather than bulbs not having been shipped. We therefore recommend that any future order forms require the customer to provide a contact name and contact telephone number. This would allow the shipments to be addressed to the person who filled out the order form and would increase the chances of the bulbs being received and being installed. Contact information would also help in the evaluation effort as it would allow us to identify the correct person for our participant interviews. We also recommend capturing the date the order was fulfilled, so that the time between receipt and fulfillment of the order can be tracked.

Data Tracking

The following data were tracked for the free CFL component of the program: customer/reference number, account number, phone number, name, mailing address, service address, source of the order (mail or phone), and type of bulb requested. As discussed above, the dates for receiving and for fulfilling the order were not present in the database provided by EFI and could not be made available for this evaluation. (EFI later informed us that the date the order was received is tracked.)

Assessment: The data tracking for the free CFL component of the program was sufficient, with the exception of the dates of order receipt and order fulfillment. As discussed above, we recommend capturing this data for any future orders. We also recommend adding to the tracking database updated customer contact information (name and phone number) to be collected on the order form.

Summary and Recommendations

Table 11 summarizes the quality assurance and verification activities currently carried out by the C&I CFL Intro Kit Program. It also features recommended changes to current procedures, as well as suggestions regarding additional activities that ComEd could implement to enhance current quality assurance and verification. Overall, ComEd's quality assurance and verification procedures for the Small C&I Intro Kit program are strong and in accordance with best practices for such a program.

Table 11: Summary of Quality Assurance Activities in Place and Recommendations

Quality Assurance Activities in Place	Recommended Change
Autofill of account information based on reference number	Implement procedures for random data entry quality checks (mini-catalog)
Spot checking of orders to ensure correct bulb type is shipped	None
Other Areas	- Clean up rate codes to better target business customers - Capture date of receipt of order - Capture date of fulfillment of order - Collect contact name and phone number

Source: Program manager interviews conducted in April and May 2009. Program documentation

3.1.2 Gross Program Impact Parameter Estimates

As mentioned above there are six key parameters necessary to calculate gross energy and demand savings estimates for the Small C&I Intro Kit program. These include:

1) Number of free CFLs distributed through the program,
2) Installation Rate across all CFLs distributed through the program,
3) Average Displaced Watts (Delta Watts) across all installed program bulbs,
4) Average Hours of Use (HOU) per Day across all installed program bulbs,
5) Energy Interactive Effects, and
6) Mean Load Coincidence Factor[14].

These parameter estimates will be used to calculate gross energy and demand (coincident peak and overall) savings using the following savings algorithms:

Annual kWh Savings = Program bulbs * Delta Watts/1,000 * Annual HOU * Installation Rate
     * Energy Interactive Effects

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[14] Calculated as the percentage of program bulbs turned on during the peak hours (weekdays from 3-6 p.m.) of the summer.

Annual kW Savings = Program bulbs * Delta Watts/1,000 * Installation Rate
        * Energy Interactive Effects

Annual Coincident Peak kW Savings = Annual kW Savings * Mean Load Coincidence Factor

The calculations used to estimate each of these parameter estimates is described in detail below.

Program Bulb Distribution

The number of bulbs distributed through the program is a key parameter in the calculation of gross and net program impacts and is used to extrapolate the per-bulb savings estimates to the program level. Table 12 below provides the total number of CFLs distributed through the program by bulb type and wattage. This data is based on the *Customer Response Database* provided to the evaluation team by ComEd.

Table 12: Free CFLs Distributed by Bulb Type and Wattage

Lighting Measures	Bulbs Distributed	% of Overall Bulbs
14 Watt Spiral CFL	23,961	23%
23 Watt Spiral CFL	43,353	42%
15 Watt Interior Reflector	15,672	15%
23 Watt Reflector	21,174	20%
Total	**104,160**	**100%**

Source: Customer Response Database

It was somewhat surprising to find that 65% of the bulbs requested through the program were Spiral CFLs and only 35% were Reflector Bulbs, given that Reflector bulbs tend to cost about $2 more[15] per bulb. When customers were asked about this choice more than three-quarters of respondents stated they had ordered the spiral bulbs because those were the type they needed or they did not have a place to install Reflector bulbs.

Installation Rate

The installation rate for CFLs given away as part of the PY1 Small C&I Intro Kit program was calculated based on data gathered during the participant telephone surveys. The questions asked of participants included:

- How many of the free CFLs you received from ComEd did you install in your facility?
- How many have been installed in another location within ComEd service territory?
- Where are the free CFLs that you did not install?
- What do you intend to do with the bulbs you have not installed?

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[15] Estimated based on regular retail prices of spiral versus reflector bulbs in the ComEd Phase 3 Residential Lighting program MOU database.

As shown in Table 13 below, 115 of the 200 participants (58%) surveyed reported they had not installed any of the three free bulbs they received within their businesses and only 39 of the 200 (20%) reported they had installed all three of the bulbs at their business location. Overall, 166 of the *576* bulbs whose installation location was known[16] were reported to be installed at the business location where the bulbs were mailed. This resulted in a preliminary installation rate of 29%.

Table 13: Program Bulbs Installed in Business

# of Bulbs Installed in Business	Parts	% of Parts	Bulbs Not Installed	Bulbs Installed	% of Bulbs Installed
0	115	58%	345	0	0%
1	27	14%	54	27	33%
2	11	6%	11	22	67%
3	39	20%	0	117	100%
Don't Know	8	4%	na	na	na
Total	**200**	**100%**	**410**	**166**	**29%**

Source: Participant Survey

Participants were then asked whether any of the 166 bulbs that had been installed at the customer's business location had since been removed and 5 bulbs (or 3% of those installed) reportedly had been removed. The reasons given for the removal of these bulbs included they had stopped working (3 bulbs), they had originally been installed only to test to see if they worked (1 bulb), and they were not needed at this time (1 bulb).

All survey respondents who reported that they had not installed all three of the free CFLs at their business location were asked a follow-up question regarding whether they had installed any of the uninstalled bulbs at another location within ComEd service territory. Eighteen participants reported they had installed one or more of the free CFLs elsewhere and all reported that this alternate location was within ComEd service territory.

Table 14 below shows that with the inclusion of these bulbs installed elsewhere in ComEd territory bulbs the installation rate increases to 37%.

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[16] 8 of the 200 participants surveyed did not know if the bulbs were installed. These individuals also stated there was no one else at their facility that could provide additional information as to the current status of these bulbs.

Table 14: Program Bulbs Installed in Business/Other Location within ComEd Service Territory

# of Bulbs Installed in ComEd Territory	Parts	% of Parts	Bulbs Not Installed	Bulbs Installed	% of Bulbs Installed
0	97	49%	291	0	0%
1	26	13%	52	26	33%
2	14	7%	14	28	67%
3	52	26%	0	156	100%
Don't Know	11	6%	na	na	na
Total	**200**	**100%**	**357**	**210**	**37%**

Source: Participant Survey

Customers were not asked whether any of the bulbs installed in an alternative location had since been removed and thus a removal rate of 3% (as found above for the business locations) was also applied to these additional installations resulting in an adjusted installation rate of 36%.

There was some concern that the installation rate was lower than expected due to the short timeframe between the bulb distribution (May 12th to June 10th, 2009) and the survey calls (June 22nd to June 26th, 2009). To further investigate this hypothesis we calculated the program bulb installation rate by the week the bulbs were mailed to the customers. Table 15 below shows that the bulb installation rate does increase the longer the customer had the bulbs in their hands, however the customers who were mailed bulbs during the week of May 11th would have had the bulbs in their hands for at least a month and still had only a 39% installation rate. Initially a follow up phone survey had been planned for a month after this original phone survey to see whether any of the non-installed bulbs had since been installed. This data collection effort was cancelled due to the timing of when the bulbs were mailed and the assumption that the ICC will only count bulbs installed within the program year toward program savings.

Table 15: Installation Rate by Bulb Mail Date

Bulb Mail Date	Installed	Not Installed	Installation Rate
Week of 5/11	62	97	39%
Week of 5/18	110	169	39%
Week of 5/25	38	91	29%
Week of 6/8	0	0	0%
Total	**210**	**357**	**37%**

Source: Participant Survey

As mentioned previously in Section 2.2.1, 25% of customers we contacted for the survey reported that they had not received the bulbs. A random sample of these customers was called back to confirm the

bulbs had not arrived and only 20% of the callbacks could confirm this was the case[17], resulting in a revised estimate of 5% of program bulbs not arriving at their final destination. The installation rate was adjusted to account for these non-delivered bulbs resulting in an overall installation rate of 32%.

Surveyed participants were also asked what became of the bulbs that were not installed. Table 16 below shows that 97% of those not installed were reported to be in storage, 1% were given away, and 1% were broken. The majority of the surveyed participants (91%) reported that they intended to install the program bulbs they currently had in storage in their business location. The majority of customers (86%) reported that these installations would occur when a bulb currently installed burned out. This may be an indication that the program could do more to educate customers on the savings resulting from changing out incandescent bulbs prior to burn out. The energy savings from these stored bulbs was not counted as PY1 savings, but future savings resulting from these bulbs will be estimated in future evaluations.

Table 16: Current Status of Non-Installed Program Bulbs

Location of Non-Installed Bulbs	Bulbs	%
In Storage	345	97%
Gave Away	3	1%
Bulbs Broke	3	1%
Don't Know	6	2%
Total	**357**	**100%**

Source: Participant Survey

Delta Watts

In order to estimate the watts displaced by installing program bulbs it is necessary to know the wattage of the program bulb as well as the wattage of the bulb that was installed prior to the program bulb (pre-wattage). Based on data gathered during our participant phone survey the displaced watts (delta watts) were calculated as the difference between the prior bulb wattage and program bulb wattage.

For the Small C&I Intro Kit program, the exact wattage of the program bulb is known (from the tracking database). The CATI phone survey collected information from program participants on the type of bulb installed prior to the program bulb, the wattage of the prior bulb and the location where the new CFL was installed (and from where the prior bulb was removed). Respondents were only able to provide pre-wattage estimates for three-quarters of the newly installed bulbs (118 bulbs of the 158 installed). For the remaining one-quarter of program bulbs where the pre-wattage was unknown, the pre-wattage was backfilled using typical CFL to Incandescent wattage equivalents (Table 17 below) if the prior bulb was reported to be an incandescent and zero if the prior bulb was reported to be a CFL.

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[17] In the remainder of the cases we found that either the bulbs did arrive but the original respondent was unaware they had, they arrived broken, or the address and the phone number in the tracking database did not match (and thus we were calling a location other than where the bulbs were shipped).

Table 17: Typical CFL to Incandescent Wattage Equivalents

CFL Wattage	Incandescent Wattage	Typical Delta Watts
14	60	46
15	60	45
23	75	52

Source: Itron Inc., California Residential Efficiency Market Share Tracking: Lamps 2007. Prepared for Southern California Edison, December 2008

Table 18 provides the average self-reported delta watts estimate by program bulb wattages and compares these to the typical delta watts estimates using the standard incandescent equivalents provided above. As this figure shows, the average self-reported pre-wattages were very similar across all three wattages of program bulbs (45, 47 and 46 watts for the 14, 15 and 23 watt CFLs respectively). The average difference between the self-reported estimate of the change in bulb wattage and those calculated based on the standard incandescent equivalents across all of the program bulbs was roughly -4 watts, indicating customers either tend to under estimate the wattage of their previous installed incandescent bulb or they tend to replace the bulb with a brighter CFL.

Table 18: Average Self-Reported Delta Watts

CFL Wattage	Self-Reported Pre-Wattage	Self-Reported Delta Watts	Typical Delta Watts	Difference from Standard Equivalents
14	59	45	46	- 1
15	62	47	45	2
23	69	46	52	-6

Source for self-reported watts: Participant Survey

As Table 19 below shows the majority of program bulbs (93%) were reported to replace an existing incandescent bulb and only 3% were reported to replace another CFL. The remaining bulbs replaced a Halogen (1%) or an unknown bulb type (4% of participants could not remember the previous bulb type).

Table 19: Distribution of Prior Bulb Type

Prior Bulb Type	Small C&I Intro Kit			
	n	%	Bulbs	%
Incandescent	69	90%	147	93%
Halogen	1	1%	1	1%
CFL	5	6%	4	3%
Don't Know	2	3%	6	4%
Total	**77**	**100%**	**158**	**100%**

Source: Participant Survey

Table 20 shows the prior bulb type that was installed across the various room locations. As this figure shows, CFLs were only reported to have been previously installed in three room locations (Offices,

Hallways, and Residences). Totals in this table do not sum to 100% since some respondents reported the previous bulbs were Halogen and others reported they could not recall the previous bulb type. Please note the relatively small bulb sample sizes in most of the room locations and view the results within this limited context.

Table 20: Distribution of Prior Bulb Type by Room Location

CFL Location	Small C&I Intro Kit		
	Bulbs	Incandescent	Another CFL
Office	71	92%	1%
Entryway	16	100%	0%
Outside	11	82%	0%
Showroom	4	100%	0%
Storeroom	15	100%	0%
Hallway	9	78%	22%
Bathroom	7	100%	0%
Closet	2	100%	0%
Workroom/Shop	6	100%	0%
In Residence	4	75%	25%
Other	5	100%	0%
Don't Know	5	100%	0%
Refused	3	100%	0%
Total	**158**	**93%**	**3%**

Source: Participant Survey

Table 21 below provides the average delta watts estimate per bulb across each of the room locations as well as an estimate of the average total delta watts per participant within a given location. This table shows that the average displaced watts across all installed program bulbs is estimated to be 46.2 watts which equates to 64.5 watts on average per room.

Table 21: Distribution of Average Delta Watts per Bulb and Room

CFL Location	Small C&I Intro Kit			
	Bulbs	Average Watts per Bulb	Rooms	Average Watts per Room
Office	71	47.6	49	69.0
Entryway	16	40.0	10	64.0
Outside	11	42.4	9	51.8
Showroom	4	46.0	2	92.0
Storeroom	15	51.5	11	70.2
Hallway	9	38.9	8	43.8
Bathroom	7	49.0	7	49.0
Closet	2	44.5	2	44.5
Workroom/Shop	6	54.7	6	54.7
In Residence	4	12.8	2	25.5
Other	5	57.4	3	95.7
Don't Know	5	44.0	3	73.3
Refused	3	61.0	1	183.0
Total	**158**	**46.2**	**113**	**64.5**

Source: Participant Survey

To cross check this self-reported estimate, we re-estimated the average delta watts across all program bulbs using the typical CFL to Incandescent Wattage Equivalents provided in Table 17 above. This resulted in an estimate of 49.6 watts which was then applied to 93% of the program population (the self-reported estimate of program participants that used their program CFL to replace an incandescent bulb) and 0 watts was applied to the 3% of the population who reported using the program CFL to replace another CFL. The average delta watts across these two groups was then estimated to be 48.3 watts (shown in Table 22 below) which is approximately 2 watts higher than the self-reported estimate provided in Table 21 above.

Table 22: Estimation of Delta Watts based on Typical Bulb Equivalencies

CFL Wattage	Incandescent Wattage	Delta Watts	% Program Bulbs
14	60	46	23%
15	60	45	15%
23	75	52	62%
Program Average		**49.6**	**100%**
% of Incandescent replacements		49.6	93%
% of CFL replacements		0	3%
Adjusted Program Average		**48.3**	**100%**

Due to the difficulty customers can have recalling the exact wattage of the bulb that was installed prior to the program bulb and the closeness of the results from two methods shown above (self-report and standard equivalencies), the evaluation team decided to use the delta watts estimate of 48.3 watts based on typical bulb equivalences to calculate ex-post program impacts.

Hours of Use

Average daily hours of use (HOU) is a key parameter in the estimation of both gross and net program impacts. During our survey of program participants, we asked respondents to estimate the number of hours the program CFLs they had installed within various rooms of their businesses were turned on each day and during the peak time period. Table 25 below shows the HOU estimates by room location based on the self-reported data collected during the participant survey. As this figure shows, the average HOU across all installed bulbs was 6.8 hours (or 28% of the day). The most frequently reported number of hours of use was 8 hours (17%) and a similar percentage were unable to estimate how many hours a day the program bulbs were turned on (and thus these bulbs were not included in the remainder of the analysis in this section leaving us with 131 program bulbs).

Table 23: Distribution of Hours of Use across Program Bulbs Installed within Participants Business Locations

Average Daily HOU	Survey Self-Report	
	Bulbs	%
0	1	1%
1	3	2%
2	9	6%
3	14	9%
4	18	11%
5	6	4%
6	8	5%
7	4	3%
8	27	17%
9	13	8%
10	18	11%
11	1	1%
12	7	4%
13	1	1%
24	1	1%
Don't Know	27	17%
Total	**158**	**100%**
Wt'd Avg	**6.8**	**83%**

Source: Participant Survey

The HOU estimates used by ComEd in the program planning process to estimate the ex ante program impacts were based on the annual DEER HOU estimates which are provided by customer business type. Table 24 below provides a comparison of the distribution of self-reported primary business activity at the facilities surveyed versus the estimated ex ante distribution used within the ComEd Small C&I Intro Kit program plan. As this table shows significantly fewer small retail businesses and restaurants participated

in the program than expected (44% and 3% based on customer self-reports compared to 76% and 19% from the ComEd Small C&I Intro Kit plan) and significantly more offices participated (27% versus 4%). These differences between the types of businesses anticipated to participate in this lighting program and those who actually did participate is important since HOU estimates can vary significantly by business type[18].

Table 24: Comparison of Primary Business Activity of Participants Surveyed versus ComEd Plan

Primary Business Activity	Participants Surveyed		ComEd Plan
	n	**%**	**%**
Retail/Service	87	44%	76%
Office	54	27%	4%
Industry	25	13%	
Medical	11	6%	
Agricultural/Farm	6	3%	
Restaurant	5	3%	19%
Warehouse	5	3%	
Grocery	2	1%	
Unknown	5	3%	
Total	**200**	**100%**	**100%**

Source for self-reported Business Type: Participant Survey

Table 25 below provides the average self-reported estimates of the number of hours program bulbs are turned on per day across all room locations. As this figure shows the average was 6.8 hours per day, but ranged from a low of 4.4[19] hours per day in bathrooms and workshops to a high of 10.8 hours per day in entryways.

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[18] Unfortunately reliable business type information was not available on all program participants and thus a comparison between the plan and all program participants could not be completed. It is possible that some of the discrepancies found could result from the subsample of customers that completed phone surveys. In the future, ComEd might consider collecting self-reported business type information on the product order form.

[19] Locations where less than 5 bulbs were installed all grouped into the "Other" category for this analysis.

Table 25: Self-Reported Average Daily and Annual HOU by Room[20]

CFL Location	Survey Self-Reported			
	n	%	Average Daily Hours of Use	Average Annual Hours of Use
Office	55	42%	6.9	2,017
Entryway	15	11%	10.8	3,389
Storeroom	15	11%	5.5	1,526
Outside	10	8%	6.2	1,908
Hallway	7	5%	7.6	2,525
Bathroom	7	5%	4.4	1,408
Workroom/Shop	5	4%	4.4	1,314
Other	17	13%	5.6	1,644
Total	**131**	**100%**	**6.8**	**2,029**

Source: Participant Survey

As mentioned previously, a review of past evaluations found that self-reported estimates of hours of use can be highly inaccurate[21]. Given this uncertainty and because the budget for this evaluation did not allow for a lighting logger study of program bulbs, the evaluation team decided to use the DEER annual HOU estimates (weighted by business type) to calculate the ex post program energy savings.

Table 26 below provides the daily and annual DEER HOU estimates by business type. As this figure shows, the business type weighted average daily HOU across all installed bulbs is roughly 10.0 hours per day.

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[20] This figure is based on a total (N) of 131 (versus 158) bulbs since participants were unable to estimate the average daily HOU for 27 of the installed program bulbs.

[21] EcoNorthwest, *Evaluation of the SCE 2004-05 Small Business Energy Connection Program*. Prepared for Southern California Edison, April 2007 and Itron Inc., *2003 Statewide Express Efficiency Program Measurement and Evaluation Study*. Prepared for California's Investor-Owned Utilities (PG&E, SCE, SDG&E and SoCalGas), March 2005.

Table 26: Average Daily and Annual DEER HOU Estimates by Business Type

Main Business Activity	DEER HOU			
	Bulbs	%	Daily HOU	Annual HOU
Retail/Service	73	46%	10.2	3,724
Office	32	20%	6.8	2,492
Industry	20	13%	11.8	4,290
Medical	8	5%	11.5	4,212
Agricultural/Farm	7	4%	11.9	4,334
Restaurant	6	4%	9.4	3,444
Warehouse	6	4%	11.4	4,160
Grocery	3	2%	16.0	5,824
Unknown	3	2%	11.9	4,334
Average Bulb Weighted	**158**	**100%**	**10.0**	**3,655**

Source: Participant Survey and DEER

Although the free CFLs were intended for small business customers, approximately one-third of the program bulbs ended up in residential locations[22] where lights are typically on for fewer hours per day. Since the telephone surveys were with the small businesses that were the intended target of the program, none of the survey data were applicable to these inadvertent residential participants. Therefore, we applied data from California's 2005 Residential DEER Database. Specifically, we used the DEER Residential Hours of Use estimate (2.34 hours per day) to estimate energy savings for this fraction of the program bulbs.

Mean Load Coincidence Factor

The mean load coincidence factor measures the percentage of time that the program bulbs were turned on during ComEd's peak time period (1 to 6 p.m. on summer weekdays). One method of estimating this is to ask survey respondents approximately how many hours their program CFLs installed in various room locations were turned on during the peak time period[23].

Table 27 below shows the distribution of hours of use during the surveyed peak time period. This figure shows that more than a quarter of the bulbs (28%) were estimated to be in use during the entire surveyed peak period and overall the bulbs were estimated to be in use for just over half (56%) of the surveyed peak period. Twenty-one bulbs were removed from this analysis since the respondent was unable to estimate the hours of use during this period.

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[22] As shown in Table 6 there were 137 customers contacted who had received the bulbs but surveys were not performed since they were residential customers.

[23] The peak period asked about in the survey was inadvertently set as 3 to 6 p.m., rather than the PJM peak of 1 to 6 p.m. As a result the following tables will refer to the surveyed peak period (of 3 to 6 p.m.) and the final coincidence factor will be based on DEER estimates rather than self-reports.

Table 27: Average Hours of Use during the Peak Time Period

Hours of Use During Peak	Bulbs	%
0	22	16%
0.5	6	4%
1	24	18%
1.5	16	12%
2	27	20%
2.5	3	2%
3	39	28%
Total	**137**	**100%**
Peak Coincidence Factor		**56%**

Source: Participant Survey

Table 28 below presents the average percent of time in use during the peak time period by room location. As this table shows, bulbs located in offices, entryways and hallways were turned on most often[24] during the peak period and bulbs located in outside locations were turned on the least. We would expect this to be the case, since bulbs should not need to be turned on outside during the daylight hours of summer from 3 to 6 p.m.

Table 28: Average Peak Load Coincidence Factors by Room Location[25]

CFL Location	Bulbs	% On During Peak Period
Office	64	68%
Entryway	16	56%
Hallway	9	56%
Storeroom	15	43%
Bathroom	7	43%
Other	16	43%
Outside	10	25%
Total	**137**	**56%**

Source: Participant Survey

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[24] Locations where less than 5 bulbs were installed all grouped into the "Other" category for this analysis.

[25] The four bulbs installed in residential locations have been included in the "Other" category. The same Coincidence Factor was used to estimate savings in both residential and non-residential locations which may be a slight over-estimate for the residential installations (which are typically used less frequently during daytime hours).

Due to the issues stated in the HOU section above regarding inaccuracies in customer self-reported hours of use and an error in the coding of the survey (they peak period was inadvertently set as 3 to 6 p.m. rather than the PJM peak of 1 to 6 p.m.), the evaluation team decided to use the DEER coincidence factor estimates re-weighted to represent the business type distribution of program participants (based on survey respondents).

Table 29 below provides the average DEER peak coincidence factors by business type. As this figure shows, the business type weighted average daily peak coincidence factor across all installed bulbs is roughly 0.86 hours per day.

Table 29: Average DEER Peak Coincidence Factors by Business Type

Main Business Activity	DEER Coincidence Factors		
	Bulbs	%	Coincidence Factors
Retail/Service	73	46%	0.88
Office	32	20%	0.81
Industry	20	13%	0.99
Medical	8	5%	0.74
Agricultural/Farm	7	4%	0.77
Restaurant	6	4%	0.68
Warehouse	6	4%	0.84
Grocery	3	2%	0.81
Unknown	3	2%	0.77
Average Bulb Weighted	**158**	**100%**	**0.86**

Energy Interactive Effects

Recent research has focused on the incremental electric savings and gas usage resulting from customers' adoption of CFLs. The cooler temperatures at which CFLs run can lead to decreased air conditioning loads during the peak summer months; however they also can lead to increased electric or gas heating during the winter months. To calculate energy and demand interactive effects for this evaluation, the ex ante DEER estimates (estimated by business type grouping) were re-weighted to represent the distribution of surveyed participants(our best guess at the distribution of business types for the population of program participants).

Table 30 below provides the average DEER energy and demand interactive effects by business type. As this figure shows, the business type weighted average energy and demand interactive effects across all installed bulbs are roughly 1.12 and 1.19, respectively.

Table 30: Average Energy and Demand Interactive Effects by Business Type

Main Business Activity	DEER Interactive Effects			
	Bulbs	%	Energy	Demand
Retail/Service	73	46%	1.11	1.19
Office	32	20%	1.17	1.25
Industry	20	13%	1.04	1.08
Medical	8	5%	1.18	1.26
Agricultural/Farm	7	4%	1.12	1.19
Restaurant	6	4%	1.15	1.26
Warehouse	6	4%	1.06	1.09
Grocery	3	2%	1.13	1.25
Unknown	3	2%	1.12	1.19
Average Bulb Weighted	**158**	**100%**	**1.12**	**1.19**

3.1.3 Gross Program Impact Results

Based on the gross impact parameter estimates described in the previous section we were able to estimate the gross program impacts resulting from PY1 Small C&I Intro Kit program. The results are provided in Table 31 below.

Table 31: Gross Parameter and Savings Estimates

Gross Parameter and Savings Estimates	Program Reported	Evaluation Adjusted	
	Small Business	Small Business	Residential
CFLs Distributed through the Program	104,160	73,593	30,567
Average Displaced Watts (Delta Watts)	62.9	48.3	
Average Daily Hours of Use[1]	10.4	10.0	2.3
Gross kWh Savings per unit	238.6	176.4	41.2
Gross kW Savings per unit	0.06	0.05	
Installation Rate	90%	32%	
Energy Interactive Effects	1.12	1.12	1.00
Demand Interactive Effects	1.21	1.19	1.00
Peak-Load Coincidence Factor	0.84	0.86	0.081
Total First-Year Gross MWh Savings	**25,064 MWh**	**5,025 MWh**	
Total First-Year Gross MW Savings	**7.1 MW**	**1.8 MW**	
Total First-Year Gross Coincident MW Savings	**6.0 MW**	**1.2 MW**	

3.1.4 Net Program Impact Parameter Estimates

Once gross program impacts have been estimated, net program impacts are calculated by multiplying the gross impact estimate by the Program Net-to-Gross (NTG) ratio. As mentioned above, the NTG ratio for the PY1 Small C&I Intro Kit program was estimated using a customer self-report approach. This approach relied on responses provided by program participants during the CATI phone survey to determine the fraction of CFL installations that would have occurred by participants in the absence of the program (free-ridership).

Once this parameter has been estimated, the PY1 NTG ratio is calculated as:

NTG Ratio = 1 – Free-ridership

Free-ridership

The customer self-report method uses participant phone survey data to assign the following two scores:

1) *Program Influence Score* - The degree of influence the program had on the customers' decision to install CFLs, and
2) *No-Program Score* - What actions the customer would have taken on their own had they not been given the free CFLs.

Once these two scores have been calculated, the customer-level free-ridership is equal to:

Customer-level Free-Ridership = 1 – (Program Influence Score + No-Program Score)/20

Using the NTG scoring algorithm, customers fall into one of three free-ridership levels: Full, Partial, or Non Free-rider. A customer was classified as a *Full Free-rider*[26] if they reported that the program was not a critical factor in their decision to install CFLs as opposed to standard efficiency bulbs and that they would have purchased CFLs at the same time to install in their business if the program had not provided them with the free CFLs. Conversely, a customer was defined as a *Non Free-rider*[27] if they reported that the program was a critical factor in their decision to install CFLs and that it would have been highly unlikely that they would have purchased the same CFLs on their own without the program. Between these two extremes, customers were classified as Partial Free-riders[28] and the free-ridership score that was assigned to them reflected their reported influence of the program and what they would have done in its absence.

Table 32 below shows the distribution of surveyed customers across these three free-rider levels and the average free-ridership score assigned to the customers within a particular level. It also shows that the overall free-ridership score estimated for this program was 44%.

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[26] Full Free-rider: Free-ridership score of 1.0 and NTG score of 0.

[27] Non Free-rider: Free-ridership score of 0.0 and NTG score of 1.

[28] Partial Free-rider: Free-riders score > 0 and < 1, NTG score > 0 and < 1.

Table 32: Free-Rider Distribution

Free-Ridership Level	n	%	Average FR Score
Full Free-rider	29	15%	1.0
Partial Free-rider	125	63%	0.45
Non Free-rider	39	20%	0.0
Missing	7	4%	-
Total	**200**	**100%**	**0.44**

Source: Participant Survey

Further analysis of participants classified as Partial Free-riders found that these participants had on average higher Program Influence Scores (mean of 6.2) than No-Program Scores (mean of 4.9). This indicates that Partial Free-Riders tend to say the program is more influential than their stated actions in the absence of program indicate.

It is interesting to note that during the phone surveys participants were asked whether or not they had purchased CFLs for their facility prior to receiving the free program bulbs and 47% reported that they had. One could argue that customers who had purchased CFLs for their facilities on prior occasions in the absence of the program would be more likely to purchase them again without the program (and thus are more likely to be Free-Riders) which increases our confidence in our estimated free-ridership rate of 44%.

Net-to-Gross Ratio

Based on the overall estimate of free-ridership provided above, the program-level NTG ratio for the PY1 Small C&I Intro Kit program is calculated as:

NTG Ratio = 1 – Free-ridership

$$= 1 – (.44) = .56 = 56\%$$

3.1.5 Net Program Impact Results

Once the NTG ratio was calculated, net program impacts were derived by multiplying gross program savings by the estimated NTG ratio.

Table 33 below provides the program reported and evaluation-adjusted net impact results for the PY1 Small C&I Intro Kit program. As this figure shows, the ex post program-level first-year net energy saving estimate resulting from this evaluation is 2,815 MWh and the net demand savings estimate is 1.0 MW.

Table 33: Net Parameter and Savings Estimates

Net Parameter and Savings Estimates	Program Reported	Evaluation Adjusted
Total First-Year Gross MWh Savings	25,064 MWh	5,025 MWh
Total First-Year Gross MW Savings	7.1 MW	1.8 MW
Total First-Year Gross Coincident MW Savings	6.0 MW	1.2 MW
Net-to-Gross Ratio (1-FR)	80%	56%
Total First-Year Net MWh Savings	20,051	2,815 MWh
Total First-Year Net MW Savings	5.7 MW	1.0 MW
Total First-Year Net Coincident MW Savings	4.8 MW	0.7 MW

The PY1 net savings claimed savings for this program were 20,051 MWh, resulting in a net energy saving realization rate of 14%. There were three primary drivers for this low realization rate, they include:

1. The *Installation Rate* of program bulbs was estimated to be 32% based on participant phone surveys, which was 65% lower than the installation rate assumed within the program plan (90% installation rate used in Small C&I Intro Kit plan).

2. The HOU estimate for the CFLs installed within business locations is similar to that used in program planning[29], however the HOU estimate for Residential locations, where one-third of program bulbs ended up, is significantly lower (25% of business HOU).

3. The self-reported NTG ratio was found to be 56%, which is 70% of the estimated used for program planning (NTG of 80% assumed in program plans).

Table 34 below provides a comparison of ComEd's program goals and reported savings estimates to the Evaluation-Adjusted savings estimates. As this table shows the impact evaluation team found that the PY1 Small C&I Program realized 18% of their gross Program-Reported energy savings and 13% of their net Program-Reported energy savings.

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[29] Program plans for both residential and small business lighting programs used HOU estimates from DEER. The final small business HOU estimate used in this evaluation was also based on DEER but was bulb weighted to represent the distribution of businesses participating in the program.

Table 34: Comparison of Program Goals and Reported Savings versus Evaluation Adjusted Savings Estimates

Net Parameter and Savings Estimates	Small C&I Intro Kit		
	Energy (MWh)	Demand (MW)	% of Program-Reported Savings Achieved
Gross Program Savings Goals	**21,020**	**4.4**	
Net Program Savings Goals	**16,816**	**3.5**	
Gross Program-Reported Savings	25,064	NA	
Net Program-Reported Savings	20,051	NA	
Gross Evaluation-Adjusted Savings	**5,025**	**1.8**	**20%**
Net Evaluation-Adjusted Savings	**2,815**	**1.0**	**14%**

3.2   Process Evaluation Results

The process evaluation component of the Small C&I Intro Kit evaluation focused on CFL awareness, past and intended future purchases of CFLs, awareness of and intention to purchase from the mini catalog, awareness of other programs for business customers, and program satisfaction. Data sources for the process evaluation include the Participant CATI survey (n=200) and the in-depth interviews with program staff and program implementers (n=2).

3.2.1 Program Theory and Logic Model

This section contains the program theory, logic model, and performance indicators of the Small C&I Intro Kit program. We created this model based on discussions with program management and implementers as well as program documentation. The program theory and logic model is to be used:

- As a communication tool by
    - allowing the implementer to show reasoning to other stakeholders
    - bringing common understanding between implementer and evaluator
- As an evaluation tool to
    - Focus evaluation resources
    - Clearly show what evaluation will do and expected answers from evaluation
    - Provide a way to plan for future work effort

The logic model (LM) is a graphic presentation of the intervention – what occurs and clear steps as to what change the activities undertaken by the intervention are expected to bring about in the targeted population. Logic models can be impact or implementation oriented. An impact model is sparse in terms of how the programs works, but clearly shows the outputs of the program and what they are aimed at affecting. Outcomes are changes that could occur regardless of the program and should be written as such. The implementation model is how the program works and typically resembles a process flow chart. The attached model is an impact model.

We use numbered links with arrows between each box in the logic model. These numbers allow us to:

- Clearly discuss different areas of the model
- Describe why moving from one box to the other brings about the description in the later box
- Set up hypotheses for testing of specific numbered links
- Explicate what we will and will not be testing within the evaluation

The program theory (PT) is a description of why the intervention is expected to bring about change. It may reference theories of behavioral change (e.g., theory of planned behavior, normative theory) or be based on interviews with the program managers as they describe their program.

Creation of the Logic Model

There are several different "looks" to logic models. For this evaluation, we are using a multi-level model that has a generic statement about resources in the header, activities in the first row, outputs of those activities in the second row, and outcomes in the third (proximal) and fourth (distal) rows. External factors are shown on the bottom of the diagram.

When we created the boxes in the logic model, we used the following "road-map."

Activities

These are discrete activities that roll up to a single "box" that is shown in the model. It separates out activities that may be performed by different groups. Each activity typically has an output. We used program documentation (implementation plans) and/or discussion with program managers to determine activities.

Outputs

These are items that can be counted or seen. It may be the marketing collateral of a marketing campaign, the audits performed by a program, or the number of completed applications. All outputs do not need to lead to an outcome. We used the same sources as for activities to determine outputs.

Proximal Outcomes

These are changes that occur in the targeted population that the program directly "touches." Multiple proximal outcomes may lead to one or more distal outcomes.

Distal Outcomes

These are changes that are implicitly occurring when the proximal outcome occurs. For example, an energy efficiency program may use marketing to bring about changes in Awareness, Knowledge, or Attitudes as a proximal outcome, which leads to the distal outcomes of: intent to take actions, which leads to actual installation of EE equipment, which leads to energy impacts.

External Factors

These are known areas that can affect the outcomes shown, but are outside of the programs influence. Typically, these are big areas, such as the economy, environmental regulations, codes/standards for energy efficiency, weather, etc. Sometimes these can arise from our discussions with the program managers, but often they were thought about and included based on our knowledge.

Expanding the Impact Logic Model

Once the impact logic model was drafted, a table was created that describes the links, the potential performance indicators that could be used to test the link, the potential success criteria that would indicate the link was successful, and potential data sources of the link.

When thinking about how to write each of the performance indicators, we asked ourselves "What would we look at to judge whether the link description actions are occurring" and wrote the answer as the performance indicator.

Success criteria were created by us and are thought to be reasonable.
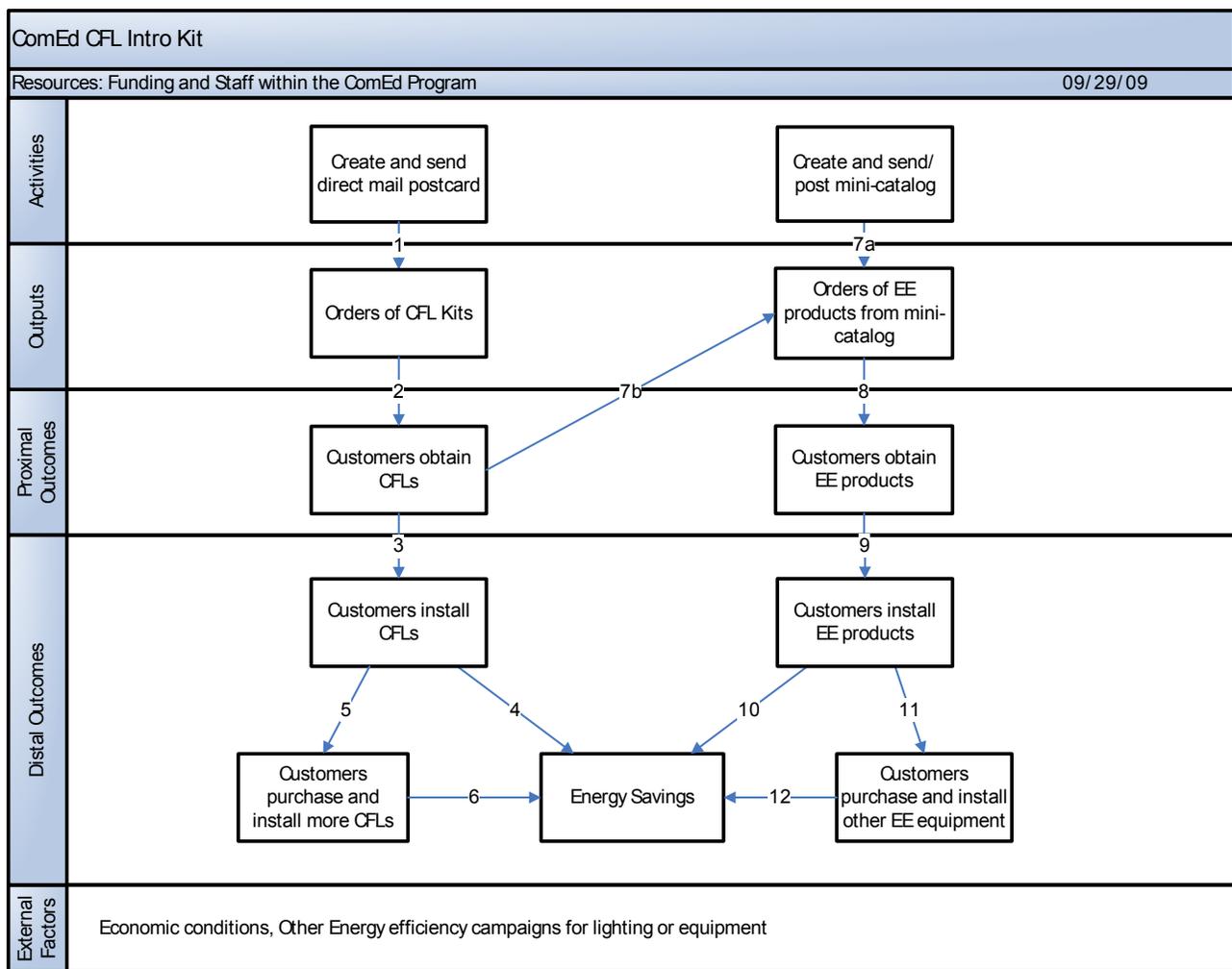
Figure 1: Preliminary Logic Model

Table 35: Performance Indicators Table

Link	Description of Link	Potential Performance Indicator	Potential Success Criteria for Performance Indicator	Evaluator Data Collection Activities Associated with Link
1	ComEd creates and sends the direct mail postcard to their small business customers (<10 kW). These customers are hard to reach with traditional EE programs. Customers receive the postcard, understand how to participate, and are motived to tear off the reply portion and send back the order form. This generates a number of orders for the CFL Kit.	1. CFL Kit orders received	1. Business customers order 100,000 CFLs (or approximately 35,000 kits)	Review of program databases
2	ComEd expeditiously fulfills the orders for the CFL kit and sends it out to customers. Hard-to-reach customers receive unbroken CFLs.	1. Orders are filled and sent to customers within 6 weeks of order 2. % of customers who report receiving the CFLs in the mail	1. 100% of orders are mailed within 6 weeks of order date. 2. 90% of customers report receiving CFLs in the mail	1. Review of program databases 2. Participant survey
3	CFLs fit sockets and are installed. Customers like how the lamps work (e.g., color of the light), and the lamps are kept in the sockets.	1. Installation rate of CFLs 2. Persistence of CFL installation	1. 75% of distributed CFLs are installed 2. 100% of installed lamps remain installed for at least 3 months	1. Participant survey 2. The free CFLs were sent out ~6 weeks before the participant survey. We therefore cannot measure persistence as part of the PY1 evaluation.
4	Installing the free CFLs will lead to energy savings because the CFLs replace incandescent bulbs.	1. Type of bulb that the CFL replaced	1. 95% of CFLs installed replaced an incandescent bulb	Participant survey
5	The experience with the free CFLs causes customers to purchase and install additional CFLs.	1. % of customers who have purchased bulbs as a result of receiving the free program CFLs	1. 50% of customer have purchased one or more CFL bulbs because of the experience with the free CFLs	The free CFLs were sent out ~6 weeks before the participant survey. We therefore cannot measure spillover as part of the PY1 evaluation.
6	Installing the additional CFLs will lead to energy savings because the CFLs replace incandescent bulbs.	1. Type of bulb that the CFL replaced	1. 95% of CFLs installed replaced an incandescent bulb	The free CFLs were sent out ~6 weeks before the participant survey. We therefore cannot measure spillover as part of the PY1 evaluation.
7a	ComEd small business customers have not adopted other types of energy efficient equipment because of awareness and cost barriers. A mini-catalog is created and sent to customers and posted on ComEd's website. The mini-catalog provides general information about the benefits of different energy efficiency equipment as well as offers for discounts. Customers will look at the catalog and become more aware of what options are available for their business. Customers order energy efficient equipment from the mini-catalog.	1. The mini-catalog contains a range of products that are suitable for small business customers 2. Products are offered at a price that will induce customers to purchase them 3. Purchases of energy efficient equipment.	1. 75% of small business customers desire products offered 2. 90% of customers believe prices are "good deal" 3. 50% of cutomers have purchased energy efficient equipment from the catalog	The evaluation in PY1 is focused on the free CFL offer. A content analysis of the mini-catalog and analysis of mini-catalog purchases will be conducted as part of the PY2 evaluation.
7b	The shipment of the free CFLs provides a direct channel to the target audience of the mini-catalog. The catalog is therefore included in the mailing of the free CFLs.	1. % of customers who recall the mini-catalog 2. % of customers who have looked through the mini-catalog	1. 90% of interviewed participants recall mini-catalog in shipment 2. 75% of customer indicate they have looked through the catalog	1. Participant survey 2. Participant survey
8	ComEd expeditiously fulfills the orders for the energy efficient equipment from the catalog and sends it out to customers. Customers receive unbroken equipment.	1. Orders are filled and sent to customers within 6 weeks of order 2. % of customers who report receiving the equipment in the mail	1. 100% of orders are mailed within 6 weeks of order date. 2. 90% of customers report receiving equipment in the mail	The PY1 evaluation is focused on the free CFL offer. Mini-catalog purchases will be included in the PY2 evaluation.
9	Energy efficient equipment is installed. Customers like how the equipment works and keep it installed.	1. Installation rate of equipment 2. Persistence of equipment installation	1. 90% of distributed equipment is installed 2. 100% of installed equipment remains installed for at least 3 months	The PY1 evaluation is focused on the free CFL offer. Mini-catalog purchases will be included in the PY2 evaluation.
10	When EE equipment ordered through the mini-catalog is installed, energy savings are realized because the equipment that has been installed is more energy efficient than the equipment that it is replacing.	1. Type of equipment that was replaced	1. 95% of the replaced equipment was less efficient than the installed equipment	The PY1 evaluation is focused on the free CFL offer. Savings from mini-catalog purchases will be included in the PY2 evaluation.
11	The experience with the discounted energy efficient products from the mini-catalog causes customers to purchase and install additional energy efficient equipment.	1. % of customers who have purchased additional energy efficient equipment as a result of receiving the discounted equipment	1. 50% of customer have purchased additional energy efficient equipment because of their experience with the discounted equipment	The PY1 evaluation is focused on the free CFL offer. Spillover from mini-catalog purchases will be included in the PY2 evaluation.
12	When other EE equipment is purchased and installed, energy savings are realized because the equipment that has been installed is more energy efficient than the equipment that it is replacing.	1. Type of equipment that was replaced	1. 95% of the replaced equipment was less efficient than the installed equipment	The PY1 evaluation is focused on the free CFL offer. Savings from mini-catalog spillover will be addressed in the PY2 evaluation.

3.2.2 Awareness of CFLs and CFL Purchases

Customers who participated in the free CFL component of this program were typically aware of CFLs *before* receiving the direct mail offer from ComEd (73% of participants) and had known about CFLs for at least one year (74% of participants aware of CFLs). Nearly half of program participants had previously purchased CFLs for their facilities.

Table 36: Timing of Initial Exposure to CFLs

When customers first heard of CFLs	Percent of Respondents (n=200)
Before the CFL offer	73%
Within the past year	*24%*
Within the past two years	*36%*
More than two years ago	*38%*
Don't know	*1%*
At the time of the CFL offer	27%

Source: Participant Survey

Almost all program participants who had installed at least one of the three free light bulbs are "very likely" (64%) or "somewhat likely" (22%) to purchase CFLs for their business in the future. Only 10% of participants said they are "very unlikely" to purchase CFLs in the future, mostly because they cannot use CFLs in their business location.

3.2.3 Awareness of the Mini Catalog and Intent to Purchase

The mini catalog was included in the mailing of the free CFLs. Due to the timing of the fulfillment of the CFL offer (towards the end of Program Year 1), the mini catalog was not the focus of the program for Program Year 1. However, it will be the primary delivery mechanism in Program Year 2. Therefore, this evaluation conducted a preliminary investigation into customer awareness of the catalog and intent to purchase items offered through the catalog.

Recall of the mini catalog among participants in the free CFL offer was high (46%), showing that including the catalog with the free product is an effective strategy for reaching customers.[30]

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[30] Unaided, about one-third of customers remembered receiving a catalog or brochure. Few of the customers who did not remember the catalog unaided remembered it after being asked about it directly (17%).

Table 37: Recall of Mini Catalog

Recall of Catalog (Unaided) (n=200)		Recall of Catalog (Aided) (n=131)		Recall of Catalog (Total)	
Yes	35%			Yes	46%
No/Don't know	65%	Yes	17%		
		No/Don't know	83%	No/Don't know	54%

Source: Participant Survey

However, only half of the customers who recalled the catalog had looked through it at the time of the survey – which was conducted approximately six weeks after the customers received the free CFLs and the mini catalog – and none of the customers we interviewed had made a purchase from the catalog. Nevertheless, a majority of customers (62%) who recalled the catalog reported that they would or might purchase something in the future. Customers who own their facilities more frequently report that they intend to make a purchase from the mini catalog (19%) than customers who rent their facility (10%), although this difference was not statistically significant.

Table 38: Interest in Future Purchase from Mini Catalog

Recall of Catalog (Total) (n=200)		Looked at Catalog (n=91)		Intent to Purchase (Looked at catalog: n=47) (Didn't look at catalog: n=44)		Overall Intent to Purchase (n=91)	
Yes	46%	Yes	52%	Yes	17%	Yes	14%
				Maybe	53%		
				No	23%	Maybe	48%
				Don't know	6%		
		No	48%	Yes	11%	No	29%
				Maybe	43%		
				No	34%	Don't know	9%
				Don't know	11%		
No/Don't know	54%						

Source: Participant Survey

The product category in the mini catalog that generated the most interest from customers is lighting. This is not surprising since lighting is the main focus of the mini catalog and the surveyed customers are known to be interested in lighting as they just ordered the free CFLs. Customers who indicated they would or might purchase something from the mini catalog are most likely to purchase more CFLs (68%). Fewer customers intend to purchase LED products (21%) or water products such as aerators, showerheads, or spray valves (9%).[31]

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[31] Questions about the types of products customers intend to purchase were prompted.

Table 39: Interest in Mini Catalog Items

Items intended to Buy	Percent of Respondents Interested (n=57)
Light bulbs	68%
LED products	21%
Water products	9%
Other*	11%

Some of the other products mentioned included Smart strip, motion sensor, electricity monitor, fan and fan switch.
Source: Participant Survey

3.2.4 Awareness of Other ComEd Business Programs

Awareness of other energy efficiency opportunities offered to ComEd business customers is moderate. About one-third of surveyed customers are aware that ComEd program offers rebates for the installation of energy efficient equipment to its business customers. The most common way that these customers found out about the program was through a bill insert.

Table 40: Initial Exposure to ComEd Business Rebate Program

How did you hear about ComEd's Business Rebate program?	Percent of Respondents (n=62)
Bill Insert	50%
Colleague/friend	16%
TV	6%
Email	5%
Contractor/trade ally	3%
ComEd Website	2%

Source: Participant Survey

More generally, customers report that the best way for ComEd to target business customers with offers such as the CFL Intro Kit is through flyers in the mail (59%), bill inserts (18%), email (12%), or phone (9%).

If one of the goals of the CFL Intro Kit program is to channel hard-to-reach customers into ComEd's Smart Ideas business programs, then marketing pieces like the mini catalog represent a good opportunity to raise awareness of these programs. The mini catalog provided useful information on the products offered – including product descriptions, potential uses, and savings estimates – but it did not include any information about other opportunities for business customers. Only the "Letter to Our Customers" on page 2 included a reference to ComEd's small business website. Future marketing pieces – especially ones sent with free products, which are more likely to be viewed by customers than direct mailings – should include more information about opportunities available for ComEd business customers.

3.2.5 Customer Barriers

Even though the CFLs were offered for free, many targeted business customers did not take advantage of the offer. In addition, many of the CFLs that were shipped to customers had not been installed at the time of the participant survey, leading to reduced program savings.

Barriers to Participation in Program

This evaluation did not include a survey of non-participants, so reasons for not taking advantage of the free CFL offer could not be directly explored with customers who were targeted with the offer but did not participate. However, customers who did participate offered a variety of reasons as to why businesses like theirs would not take advantage of an offer like the free CFLs. Several reasons had to do with people just being too busy, including forgetting to send back the postcard (18%), time constraints (9%), or just overlooking the offer (4%). Just over ten percent of surveyed customers feel that customers in businesses like theirs would have no need for CFLs.

Table 41: Barriers to Participation in Free CFL Offer

Reasons why business would NOT participate in free CFL offer	Percent of Respondents (n=200)
Wanted to participate but forgot	18%
No need for CFLs	11%
Too busy	9%
Skeptical about "free" offer	6%
Don't like CFLs	4%
Overlooked offer	4%
No reason not to participate	3%

Source: Participant Survey

As far as the mini-catalog is concerned, lack of awareness is one of the major barriers to participation. Less than half of participants in the free CFL offer recalled seeing the catalog, even though the catalog was included in the shipment. When asked about reasons why companies like theirs would not take advantage of the discounts in the mini catalog, participants in the free CFL offer noted lack of awareness that the catalog exists (37%), the cost of the products in the catalog (23%), and being too busy to take advantage of the offer (12%).

Barriers to Installing CFLs

Overall, installation of the free CFLs was low. Nearly 60% of participants report that they had not installed any of the three bulbs, and 97% of those bulbs were reported to be in storage. A majority of participants who put the bulbs in storage (91%) intend to install them in their business at a later time, suggesting that they are waiting for current light bulbs to burn out.

In addition, many customers did not recall receiving the CFL shipment: 5% claimed they did not receive the CFLs, while an additional 20% was unsure if they received them. While the evaluation team took great care to reach the person who ordered the bulbs for the business, it is possible that someone else in the business did receive the bulbs. For future product orders through the program, contact information

(name and phone number) should be collected to allow for better verification of receipt and installation of the products.

Finally, over one-quarter (26%) of participants in the free CFL offer were residential rather than business customers. This has a significant effect on program impacts since per CFL savings for residential customers are smaller than for business customers. It would be beneficial to verify and correct rate codes within customer databases prior to mailings, to be able to better target business customers with specific program offers.

3.2.6 Program Satisfaction

An overwhelming majority of customers (86%) are "very satisfied" with their participation in the free CFL offer; less than 2% are "dissatisfied" or "very dissatisfied." Reasons for not being "very satisfied" include bulbs that did not fit in the sockets and bulbs that arrived broken or burned out.

Most customers had no recommendations for ComEd to improve their programs. A few customers mentioned that they would like to see more information about the rebate program.

3.3 Cost-Effectiveness Analysis

This section addresses the cost effectiveness of the Small C&I Intro Kit program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. The TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

> *" 'Total resource cost test' or 'TRC test' means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases."* [32]

ComEd uses DSMore™ software for the calculation of the TRC test. [33] The DSMore model accepts information on program parameters, such as number of participants, gross savings, free ridership and program costs, and calculates a TRC which fits the requirements of the Illinois legislation.

One important feature of the DSMore model is that it performs a probabilistic estimation of future avoided energy costs. It looks at the historical relationship between weather, electric use and prices in the

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[32] Illinois Power Agency Act SB1592, pages 7-8.

[33] Demand Side Management Option Risk Evaluator (DSMore) software is developed by Integral Analytics.

MISO region and forecasts a range of potential future electric energy prices. The range of future prices is correlated to the range of weather conditions that could occur, and the range of weather is based on weather patterns seen over the historical record. This method captures the impact on electric prices that comes from extreme weather conditions. Extreme weather creates extreme peaks which create extreme prices. These extreme prices generally occur as price spikes and they create a skewed price distribution. High prices are going to be much higher than the average price while low prices are going to be only moderately lower than the average. DSMore is able to quantify the weighted benefits of avoiding energy use across years which have this skewed price distribution.

Table 42 summarizes the unique inputs used in the DSMore model to assess the TRC ratio for the Small C&I Intro Kit program in PY1. Most of the unique inputs come directly from the evaluation results presented previously in this report. Measure life estimates and program costs come directly from ComEd. All other inputs to the model, such as avoided costs, come from ComEd and are the same for this program and all programs in the ComEd portfolio.

Table 42. Inputs to DSMore Model for Small C&I Intro Kit Program

Item	Value Used
Measure Life	4.3 years
Participants	34,720
Annual Gross Energy Savings	5,024 MWh
Gross Coincident Peak Savings	1.2 MW
Net-to-Gross Ratio	56%
Utility Administration and Implementation Costs	$392,267
Utility Incentive Costs	$309,271
Participant Contribution to Incremental Measure Costs	$0

Based on these inputs, the TRC for this program is 1.88 and the program passes the TRC test.

At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.

4 CONCLUSIONS AND RECOMMENDATIONS

This section highlights the findings and recommendations from the evaluation of the Small C&I Intro Kit program implemented by EFI on behalf of ComEd. The primary objectives of this evaluation were to quantify the gross and net energy impacts resulting from the distribution of the free CFLs and to assess program participants' prior awareness of CFL and their initial reactions to the mini-catalog. Below are the key conclusions and recommendations.

4.1 Conclusions

The Small C&I Intro Kit evaluation team completed surveys with 200 program participants in support of this evaluation. The following conclusions were drawn from these surveys.

4.1.1 Marketing Approach

The direct mail approach successfully encouraged customers to request free CFLs. Of the 156,883 brochures that were mailed containing the free CFL offer 34,720 were returned, yielding a response rate of approximately 22%.

ComEd had set a goal of distributing 100,000 CFLs to customers through this program and was able to exceed this goal by 4% (4,160 bulbs). Sixty-five percent of the bulbs distributed were Spiral CFLs and only 35% were Reflector CFL bulbs.

Almost half of the participants who received free CFLs recalled having received the mini catalog although none reported ordering from the catalog. Of those who recalled the catalog, about half had looked through it at the time of the survey and 14% indicate that they intend to make a purchase while 48% say they might make a purchase.

4.1.2 Adjusted Gross Program Savings

Delta Watts

The average number of watts displaced by program bulbs (delta watts) was estimated to be 48.3 watts or 81% of the ex ante estimates of 59.3 watts. The average difference in the estimated pre-program bulb wattage between self-reports and those based on standard incandescent equivalents was -4 watts (6% of the pre-program wattage based on the typical equivalencies). The majority of program bulbs were reported to replace an existing incandescent bulb and only 3% were reported to replace another CFL.

Hours of Use

The ex ante estimate of hours of use was 10.4 hours per day (3,801 hours/year). Using business type HOU estimates from the DEER database and business type data from the customer survey, the evaluation estimated that the actual operating hours were 10.0 hours per day (3,655 hours per year). This ex post HOU estimate for bulbs installed in business locations is only 4% lower than the ex ante estimate and thus does little to reduced evaluation estimated savings estimates. However, nearly one-third of the program bulbs were reportedly installed in residential locations where HOU estimates are significantly

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lower (2.34 hours per day, ~25% of business HOU). As a result, the average HOU estimate across all program bulbs was 7.8 hours per day which led to a 26% decrease in program savings.

Installation Rate

The ex ante installation rate was assumed to be 90%. The evaluation-calculated installation rate for the Small C&I Intro Kit program is 32%, which was 35% of the program plan estimate. This installation rate decreased program savings by 64%. The bulbs were sent out between 5/11 and 6/8, and the surveys were done between 6/22 and 6/26. As a result, the time customers had to install the lamps was limited (however sufficient). Survey respondents indicated that the majority of the program bulbs that remain in storage will be installed when a bulb currently installed burns out.

4.1.3 Net Program Savings

Net-to-Gross Ratio

The ex ante estimate of the NTG ratio 80%. The evaluation calculated a NTG ratio of 56%, which was 70% of the estimate used for program planning. This estimate was based on self-reported estimates calculated using participant phone survey data. Nearly three-quarters of program participants were aware of CFLs *before* they received the offer for the three free CFLs in the mail and 47% had installed CFLs *before* the program.

4.2   Recommendations

The following recommendations apply to future rollouts of the Small C&I Intro Kit program or other programs that use a similar program delivery strategy.

- Clean up rate codes within customer databases to be able to better target residential and nonresidential customers for specific program offers.
- Get products out to customers earlier in a program year to allow for a longer installation period within the program year.
- Get products out to customers soon after their order or request.
- Request contact names and phone numbers from recipients of free products to help ensure the recipients can be contacted as part of verification and evaluation.
- Request business type from recipients of free products to ensure the business type of participants can be better understood.
- Provide consistent messages regarding benefits of participation, such as expected energy or electricity bill savings.
- Enhance the program materials to emphasize the savings that can be achieved by replacing existing inefficient lights *before they burn out*.
- Include more information about ComEd's business programs in marketing pieces like the mini-catalog to more effectively channel hard-to-reach customers into these programs.

5 APPENDICES

5.1 Data Collection Instruments

5.1.1 In-Depth Interview Guides ComEd Staff and EFI Implementers

ComEd Small CI CFL
Intro Kit Depth Interv

5.1.2 Participant Survey Instrument

ComEd Small CI Part
Survey Final.docx

5.1.3 Free-ridership Scoring Algorithm

/* Data Cleaning for NTG Calculation */
if qc10 >10 then qc10 = .;
if qc11a >10 then qc11a = .;
if qc11b >10 then qc11b = .;

/* Calculation of Program Influence Score */
if QC11b NE . then PIScore = QC11b;

/* Calculation of No-Program Score */
if QC7 = 1 then NPScore_2 = 0;
else if QC7 = 2 then NPScore_2 = 3;
else if QC7 = 3 then NPScore_2 = 9;
else if QC7 = 4 then NPScore_2 = 12;

NPScore_4 = 10 - QC10 * (1 - ((NPScore_2 - 6)*0.024));

if NPScore_2 < 7 then NPScore_3 = 10 - QC10;
else NPScore_3 = NPScore_4;

if qc5 = 1 then NPScore = NPScore_3;
else if qc5 in (3,8) then NPScore = (NPScore_3+10)/2;
else if qc5 = 2 then NPScore = 10 - (QC10*.5)/2;
if Qc6 = 3 then NPScore = min(NPScore * 3/2,10);
If PIScore ne . then FRScore_JF1 = 1 - (PIScore + NPScore)/20;
else FRScore_JF1 = 1 - (NPScore)/10;