Colorado Home Lighting Program Process and Impact Evaluation Report

Prepared for
Xcel Energy

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Executive Summary

This report summarizes a process and impact evaluation conducted by The Cadmus Group, Inc. (Cadmus), along with Nexus Market Research, of Xcel Energy's Colorado Home Lighting program (the program). The program's primary objective is to provide kWh savings for Xcel Energy's DSM residential program portfolio.

This evaluation focused on: a market assessment to determine saturation and penetration of CFLs in Colorado homes; a process evaluation to determine the effectiveness of current program attributes, delivery, and marketing approaches, program satisfaction and CFL purchase barriers; and an impact evaluation to calculate net and gross savings impacts associated with the program.

The evaluation findings and conclusions were informed by an array of data collection activities, including: staff interviews; surveys of random Xcel Energy customers; surveys of known end-use customers that purchased program incented bulbs; in-home lighting audits; surveys of lighting manufacturers and retailers; and participation in a multistate regression model.

Key Findings

Cadmus found the program operates successfully and has a history of achieving its participation and kWh savings goals. Efforts Xcel Energy made in 2008 to promote CFLs through an upstream manufacturer mark-down approach resulted in a dramatic increase in CFL sales in Colorado. This was accomplished at the same time CFL sales declined nationally. Although the program has been in place only since 2006, the sales and participation levels found in Colorado were on par with or beyond those in states with mature programs. This suggested the Colorado market was primed for adoption of CFLs and the program helped to accelerate sales.

Staff Interviews

As the program has developed over the past three-and-a-half years, staff members have shaped program design around the needs and opportunities presented by the market. This is particularly evident in the shift to an upstream, mark-down program that has proven highly cost-effective. Communication remains a challenge at the retail level, as does capturing detailed sales level data.

The program's success was measured by sales that exceeded program goals, and also presumably meant greater CFL market saturation per home. Essentially, the more effectively the program achieved its goals, the more difficult they became to meet in the future (e.g., fewer available sockets). Changing lighting efficiency standards (EISA 2007) represented an unknown but anticipated challenge to continued high program savings.

CFL User Survey and Site Visits

- CFL awareness of was extremely high among Ace and randomly surveyed Xcel Energy customers (99% and 93%).
- Respondents most commonly learned of CFLs through TV, radio, newspaper, or magazine advertising.

- A large percentage of Ace respondents (45.6%) and Random respondents (38.1%) first used a CFL in 2008 or 2009, reflecting a surge in new CFL users in Colorado in the last two years.
- The majority of respondents reported satisfaction with CFLs: 86% of Ace respondents and 74% of Random respondents reported they were highly satisfied with CFLs.
- Both Ace and Random respondents most commonly disposed of their CFLs by throwing them in the trash rather than recycling them (61% and 74%).
- 65% of Random respondents reported having at least one CFL installed.
- On average, Xcel Energy residential customers had 8.7 CFLs installed per home, with a 90% confidence interval of 7.2 to 10.3 CFLs per home. The median number of CFLs installed per home was 6.7.
- CFLs were installed in approximately 16% of all sockets in the typical residential home.
- CFL users differed from non-users in terms of home ownership, education, and income.

Upstream Interviews

- **CFLs have established a foothold in retailers targeted by the program.** The vast majority of participant retailers (19 of 20) and all manufacturers interviewed sold ENERGY STAR CFLs prior to participating in the program. All nonparticipant retailers stocked ENERGY STAR-qualified CFLs.
- **Stocking patterns remain stable.** All retailers interviewed, including participants and nonparticipants, stocked ENERGY STAR CFLs year-round, and 26 of the 30 retailers stocked specialty CFLs year-round.
- **Shelf space devoted to CFLs compared to other types of lighting has increased.** Both participant and nonparticipant retailers (23 out of 30) reported the number of models of ENERGY STAR bulbs carried in their stores increased in 2009. Membership/wholesale stores devoted the highest percentage of shelf space to CFLs compared to other types of retailers. There was overwhelming agreement, however, that the wider variety of CFL offerings was due to greater consumer demand and increased CFL sales.
- **The mix of standard and specialty CFLs gives consumers choices.** The program supported sales of standard and specialty CFLs, and 26 of the 30 retailers sold specialty CFLs year-round. Manufacturers said the program supported a broad range of bulbs, but pricing incentives favored standard CFLs.
- **High CFL sales rates in Xcel Energy territory bucked the recent national trend of declining CFL sales.** Nearly every retailer (28 out of 30), both participants and nonparticipants, saw an increase in the sales of ENERGY STAR CFLs over the past year, whereas national CFL shipments declined an estimated 36% compared to just two years ago. Most retailers thought increased sales primarily were due to a mix of the economy, higher energy prices, growing environmental awareness or the desire to be “green,” and a desire to reduce utility bills.

- **While CFLs maintain a presence in the marketplace within Xcel Energy territory, current sales levels would not be sustainable in the program's absence.** The vast majority of participant retailers (16 of 20) believed their CFL sales would be lower without the Xcel Energy program. The retailers estimated sales would decrease by 15% to 75%. All manufacturers believed their CFL sales would be lower in Colorado—by as much as 30% to 95% less—in the absence of the Xcel Energy's program.

- **Program partners are satisfied with the program, but want program allocations extended.** Both retailers and manufacturers reported positive experiences working with the program, participant retailers said they would like to extend their program allocations as customer response has been strong.

Conclusions and Recommendations

Drawing upon this evaluation's key findings, Cadmus has developed the following conclusions and recommendations.

Program Features and Marketing

The research conducted as part of this study found a number of ways in which the program could be improved by adding and/or modifying existing features.

- ***Consider making the Colorado Home Lighting Program available year-round with select partners***. Several CFL programs across the country follow this model. As CFLs become more popular, Xcel Energy may miss out on potential program purchases due to individuals wishing to purchase a CFL during the off-program season, yet being deterred by higher prices. One of the manufacturers also explicitly expressed interest in seeing an increase in the frequency in which the program takes place throughout the year. In addition, participation has not always been consistent from one program season to the next, further limiting the opportunities to sell additional program bulbs.

- ***More consumer education is necessary*.** Increasing consumer awareness and education about CFLs proved important for CFL sales, and partners looked to Xcel Energy to fill this role. The majority of participants said CFL sales increased when promotions were advertised. However, only six of the 20 participant retailers independently marketed CFLs beyond the aid provided by the program.

- ***Program administrators need to engage partners.*** This includes understanding the management structures of participant retailers and working within their systems to deliver the program. At least one participant retailer was not even aware of their partnership with Xcel Energy. Stores need to better train their floor staff, ensuring program bulbs are stocked, and create pricing labels and signage in preparation for a promotion period.

- ***Cadmus supports WECC's plan for an additional field representative in Colorado to enhance communication and promotion coordination at the store level***. This field representative could also provide more of the store level training to ensure consistency across stores and retailers.

- ***More marketing materials should be provided to retailers.*** This would include creating more customized options for POP materials to fit within the retailers signage constraints and make replacement POP easily available to retailers to replace lost or damaged materials. During the upstream interviews, many retailers expressed the need for increased signage. In addition, based upon upstream interviews and rather low program awareness among Random phone survey and even Ace Hardware coupon respondents, improved signage could prove beneficial for also increasing program awareness. As an upstream program, customers rarely make the connection that they receive discounts from Xcel Energy. Although this may do little to increase CFL sales, it could contribute to increasing customers' overall satisfaction with Xcel Energy and may ultimately translate to interest in other Xcel Energy DSM programs and additional energy savings.

- ***Xcel Energy should promote proper disposal of CFLs, and consider offering a coupon for a discount rate at which customers could recycle their CFLs at a local hardware store***. The majority of respondents that had disposed of CFLs stated that they had done so by throwing away their CFLs in the trash. Manufacturers also confirmed that the mercury content is becoming a new concern among CFL users and one manufacturer believes that this will be the largest barrier moving forward. In finding a way to address this concern, the phone survey data have shown that people are receptive to the idea of using a coupon from Xcel Energy for a discount rate at which they could recycle their CFLs at a local hardware store. This could be a future option to address an important barrier to CFLs.

Net-to Gross Estimate for 2008-2009

- ***Although the NTG ratio, inclusive of all forms of spillover, may be as high as 1.65, this evaluation recommends using a conservative estimate of 1.0.*** The Xcel Energy Home Lighting Program, combined with other factors, appears to have boosted Colorado CFL purchases substantially. The high spillover estimate, however, may not all be fully attributable to the Xcel Energy Program, as a number of additional factors appear to have contributed to the boost in Colorado CFL sales. As a conservative estimate, therefore, this evaluation recommends applying a NTG of 1.0 in place of the 0.8 NTG currently used, whereby Xcel Energy takes full credit for every bulb incented, but does not take credit for additional CFLs that were outside of program sales.

Implementation Strategies to Maximize Future NTG

The experiences in other suggest that, as CFL use becomes more ubiquitous, NTG will begin to fall rather precipitously. Some other programs across the nation have been able to keep program-induced purchase rates high in the face of widespread CFL use through a number of strategies presented and recommended here.

- ***Expand participation among grocery stores, discount stores, and drug stores***. As noted above, grocery stores have the highest NTG ratio among the participating distribution channels, and have typically lagged other channels in CFL sales; although grocery stores represent 25% of incandescent sales, they only represent 14% of CFL sales. In addition, no stores from the discount and drug store retail channels are a part of the program. In an

effort to expand the program and maximize NTG, therefore, Xcel should expand participation among groceries, discount, and drug stores.

- ***Include a wider variety of package sizes in program offerings.*** Consumers looking to try CFLs for the first time and low-income customers were are not likely to buy large multipacks of CFLs, even if the price per bulb was low, because the overall package price was high (e.g., a 12-pack at $12).

- ***Focus on specialty CFLs, such as dimmables, three-ways, reflectors, and covered lamps***. Based upon site visit data, savings can be achieved through promotion of specialty CFLs. Medium screw-based sockets with specialty controls and small screw-based and pin-based sockets with on/off controls accounted for 22% of all socket types present, yet the presence of CFLs occupying these sockets types were very low. Data from the phone survey revealed that some customers were unhappy with the fact that unlike incandescent bulbs, they had to buy specialty CFLs (e.g., dimmable CFLs) for certain lighting fixtures within their home, and that these bulbs were only available at a price premium. This is an opportunity however to educate customers about the continued energy savings available through specialty bulbs and perhaps an opportunity to promote the availability of discounted specialty CFLs. Expansion into the specialty market, however, should include a thorough technological review, ensuring that product quality is high and consumer satisfaction will be adequate.

- ***Cadmus recommends Xcel Energy and WECC invest in longer-term planning to account for the effects of changing standards on the overall program.*** Plans for a change in lighting standards should also include further exploration into the feasibility of incenting newer technologies—such as LED lighting, specialty CFL bulbs, or other emerging technologies that could generate further kWh savings through lighting. Before undertaking such promotions, however, analysis should be conducted to ascertain whether these technologies are market ready and cost-effective. Early promotions of poor quality CFLs in the 1990's led to a rejection of the technology that took time to overcome.

- ***Consider alternative incentive strategies for retailers or distribution channels with low NTG values***. Seeking participation of stores already selling large amounts of CFLs may significantly boost gross program sales, but may inadvertently contribute to a lower NTG ratio. Xcel Energy should consider offering different participation models for different retailers, and collect adequate data to verify attribution. For example, a market share incentive structure could be developed for retailers such as Wal-Mart, whereby instead of getting a flat incentive for all program CFLs sold they get incentives for demonstrating an increase in CFL sales from one year to the next.

Implementation Strategies to Target Households with Little or No CFLs

- ***Xcel Energy should develop a segmented marketing approach to target low- or non-CFL users***. While CFL use in Colorado increased dramatically in 2008 and 2009, over one-third of all residential households still do not have any CFLs installed. Xcel should identify who these customers are, if they have any common demographic or household characteristics (e.g., income, education, race, urban vs. rural, etc.). For example,

Efficiency Vermont has implemented its Personalized URL (PURL) direct mail campaign in which it targets residential customers in specific geographic targeting areas. Under this campaign, customers have received mailers that include a unique, personalized Website address that they can visit to complete a short energy use survey. Efficiency Vermont then follows up with households whose surveys revealed that they have the potential to achieve significant energy savings. In addition, Efficiency Vermont's Targeting Lighting Campaign promoted CFL sales at retail stores that were located within their Geographic Targeting communities. CFL sales efforts focused on advertising, press releases, and presentations to local elected officials, town energy committees, professional organizations, school, as well as other groups. Efforts were extremely successful as CFL sales grew 215% during the July 2007 to December 2008 period. During that same time, CFL sales grew 69% in non-Geographic Targeted areas. Another strategy would be to consider new ways to utilize its PRIZM segments by targeting Midlife Success and Young Accumulators as primary CFL users. Messaging to convert CFL nonusers could target Cautious Couples and Sustaining Seniors.

1 Introduction

1.1 Research Objectives

As outlined in the evaluation plan, this evaluation focused on the following major objectives:

1. Conduct a market assessment to gauge household use, purchase, and installation of CFLs. Assess drivers and barriers to customer adoption, and identify emerging CFL technologies and marketing approaches.

2. Evaluate distribution channels, including program satisfaction and factors affecting product selection.

3. Conduct a process evaluation to identify barriers to and drivers for consumers' purchase of CFLs and any non-energy benefits attributable to the program. Assess characteristics of CFL purchasers, product interest and repurchase intent, and awareness of CFL disposal options.

4. Conduct an impact evaluation by calculating Xcel Energy's gross and net savings impacts attributable to the Home Lighting program. Calculate Net-to-Gross (NTG) ratios, including and identifying effects from free-riders, free drivers, and spillover for the program as a whole and for each retailer distribution channel. Verify Xcel Energy's baseline and technical assumptions of efficiency measures used for calculating gross and net savings are correct and in line with similar programs and Cadmus' own findings.

1.2 Program Background

The Colorado Home Lighting Program is a Demand Side Management (DSM) program intended to achieve cost-effective kWh savings. Available to Xcel Energy's residential customers, the program provides compact fluorescent lamps (CFLs) at reduced prices through its Web site and through partnerships with CFL manufacturers and retailers.

1.2.1 Program History and Design

In 2006, Xcel Energy launched the Home Lighting Program in Colorado, targeting residential customers. The current program manager has been the first and only manager for the Colorado program, which was modeled after an established lighting program in Minnesota. This approach proved feasible due to economic and demographic similarities between Minnesota and Colorado.

The initial Minnesota model involved recruiting a network of hardware stores to run CFL bulb promotions. When the program first began in Colorado, similar to the Minnesota approach, Xcel Energy developed individual contracts with retailers to sell discounted bulbs. Xcel Energy introduced a coupon approach by providing customers with coupons they could redeem at stores to receive a discount. Stores received the incentive from Xcel Energy based on coupons collected. This process was a labor and paperwork intensive process for both stores and Xcel Energy. Upon introducing coupons, about 40% of participating retailers dropped out of the program because they did not want to administer the coupons. This clearly indicated the coupon

process was a hindrance to acquiring broad-based participation in the program, and Xcel Energy dropped the requirement for all retailers but Ace Hardware (which they now subsidize at a higher level to maintain the coupon process).

In 2007 Xcel Energy moved to a "buy-down" approach for the majority of retailers involved in the program. As part of the "buy-down" approach, Xcel Energy contracted with manufacturers to provide retail stores with a predetermined number of discounted CFLs at an agreed-on price. Manufacturers shipped the prescribed number and type of program discounted bulbs to retailers at the reduced rate, with the agreement that retailers would sell them to customers at the discount price.

The buy-down approach was limited by retailers having no incentive or motivation to provide sales data back to manufacturers or to Xcel Energy. This made tracking sales difficult to impossible. There was no tracking system in place for Xcel Energy to know if the bulbs they "bought-down" actually made it to stores within Xcel Energy's service territory. Furthermore, shipments of program bulbs could be lost or damaged en route to stores, with Xcel Energy never receiving compensation.

In early 2008, Xcel Energy shifted to a "mark-down" approach, where Xcel Energy contracted with manufacturers to partner with retailers to sell a certain number of CFLs at a discounted price. The retail stores continually received shipments from manufacturers, and, in most cases, already stocked the identified bulbs at the "regular" price. During the promotional period, they sold the identified CFL models at the reduced price. Stores then reported their sales to the manufacturer, and the manufacturer reported those sales to Xcel Energy. Xcel Energy provided the incentive to the manufacturer, and the manufacturer passed the payment along to the retailer based on the numbers they sold. The mark-down approach currently is in place with all retailers except Ace Hardware.

As Ace Hardware is the only retailer willing to use the coupon process (whereby individual customer data are collected), they have been lobbying Xcel Energy to forego the use of coupons as customers find them inconvenient to fill out, and they introduce a level of reporting and data management other stores do not (or will not) have to maintain. Xcel Energy, however, is reluctant to forego the coupon approach altogether as it would lose the only source of participant-level data.

Xcel Energy now contracts with Wisconsin Energy Conservation Corporation (WECC) to coordinate the RFP process with manufacturers, and to administer most program operations. In the RFP process, manufacturers are required to partner with a select retailer as a component of a bid. Xcel Energy determines the number of bulbs they will subsidize and the subsidy's dollar amount. Xcel Energy also sets the CFL sales goals for each promotional period.

1.2.2 Program Achievements

Program goals and achievements increased steadily over the past three years. In 2009, the program participation goal doubled from 500,000 to 1,000,000. The budget also increased proportionally to meet increased goals. The Colorado Home Lighting program 2009 budget accounted for 15% of the residential electric conservation portfolio and 85% of the kWh savings goal. See Table 1 for historical participation goals and achievements.

Table 1. Colorado Home Lighting Program Achievements

	2006	2007	2008	2009
CFL sales goal	7,688	105,000	500,000	1,000,000
CFL sales actual	102,000	333,042	510,291	
# of bulbs given away	400	1,966	9,025	
% of actual participation through coupons			14%	
Budget goal	$238,613	$200,000	$750,000	$3,127,951
Actual spend	$104,750	$559,435	$804,042	
Energy savings goal (kWh)	683,022	9,328,468	44,000,000	46,237,797
Claimed Energy savings (kWh)	9,000,000	9,364,000	45,058,922	

1.3 Report Overview

This report is organized into eight additional chapters.

- Chapter 2 describes the methods used to collect data for this evaluation.
- Chapter 3 provides a summary of interviews with program staff.
- Chapter 4 presents the results from the telephone survey and site visits.
- Chapter 4.1 highlights findings from the upstream interviews with retailers and manufacturers.
- Chapter 6 reports on net savings inputs.
- Chapter 7 provides verification of Xcel Energy lighting technical assumptions.

Included separately are Appendices with copies of all data collection instruments as well as summary tables of collected data.

2 Data Collection Activities

2.1 Overview of Data Collection Activities

This chapter describes the methodological approach and data collection activities conducted for this evaluation. As outlined in the evaluation plan, key tasks conducted during this evaluation included:

- Utility Staff Interviews (n= 6)
- End-User Surveys:
  - Randomly selected Xcel Energy customers (n= 530)
  - Coupon-Based Participant Surveys (n= 70)
  - In-home Lighting Surveys (n= 70; nested sample—recruited from phone survey)
- Retailer and Manufacturer Interviews (n= 36)
- Multistate Regression Model Phone Survey (n= 9,300)
- Multistate Regression Model In-home Survey (n= 1,400)

2.2 Utility Staff Interviews

To gather information about current implementation practices, challenges, and successes, Cadmus conducted in-depth interviews with Xcel Energy program staff and third-party implementation staff using structured interview guides. The primary objectives of these interviews were to evaluate the program in the following areas:

- Program history, design, and theory;
- Key aspects of program delivery;
- Roles and responsibilities of staff and contractors;
- Challenges to program delivery; and
- Recommendations for future efforts.

Interviews focused on four key program areas: program management, business technology, regulatory strategy, and program delivery. Program staff within each of these areas were interviewed by Cadmus evaluators (Table 2).

Table 2. Utility Staff Interviews by Program Area and Staff Role

Program Area	Key Program Staff Role
Program Management	Program Manager
Business Technology	Business Technology Consultant
Regulatory Strategy	Manager, DSM Regulatory Strategy and Planning Regulatory Analyst
Program Delivery	WECC director WECC Project Manager

2.3 End-User Surveys

Cadmus conducted 600 residential end-use customer telephone surveys: 530 surveys were conducted using a random sample generated from the Xcel Energy billing database, and 70 surveys were conducted with a sample of known program participants who had purchased program CFLs through the Ace Hardware coupon process. Xcel Energy provided contact information for residential customers, including a list of CFL coupon purchasers, and the survey company, Schulman, Ronca & Bucuvalas, Inc (SRBI) made calls randomly from the list provided.

At the conclusion of each survey, respondents were invited to participate in an in-home lighting audit. The audit, which examined CFL purchases and saturation, were conducted by trained Cadmus technicians. Participants in the in-home survey were provided a $25 gift card. Survey instruments used for the three end-user surveys are found in Appendix A.

2.4 Manufacturer and Retailer Surveys

Upstream interviews focused on the CFL supply chain at the retail store level, retail corporate level, and manufacturer level. Nexus Market Research (NMR) conducted thirty-six in-depth interviews during October and November 2009. The interviews included 20 participant retailers, 10 non-participant retailers, one corporate participant retailer and five participant manufacturers. The purpose of the interviews was to assess program satisfaction and areas for program improvement, as well as to assess the impact of the program on CFL sales in Xcel Energy's territory.

2.5 Multi-State Regression Model

The Multi-state regression model incorporated survey data from 16 regions in the United States, including regions with CFL programs and some without. The analyses drew on random-digit dial (RANDOM) telephone surveys of over 9,300 households and onsite saturation surveys (including confirmation of when CFLs were purchased) for 1,444 households. The principal goals of the statistical analyses were to identify and examine factors associated with 2008 CFL purchases and to assess the effect of CFL programs on those purchases in a changing CFL market. The evaluation team used the modeling results to estimate NTG for each study Sponsor. The team based these estimates on the models that best described CFL purchases in 2008.

2.6 NTG Data Sources

NTG was derived from three of the data collection and analysis activities:

- The Multi-state regression model approach accounted for NTG inclusive of participant and nonparticipant spillover.
- The manufacturer and retail interviews provided a self-reported assessment of free ridership by distribution channel.

- The coupon-based participant end-use customer survey provided an assessment of free ridership, using a self-report approach, for a smaller segment of end-use customers that were known to have purchased program bulbs.
- For context, Cadmus also provided lighting program NTG values from other utilities that were considered public information.

3 Staff Interviews

3.1 Summary of Key Findings

As the program has developed over the past three-and-a-half years, staff members have shaped program design around the needs and opportunities presented by the market. This is particularly evident in the shift to an upstream, mark-down program that has proven highly cost-effective. Communication remains a challenge at the retail level, as does capturing detailed sales level data.

- **Staff were confident that processes in place were effective for program delivery and goal achievement**. The program's success was measured by sales that exceeded program goals, and also presumably meant greater CFL market saturation per home. The more effectively the program achieved its goals, however, the more difficult they became to meet in the future (e.g., fewer available sockets).

- **As the program has grown, so did the relationship between Xcel Energy and the key implementer, Wisconsin Energy Conservation Corporation (WECC)**. As goals and budgets increased, WECC was able to add staff and work with more manufacturers to implement the program. WECC's level of expertise and resources provided a strong basis for expanding the program in Colorado.

- **Communication between Xcel Energy and WECC was considered effective, but communication with retail stores was considered an area for improvement**. This was the result of accountability measures at the manufacturer level, but not directly at the store level. Cadmus supports WECC's plan for an additional field representative in Colorado to enhance communication and promotion coordination at the store level. This field representative could also provide more of the store level training to ensure consistency across stores and retailers.

- **Program marketing has focused on print and radio advertising and point of purchase (POP) signage in stores**. Plans for expanding advertising to television are in place for 2010.

- **Changing lighting efficiency standards (EISA 2007) represented an unknown but anticipated challenge to continued high program savings**. LED lighting was considered the next horizon for efficient lighting, but pricing will need to decrease over the next few years before it becomes cost effective for the program to promote.

3.2 Methodology

Cadmus identified six staff members closely associated with the Residential Home Lighting program to interview as part of the process evaluation:

- Kim Sherman, Product Portfolio Manager, Xcel Energy.

- Bruce Boerner, Energy Efficiency Engineer, Xcel Energy.

- Suzanne Galster-Doyle, Manager, DSM Regulatory Strategy & Planning, Xcel Energy
- Jeremy Petersen, Regulatory Analyst, Xcel Energy.
- Dan Agne, Manager of Upstream Energy Efficiency Programs, Wisconsin Energy Conservation Corporation (WECC).
- Joe Pater, Project Manager, WECC.

Cadmus conducted interviews with these staff members in October and November 2009. Information from these interviews were used to understand the program's history, design and processes as well as to capture staff input and suggestions for program improvement.

Cadmus developed interview questions (Appendix A) with input from Xcel Energy. A Cadmus interviewer then conducted on-site interviews for Xcel Energy staff and telephone interviews for the two WECC staff members. Each interview lasted about an hour. Although specific questions differed slightly, depending on each person's role, interviews covered the following general topics:

- Performance
- Performance Indicators
- Verification
- Workload assessment
- Communication
- Internal reporting
- Marketing
- Web Sales
- Market barriers to CFL Adoption
- Factors influencing CFL Sales
- Future program development

3.3 Staff Interviews Findings

3.3.1 Performance

Staff expressed confidence in their ability to meet increasing goals within the next two to three years. However, staff were uncertain how the Energy Independence and Security Act of 2007 (EISA 2007) lighting standards, which begin phase-in in 2012 and require lighting to be approximately 30% more efficient, would affect their ability to meet kWh savings goals. Staff speculated that under at least one scenario CFLs could become the new standard for lighting, diminishing (and possibly eliminating) the need for lighting incentives.

The residential lighting program was considered the most cost-effective DSM program in the Xcel Energy DSM portfolio. Staff believed that the investment Xcel Energy made in the mark-down program and advertising to promote CFLs yielded large returns in customer CFL purchases exceeding participation goals and, therefore, kWh savings.

3.3.2 Performance Indicators

Program performance was monitored by tracking and analyzing sales data from participating manufacturers (total program CFL sales), number of program bulbs purchased through Ace Hardware retail storefronts, and secondary research resources to inform technical assumptions. Throughout the year, staff monitored the number of bulbs sold and their wattage. As wattage was a factor in the technical assumptions filed with the Colorado Public Utilities commission, staff monitored actual sales compared to projections made in the filing.

Program staff conducted verification twice a year. All data was input to the program database after the first promotion. Staff looked at the average wattage & number of bulbs sold per person—which translated to hours of use--and compared those to the projections filed. In midyear 2009 staff estimated sales of 30,000 more bulbs than initially projected because people bought more bulbs per person (from 4 to 7). The program lost some kWh savings due to technical assumptions that credit fewer operating hours to successive bulbs in the same household, but that was balanced out to some extent because sales volume was higher than estimated.

Packaging played a role in increased sales as Costco only sold CFLs in eight-packs. Costco and Sam's Club sold more CFLs than any other participating retailer, partially because they sold in bulk.

3.3.3 Verification

WECC visited each store running a promotion at least once a year. They contacted store managers, who then trained and communicated with store clerks. Part of the inspection process included scanning promotional bulbs to make sure bulbs were priced properly through their electronic bar codes.

3.3.4 Workload Assessment

The program manager was responsible for other programs in addition to the lighting program. She considered lighting to account for 30% to 50% of her role. Recently, a marketing assistant has also been assigned to provide assistance for the lighting program. The program manager felt current staffing was adequate to meet the workload for which she was responsible.

WECC has recently added staff to better manage program delivery. As of July 2009, the main contact with WECC, Dan Agne, was promoted to a director-level position. His role as Upstream Program Manager was to manage contacts at the corporate and manufacturer level, develop RFPs for programs, and draft memoranda of understanding (MOU) regarding timelines and contract details. A new program manager was hired to manage more of the daily operational issues, including: primary client contact; communication with retailers; and coordinating promotions, training, and audits at store levels. His role with Xcel Energy's lighting program accounted for about 80% of his workload.

3.3.5 Communication

Communication between WECC and Xcel Energy was accomplished via daily exchanges between program managers. Both WECC and Xcel Energy felt satisfied with the frequency and quality of communication between them.

WECC described, however, some "bumps in the road" in communicating with external stakeholders. WECC staff described managing store-level communication as perhaps their biggest challenge. In the RFP process, they partnered with the manufacturer, and asked them to communicate information about training and promotions. Eventually, that information was passed to the store associate working with customers. According to WECC staff, letters and e-mails directed to manufacturers to forward to retail store associates were easily "lost in the noise." This proved to be a problem when, for example, Xcel Energy ran a lighting promotion in a bill insert directing customers to stores, but store personnel were not aware of the promotion.

The Xcel Energy program manager confirmed this communication issue. Relationships were fostered with manufacturers because they held the program contract with Xcel Energy. "Manufacturers are not always timely or thorough with communication to stores," according to the Xcel Energy Program manager. Participating manufacturers also tended to discourage program staff from talking directly with retailers for fear their competitive position with retailers could be compromised in some way. This was further confirmed when Cadmus requested a sample list of retailers for this evaluation study and found neither Xcel Energy nor WECC were able to provide a comprehensive list of retail store managers or corporate retail contacts.

WECC intends to address this communication gap in 2010 by hiring a field representative in Colorado, whose primary responsibility will be to develop store level communication and ensure promotions are coordinated throughout the system.

3.3.6 Internal Reporting

Store managers provided a weekly and/or monthly sales report to Xcel Energy via their partner manufacturer. This generally included: the model number, number sold, and store location. Xcel Energy maintained a database where those sales details were tracked and used to calculate energy savings. This information informed weekly sales forecasting/planning and was used for the ongoing M&V reporting for which the program was responsible.

The program manager, however, explained these reports did not provide individual transaction level data, so there was no a record of how many bulbs an individual purchased or which bulb types were purchased in combination. A report with individual transaction level detail would be highly valued at the program management level, but stores have not provided information with this level of detail.

The Rebate Processing department of Xcel Energy entered Coupon data and Web site transactions into "RECAP"—an internal database for all of Xcel Energy's conservation and energy-efficiency rebate programs.

3.3.7 Marketing

CFL promotions tended to last six to eight weeks, with one held in the Spring and another in the Fall, and featured retailer-sponsored signage or Xcel Energy-sponsored marketing and advertising. ACE Hardware reportedly tended to provide better promotional signage than other stores. Generally, signage was developed by the corporate retail office as opposed to each individual store. Staff believed that the signage was often not well designed or well placed in stores. As a result, customers were not always aware bulbs were discounted and were even less likely to know the discount was subsidized by Xcel Energy.

Xcel Energy's advertising department and ad agency worked with the program manager to develop an annual advertising plan. In 2009 the program utilized radio, bill envelopes, bill inserts, online banner ads, sweepstakes, and giveaways at local events. In 2010, the marketing plan includes television advertising. Generally, the following year's ad plan is developed in the fourth quarter, and creative materials are usually developed in December.

Timing for promotions also represented an ongoing challenge between Xcel Energy and the stores. These activities were not always in sync with advertising and bill inserts. Major retailers were generally not as flexible at the corporate level in accommodating the program promotional timing needs for a single product line, such as lighting.

The program manager estimated the most effective promotional activities were radio and bill inserts. For example, tracking indicated the lighting program fell short of CFL sales goals in the Xcel Energy New Mexico service territory; so Xcel Energy staff increased radio advertising and "radio remotes" (radio broadcasts from the store). This showed immediate results in improving New Mexico sales within required time frame, and Staff believed radio ads and bill inserts were equally effective in Colorado.

Last year, ENERGY STAR sponsored a cross-country CFL promotional tour. Xcel Energy purchased space with them at an event in Colorado. The "Change a Light; Save the World Campaign" offered a branding platform for utility lighting promotions. Xcel Energy leveraged the national effort by running promotions at the same time. ENERGY STAR had additional promotional concepts that have not been effective for Xcel Energy. This was primarily due to technical requirements, such as linking into the ENERGY STAR Web site from the utility Web site, which have presented significant challenges due to the Xcel Energy requirement that the Information Technology (IT) department manage all Web content..

3.3.8 Web Sales

Though Xcel Energy had a third-party vendor Web site selling CFLs, they did not heavily promote it, particularly in recent years. The program manager described an issue with Web sales as follows: "We used to sell a lot over the web, but then we had to comply with new branding requirements—we used to have a direct link to the CFL site, but they changed the requirement so that customers have to go through the Xcel Energy Web site to get to the lighting Web site. Since then, traffic has dropped off dramatically because customers have trouble navigating Xcel Energy's Web site and never find the link."

To address the navigation issue, Xcel Energy established a unique URL for CFL bulb sales: XcelEnergy.com/HomeLighting. Staff promoted it, however, only on bill inserts as they found it

was not cost-effective to promote it through a separate campaign. For example, Xcel Energy spent about $20,000 for a bill insert promoting CFLs on their Web site, which appeared to only yield about $3,000 in direct Web sales. As this was not cost-effective, Staff decided to focus their budget into the direct mark-downs. At their most effective Web sale time period, they sold about 20,000 bulbs annually through the Web. At the time of the evaluation, their overall program goal was 2 million bulbs. The program manager concluded, "The return on that investment has made the web promotions rather prohibitive." The site still exists, and includes some specialty bulbs (e.g., dimmables) that may be hard to find in stores, but customers have to pay for shipping.

3.3.9 Market Barriers to CFL Adoption

Incremental price—the difference between the price of a CFL compared to an incandescent bulb—was perceived to be the most significant market barrier to CFL adoption. This formed the program's basis in that upstream incentives were designed to reduce incremental costs to customers, making the choice to purchase a CFL more attractive in comparison to other bulbs.

Bulb quality was perceived to be another market barrier by program staff. Aspects of CFL bulb size, shape and quality of light remained complaints that staff heard from customers. Recently more concerns regarding mercury content and disposal options for CFLs were heard by staff. These preferences appeared to be larger barriers for some segments of the population than others. Further analysis of CFL non-users based on survey responses is presented in the survey findings chapter of this report.

Early bulb failure was perceived to be another barrier by staff. Xcel Energy received complaints that some CFL bulbs have not lasted as long as packaging indicated. Though ENERGY STAR has found little compelling evidence for this, Xcel Energy has anecdotal evidence indicating major CFL brands tend to last longer than minor brands.

3.4 Factors Influencing CFL Sales

3.4.1 Federal Standards

Xcel Energy was concerned about changing lighting standards resulting from EISA, as the CFL program was the largest contributor to DSM goals, and, at this point, there was no comparable measure to replace it. The program changed its cost-benefit analysis to account for the phase-out, adjusting avoided costs to account for approaching standard changes. In the future, staff expect the program to decline and eventually phase out. While they were concerned about losing the program, they currently did not have the time or resources to explore and develop new DSM options.

3.4.2 Technologies

Xcel Energy staff have begun to look at LEDs as an emerging lighting technology, but so far they have not seen a cost effective alternative to CFLs for general residential lighting applications. Staff were not aware of information to indicate when or how LED pricing would become more competitive.

3.4.3 Economic Downturn

Staff believed the economic downturn resulted in declining CFL sales, nationally, in the past year. In response to declining national CFL sales, the EPA encouraged utility sponsored CFL promotion. The program manager cited a letter from Rich Kearney at the Department of Energy (DOE) encouraging utilities to continue promoting CFL because of national trends indicating sales were down.

3.4.4 Geographic Factors

While there are demographic differences between some of the states within Xcel Energy service territory, the similarities between the Colorado and Minnesota markets tend to be more extensive. While the customer base appears similar in those two major markets, differences are evident on the retail level. For example, in Colorado, Costco sells more CFLs than in other states within Xcel Energy service territory. This single regional difference resulted in different plans and goals for each state based on the history of sales from retail channels.

3.4.5 Other DSM Programs

Lighting served as a component in several other Xcel Energy DSM programs. For example, CFLs were used as incentives (as a giveaway) for participating in another program. Although kWh savings from giveaway bulbs were attributed to the Home Lighting program, the claimed savings from this program component were quite small (less than 2%) compared to the high volume of lighting sales through the program. If lighting was a required measure for a program, as it is for the Home Performance program, those kWh savings were attributed to that program rather than the Home Lighting program.

3.5 Future Program Development

Xcel Energy is looking into LED lighting as a future program component. Although cost-benefit analyses did not support LEDs as they were currently priced, Xcel Energy anticipated declining LED prices and ability to average costs across the entire program could make them a viable incentive program option.

Xcel Energy has also considered incenting more specialty bulbs, including dimmables, 3-ways, and reflectors. Specialty bulbs tend to have higher incremental costs and lower sales volumes, making them less attractive from a program standpoint. Staff anticipated, however, as the market becomes more saturated with regular, medium, screw-based CFLs, the value of specialty bulbs will increase for the program.

4 CFL User Survey Results and Site Visits

4.1 Summary of Key Findings

This section summarizes the results of telephone survey with CFL users and subsequent in-home visits (site visits). The telephone surveys were designed to collect information on: awareness and familiarity with CFLs; past and recent purchases of CFLs; use and storage of CFLs; satisfaction with CFLs; disposal of CFLs; and awareness of Xcel Energy's Home Lighting Program. The analysis compared survey findings from those who were known program participants prior to the survey (Ace Hardware coupon respondents) to those who were Colorado Xcel Energy customers yet not known to be program participants prior to the survey (random survey sample [RSS] respondents). The telephone survey was also based on CFL user surveys conducted nationwide to compare findings with other program and non-program areas.

In-home visit participants were drawn from a nested sample of telephone survey respondents. Site visits sought to ascertain CFL saturation levels among Xcel Energy's Colorado customers and to verify phone survey responses regarding CFL purchases.

Key observations from the survey efforts include the following:

- CFL awareness of was extremely high among Ace and RSS respondents (99% and 93%).
- Respondents most commonly learned of CFLs through TV, radio, newspaper, or magazine advertising.
- A large percentage of Ace respondents (45.6%) and RSS respondents (38.1%) first used a CFL in 2008 or 2009, reflecting a surge in new CFL users in Colorado in the last two years.
- The majority of respondents reported satisfaction with CFLs: 86% of Ace respondents and 74% of RSS respondents reported they were highly satisfied with CFLs.
- Both Ace and RSS respondents most commonly disposed of their CFLs by throwing them in the trash rather than recycling them (61% and 74%).
- 65% of RSS respondents reported having at least one CFL installed.
- On average, Xcel Energy residential customers had 8.7 CFLs installed per home, with a 90% confidence interval of 7.2 to 10.3 CFLs per home. The median number of CFLs installed per home was 6.7.
- CFLs were installed in approximately 16% of all sockets in the typical residential home.

4.2 Methodology

Both the phone survey and on-site lighting verification instruments were based on instruments used to evaluate a number of similar upstream CFL programs around the country, including programs in California, Massachusetts, New York, Connecticut, and Wisconsin. Many questions were repeated verbatim; so the data could be compared to past studies and could be added to the multistate model being developed by Nexus Market Research. Some questions were modified for relevance to Xcel Energy's Home Lighting Program and Xcel Energy's Colorado customer base. The phone survey and the on-site lighting verification instruments are included in Appendix A.

Phone survey data analyzed in this report compares Ace and random survey sample (RSS) respondents. Ace respondents include participants who bought CFLs at a participating Ace Hardware store using an Xcel Energy coupon to discount CFL bulbs. Unlike other participating stores, Ace Hardware was the outlet where respondents could purchase discounted CFLs using a coupon provided by Xcel Energy. This coupon allowed Xcel Energy to track program participants and collect sales information such as when, what type, and how many bulbs were purchased.

The second group of respondents was selected randomly from a list of Colorado Xcel Energy residential customers. Although RSS respondents may have purchased program discounted bulbs, this remained unknown until program identifying questions from the survey were answered.

Table 3 shows the final disposition of calls completed for this project. The surveys were conducted by SRBI Consulting using computer-assisted telephone interviewing (CATI) during September and October 2009.

Table 3. Final Disposition of Surveys

	Completed Interviews	Site Visits Completed
Ace	70	10
RSS	530	60
Total	600	70

During October 2009, 70 site visits were completed in which Cadmus field staff visited a phone survey participant's homes to take inventory of the lighting in their dwellings. Participants were also asked a few questions to confirm information given during the phone survey. Each site visit took between 20 to 40 minutes to complete, and, at the end of the visit, participants were given a $25 gift card for their participation. Seventy site visits were anticipated to meet goals of 90% confidence and 10% precision levels.[1]

For the phone surveys, statistical significance testing was run on appropriate items. Multiple response and open ended questions were not tested for statistical significance. The chi-squared test was used and tested to the 95% confidence level. The null hypothesis was that the responses

[1] These levels are based on a binomial assumption (50% proportion) regarding the stated vs. actual presence of CFLs in respondent households.

given from the two sets of respondents (Ace and RSS) were the same. Therefore, statistical significance indicated that there was a high probability (95% or greater) that the responses given from the two groups were different.

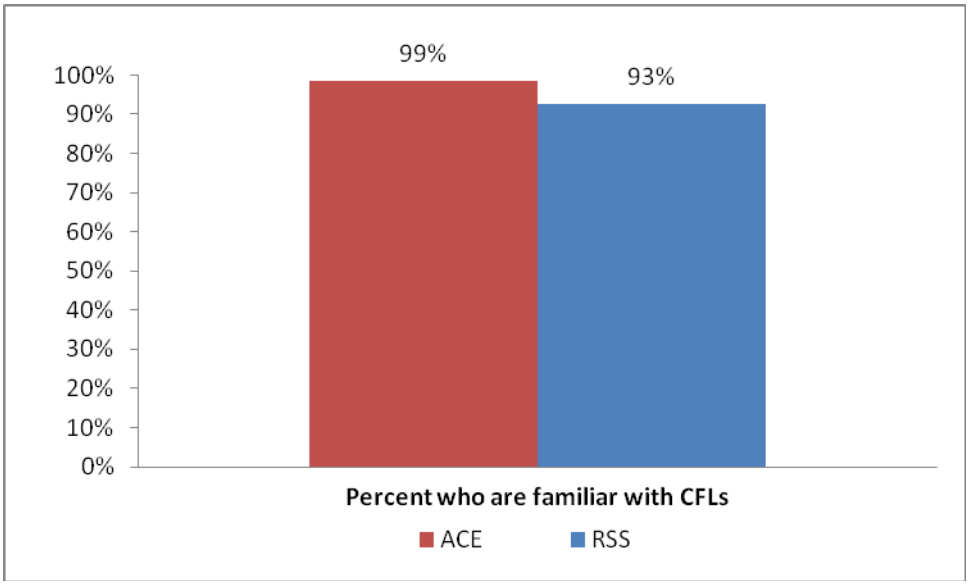
4.3 Findings

4.3.1 Awareness and Use of Energy-Efficient Lighting

The phone survey asked a series of questions to assess respondents' familiarity with and experience using CFL bulbs. Virtually all Ace respondents and the majority of RSS respondents were familiar with CFLs (99% and 93%, Figure 1). Over half of Ace respondents (67%) rated themselves as "very familiar" with CFLs, and close to half of RSS respondents (43%) rated themselves as "very familiar" as well (Figure 2). An additional 40% of RSS respondents rated themselves as "somewhat familiar."

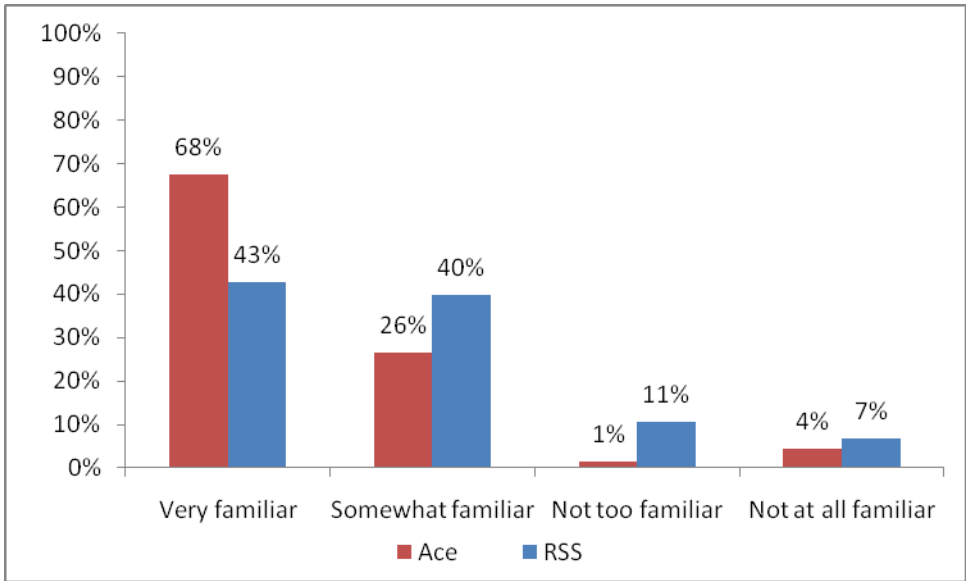
As show in Figure 3, a large percentage of Ace respondents (45.6%) and RSS respondents (38.1%) first used a CFL in 2008 or 2009. These data indicate that there was a surge in new CFL users occurring in Colorado in the last two years, particularly since 2009 was not even complete at the time the survey was conducted.

Figure 1. Percent of those who are Familiar with CFLs*
(Ace N=70, RSS N=530)



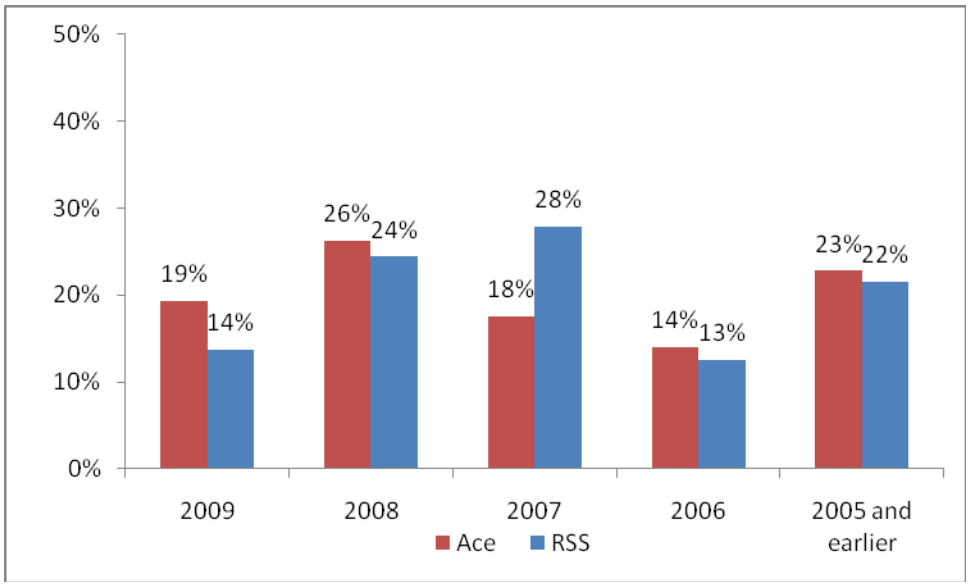
*Indicates statistical significance.

Figure 2. Level of Familiarity with CFLs*
(Ace N=70, RSS N=530)



*Indicates statistical significance.

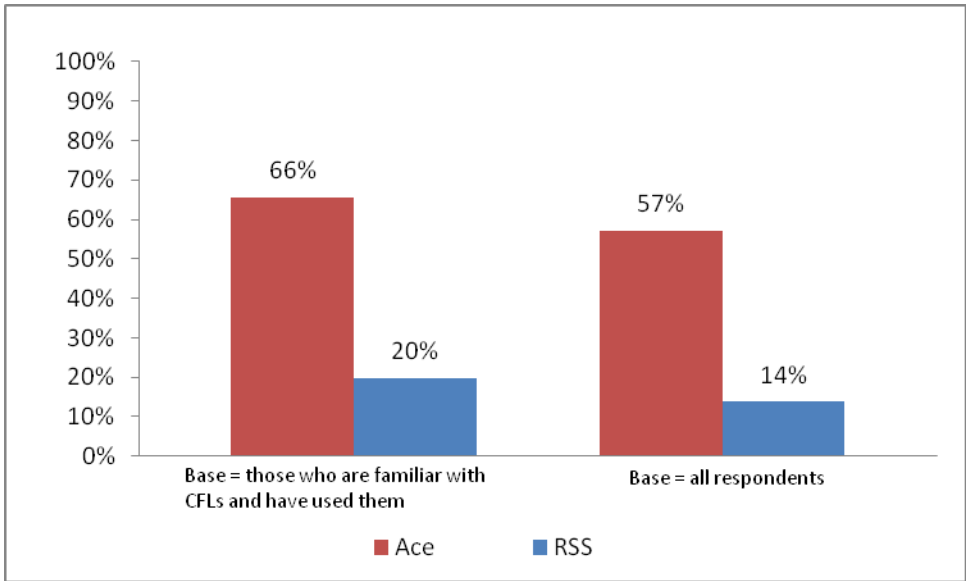
Figure 3. Year in which Respondent First Used a CFL
(Ace N=57, RSS N=344,
Base=those who have ever used a CFL on the inside or outside of their home)



Regarding awareness of Xcel Energy's Home Lighting Program, 67% of Ace respondents and 20% of RSS respondents were aware of the program (Figure 4). Although all Ace respondents bought CFLs at Ace Hardware using an Xcel Energy program coupon, reasons for why 100% of the respondents were unaware of the program could include some respondents simply did not

realize the coupon was attached to a specific program or respondents may have forgotten their specific purchase of CFLs at Ace.

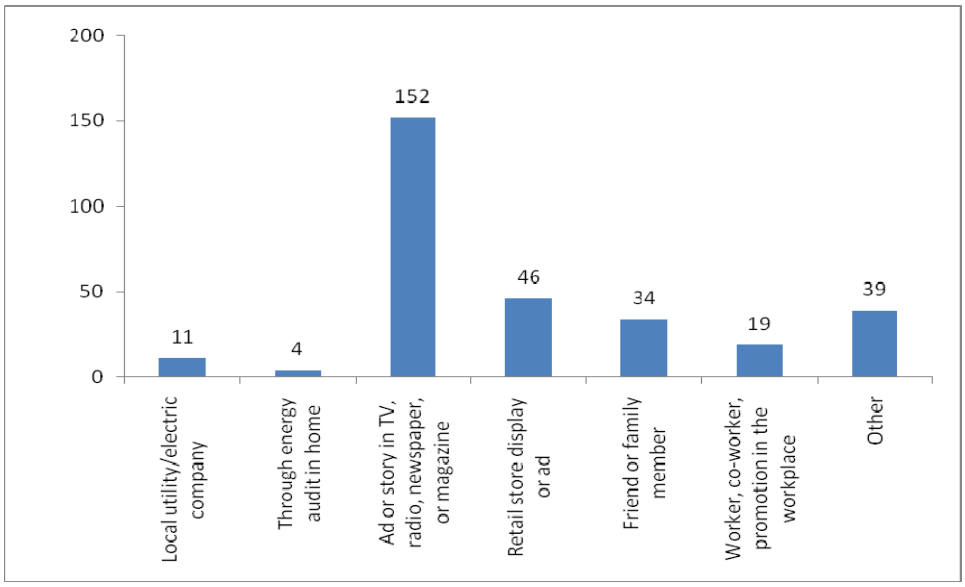
Figure 4. Home Lighting Program Awareness Among CFL Users*
(CFL Users: Ace N=61, RSS N=369
All Respondents: Ace N =70, RSS N=530)



*Indicates statistical significance.

When RSS respondents were asked how they first learned about CFLs, the most common response given was through TV, radio, a newspaper, or magazine advertising. The second most common response was through a retail store display or advertisement.

Figure 5. Means Through which Respondent First Learned About CFLs (RSS N=305)



4.3.2 CFL Penetration

Approximately 65% of the RSS respondents reported having at least one CFL currently installed in their home. This percent represents the penetration rate for CFLs. The survey asked respondents familiar with CFLs to describe their past and current use of the products. Respondents were asked: "Have you ever used a CFL on the inside or outside of your home;" over 90% of Ace and RSS respondents replied "Yes" (95% and 96%).

Of the 530 respondents to the RSS survey, two thirds (65%) indicated they had used a CFL in their home. The remaining 35% either had not used a CFL bulb or they were not aware of CFLs and the question was not asked of them. These respondents were classified as non-users and the two thirds that had used a CFL were classified as CFL users.

CFL users and nonusers differed in their education level, annual income and home ownership. CFL non-users were more likely renters than CFL users (10% vs. 4%), less likely to have a bachelor's or graduate degree (39% vs. 85%), and less likely to earn $75,000 or more annually (17% vs. 46%). Nonusers were also more likely to live in a manufactured home (8% vs. 3%). There were no differences between CFL users and nonusers in sex and satisfaction with Xcel Energy.

In terms of the Nielsen Claritas PRIZM market segmentation model[2], the RSS survey had a higher proportion of Conservative Classics and Cautious Couples segments and a lower proportion of Young Achievers as compared to the proportions in the Public Service of Colorado (PSCo) service territory. The remaining survey respondent segments were in proportion to the

[2] Xcel Energy has selected the Nielsen Claritas comprehensive consumer segmentation system, PRIZM for marketing segmentation across all DSM programs. For more information see the Nielsen Claritas Web site: http://en-us.nielsen.com/tab/product_families/nielsen_claritas/prizm.

PSCo service territory. Table 4 shows the proportions of survey respondents by PRIZM segment.

CFL non-users were concentrated in the Sustaining Seniors and Cautious Couples segments. Conversely, CFL users were more likely associated with the Midlife Success and Young Accumulators groups. Both CFL users and non-users had higher proportions associated with Conservative Classics. These segment differences align with the income variable and also indicate age as a defining characteristic, with non-users more likely in the senior age category and CFL users younger.

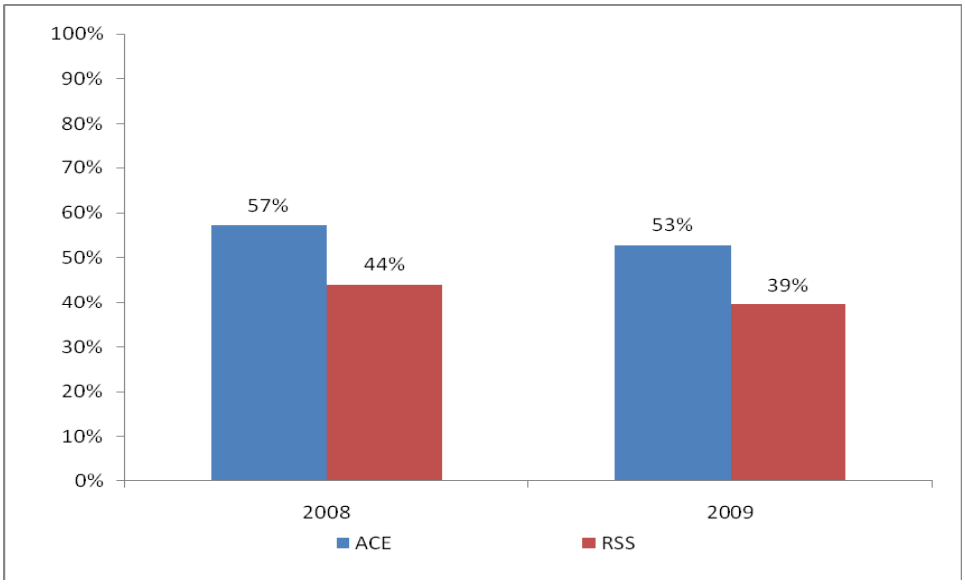
Table 4. RSS Survey Respondents by PRIZM Segment

PRIZM Segment code	PRIZM Segment Name	PSCO Frequency	PSCO PCT	RSS Survey PCT	CFL Non-User	CFL User
F1	Accumulated Wealth	84305	6%	3%	1%	5%
F2	Young Accumulators	153519	11%	12%	7%	15%
F3	Mainstream Families	161300	12%	9%	9%	9%
F4	Sustaining Families	56365	4%	3%	3%	3%
M1	Affluent Empty Nests	103529	7%	8%	9%	7%
M2	Conservative Classics	135192	10%	16%	17%	15%
M3	Cautious Couples	110609	8%	15%	19%	13%
M4	Sustaining Seniors	79121	6%	12%	17%	11%
Y1	Midlife Success	232680	17%	14%	10%	16%
Y2	Young Achievers	187426	14%	3%	3%	4%
Y3	Striving Singles	78766	6%	4%	6%	3%

4.3.3 Recent CFL Bulb Purchases

In 2008, 57% of Ace respondents purchased one or more CFLs. In 2009, this percentage decreased slightly to 53%. For RSS respondents, the percentage of those who purchased CFLs decreased from 2008 to 2009 (44% and 40%).

Figure 6. Percent of Respondents that Purchased One or More CFLs in 2008 and 2009 * (Ace N=70, RSS N=530)



*Indicates statistical significance.

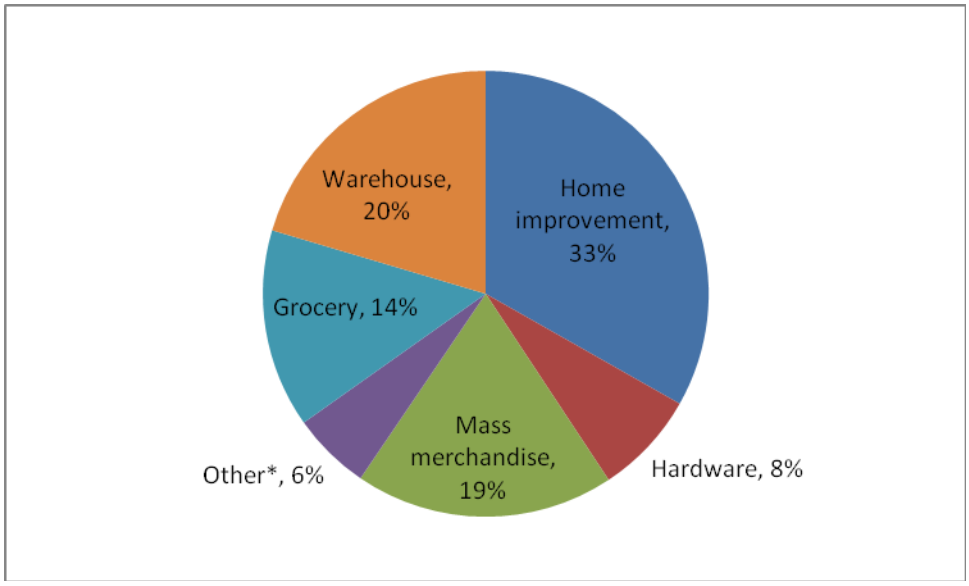
As shown in Table 5, the highest number of incandescent and CFL bulbs bought per store channel, for 2008-2009, were at warehouse stores, such as Costco and Sam's Club. For incandescent bulbs, the retail channel where the second highest amounts of bulbs were bought (on average) was at grocery stores. For CFLs, the retail channel was home improvement stores.

Figure 7 and Figure 8 show the percentage break out by channel at which respondents purchased CFLs and incandescent bulbs. For CFLs, one-third of all bulbs were purchased at home improvement stores, such as Home Depot. The next highest percentage was at warehouse stores such as Costco and Sam's Club (20%), followed by mass merchandise stores, such as Wal-Mart and Target (19%). This is in contrast to incandescent purchases, where mass merchandise stores were the most common channel for bulb purchases (28%) and grocery stores were the second most common channel (25%). Mass merchandisers and grocery stores, therefore, represent a substantially larger percentage of incandescent bulbs compared to CFLs, and thus represent additional opportunities for future CFL sales.

Table 5. Average Number of Bulbs Bought in 2008-2009 by Channel[3]
(Base=those who purchased CFLs)

Store Type	Incandescent	CFL
Grocery	5.1	4.2
Warehouse	12.6	8.9
Home Improvement	4.2	6.4
Hardware	3.8	5.0
Mass Merchandise	5.6	4.5

Figure 7. CFL Purchases by Channel[4]
(N=1,402)

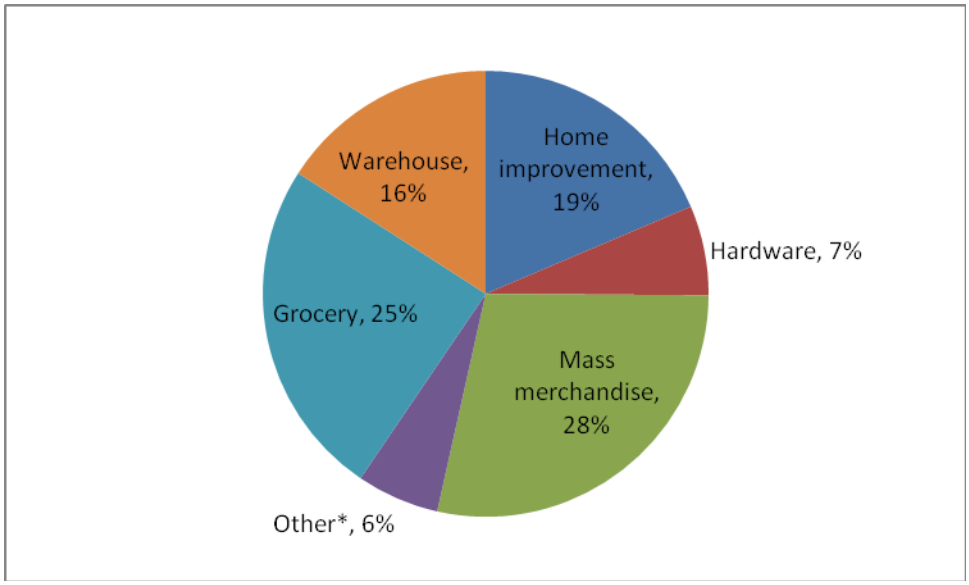


*Other includes drug stores, convenience stores, specialty lighting stores, home furnishing stores, bargain stores, office stores, and the utility, Xcel Energy.

[3] Some store channel types were not included as N's were extremely low. These data just reflect RSS responses as Ace respondents were not asked this question. As discussed in the multistate regression analysis, the self-reported number of CFLs purchased varies substantially from the telephone survey to the in-home audit, and the data presented here are based on the telephone survey.

[4] These data just reflect RSS responses as Ace respondents were not asked this question.

Figure 8. Incandescent Purchases by Channel[5]
(N=1,506)



*Other includes drug stores, convenience stores, specialty lighting stores, home furnishing stores, bargain stores, office stores, and the utility, Xcel Energy.

4.3.4 Motivation to Purchase CFLs

When asked what factors first motivated respondents to purchase CFLs, the most common answer given among respondents was that they wanted to save energy (36%, Table 6). Reducing energy costs (19%) and longer life (17%) were also important motivating factors to first purchase a CFL. Additional, 26 out of 34 Ace respondents and 121 out of 160 RSS respondents said that despite any concerns that they may have with CFLs, they are still very likely to purchase them. When respondents were asked what they liked most about CFLs, the most common response given was that CFLs have a longer life than incandescent bulbs (34%) followed by CFLs save energy (32%).

Table 6. Motivating Factors to First Purchase CFLs
(Base N=those who have purchased CFLs)

Reason	Ace	RSS	Total	Percent of Responses
Advertisement	0	1	1	0%
Socially conscious thing to do	1	2	3	1%
Recommendation of someone else	0	4	4	1%
Persuaded by information provided by the program	4	1	5	2%
Old light bulb burnt out	2	8	10	3%

[5] These data just reflect RSS responses as Ace respondents were not asked this question.

Reason	Ace	RSS	Total	Percent of Responses
Wanted to try something new	4	6	10	3%
Save money in the long run	4	6	10	3%
Environmental concerns	3	30	33	10%
Longer life than incandescent bulbs	8	47	55	17%
Wanted to reduce energy costs	8	54	62	19%
Wanted to save energy	18	101	119	36%
Other	2	19	21	6%
Total responses	54	279	333	100%

Table 7. What Respondents specifically like most about CFLs (Base N=those who have purchased CFLs)

Reason	Ace	RSS	Total Responses	Percent of Responses
Cheaper than incandescent bulbs in the long run with the program	0	1	1	0%
Cheaper than incandescent in the long run without the program	0	1	1	0%
Brightness/color	1	0	1	0%
Nothing	2	0	2	1%
Feel good about making an environmentally responsible choice	0	14	14	5%
Feel good about making a socially conscious choice	1	20	21	7%
Reduces energy costs	5	31	36	12%
Saves energy	23	74	97	32%
Has a longer life than incandescent bulbs	13	90	103	34%
Other	2	22	24	8%
Total responses	47	253	300	100%

4.3.5 Removal and Storage of CFLs

When asked, "Have you ever installed and then later removed a CFL from the inside or outside of your home," 35% of Ace respondents said "Yes" as did 45% of RSS respondents. Of those who removed a CFL from their home, the most common reason for doing so was that the CFL burnt out. Other reasons can be seen in Table 8, below. Respondent who were storing CFLs were also asked about how they anticipate using them to replace current bulbs in their home. Thirty-three percent (33%) of Ace respondents and 35% of RSS respondents reported that they plan to

use their stored CFLs to replace currently installed CFLs. Although 22% of Ace respondents and 27% of RSS respondents plan to replace incandescent bulbs, another 41% of Ace respondents and 34% of RSS respondents plan on replace both types of bulbs depending on which types of bulbs burn out first.

Table 8. Reason for Removing Previously Installed CFLs
(Base=those who have installed and then later removed a CFL from the inside or outside of their own home)

	Ace	RSS	Total Responses	Total %
N	21	173	194	100.0%
Light color	1	1	2	1%
Interference with electronic devices	0	1	1	1%
Bulb is too bright	3	3	6	3%
Does not fit properly	1	5	6	3%
Delay in light coming on	1	6	7	4%
Stuck out of fixture	0	7	7	4%
Broke/stopped working	3	9	12	6%
Did not work with dimmer switch	1	11	12	6%
Bulb is not bright enough	1	32	33	17%
Burned out	8	75	83	43%
Other	2	23	25	13%

Of those storing CFLs (64% of phone respondents), the most common reason for doing so was stored bulbs were intended for future use. Nearly two-thirds of Ace respondents (65%) gave this reason, as did 60% of RSS respondents.

Figure 9. Reason for Storing CFLs
(Ace N=66, RSS N=317
Base=those who were storing CFLs)

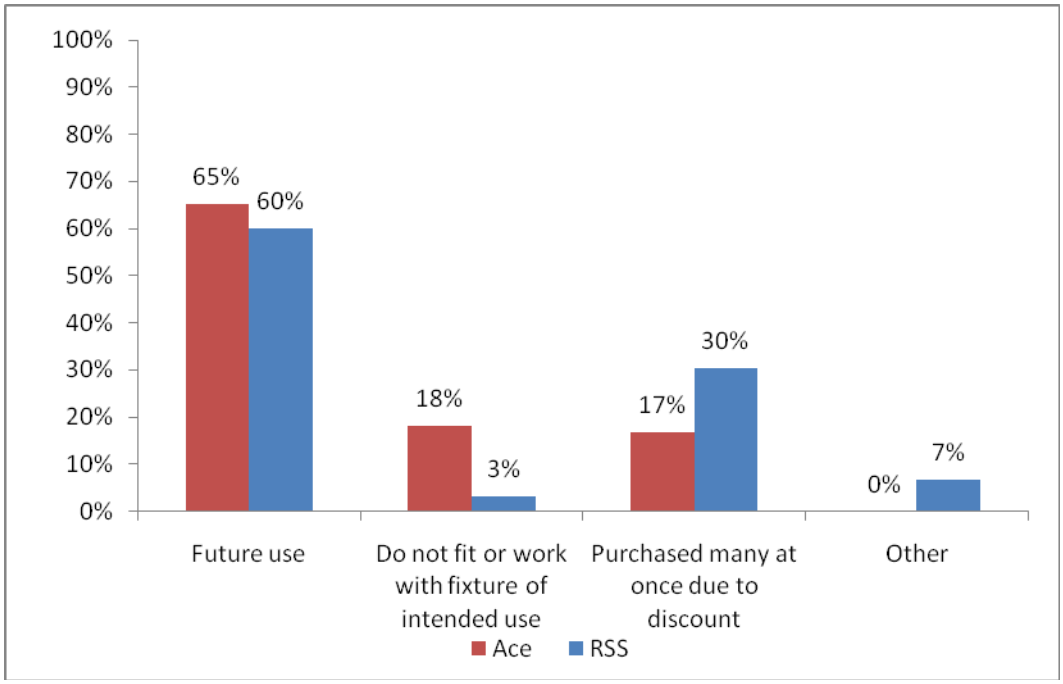
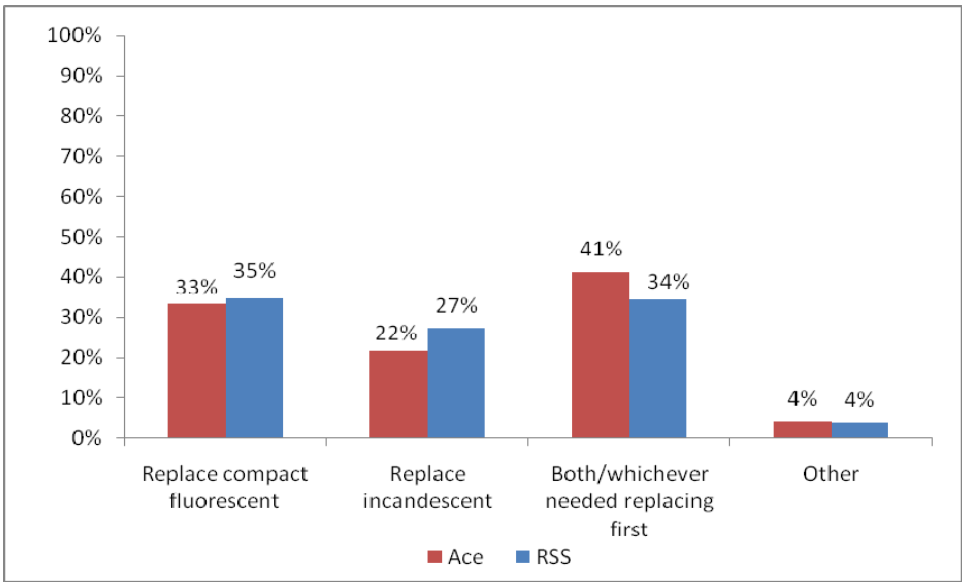


Figure 10. Intended Use of Stored CFLs
(Ace N=51, RSS N=268
Base=those who were storing CFLs)



4.3.6 Impressions about CFLs

The majority of respondents who currently have or previously had CFLs installed reported being either very satisfied or extremely satisfied with CFLs. Satisfaction was reported on a scale of 0 to

10, with 0 being not at all satisfied, and 10 being highly satisfied. The majority of respondents were either very satisfied or extremely satisfied (86% for Ace respondents and 74% for RSS respondents). When respondents who expressed dissatisfaction with bulbs were asked what they specifically disliked, the most common responses were: the bulbs were too dim; the bulb does not last long enough; they did not like the light color; and CFLs were difficult to dispose of properly.

Table 9. Level of Satisfaction with CFLs

	Ace	RSS
N	58	354
Not at all satisfied (0-3)	3%	6%
Low to moderately satisfied (4-6)	10%	20%
Very satisfied (7-8)	43%	36%
Extremely satisfied (9-10)	43%	37%
Not satisfied (0-4)	3%	10%
Neutral (5)	7%	11%
Satisfied (6-10)	90%	80%

Table 10. Reasons for Dissatisfaction with CFLs[6]
(Base=not at all satisfied to low level of satisfaction (0-4))

Reason	Number of Responses
Bulb takes too long to reach full brightness	2
Bulb does not fit with fixture	3
Do not like that it is necessary to buy specialty bulbs for certain fixtures	4
Mercury/hard to dispose of	5
Do not like the light color	6
Bulb does not last long enough	7
Bulb is too dim	13
Total respondents	40

4.3.7 Disposal of CFLs

Respondents were asked how they disposed of CFLs. Of those answering the question, the majority threw them away in the trash. However, almost 40% of Ace respondents recycled their bulbs, compared to 20% of RSS respondents. Table 11 reveals that respondents are most

[6] This is a multiple response question that was asked of both Ace and RSS respondents.

receptive to the idea of having a coupon from Xcel Energy to get a discount rate to recycle CFLs at their local hardware store.

Figure 11. CFL Disposal Methods
(Ace N=18,[7] RSS N=134
Base=of those who have disposed of CFLs)

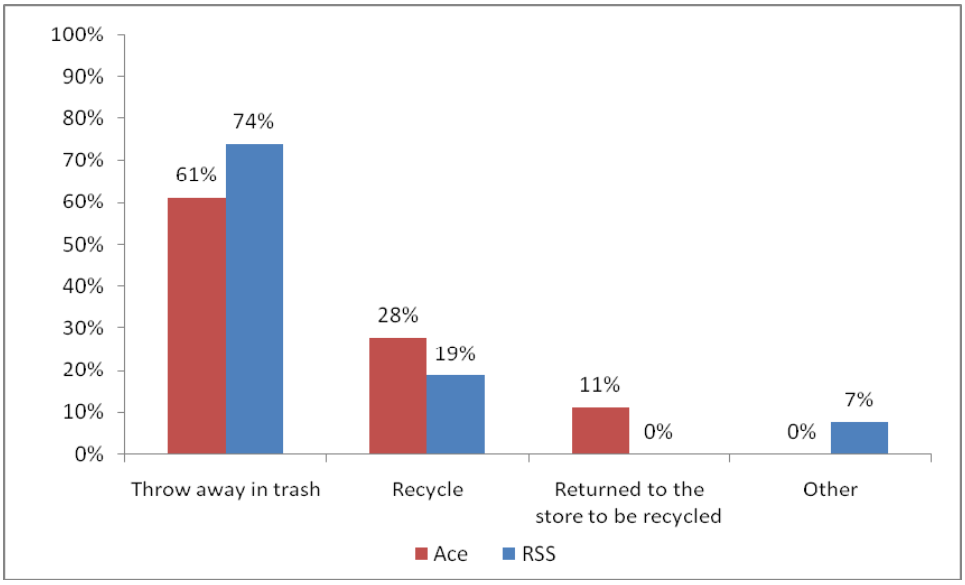


Table 11. Likelihood of Using the Following Options to Recycle CFLs
(Base=of those who have disposed of CFLs)

	Coupon at local hardware store		Free at county recycling center	
	Ace	RSS	Ace	RSS
N	18	137	19	138
Not at all likely (0-3)	11%	23%	47%	36%
Somewhat likely (4-6)	22%	17%	26%	17%
Very likely (7-8)	6%	21%	0%	12%
Extremely likely (9-10)	61%	39%	26%	35%
Not likely (0-4)	11%	27%	58%	38%
Neutral (5)	22%	12%	16%	11%
Likely (6-10)	67%	61%	26%	51%

[7] Due to a low frequency, percentages should be regarded with caution.

4.3.8 Satisfaction with Xcel Energy and its CFL Program

The majority of both Ace and RSS respondents rated themselves as being highly satisfied with the services provided by Xcel Energy. Additionally, 90% of Ace respondents reported that they were also highly satisfied with Home Lighting Program.

Table 12. Satisfaction with the Services Provided by Xcel Energy

	Ace	RSS
N	41	240
Not at all satisfied (0-3)	2%	3%
Low to moderately satisfied (4-6)	12%	17
Very satisfied (7-8)	34%	35%
Extremely satisfied (9-10)	51%	44%
Not satisfied (0-4)	7%	5%
Neutral (5)	2%	10%
Satisfied (6-10)	90%	85%

Table 13. Satisfaction with the Program[8]

	Ace
N	39
Not at all satisfied (0-3)	3%
Low to moderately satisfied (4-6)	8%
Very satisfied (7-8)	23%
Extremely satisfied (9-10)	67%
Not satisfied (0-4)	3%
Neutral (5)	3%
Satisfied (6-10)	95%

4.3.9 Demographics

The following demographic comparisons present unweighted results comparing Ace and RSS respondents. The majority of both Ace and RSS respondents owned their own homes (97% and 94%). The majority lived in single-family detached homes as opposed to attached homes or multifamily apartments or condominiums: 83% for Ace respondents and 84% for RSS respondents.

[8] This question was asked just of Ace respondents.

Table 14. Home Ownership Status

	Ace	RSS
N	63	512
Own	97%	94%
Rent	3%	6%

As to socioeconomic status, 18% of Ace respondents and 24% of RSS respondents obtained a high school diploma as their highest level of education. Another 10% of Ace respondents and 16% of RSS respondent pursued some college courses after high school but did not obtain a degree. However, over half of all Ace respondents (65%) and RSS respondents (57%) obtained an associate's degree or higher.

Table 15. Educational Attainment

	Ace	RSS
N	699	20,534
Less than high school grad	2%	2%
High school grad	18%	24%
Some college, no degree	10%	16%
Associate's or bachelor's degree	27%	32%
Graduate or professional degree	38%	26%

Sixty-three percent (63%) of Ace respondents had an income less than $50,000 per year, compared to 48% of RSS respondents. Additionally, only 9% of Ace respondents made $75,000 per year or more, compared to 36% of RSS respondents.

Table 16. Income Level per Year

	Ace	RSS
N	43	409
Less than $10,000	0%	3%
$10,000 - $20,000	14%	14%
$20,000 - $40,000	37%	22%
$40,000 - $50,000	12%	9%
$50,000 - $75,000	12%	16%
$75,000 - $100,000	7%	17%
$1000+	2%	19%

4.4 In Home Site Visits

During October 2009, 70 site visits were completed, with Cadmus field staff visiting phone survey participants' homes to take inventory of the lighting in their houses. Ten Ace phone

survey respondents and 60 RSS phone survey respondents participated in the site visits. Due to a statistically significant higher percentage of site visit participants having at least one CFL than CFL user survey respondents (and analysis showing phone survey respondents were generally reliable when reporting the presence of at least one CFL), it became apparent that phone survey respondents with at least one CFL were more likely to agree to participate in the evaluation's site visit portion than were phone survey respondents without CFLs. To correct for site visit participants' self-selection bias, site visit data were weighted to reflect the actual proportions of CFL users in Colorado, as determined from phone survey data. Specifically, the RSS phone survey analysis found that 64.6% of Xcel Energy customers have at least one CFL installed inside or outside their home. The site visit sample, however, consisted of 71.4% having more than one CFL installed. Therefore, we downgraded the number of CFLs found during our site visits by 9.6% in order to make our onsite sample findings more accurately represent the population of the Xcel Energy Colorado service territory. All results described in the remainder of this section incorporated this weighting scheme.

Table 17 shows medium, screw-based bulbs made up the majority of all bulbs found during the 70 site visits. A total of 4,187 installed bulbs were identified during the audits, and 678 (16%) of installed bulbs were CFLs. Of all different types of medium, screw-based bulbs installed, 19% were CFLs. Thirty-seven percent (37%) of bulbs in storage were CFLs. The higher percentage of CFLs in storage compared to the percentage of CFLs installed (out of sockets present) shows more CFLs can be expected to be installed in the future. Although, since they are not currently installed, their potential energy savings must be deferred until that happens.

CFL saturation was 16%, which represents the percentage of CFLs out of all the installed bulbs. Figure 12 shows the percentage breakout of bulbs by type out of all bulbs present. Incandescent bulbs accounted for the majority of bulbs (over 70%), while CFLs accounted for the second-highest percentage. CFLs were followed by fluorescent bulbs, then halogen bulbs, and finally LEDs. On average, Xcel Energy residential customers had 8.7 CFLs installed per home, with a 90% confidence interval of 7.2 to 10.3 CFLs per home. The median number of CFLs per home was 6.7.

Table 17. Bulbs per Socket Type

Socket Type	Total		CFLs	
	#	%	#	%
Total sockets	4,187	100.0%	678	16%
Medium screw base	3,530	84%	665	19%
Pin base	317	8%	12	4%
GU base	11	0%	1	9%
Small screw base	329	8%	0	0%
Other	0	0%	0	0%

Table 18. Bulbs in Storage

Total		CFLs	
#	%	#	%
344	100%	126	37%

Figure 12. Percent of Bulb Type Out of all the Sockets (Site Visits N=70, Total Bulbs Installed N=4,187)

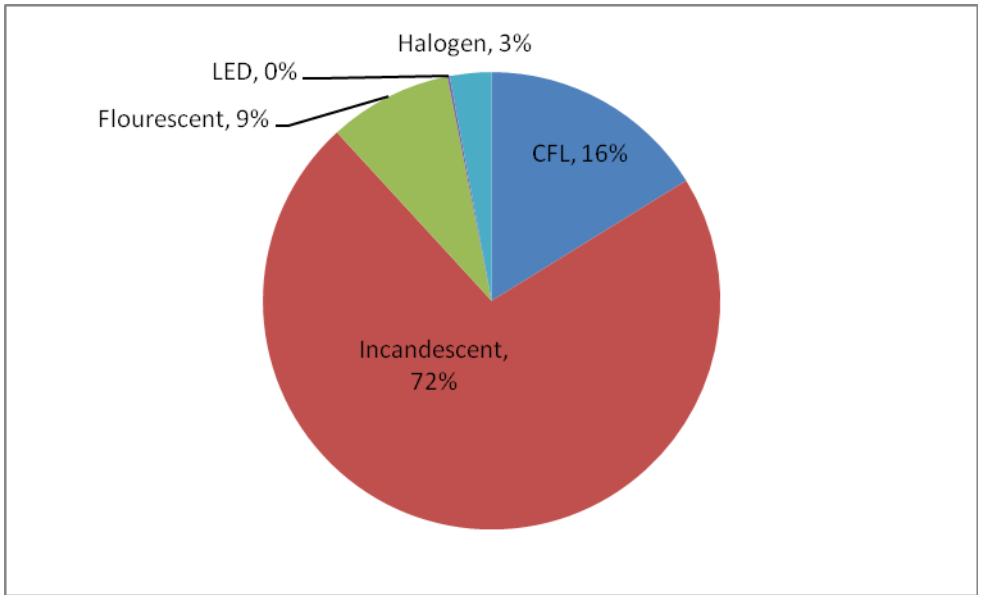


Figure 13 shows the average number of bulbs per room type (which includes bulbs in storage as a category). Again, one can see incandescent bulbs were more popular than CFLs. In some room types, fluorescent bulbs and halogen bulbs had a greater presence than CFLs. For example, higher rates of fluorescent bulbs were present in the kitchen, garage, and basement, and slightly more halogen lights were present outdoors than CFLs. Of final note, the proportion of CFLs to incandescent bulbs was much higher for the in-storage category compared to other categories. This could suggest, in the future, one might see higher rates of CFLs installed.

Figure 13. Average Number of Bulbs per Room Type
(Total Bulbs N=4,531)

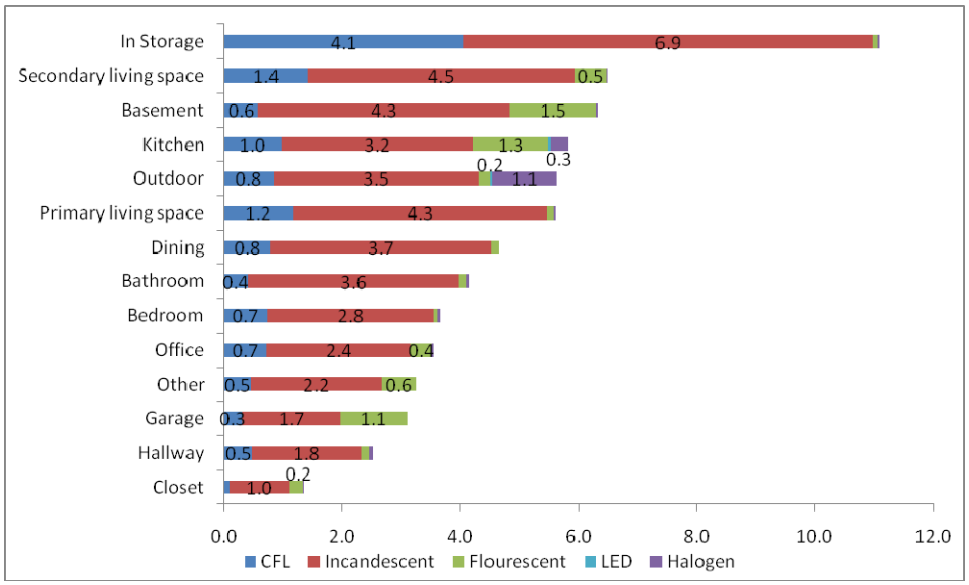


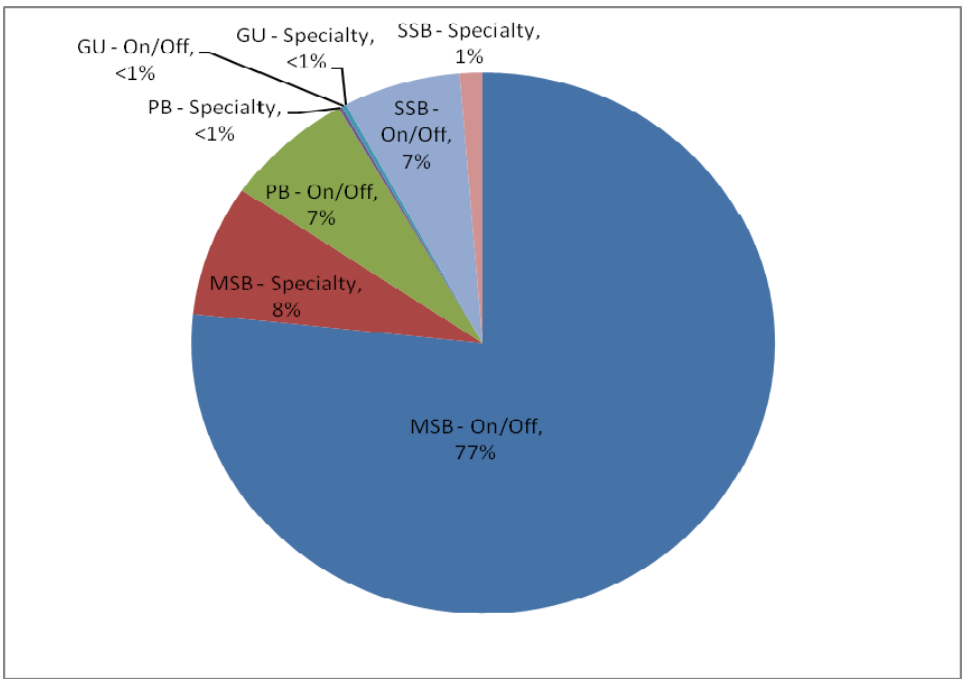
Table 19 shows the greatest number of CFLs found on site were purchased in 2008. The average number of CFLs purchased per home was 5.35 in 2008, followed by 3.46 in 2009.

Table 19. CFLs by Purchase Date

Confirmed Site Visit Data	<2008	2008	2009
Total CFLs purchased	146	374	242
Average CFLs purchased per home	2.08	5.35	3.46

As shown in Figure 14**,** below, the greatest percentage of socket types were medium, screw-based sockets controlled by an on/off switch (77%). The second highest percentage was medium, screw-based sockets that are controlled by a specialty switch, such as a dimmable or three-way switch (8%). This was closely followed by pin based, on/off sockets (7%), and small screw based, on/off sockets (7%).

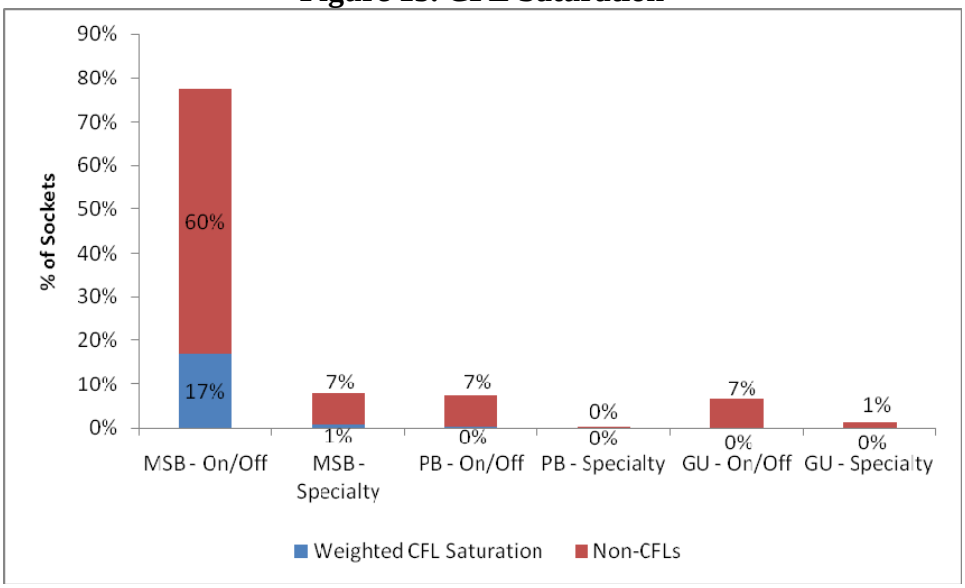
Figure 14. Percent of Sockets



MSB = Medium Screw Based, PB = Pin Based, GU = GU Base, SSB = Small Screw Base

For medium, screw-based, on/off sockets, one can see that although they made up the greatest percentage of socket types (77%), with a CFL saturation level less than one-fifth of this percent (17%), substantial energy savings could still occur in this area. The same was true for small, screw based, on/off sockets, such as candelabras often found on chandeliers. This percentage was 6.6% of all socket types, yet there were no CFLs found in this category. For further energy savings, one could also look at medium, screw based, specialty sockets, and at pin based, on/off sockets, as these socket types have a very small percentage of CFLs.

Figure 15. CFL Saturation



MSB = Medium Screw Based, PB = Pin Based, GU = GU Base, SSB = Small Screw Base. GU sockets are not shown since they represent 0% of the socket types. All percentages in this chart add to 100%.

Additional information compared Colorado site visit data against the rest of the states participating in the multistate model. More specific information about the multistate model is discussed in Section 6.4. Figure 16 compares the number of CFLs per home in 2008. Colorado had the highest number of CFLs per home at 5.1. The next highest state was New York at 3.8. Figure 17 compares CFL saturation rates across all states. The saturation rate was highest in California at 25.8, and lowest in the city of Houston, Texas, at 12.3. The saturation rate for Colorado was slightly above the average among all multistate model participants, at 18.6 (the average was 18.4). While the saturation rate found by the mulit-state model for Colorado is different, the differences can be attributed to the fact that the model does not weight down the site visit data to reflect the self-selection bias of the on-site participants.

Figure 16. Average Number of CFLs per Home, 2008
(CO N=70, CT N=95, DC N=97, IN N=88, ND N=57, MA N=100, MI N=86, NYS N=203, NYC N=100, OH N=98, Houston N=99, WI N=82)

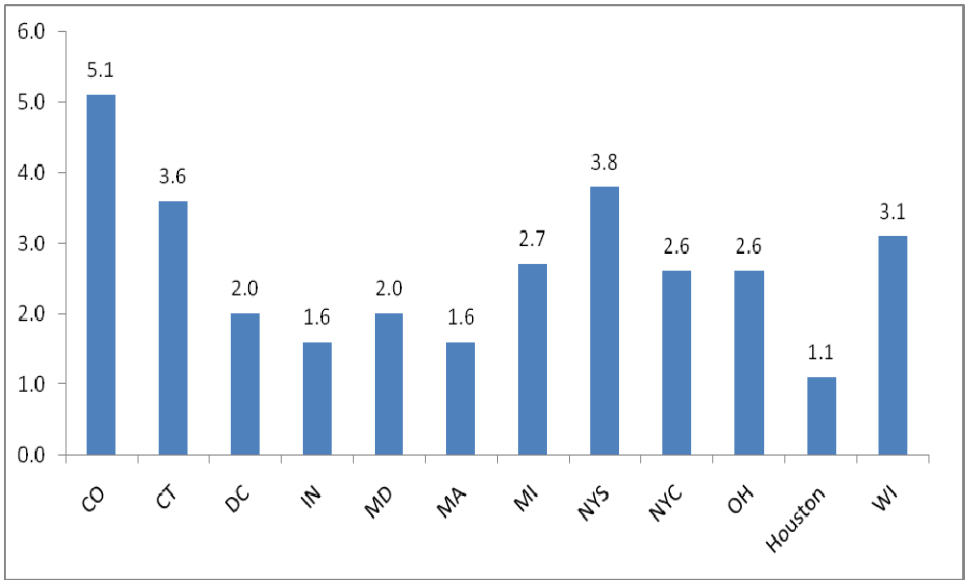
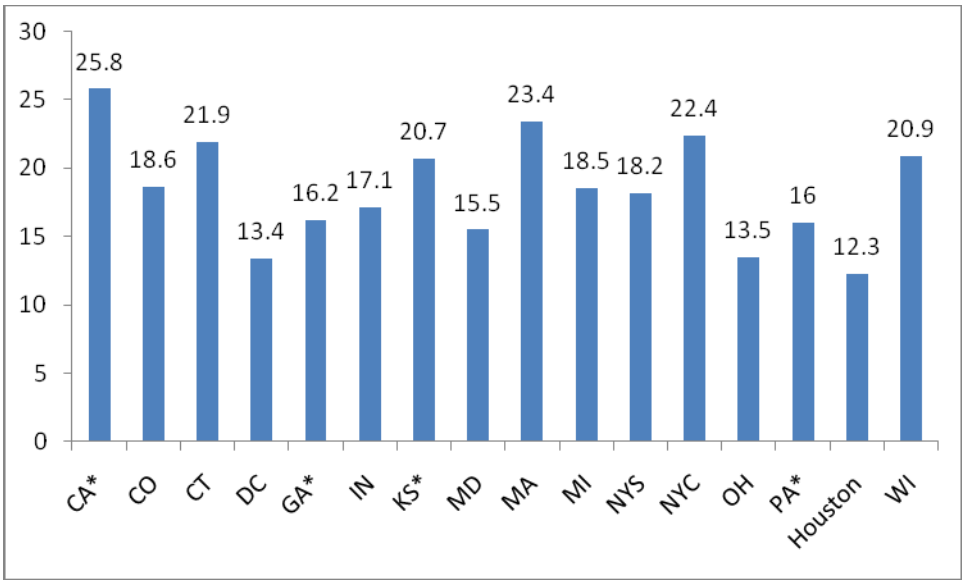


Figure 17. CFL Saturation (% of Sockets with CFLs)
(CA N=77, CO N=70, CT N=95, DC N=97, GA N=62, IN N=88, KS N=71, MD N=57, MA N=100, MI N=86, NYS N=203, NYC N=100, PA N=59, Houston N=99, WI N=82)



* Adjusted to account for small screw and pin based sockets.

Table 20. CFL Saturation[9] from CO Site Visit Primary Data Collection

	Percent
Overall CFL saturation	16%
Saturation of the following socket types:	
Medium Screw Based (MSB) – On/Off	17%
MSB – Specialty	1%
Pin Based (PB) – On/Off	0%
PB – Specialty	0%
GU – On/Off	0%
GU – Specialty	0%
Small Screw Based (SSB) – On/Off	0%
SSB - Specialty	0%

[9] Saturation is the percent of sockets with CFLs installed.

5 Upstream Interviews

5.1 Summary of Key Findings

This section summarizes results from retailer, corporate retailer, and manufacturer depth interviews, which focused on identifying the impacts of Xcel Energy's CFL Home Lighting program in Colorado. In total, 36 interviews were conducted with the following breakdown: 20 participant retailers; 7 nonparticipant retailers; 3 interviews with retailers that were unaware that they were participating; one corporate retailer; and five manufacturers. Findings from the survey include:

- **CFLs have established a foothold in retailers targeted by the program.** The program targeted CFL sales in retailers typically stocking CFLs, including large home improvement, membership/wholesale, small hardware, mass merchandise, and grocery stores. The vast majority of participant retailers (19 of 20) and all manufacturers interviewed sold ENERGY STAR® CFLs prior to participating in the program. All nonparticipant retailers stocked ENERGY STAR-qualified CFLs.

- **Stocking patterns remain stable.** Stable stocking patterns throughout the year indicated consumers could find CFLs when they needed them and did not have to seek them out during certain promotional periods. All retailers interviewed, including participants and nonparticipants, stocked ENERGY STAR CFLs year-round, and 26 of the 30 retailers stocked specialty CFLs year-round. The majority of participant and nonparticipant retailers (19 out of 30) described their stocking patterns as relatively stable throughout the year; fluctuations typically occurred during fall/winter and program promotion periods.

- **Shelf space devoted to CFLs compared to other types of lighting has increased.** Both participant and nonparticipant retailers (23 out of 30) reported the number of models of ENERGY STAR bulbs carried in their stores increased in 2009. Participant retailers devoted 10% to 100% of their shelf space to CFLs, while nonparticipant retailers devoted 20% to 70% to CFLs. Membership/wholesale stores devoted the highest percentage of shelf space to CFLs compared to other types of retailers, with two participant wholesale partners stocking only CFLs. Nine out of 20 program participants believed the program has led to an increase in the number of ENERGY STAR models their store carries, while 10 out of 20 believed the program has not had a significant effect on the number of models their store carries. There was overwhelming agreement, however, that the wider variety of CFL offerings was due to greater consumer demand and increased CFL sales.

- **The mix of standard and specialty CFLs gives consumers choices.** The program supported sales of standard and specialty CFLs, and 26 of the 30 retailers sold specialty CFLs year-round. Manufacturers said the program supported a broad range of bulbs, but pricing incentives favored standard CFLs.

- **High CFL sales rates in Xcel Energy territory bucked the recent national trend of declining CFL sales.** Nearly every retailer (28 out of 30), both participants and nonparticipants, saw an increase in the sales of ENERGY STAR CFLs over the past year,

whereas national CFL shipments declined an estimated 36% compared to just two years ago. Most retailers thought increased sales primarily were due to a mix of the economy, higher energy prices, growing environmental awareness or the desire to be "green," and a desire to reduce utility bills. Seven retailers participating in the program believed the Xcel Energy CFL Home Lighting Program also aided in increased sales of ENERGY STAR CFLs. One manufacturer believed decreased prices (provided by the program) were the primary driver of increased CFL sales, while the other believed increased consumer awareness was the primary driver.

- **While CFLs maintain a presence in the marketplace within Xcel Energy territory, current sales levels would not be sustainable in the program's absence.** The vast majority of participant retailers (16 of 20) believed their CFL sales would be lower without the Xcel Energy program. The retailers estimated sales would decrease by 15% to 75%. All manufacturers believed their CFL sales would be lower in Colorado—by as much as 30% to 95% less—in the absence of the Xcel Energy's program.

- **Program partners are satisfied with the program, but want program allocations extended.** Both retailers and manufacturers reported positive experiences working with the program, but felt the program could do more. Participant retailers said they would like to extend their program allocations as customer response has been strong.

5.2 Methodology

Thirty-six[10] in-depth interviews were conducted by NMR during October and November 2009. The interviews included: 20 participant retailers; 7 nonparticipant retailers; 3 participant non-aware; one corporate participant retailer; and five participant manufacturers. The interviews sought to assess program satisfaction and areas for program improvement as well as the program's impact on CFL sales in Xcel Energy's territory.

5.2.1 Survey Sample

5.2.1.1 Participants

Cadmus identified the following six retailers as participants in Xcel Energy Energy's discount CFL program: King Soopers (a grocery store); Ace Hardware (a small hardware store); Home Depot (a large home improvement store); Target (a mass merchandise store); and Costco and Sam's Club (membership/wholesale stores). Cadmus provided NMR with a list of geographic areas Xcel Energy serves; so only retail outlets within Xcel Energy's service territory would be contacted for interviews. NMR visited the Web site of each participating retailer and collected contact information for every branch of that store in Colorado. Each address was cross-checked against Xcel Energy's service territory, and all branches not located in Xcel Energy's territory were removed, resulting in a list identifying all individual retail outlets of retailers participating in the Xcel Energy discount CFL program in Colorado.

[10] Note that results from these interviews must be interpreted with caution due to the small sample size.

Interviewers attempted to obtain the targeted 20 participant interviews from a sample evenly distributed among the six different retailers. Efforts to obtain participant interviews resulted in the desired mix, except for Ace Hardware, which provided five interviews, and Target, which provided only one.[11] Also, while the final sample included stores throughout Xcel Energy's service territory, efforts were made to first obtain interviews from retail outlets located in heavily populated areas comprising the larger percentages of Xcel Energy's territory. Contact information for an Xcel Energy representative was available for interviewers to use for verifying the study's legitimacy.

To obtain an interview with a participating store, an interviewer called the main phone number of that retail outlet and attempted to speak with the person most responsible for tracking sales and stocking trends of the store's lighting products. At smaller stores, such as most of the Ace Hardware stores interviewed, the appropriate contact was most often a store manager. At larger stores, including grocery, mass merchandise, wholesale, large home improvement, and large hardware stores (including large Ace Hardware branches), the appropriate contact was generally the manager in charge of merchandising or purchasing, or the manager in charge of the specific department containing lighting products.[12] The ease of reaching the appropriate employee varied greatly. At smaller stores, the first point of contact often knew which employee dealt with lighting or the Xcel Energy program. When calling other stores, particularly large retailers with many employees, an interviewer might be transferred multiple times before identifying the correct employee. Because interviewers were generally calling during business hours, respondents sometimes declined to be interviewed or asked to reschedule, citing job duties or the store's current customer level. Other reasons for refusal to participate in the interview included: survey length (multiple retailers stated that 15 to 20 minutes was too much time to devote to an interview); lack of availability; and a store policy of not responding to surveys. Several retailers insisted only their corporate offices could provide such information, but the corporate offices were not responsive to contact efforts. In one instance, an interviewer was told to contact the relevant manager via e-mail, but that manager never responded to an e-mail request for a phone interview. Otherwise, retail outlet interviews were solicited solely over the phone.

Interviews with participating retail outlets typically lasted at least 20 minutes and often up to 30 minutes. Two respondents terminated the interview approximately halfway through due to time constraints. Three additional participants declined full interviews, but instead provided a quick and generally positive summary of their experience with the program or with CFL sales in the store. One interview was conducted in parts on two different days to accommodate the respondent's schedule.

Participant interviews were obtained from the following stores:

[11] Target provided two interviews: one as a participant and one as a nonparticipant. This is discussed in more detail below.

[12] At grocery stores, this manager was typically the General or Assistant General Merchandise Manager. Similarly, the appropriate Sam's Club manager was the Hard Lines Manager, the official title for that store's merchandising manager. For large home improvement stores, the contact was often the Manager/Supervisor of the Electrical/Lighting Department, and, at some mass merchandise stores, the contact was also the manager in charge of the department overseeing sales of lighting products.

Table 21. Completed Participant Retailer Interviews

Store Type	Store Name	Number of Stores
Small hardware	Ace Hardware	5
Grocery	King Soopers	4
Membership/wholesale	Sam's Club	4
Membership/wholesale	Costco	3
Large home improvement	Home Depot	3
Mass merchandise	Target	1
Total retailers: 6		Total interviews: 20

Table 22 details the results of analysts' efforts to obtain surveys from participant retailers.

Table 22. Final Status of Outreach to Participant Retailers

Final Status	Number of Stores
Refused	10
Inconclusive	25
Partial interview[13]	3
Completed	20
Total	58

Obtaining participant interviews from Target stores proved difficult; after multiple brief conversations with store managers, only one confirmed his store was a participant in the Xcel Energy program. Some Target managers were unaware of the program; some thought their stores might have participated in the past; and one had heard of the program being offered at other retailers, but believed his store was not a participant.[14] Target managers also seemed to have difficulty identifying the one employee most capable of completing such an interview, even as a nonparticipant. These managers indicated the responsibility of stocking lighting products was diffused across multiple teams, each responsible for only one component of the stocking and sales process. Each of these teams had many employees; so there was not one person consistently in charge of monitoring sales or stocking trends for one particular department. These managers often thought their corporate offices would be the proper source of this information as the store's stocking processes were tracked and managed by computerized inventory tracking systems not managed at the store level.

5.2.1.2 Nonparticipant Retailers

NMR analysts used Internet research, telephone inquiries to stores, and their knowledge of the Colorado market to identify nonparticipant retailers both comparable to the participant retailers and selling CFL bulbs. Analysts followed the same methods employed when researching

[13] Partial interviews of participant retailers were not factored into this report's analyses. These partial interviews included respondents who terminated the interview before completion, either due to time constraints or inability to answer the survey questions.

[14] This particular Target manager completed the interview as a nonparticipant.

participant retail outlets to obtain contact information for nonparticipant retail outlets and to identify only stores within Xcel Energy's service territory. Interviewers also used the same phone protocol to reach the employee most familiar with that store's lighting sales and stocking trends. Interviews were solicited from nonparticipant retail outlets solely over the phone.

Interviewers obtained 7 nonparticipant interviews from a sample of retailers throughout Xcel Energy's service territory, again first attempting to obtain interviews from retail outlets in heavily populated Xcel Energy service territories. As nonparticipants were asked fewer questions than participants, the participant interviews typically lasted only 10 to 15 minutes. Even though the interviews were significantly shorter, the nonparticipant interviews posed a greater challenge than participant interviews. Three outlets were not familiar with the Xcel Energy program, or at least had not benefited from the program; thus, they had less of an incentive to assist Xcel Energy by answering a survey. These three were given the nonparticipant survey questions but were excluded from any calculations used to determine NTG.

Table 23. Completed Nonparticipant Retailer Interviews

Store Type	Store Name	Number of Stores
Large home improvement	Lowe's	2
Grocery	Albertsons	1
Small hardware	True Value	1
Mass merchandise	Wal-Mart	1
Mass merchandise	K-Mart	1
Other	Big R	1
Total retailers: 7		Total interviews: 7

5.2.1.3 Corporate Interviews

NMR attempted to obtain interviews from six corporate representatives of retailers participating in Xcel Energy's discount CFL program. Cadmus provided NMR with contact information for corporate representatives at three of the participating retailers. NMR attempted to obtain corporate retail contact information for the other retailers from local storefronts, manufacturer partners, and independent research efforts. Corporate contacts were contacted over the phone and via e-mail. A letter endorsed by Xcel Energy was also sent to manufacturers affiliated with particular retailers to request their cooperation in soliciting feedback from their corporate contacts. Up to three attempts were made to conduct or schedule each corporate interview, resulting in just one completed interview with the ACE Hardware corporate contact.

5.2.1.4 Manufacturer Interviews

Cadmus provided NMR with contact information for the primary manufacturer representative for each of the six participating retailers, which included four distinct manufacturers. Five contacts from three manufacturers completed the interview. NMR interviewed three manufacturers from GE, one from TCP, and one from Greenlite. Another manufacturer declined to participate in the interview because they had previously provided input to the program through another study. As

with corporate interviews, interviewers solicited manufacturer interviews over the phone and via e-mail, in one instance requiring up to five attempts to complete the interview.

Except when noted otherwise in the findings, manufacturer responses referred only to the primary retail store associated with that manufacturer representative and not multiple retail channels.

Table 24. Completed Manufacturer Interviews

Manufacturer	Retail Channel
General Electric (GE)	Sam's Club
General Electric (GE)	Target
General Electric (GE)	ACE Hardware
TCP	Home Depot
Greenlite	King Sooper's/Krogers
Total manufacturers: 5	

5.2.2 Survey Instrument

5.2.2.1 Retailer Surveys

Topics discussed in the retailer survey included: stocking and sales trends for CFL and non-CFL bulbs; consumer awareness of CFLs; CFL pricing; CFL marketing and promotions and opinions of the Xcel Energy discount CFL program; and perceived market effects of discounted CFL bulbs. The participant CFL retailer survey consisted of 75 questions, and the nonparticipant version consisted of a subset of those questions (41 out of the 75), omitting those regarding the retailer's experience with the Xcel Energy CFL discount program. Depending on their answers to particular questions, some questions were not asked of all respondents. For example, a respondent would not be asked about seasonal variations in specialty CFL bulb sales if they had already said that they did not sell CFL specialty bulbs.

Respondents from large home improvement, small hardware, and wholesale outlets selling large quantities of CFL bulbs seemed to be the most knowledgeable about CFL technologies, sales, and stocking trends of CFLs in their store. They also tended to be the most familiar with the Xcel Energy program. Respondents from other retail channels seemed confused by some questions. One respondent showed irritation about the "complex terms" involved in the questions. The survey asked questions that required some basic knowledge of CFL lighting technologies, and the more familiar the respondent was with the difference between the various types of CFL bulbs (standard spiral bulbs, ENERGY STAR® qualified bulbs, and specialty bulbs such as dimmables, three-ways, reflectors, etc.), the more easily he/she was able to answer these questions.

5.2.2.2 Corporate Surveys

Topics discussed in the corporate retail survey included: CFL familiarity, retailer add-on rebates, free-ridership, and in-state spillover of CFLs in Colorado, CFL pricing, CFL market characterization, CFL sales and trends since 2008, and satisfaction with the Xcel Energy CFL

Home Lighting Program. The corporate survey consists of 49 questions. Depending on their answers to certain questions, some questions were not asked of all participants, as was the case with the store-level retail survey. Prior to the interview, corporate retailers were sent a table (via e-mail) and asked to fill it out before the interview, if they had time. The table asked corporate retailers to identify the CFL bulb types and quantities sold in 2008 and 2009.

5.2.2.3 Manufacturer Surveys

Topics discussed in the manufacturer survey included: reasons for participating in the Xcel Energy program; free-ridership and in-state spillover of CFLs in Colorado; CFL pricing; CFL market characterization; and satisfaction with the Xcel Energy CFL Home Lighting Program. The manufacturer survey consists of 75 questions. As with the other surveys, some questions were not asked of all respondents, depending on their answers to previous questions. Prior to the interview, manufacturers were sent two tables (via e-mail) and asked to fill them out before the interview. if they had time. The tables asked manufacturers to identify CFL bulb types and quantities they sold in 2008 and 2009, as well as the retail channels through which these bulbs were sold.

The manufacturer survey was quite lengthy, taking around an hour to complete. Due to time constraints, three of the five manufacturers were not asked questions on CFL market characterization and their satisfaction with the Xcel Energy program. One manufacturer was available for only a limited amount of time, and was asked just a few important questions, including a final comment on the program. This manufacturer's responses have been included where appropriate.

5.3 Findings

Respondents were asked about a variety of topics related to the program and CFL sales in the state. Discussion topics included: lighting stocking patterns; sales trends; participant reaction to the program; opinions about marketing materials; program satisfaction; product pricing; and market characterization. The depth interviews focused on three types of CFL bulbs: standard, spiral-shaped, ENERGY STAR qualified CFL bulbs; standard, spiral-shaped, non-ENERGY STAR qualified CFL bulbs; and specialty CFL bulbs. Specialty CFL bulbs included a variety of bulb types, such as three-way, dimmable, reflector, and candelabra-shaped bulbs.

5.3.1 Stocking and Sales Trends

5.3.1.1Retail Level

Every retailer interviewed, including participants and nonparticipants, stocked ENERGY STAR CFLs year-round, and 26 of the 30 retailers sold specialty CFLs year-round. Two retailers (both participants) did not sell specialty CFLs year-round, though they received specialty CFLs at a discount through the Xcel Energy program. Of 30 retailers interviewed (both participant and nonparticipant retailers), 18 stocked ENERGY STAR-qualified CFLs, non-ENERGY STAR-qualified CFLs; and specialty CFLs, such as dimmable, three-way, or reflector CFLs. In addition to stocking ENERGY STAR CFLs, some grocery and large home improvement stores stocked standard CFLs not ENERGY STAR qualified, and thus not discounted through the Xcel Energy

program.[15] Of 20 participant retailers interviewed, 11 stocked both standard ENERGY STAR CFLs and specialty CFLs discounted through Xcel Energy, while seven of the participating respondents stocked only standard ENERGY STAR CFLs discounted through Xcel Energy.

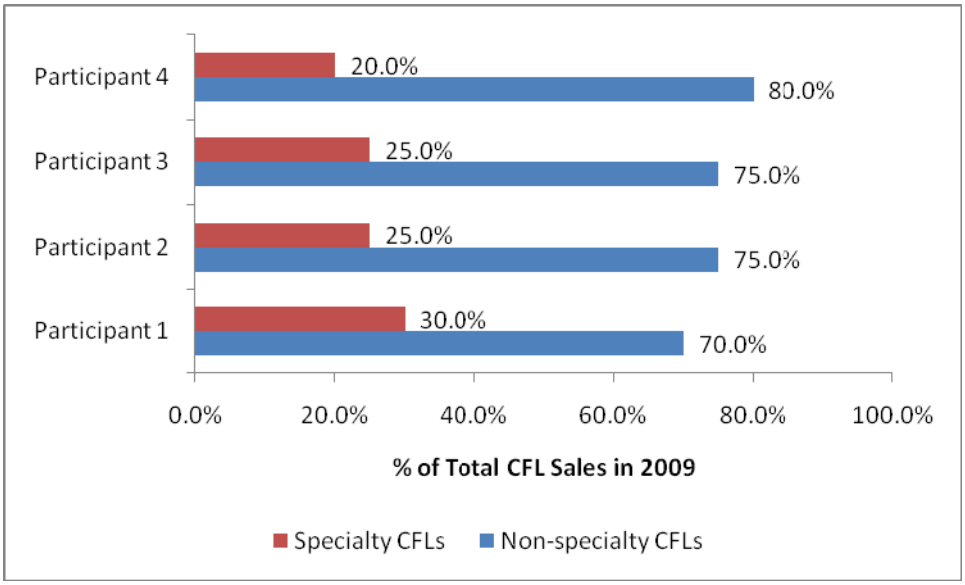
5.3.1.2 Manufacturer Level

Five manufacturers were interviewed as part of this study. All manufacturers sold ENERGY STAR CFLs prior to their participation in the Xcel Energy CFL Home Lighting Program. The manufacturers interviewed all joined the program at different times, ranging from 2003 to 2009. Three of the manufacturers said the primary reason for their involvement in the program was to increase the volume of sales. One manufacturer noted it was their "job" to sell CFL products into the market. The other manufacturer's primary reason for involvement in the Xcel Energy program was to boost the CFL awareness of their primary retail channel customers. This particular manufacturer noted increasing CFL sales volumes was a secondary reason for participation. In this case, the manufacturer believed their mass merchandising customer was more interested in the point of purchase (POP) materials provided by the Xcel Energy program than the CFL discount itself.

Figure 18 compares standard and specialty CFL shipments in 2009 for four of the five manufacturers interviewed (one manufacturer did not have this information readily available during the interview). Standard CFLs dominated the mix, with more than double the shipments compared to specialty CFLs for every manufacturer. The corporate retailer (not included in Figure 18) said their store had a 90 to 10 ratio of standard to specialty CFLs. Since January 1, 2008, all manufacturers have sold standard CFLs not rebated through the Xcel Energy program. Two manufacturers reported they sold some standard CFLs not ENERGY STAR qualified, and thus not rebated through the program. One manufacturer noted that while they only sold ENERGY STAR qualified CFLs, Xcel Energy's promotion did not cover the hundreds of CFLs they manufactured (although they noted the Xcel Energy program covered a wide range of CFLs). The other two manufacturers said they sold non-rebated standard CFLs because utility programs do not run year-round, but there was demand for these types of CFLs all year.

[15] In grocery stores, the non-ENERGY STAR standard CFLs were often a store brand CFL.

Figure 18: Manufacturer Shipments of Standard vs. Specialty CFLs in Colorado in 2009



All manufacturers sold five types of specialty CFLs to their primary retail channel: three-way, dimmable, A-shaped, globe; and spot/reflector/flood CFLs. Four of the five manufacturers also sold bullet/torpedo CFLs, and three of the five manufacturers sold circline CFLs.

Manufacturers were asked if they believed the Xcel Energy program promoted sales of certain CFL types over the sales of others. Three manufacturers believed Xcel Energy did not promote any "one" bulb over another. The other two manufacturers believed the Xcel Energy program promoted distribution of certain types of CFLs through the program. One manufacturer noted these bulbs were "primarily the bulb which meets their [Xcel Energy's] price points"— noting spiral bulbs were more likely to sold at a 99 cent per bulb price point. The other manufacturer believed Xcel Energy promoted spiral CFLs through the program.

5.3.2 Other Lighting Stock and Stock Distribution

5.3.2.1 Retail Level

Of the 30 retailers interviewed, including participants and nonparticipants, 14 stocked four of the most common bulb types, including CFL, incandescent, halogen, and LED bulbs.[16] The remaining retailers stocked a mix of: 1) CFL, incandescent, and LED bulbs; 2) CFL, incandescent, and halogen bulbs; 3) CFL and LED bulbs; or 4) CFL bulbs alone. There was a considerable difference in the amount of shelf space devoted to CFLs between retailers who participated in the Xcel Energy program and those who did not. Nine of the 20 participant retailers interviewed devoted between 50% and 100% of their shelf space to CFLs. The

[16] Halogen bulbs are technically categorized as incandescent bulbs. However, in common usage, a distinction is drawn between halogen and standard incandescent bulbs. In this report, this distinction is upheld, so "incandescent" refers to typical A-shaped bulbs, while halogen is identified as a separate category.

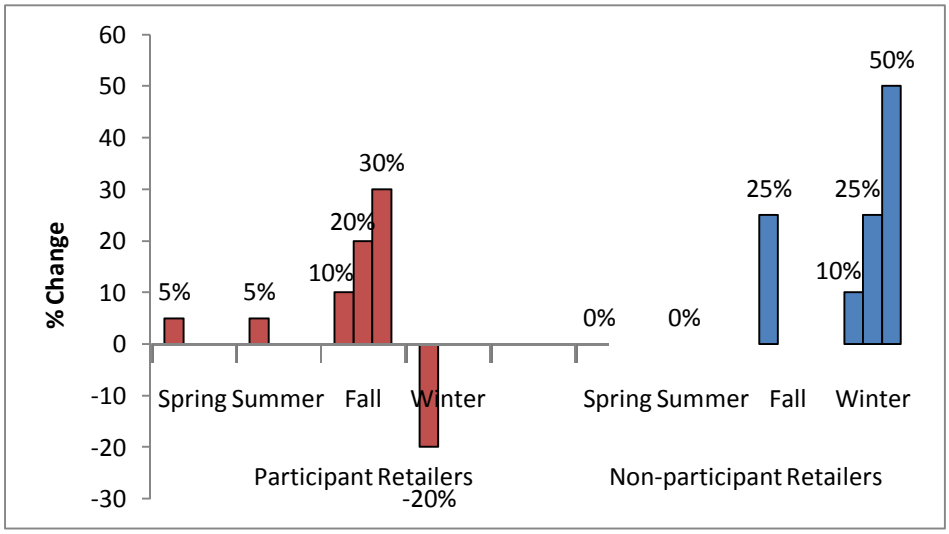
remaining participant retailers devoted 20% to 33% of their shelf space to CFLs. It is noteworthy that seven of the nine retailers with a strong CFL presence were in the "wholesale" retail category—three of these wholesale participants (all outlets of the same retail chain) stocked only CFLs and LED bulbs, and two other wholesale participants (both outlets of another, different retail chain) stocked only CFLs. Only one of the 10 nonparticipant retailers interviewed devoted 50% or more of their shelf space to CFLs. The remaining nonparticipants devoted 20% to 40% of their shelf space to CFLs. At both participant and nonparticipant stores, incandescent bulbs comprised the majority of the remaining shelf space (not dedicated to CFLs).

5.3.3 Stocking and Sales Fluctuations

5.3.3.1 Retail Level

The majority of participant and nonparticipant retailers (19 out of 30) described their stocking patterns as relatively stable throughout the year. Seven participant retailers and four nonparticipant retailers reported seasonal stocking fluctuations for ENERGY STAR CFLs. Figure 19 shows the stocking fluctuations described by retailers.[17] Participant retailers reported an increase in ENERGY STAR CFL stock during the fall. Most participants said the stock increase in the fall was due to increased customer demand for light bulbs because of shorter daylight hours, while a few noted the Xcel Energy program also took place in the fall, which also encouraged them to increase their stock. Nonparticipant retailers reported stock increases of their standard ENERGY STAR CFLs primarily in the winter, increasing up to 50%.

Figure 19: Reported Stocking Fluctuations of Standard ENERGY STAR CFLs (Among respondents reporting seasonal stocking variation)



[17] One of the participants who noted seasonal stocking fluctuation of CFLs was unable to specify how much the seasonal stock fluctuated. Instead, the participant noted CFL stock increased in the fall. This participant was not included in Figure 19.

Only three retailers, all participants in the Xcel Energy program, noted seasonal fluctuations in the stock of specialty CFLs. Coinciding with Figure 19, five participants noted an increase in the *sales* of standard ENERGY STAR CFLs during the fall, and two participants noted an increase during the winter. Four participant retailers also noted a sales increase of incandescent bulbs during the fall, while one noted incandescent sales increased during winter, along with their CFLs.

5.3.4 ENERGY STAR Models and Sales[18]

5.3.4.1 Retail Level

Of the 30 participant and nonparticipant retailers, 23 reported the number of models of ENERGY STAR bulbs carried in their store has increased in the past year (2009), and the majority also reported an increase or stable stock of all types of CFLs over the past year. Six respondents reported no change in the number of ENERGY STAR models carried during the past year. There seemed to be a number of reasons for the wider variety of ENERGY STAR CFLs on store shelves. Nine out of 20 program participants believed the Xcel Energy program led to an increase in the number of ENERGY STAR models their store carried, while 10 out of 20 believed the program did not have a significant effect on the number of models their store carried. There was overwhelming agreement, however, that the wider variety of CFL offerings was due to greater consumer demand, as evidenced by increased CFL sales. Out of 30 respondents, 28 saw an increase in the sales of ENERGY STAR CFLs over the past year, and the remaining two (both participants) did not know if sales of these bulbs had changed over the past year. This was surprising when comparing Colorado to recent national CFL trends in the United States. After peaking in 2007 at 397 million bulbs, CFL shipments to the United States declined to 337 million in 2008, and are projected to be about 254 million by the end of 2009—a 36% decrease compared to 2007.[19] When asked why sales of these bulbs have increased since the beginning of 2009, the retailers were fairly consistent across the board. Most retailers thought increased sales were due primarily to a mix of: the economy, higher energy prices, growing environmental awareness or the desire to be "green," and a desire to reduce utility bills. Seven retailers who participate in the program believed the Xcel Energy CFL Home Lighting Program also aided in increased sales of ENERGY STAR CFLs.

5.3.5 Participant Reaction to the Program

5.3.5.1 Retail Level

Participant retailers were asked to describe what they thought their CFL sales would be like in the program's absence. Every participant retailer interviewed believed their store would stock ENERGY STAR CFLs without the support of the Xcel Energy Home Lighting program, but the number of models stocked and sales would likely be lower at many. Of the 20 participants, 16 retailers believed their CFL sales would be lower without the discounted bulbs from the Xcel

[18] Manufacturer interviews did not focus on ENERGY STAR Models and Sales.

[19] Source: U.S. Imports of Selected Merchandise, U.S. Department of Commerce. 2009 projection by NMR based on shipments for first three quarters of the year.

Energy program. Only six of the 16 retailers were able to estimate how much lower their CFL sales would be without the Xcel Energy program. Three believed their sales would decrease by 15%; one believed their sales would decrease by 20%; and two believed their sales would decrease by 25%. The corporate retailer interviewed believed their sales of standard ENERGY STAR CFLs would be 75% lower without the Xcel Energy program.

Retailers were also asked to estimate the time it took for program bulbs to sell out. The amount of time a discounted bulb allotment lasts varied over the 20 participating stores interviewed. Some retailers reported their discounted stocks would sell out in a week, while others reported having Xcel Energy's discounted bulbs on the shelves from one to three months. One retailer, when asked how long it would take them to sell out of their CFL stock currently on the floor (during an Xcel Energy promotion at their store in late October 2009, when this interview was conducted), said this was an "unfair question," sensing their answer would attribute sales solely to the Xcel Energy program. The retailer stated the CFLs would sell at this time of year (due to daylight savings changes) whether or not the Xcel Energy program was in place. Two retailers indicated their store never actually ran out of discounted CFLs because low stock levels were automatically replenished via the store's computerized inventory system. The majority of retailers will reorder discounted CFLs if they run out of an initial shipment. However, there were a number of issues preventing retailers from selling as many discounted CFLs as they would like. One store reported an instance where they met their quota of discounted bulbs, and were not allowed to purchase any more through the program. Other retailers made it clear they would continue to purchase discounted CFLs (as it was good for them and their customers), but the program ran out after a specified amount of time. Answers to questions regarding bulb allotments and procedures for reordering discounted bulbs varied greatly as retailers interviewed had very different stocking and inventory systems. Some respondents directly ordered more inventory from their manufacturing partners; some respondents made inventory requests to their company's corporate or regional buyers (who presumably had an arrangement with Xcel Energy); and some stores had automatic inventory management systems that shipped inventory to replenish the store's stock without any action by the manager.

5.3.5.2 Manufacturer Level

All the manufacturers stated their sales of standard ENERGY STAR CFLs, through the primary retail channel with which they deal, would be significantly lower without the discounts provided by the Xcel Energy program. When asked how much lower these sales would be without the Xcel Energy program, the manufacturers gave answers ranging from 30% to 95%. On average, the manufacturers believed their sales of standard ENERGY STAR CFLs would be approximately 57% lower. The manufacturers seemed to believe the discounted CFL program increased the volume of sales more so than did their retail counterparts. Three out of five manufacturers believed that without the program, their sales of these CFLs would be at least 60% lower.

When asked why they believed sales would decrease without the program, the five manufacturers cited CFL awareness and consumer incentives provided by the program. One manufacturer said, "Consumers are only going to buy CFLs if they are cheap; otherwise they will not be incentivized and will buy incandescent bulbs." Another manufacturer stated, "Right now, when you look at all of the sockets in the U.S., only 11% are filled with CFLs. The majority of

people are not buying." This manufacturer went on to say, "Awareness in a down economy will not promote CFL purchases. Price points increase the amount manufactured and the amount promoted at the retail space."

Two manufacturers said their company provided discounts on top of the Xcel Energy program discounts. One manufacturer added on discounts because they were looking for very large volumes during the program's promotional period. This manufacturer said they would not apply these additional discounts without the discounts of the Xcel Energy program. The other manufacturer mentioned sometimes there may be a "national coupon" available during the Xcel Energy promotional period. The corporate retailer said they offered a sale on standard spiral bulbs every other month, and they offered a sale on all varieties of CFLs twice a year.

5.3.6 Point-of-Purchase Materials

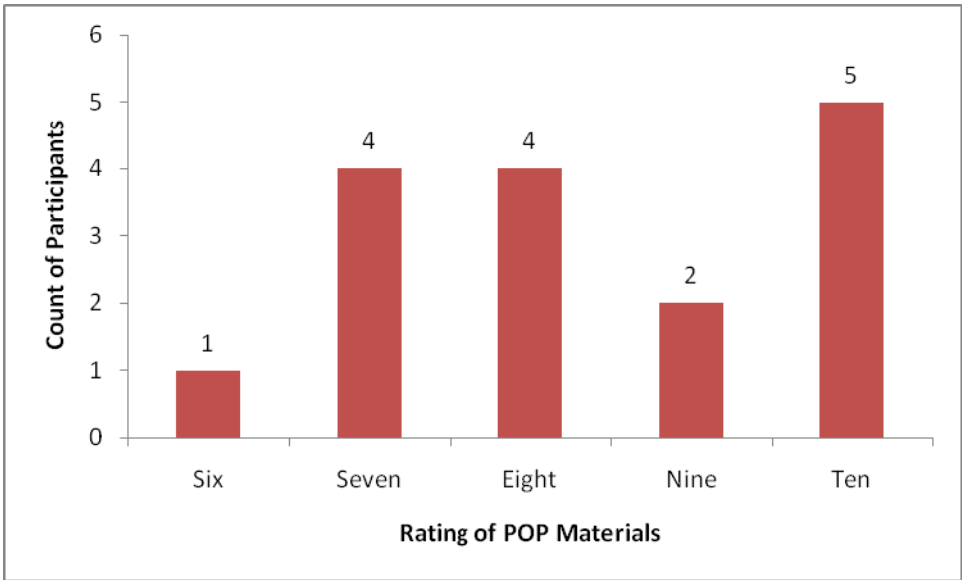
5.3.6.1 Retail Level

Of 20 participant retailers interviewed, 18 said they displayed POP materials. Of these 18 retailers, 17 displayed the POP materials for the length of the Xcel Energy promotion (one displayed the materials year-round), and the remaining retailer displayed the materials for the length of the promotion unless their store began its own promotion during the Xcel Energy promotional period. Store manager perceptions of the use and placement of signage and POP materials differed from WECC staff perceptions in that use and length of display was said to vary by store. Figure 20 shows the rating 16 of the participants gave the Xcel Energy-provided POP materials. Despite positive ratings for POP materials, retailers' primary request to improve the program was for more customizable POP materials in different formats. This is discussed further in the retailer program satisfaction section (5.3.9.1).

Retailers were also asked if they were provided details about the advertising surrounding the Xcel Energy promotions. Twelve of the 20 participants confirmed they received details surrounding the Xcel Energy promotions and advertisements. Some retailers said an Xcel Energy representative came to their store and educated them about the program, while other retailers believed the extent of the details they were provided were the POP materials on their sales floor. Additionally, 14 of the 20 participants said they trained their staff about the promotions' details.

Six of the 20 participant retailers independently marketed CFLs beyond the aid provided by the Xcel Energy program, and seven nonparticipant retailers independently marketed CFLs. The independent marketing consisted of a mix of newspaper ads, TV and radio advertisements, weekly flyers, and in-store signage. The frequency of independent marketing varied widely among the retailers from "always" to "not very often." Fifteen of the participant retailers believed sales increased when promotions were being advertised, be it independent advertising or Xcel Energy advertising. Four believed sales stayed the same, and one respondent was unable to answer. Six of the seven nonparticipants who independently promoted CFLs said their CFL sales increased during promotional periods.

Figure 20: Participant Satisfaction Rating of Xcel Energy Energy's POP Materials (Scale 0 to 10, where 0 is 'not at all satisfied' and 10 is 'very satisfied')



5.3.6.2 Manufacturer Level

The manufacturer interviews did not contain a section focused on the POP materials provided by Xcel Energy. However, the interviews allowed manufacturers to express their thoughts on how well Xcel Energy has marketed CFLs in Colorado. All the manufacturers praised the program for raising consumer awareness about CFLs in Colorado. When asked if the Xcel Energy program did anything other than provide discounts and POP materials to sell standard CFLs, all manufacturers responded with a resounding "yes." As one manufacturer said, "It creates buzz, it creates awareness. People tell other people, and it converts first time buyers who have never bought CFLs. Those are huge, important points." Another manufacturer stated: "It is an awareness campaign. You have additional resources on both the manufacturer and the retail sides dedicated to running these programs." Two other manufacturers also believed the program promoted CFL awareness and education.

5.3.7 Pricing

5.3.7.1 Retail Level

Of the 20 participant retailers interviewed, two used a pricing method known as "keystone pricing" to set the price of the discounted CFLs they received from Xcel Energy. Keystone pricing is a pricing mechanism in which retailers double the wholesale price of a product. None of the nonparticipants used keystone pricing to set the price of their CFLs.

Most retailers did not set the price of their CFLs at the store level. Instead, CFL prices were set by the corporate retail offices of many stores. At most of the wholesale clubs, corporate-level buyers were responsible for setting the store level prices on items.

The corporate retailer believed their company was "very influential" on the pricing of CFLs at their stores. The corporate retailer noted they set their retail price "based on the market."

5.3.7.2 Manufacturer Level[20]

Three of the four manufacturers believed their retail partners were "very influential" over the pricing of CFLs at the store level. One manufacturer believed they were "somewhat influential" over store level CFL prices. One manufacturer said keystone pricing was used "most of the time" at the retail channel with which he primarily worked. Of the other three manufacturers, one said keystone pricing was never used, one was unfamiliar with how retailers price their CFLs, and another said his retail partners used keystone pricing some of the time, but, for the most part, that pricing mechanism was no longer in use. The same manufacturer said his primary retail channel set CFL prices by "looking at the market and what their margin needs are." Another manufacturer said CFL prices were determined by "market research and competition."

Only one of the four manufacturers believed retailers used a different pricing mechanism for Xcel Energy discounted CFLs and non-discounted CFLs. When asked how they differed, the respondent answered the promotional bulbs were handled "as a promotion."

All the manufacturers were asked what they thought would happen to CFL prices in the future. Two manufacturers believed CFL prices will level off. One believed prices would level off because it was impossible to keep up with the 2007 pace of decreasing CFL prices. The other manufacturer said their retail partners had already seen increased CFL sales without decreased CFL prices. One manufacturer believed CFL prices would continue to decrease in price due to newer innovative technologies entering the market place. This manufacturer noted that while he believed the trend will continue, it may be at a lesser rate than seen over the last few years. Finally, one manufacturer believed CFL prices would increase in the future. This manufacturer cited the end of the current global recession and increased global demand for CFLs as the reasons for a CFL price increase.

The corporate retailer believed CFL prices would level off in the future, and noted volume drives price. The corporate respondent said, "If Ace buys "x" amount more bulbs than usual right now the price decrease for Ace will be minimal."

5.3.8 Market Characterization[21]

5.3.8.1 Manufacturer Level

As previously mentioned, only two of the manufacturers were able to complete the entire interview. As a result, questions geared toward market characterization and program satisfaction were only answered by those two manufacturers. Both manufacturer respondents were from the same company, but each one was the manufacturing representative for a different retail channel.

[20] One manufacturer was not asked pricing questions.

[21] The retail level interviews did not focus on market characterization of CFLs.

Each of the manufacturers believed a few things acted as demand barriers in the current CFL market. Both agreed that size, shape, and lighting quality concerns (i.e., blue light, dim light, etc.) among consumers were the primary demand barriers to the CFL market. One of these manufacturers went on at length about mercury being a new concern among consumers. He believed that, while lighting and shape barriers have been diminished over the past few years, mercury posed a new problem to CFL market expansion, and likely will be the largest demand barrier moving forward. The corporate retailer also mentioned mercury concerns as a demand barrier to the CFL market.

Both manufacturers saw increases in their CFL sales since the beginning of 2008. These manufacturers expected CFL sales to continue to increase in 2010 and beyond. The two manufacturers were split when asked if corporate buyers at major retailers were showing more, less, or the same amount of interest in CFLs as they did in 2008. One manufacturer believed buyers are showing more interest as they realize CFLs can save money and the planet at the same time. The other manufacturer believed buyers are showing less interest in CFLs than in 2008. This manufacturer notes it would be difficult for buyers to keep up with the "Everest"-like interest in CFLs that peaked in 2007.

The manufacturers agreed CFL sales would decrease without the Xcel Energy program. However, these manufacturers disagreed on what have driven increased sales from the program. One manufacturer believed decreased prices (provided by the program) served as the primary driver of increased CFL sales, while the other believed increased consumer awareness was the primary driver. Each of the manufacturers understood both issues were important; they just disagreed on which was the primary driver in increased sales through the program.

5.3.9 Program Satisfaction

5.3.9.1 Retail Level

The retail level interviews asked how the program's promotions could be improved to make them more effective for respondents' retail stores.

Three retailers mentioned Xcel Energy should provide more clarity to both retailers and consumers on the 99-cent per bulb price point. All the retailers reported Xcel Energy promoted the 99-cent bulbs as if a customer could walk into the store and buy one CFL for 99 cents. However, the three respondents reported this was not always possible because 99-cent bulbs were sometimes only available to consumers as bulk packages (i.e., the customer had to buy a 12-bulb package to get each CFL for 99 cents). In one case, the respondent reported selling discounted multipacks of bulbs that amounted to less than 99 cents per bulb, but the per bulb price was overshadowed by the package price; this confused consumers because they expected to be able to buy a single, discounted bulb.

General advertising was another area of concern among retailers, particularly signage. Many retailers expressed the need for increased, more detailed signage that could be customized for their stores. More signage would be valuable to retailers in case original signage was destroyed. Some retailers wanted bigger or differently sized signage to fit on their rack pegs properly. One retailer mentioned an outdoor banner would be valuable to bring in customers driving past.

Finally, a few retailers believed regular television advertisements during the promotional period would boost sales and customer knowledge of the Xcel Energy discounted CFLs.

5.3.9.2 Manufacturer Level

Both manufacturers who completed the program satisfaction portion of the survey believed the Xcel Energy program has been run extremely well. Using a scale of 0 to 10, where 0 was 'not at all satisfied' and 10 was 'very satisfied,' one of the manufacturers gave Xcel Energy a "10" rating on all aspects of the program. The other manufacturer gave Xcel Energy either an "8" or "9" rating on all aspects of the program.

When asked how the program could be improved, one manufacturer said only minor changes were needed. This respondent believed there could be minor improvements in overall communication of the program and in the program's success in converting CFL doubters. The other manufacturer wanted to see increased frequency of the program (i.e., three or four times a year) as well as increased communication of when the program takes place.[22] Both manufacturers believed the primary way to boost CFL socket saturation in Colorado was for Xcel Energy to increase its marketing efforts.

Three of four manufacturers were adamant that utility programs, such as Xcel Energy's, are absolutely necessary for CFL sales, both in Colorado and nationally.[23] One manufacturer believed these programs have been extremely successful and said data supports that assertion. This same manufacturer said there would be a "great impact" on the CFL market if utility programs such as Xcel Energy Energy's were discontinued. Another manufacturer was quoted saying: "There has been no market transformation of CFLs in Colorado. There has been no transformation. Almost no one knows what an energy efficient light bulb is, regardless of these programs. These programs help decrease cost, and thus increase the sales of CFLs, but it is not due to consumer education, it is due to price."

All the manufacturers had high praise for the Xcel Energy program. A couple of the manufacturers consistently stated Xcel Energy runs its program much more smoothly than similar utility programs in other states. The corporate retailer noted that while their store participated in about 40 programs per year, the Xcel Energy and WECC programs were two of the very best.

[22] This manufacturer represents Target. The manufacturer said Target can only run a promotion for a specified amount of time. Thus, very long promotions were not of great value to Target, but multiple promotions throughout the year would be valuable.

[23] As was noted, only two manufacturers completed the entire interview. However, three other manufacturers gave extended final comments, which were included in this section of the report.

Table 25 Summary of Upstream Lighting Interviews

	Retailers	Manufacturers
Number of Interviews	31	5[24]
Sold ENERGY STAR CFLs before participating in Xcel Energy's program	95%	100%
ENERGY STAR CFL sales increased over past year	93%	NA
Estimated decline in CO CFL sales* in absence of Xcel Energy's program	15% - 75% less	30% - 95% less
Satisfaction with the program	Favorable with suggestions for small areas of improvement	Very favorable

[24] Note: Very small sample size.

6 Net Savings Inputs

Four approaches were used to analyze net savings. The first was the most traditional approach, using a self-report battery of questions from the end-use customer telephone survey. The second analysis was based on results obtained from supply-side interviews, where retailers and manufacturers were asked a series of questions designed to estimate the percentage of discounted program bulbs that would have been sold in the program's absence. The third approach was a multistate regression model, which included on-site audit results from Colorado and 15 other regions of the U.S. The fourth was benchmarking of other utilities around the country.

A summary of the NTG findings is presented in Table 26. As shown, the NTG estimate is substantially higher when spillover – particularly non-participant spillover – is incorporated.

Table 26. Summary of NTG Estimates

Method	NTG	Notes
Consumer Self-Report	73.8%	Ace hardware only; only includes participant spillover
Retail Store Manager Interviews	60.1%	Does not include spillover
Multistate Regression	165%	Includes participant and non-participant spillover
Benchmarking / Multistate Comparison	54% - 197%	Varied methodologies and market factors

6.1 Summary and key NTG Findings

As noted above, each of the four approaches provides a different aspect of the NTG estimate:

- The Ace Hardware participant survey provides a NTG estimate for one participating retailer channel, and incorporates free-ridership and participant spillover.
- The retail store manager interviews provide a NTG estimate for each distribution channel, and incorporates free-ridership but not spillover.
- The multistate regression model, using a total sales based approach, is the most comprehensive of the estimates, developing a NTG ratio that is inclusive of free-ridership and all forms of spillover.
- The benchmarking comparisons offer a context for the NTG used in other similar programs in different states.

In examining the models together, there is evidence of consistency. For example, the free-ridership estimate from the Ace hardware participants was estimated at about 41% (Table 31), close to the 45% free-ridership estimate from the Ace hardware store managers (Table 34).

The difference between the estimates likely reflects the inclusion of spillover. For example, the increased marketing and outreach conducted by Xcel Energy likely led to additional sales of non-program CFLs among participating retailers, particularly since the program wasn't offered year round (i.e., consumers came into retailers to purchase CFLs, and decided to purchase bulbs even in absence of any program discount). Similarly, nonparticipant stores also likely benefited from the program by selling additional CFLs due to the increased marketing and outreach conducted by Xcel as part of the program.

In addition to the Xcel Energy program activity, however, there were a number of other factors that may have also contributed to the significant increase in CFL sales during the last two years in Colorado, including:

- A number of regional initiatives within Colorado to promote CFLs. For example, the Boulder ClimateSmart™ initiative has aggressively promoted CFLs, and the City of Aspen runs a number of energy efficiency programs that offer free CFLs.[25]
- A number of Colorado Munis and Coops ran aggressive CFL giveaway and promotions. Some of their customers may be Xcel Energy gas customers, or may be second home owners that are Xcel Energy electric customers in their primary residence.
- Energy prices have increased during the last two years, and nearly all of the non-participating retailers stated that this was an important driver in increased CFL sales.
- Political shifts in Colorado in the Governor's office and in his appointees at the Public Utility Commission and Governors Energy Office (GEO have led to a greater government emphasis and promotion of energy efficiency.

The Xcel Energy Home Lighting Program, combined with these other factors, appears to have boosted Colorado CFL purchases substantially. While the research indicates that NTG could be as high as 1.65, this spillover estimate may not all be fully attributable to the Xcel Energy Program. In addition, as presented in the benchmarking section, NTG estimates around the country appear to be falling in the last year or two, and achieving a NTG ratio of over 1.0 is extremely difficult given rising baseline sales of CFLs from the growing concern over climate change, non-program retailer promotions such as those by Wal-Mart, and additional items mentioned above. As noted in the recommendations section, this evaluation recommends a conservative approach, applying a NTG of 1.0, whereby Xcel Energy takes full credit for every bulb incented, but does not take credit for additional CFLs that were outside of program sales.

6.2 Net-to-Gross Analyses Based on End-Use Customer Telephone Survey Data

The Ace phone survey, which included respondents known to be participants in the Xcel Energy Home Lighting Program prior to the survey, used a battery of questions consistent with the self-

[25] Although Aspen is outside the Xcel service territory Colorado front range residents visit and may have second homes in the area.

report free-ridership method developed by a collaborative of California Public Utility Commission (CPUC)-hired evaluation contractors. The method developed was approved by the CPUC to determine free-ridership and the NTG ratio.

6.2.1 Methodology

Cadmus completed surveys with 70 Ace hardware participants. Questions in the survey used for the algorithm to calculate free-ridership and NTG included questions probing for what respondents would have done in the program's absence. Such questions included a few of the following examples:

- At the time that you first heard about Xcel Energy's CFL program, had you:
  - Already been thinking about purchasing CFLs?
  - Already begun collecting information about CFLs?
  - Already decided to buy CFLs?
  - Already installed CFLs?
- If the CFL bulbs had cost a dollar more, would you still have:
  - Purchased any CFLS?
  - Purchased the CFLs at the same time as you did?
  - Bought CFLs earlier than you did or later?
- Without the program, would you have purchased the same quantity as you did?

Overall, the NTG algorithm derived four separate measurements of free-ridership from different inquiry routes. The first measurement consisted of responses to a series of yes/no questions that measured the program's impact on the quantity, efficiency, and timing of the purchases, such as the examples provided above. The second measurement consisted of a 0 to 10 scale that asked the likelihood that the respondent would have purchased the same exact high-efficiency measure in the program's of the program.

The third measurement combined responses to the quantity and timing of questions with responses to a 0 to 10 scale, that asked the respondents' agreement with the statement that, in the program's absence, they would have paid the additional rebate amount to buy the high-efficiency equipment on their own. The final measurement combined responses to the quantity and timing questions with responses to a 0 to 10 scale that asked respondents' agreement with the statement that the program was a critical factor in their decision to purchase the high-efficiency equipment.

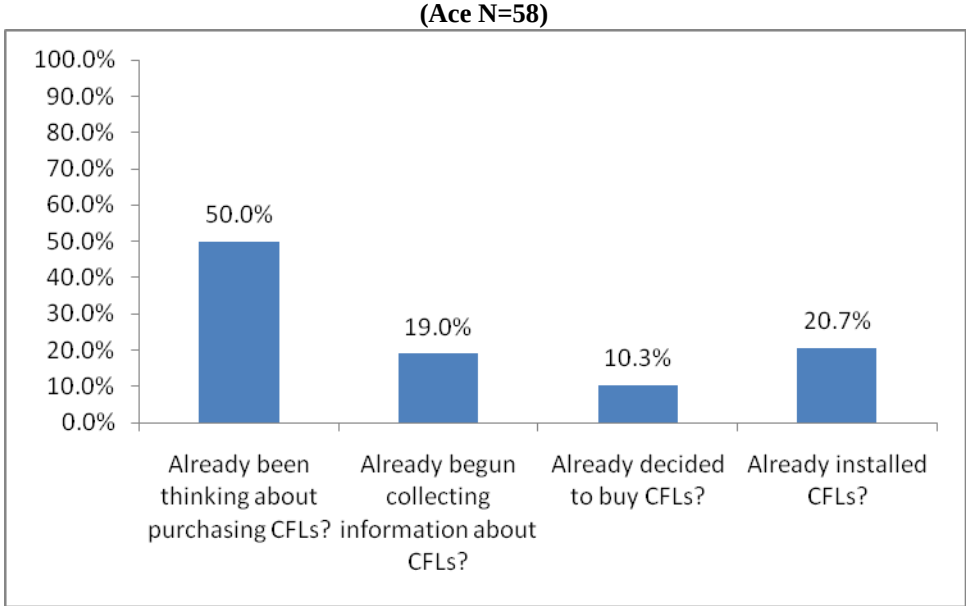
Finally, in cases where responses were inconsistent among the four measurements, an analyst reviewed responses to open-ended questions seeking to clarify the inconsistencies, and recoded the four measurements, as necessary. These four measurements were averaged to derive the final free-ridership estimate at the measure level.

Spillover was derived by dividing the average number of CFL bulbs within the program by the average number of CFLs participants' purchased without the program incentive.

6.2.2 Free-Ridership

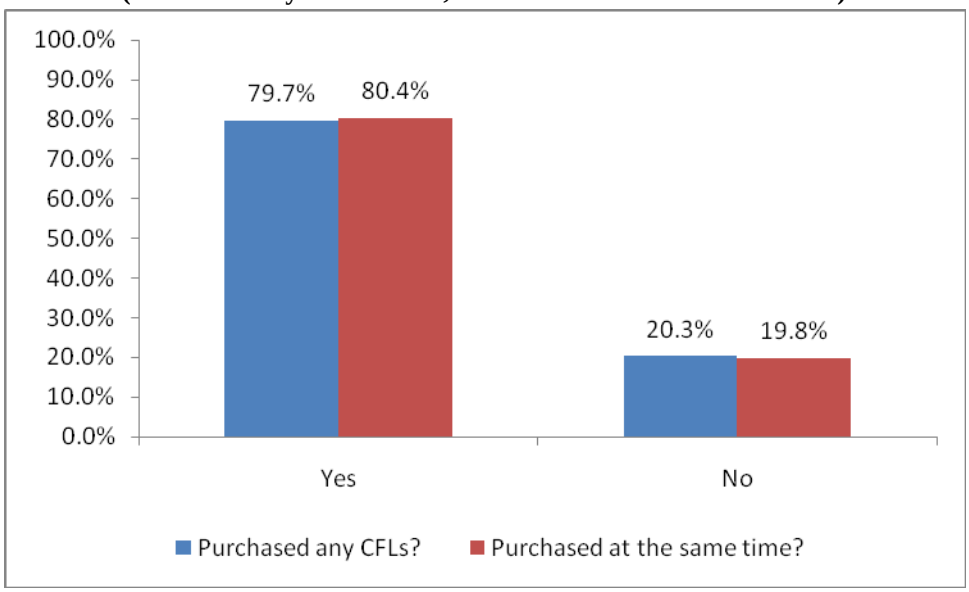
Half of all Ace respondents reported that they had already been thinking about purchasing CFLs at the time that they first heard about the program. Another 21% had already installed CFLs before the program was even available. When respondents were asked what they would have done had the CFL cost a dollar more than the price at which they purchased the discounted bulb, 80% of respondents would have still purchased CFLs and would have purchased them at the same time as they did. While 80% is high, one must also keep in mind that this represents just Ace participants and not the Random respondents nor the general population.

Figure 21. At the Time that you First Heard about the Program, had you:[26]
(Ace N=58)



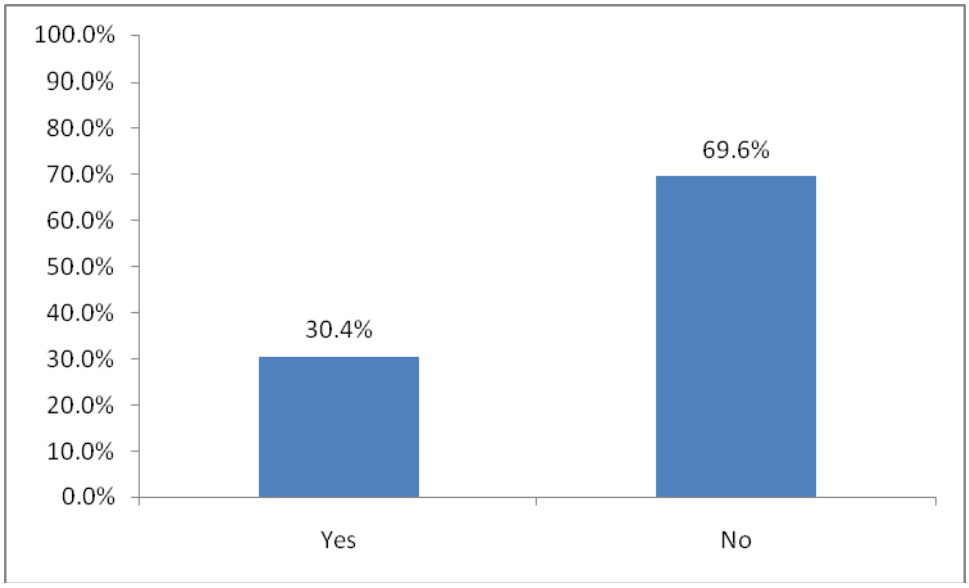
[26] All data within the free-ridership section were asked just of Ace respondents.

Figure 22. If the CFL had Cost a Dollar More, Would You Still Have:
(Purchased any CFLs N= 59, Purchased at the same time N=46)



Three respondents said that they would have purchased CFLs later than they did. The time frame given by these three respondents were 2 months, 6 months, and one year. One additional respondent said that they would have purchased CFLs 2 years earlier than they did had the CFL cost a dollar more per bulb.

Figure 23. Without the Program, Would you have Still Purchased the Same Quantity as You Did?
(N=46)



When respondents were asked whether or not they would have purchased the same quantity as they did without the program, 70% of the respondents said "No." However, 48% of those respondents did say that it was very likely that they that they would have still purchased CFLs had the lower price not been made available through the program. Additionally though, nearly

30% (29%) of those respondents said that it is very likely that they would have purchase incandescent bulbs instead of CFLs if the lower price had not been made available through the program.

Table 27. Likelihood of:[27]

	Purchasing CFL even without lower price	Purchase incandescent if lower price not available
N	58	59
Not at all likely (0-3)	29%	53%
Somewhat likely (4-6)	22%	19%
Very likely (7-8)	19%	15%
Extremely likely (9-10)	29%	14%
Not likely (0-4)	33%	55%
Neutral (5)	12%	10%
Likely (6-10)	55%	36%

Over half of all respondents (60%) believed that the lower priced CFL was a critical factor in their decision to purchase the bulbs. Additionally, 55% of respondents stated that would probably not have bought a CFL within one year of when they had the program not been made available to them.

Table 28. How much do you agree with the Following Statement?[28]

	Lower priced CFL was a critical factor in decision to purchase CFLs	Would have bought CFLs within one year even without the lower price
N	60	60
Do not at all agree (0-3)	22%	28%
Agree somewhat (4-6)	18%	27%
Agree a lot (7-8)	8%	10%
Highly agree (9-10)	52%	35%
Disagree (0-4)	24%	29%
Neutral (5)	12%	17%
Agree (6-10)	67%	57%

[27] Questions were asked on a scale of 0 to 10 in which 0 was not at all likely and 10 was very likely.
[28] Asked on a scale of 0 to 10 in which 0 was strongly disagree and 10 was strongly agree.

6.2.3 Spillover

Twelve Ace respondents reported that they had purchased and installed additional CFLs that were not discounted through the Xcel Energy program or any other program. Among these respondents, an additional 97 non-discounted CFLs were purchased. Eight of these respondents definitely agree that their experience with the CFLs they bought through the program influenced their decision to install more CFLs even without the program. When these respondents were asked their reason for purchasing CFLs without the lower price, responses varied from merely being in a hurry to wanting to save money and energy.

Table 29. Reasons for Purchasing Non-Discounted CFLS[29]

Reason	Number of Responses
Concerned about future CFL cost increase	1
Know that incandescent bulbs won't be available in the future	1
Didn't know the program existed	2
In a hurry	2
Curious about trying CFLs	4
CFLs last longer	4
Want to save energy	4
Want to save money	5
Total responses	23

Table 30 calculates the spillover from the respondents reporting purchasing additional non-program CFLs. On average, these respondents bought 4.8 additional CFLs. The spillover participants gave an average rating of 6.8 for the program's influence on their decisions to purchase additional CFLs not discounted by the program (based on a scale of 0 to 10, with 10 being most influential). Actual spillover was 14.8%, the percentage of CFLs bought outside of the program that can be attributed to people having participated in the program.

Table 30. Ace Hardware Participant Spillover Findings[30]

Category	Ace Respondents (N=59)
Number of respondents reporting purchasing additional non-discounted CFLs	12
Percent of sample	20.3%
Average rating for program influence	6.8
Spillover	14.8%

[29] This was a multiple response question.

[30] This was asked only of Ace survey respondents.

Table 31, below, shows the free-rider and NTG percentages. Free-ridership was 41%, meaning 41% of those who bought the reduced cost, program bulbs would have bought the bulbs at a higher price had the program not existed. The NTG percentage was calculated by subtracting free-ridership from 100, then adding spillover. The NTG percentage was 73.8%. This finding indicated 73.8% of Xcel Energy's claimed gross savings could be attributed to its Home Lighting Program in Colorado.

Table 31. NTG Findings for Ace Hardware Participants

Free-rider	Spillover	NTG
41.0%	14.8%	73.8%

6.3 Net-to-Gross Analyses Based on Upstream Lighting Interviews

The supply-side, self-report NTG estimation method primarily relied on information collected from in-depth interviews with manufacturers, retail buyers, and retail store managers. Generally, these market actors were asked a series of questions designed to estimate the percentage of discounted program bulbs that would have been sold in the program's absence (i.e., free-ridership). These results were analyzed to determine NTG estimates by channel (or one minus free-ridership).

6.3.1 **Methodology**

Several NTG calculations were made to provide different perspectives by retail channel. The rebates for the Home Lighting Program followed a mark-down model, meaning rebates were given to retailers and not manufacturers. Under this model, sales data were available only for retailers, meaning NTG was calculated for retailers and not manufacturers. Only one corporate level retailer agreed to an interview, and, of the 20 store mangers interviewed, 15 answered the necessary questions to be included in the NTG calculation. All participating retailers were represented in the final analysis (i.e., a representative from each of the participating retailers was included in the study).

The main question asked of retailers to inform the NTG calculation was worded as follows:

- By what percentage do you estimate your store's sales of standard ENERGY STAR CFLs would be [higher/lower] since the beginning of 2008 if the discounted CFLs were not available?

The supply-side, self-report NTG ratio was calculated at the retail channel level for each category of market actor for non-specialty ENERGY STAR CFL bulbs. The ratios were based on the shipment and sales weighted average for the component NTG estimates. For example, if five store managers had each provided estimates of declines in their sales of non-specialty CFLs through the grocery channel in the program's absence, the overall NTG estimate would be the weighted average of each estimate. In other words, if one retailer sold a significantly larger

proportion of bulbs than other retailers, the large retailer's response would be weighted upwards (i.e. would count "more" in the NTG calculations).

Table 32. Completed Participating Stores Interviewed

Store Type	Store Name	Number of Stores
Small hardware	Ace Hardware	5
Grocery	King Sooper's	4
Membership/wholesale	Sam's Club	4
Membership/wholesale	Costco	3
Large home improvement	Home Depot	3
Mass merchandise	Target	1
Total retailers: 6		Total interviews: 20

Table 33. Completed Participating Manufacturers Interviewed

Store Type	Store Name
General Electric (GE)	Sam's Club
General Electric (GE)	Target
General Electric (GE)	Ace Hardware
TCP	Home Depot
Greenlite	King Sooper's/Kroger
Total manufacturers: 5	

6.3.2 Findings

Retailer program participants and manufacturers were asked what they would have done in the program's absence. Out of 20 store managers who were asked "Would your store stock standard ENERGY STAR CFLs without the support of the Xcel Energy Home Lighting Program," 100% of respondents replied "Yes." However, the majority conceded they thought their sales of CFL bulbs would have been lower without the discounted ENERGY STAR CFL bulbs made available by the program. Only four of the 20 respondents said their sales would have been the same, and none thought their sales would have been higher in the program's absence.

The one corporate level retailer interviewed was not directly asked whether or not they would have sold CFLs in the program's absence. However, the corporate retailer said his company sold non-program, discounted CFLs alongside program discounted bulbs "Very often." The corporate level retailer also revealed he thought the increased shopper foot traffic from the program's discounted bulbs positively impacted the sales of non-program discounted bulbs. "Customers will try something with the 99-cent price point, if they like it they will try something else such as a specialty bulb." The corporate level retailer also said his sales of non-specialty CFLs would have been 75% lower since January 1, 2008, had the Xcel Energy program not existed.

All five manufacturers interviewed thought their sales of non-specialty CFLs would have been lower since January 1, 2008, had the program not existed. Estimates of the percentage decrease of sales in the program's absence ranged from 35% to 95%. The average percentage was 59%. The manufacturers, however, didn't feel that the program distributed CFLs to retailers that wouldn't have been already carrying them (i.e., none of the manufacturers responded positively

to the question: "Are there any retailers or retailer channels that you worked with through the Home Lighting Program that you think would not have been selling any CFL products since January 1, 2008, if the discounts from this program had not been available?").

Table 34 shows the NTG by distribution channel. NTG was lowest among warehouses, at .370, and highest among grocery stores, at .714. These findings are consistent with other recent studies, which demonstrate that warehouses stock and sell a large number of CFLs throughout the United States, while groceries still trail other distribution channels in CFL sales.[31] The overall weighted NTG calculated based on store manager interviews was 0.601. A NTG of 0.601 would mean 60.1% of Xcel Energy's claimed gross savings could be attributed to its Home Lighting Program in Colorado. This should be viewed as the low point in the NTG estimate since it excludes all forms of spillover.

Table 34. Retail Store Manager NTG, by Distribution Channel (Excluding Spillover)

Distribution Channel	Free-ridership	NTG
Warehouse	.630	.370
Hardware	.454	.546
Mass merchandise	.500	.500
Home improvement	.450	.550
Grocery	.286	.714
Total (Weighted Avg)	.399	.601

6.4 Multistate Model

The third, and most inclusive estimate of NTG was based off of a multistate regression model. The model, which was based on data from 16 different geographic areas in the United States, drew on random telephone surveys of over 9,300 households and on-site saturation surveys (including confirmation of when CFLs were purchased) for about 1,400 households. Study sponsors included: Xcel Energy in Colorado, the California Public Utilities Commission (CPUC), the New York State Energy Research and Development Authority (NYSERDA), the Wisconsin Public Service Commission (WPSC), Consumers Energy in Michigan (CE), the Connecticut Energy Conservation Management Board (ECMB), Connecticut Light and Power (CL&P), Northeast Utilities (NU), The United Illuminating Company (UI), the Cape Light Compact (Cape Light), NSTAR, National Grid, Unitil, and Western Massachusetts Electric (WMECO).

6.4.1 **Methodology**

Data collected in both the phone and on-site surveys provided counts of CFL purchases, use, and storage at different time periods, and the on-site survey also counted the total number of lighting sockets in homes. While the evaluation team converted the counts of total sockets and CFLs installed into a percentage representing CFL saturation, the count data for purchases, storage, and

[31] "Draft Residential Retrofit Upstream Lighting Report," December 10, 2009, Prepared by Kema and Cadmus Group for the California Public Utilities Commission.

use did not have the so-called normal curve assumed by the most common statistical modeling procedure, Ordinary Least Square Regression (OLS); rather, they were right skewed. The team attempted to transform the data to force them to meet the normality assumption using standard approaches such as taking their square or cubic roots. However, the strong presence of zero purchases and zero use meant the data remained still right skewed. In response, NMR turned to a statistical procedure appropriate for the data distribution: the negative binomial regression model (NBRM). The saturation data were also right skewed, but, because they were not count data, the team could not appropriately use NBRM. Instead, they relied on OLS methods for this report.

As data from Colorado caused the model to poorly predict actual observed 2008 purchase data for *all areas,* including the portion of Colorado served by Xcel Energy, the team developed an alternative model, presented in Table 35. This was the best model the team derived using data from the Xcel Energy respondents to explain 2008 CFL purchases, but it still was not a strong predictor of 2008 purchases in any of the study areas precisely because Colorado data were so different from those in the other areas. Note also that both models excluded the four CPUC states as on-site surveys in those areas did not collect 2008 purchase data. These models were developed using NBRM; to see the impact of any individual variable on purchases, one would multiply the variable by the impact score, not by the coefficient as in an OLS regression. Table 35 was based on the 2008 purchase model, demonstrates the program variable had a positive effect on 2008 CFL purchases, as did how long the respondent used CFLs and the timing of data collection. Variables that entered the model included: whether or not the respondent was a homeowner; the size of the home; and the county unemployment rate, all of which showed a positive effect on purchases. The team used this model to estimate NTG for Xcel Energy's portion of Colorado

Table 35. Best Fit 2008 Purchase Model—On-Site

Variables	90% Confidence Interval		
	Low	High	Impact Score
Composite program	0.09	0.20	0.16
Years using CFL	0.05	0.12	0.09
Homeowner	0.11	0.68	0.48
Size of home	0.04	0.46	0.29
County unemployment rate	0.00	0.12	0.06
Conducted during fall season	0.24	0.82	0.70
Constant	-1.61	-0.09	n/a

* Sample size = 1,133 and pseudo R^2 = 0.4%. Excludes CPUC states as 2008 purchase data were not collected on-site.

To calculate NTG for Xcel Energy's 2008 CFL program, the team turned to the alternative model. They multiplied the impact score estimate for each *nonprogram* independent variable across the on-site respondents in the sample. For the *program variable,* they multiplied the impact on purchases by the actual score for the composite program variable for Colorado (1.35), then repeated this step, setting the composite program score equal to that for nonprogram areas (-3.16). This created a hypothetical Colorado in the absence of a program. This latter calculation was used to develop an NTG estimate. Table 36 provides an example of these calculations for one respondent in Colorado. For this individual, 1.03 CFL purchases were predicted, but 0.32

would have been predicted in the program's absence. The team could not predict purchases for the few people who responded "don't know" or refused to answer questions included as variables in the model, which they took into account when calculating NTG.

Table 36. Predicted Purchases for One Colorado Respondent Based on the 2008 Purchase Composite Program Variable Model—On-Site

Variables	Impact Score	Respondent Data	Contribution to Predicted Purchases	
			Program Scenario	No Program Scenario
Composite program	0.16	1.35 with program -3.16 w/o program	0.21	-0.50
Years using CFL	0.09	1.0	0.09	0.09
Homeowner	0.48	0	0.00	0.00
Size of home	0.29	1 (less than 2,000 sq ft)	0.29	0.29
County unemployment rate	0.06	7.20	0.44	0.44
Conducted during fall season	0.70	0	0.00	0.00
Total purchase			1.03	0.32

* Results subject to rounding error

6.4.2 Findings

As shown in Table 37, after computing per-household estimates, the evaluation team summed the predicted purchases under both program scenarios across all on-site participants, although only the nonprogram scenario was used in calculating NTG. The Evaluation Team divided the totals by the number of on-site households for whom they predicted purchases. These calculations *predict* each household purchased an average of 1.79 CFLs in the program scenario.[32]

NTG was derived from the observed data. The predicted nonprogram scenario suggested 1.08. CFLs would have been purchased in the program's absence, yielding a predicted estimate of net purchases of 0.71. (modeled program CFLs per household minus predicted non-program CFLs per household) being directly attributable to the program. Dividing the predicted net purchases (0.71 CFLs) by the estimated number of incented CFLs per household (0.43 CFLs) gives a predicted NTG of 1.65, with a 90% confidence interval range of 1.63 to 1.65.[33]

[32] Note this is far below the observed weighted average of 5.14 CFLs for the same households. This difference between predicted and observed 2008 purchase numbers reflects that observed purchases in Colorado were much higher than in all other states included in the model; they drove the predicted values downward. It must be noted, however, that Colorado had a counter effect on the model; the predicted values for all other states using this alternative model tended to be quite high.

[33] Note that if the observed CFLs purchased (5.1 CFLs/household) rather than the modeled program scenario (1.79 CFLs/household) are used in the numerator, the NTG estimate is 9.44. The Evaluation Team does not believe that this estimate is realistic.

This study's results suggest CFL programs had a positive effect on CFL purchases in 2008. Based on the alternative model, the effect in the Xcel Energy service territory was particularly strong, with an estimated NTG of 1.65. This high NTG estimate reflects reported 2008 CFL purchases in the Xcel Energy service territory exceeded those in all other areas included in the study. Results from the retailers and manufacturers, presented above, also indicate that Colorado saw large increases in its 2008 CFL sales at exactly the time national sales declined precipitously. The model accounts for CFL purchase behaviors of all 12 areas included in the model—the CPUC states are excluded—even though the 11 other states had fewer 2008 CFL purchases than Colorado. The implication is the model underestimates 2008 CFL purchases in the Xcel Energy service territory, with observed purchases equaling 5.1 CFLs/household and predicted purchases equaling about 1.8 CFLs/household. Therefore, it also under predicts nonprogram purchases, yielding the high NTG.

Table 37. Calculation of NTG from Multistate Regression*

Input	Estimate	90% Confidence Level	
		Low Estimate	High Estimate
(A) Predicted purchases with program	98	94	110
(B) Predicted purchased without program	60	55	71
(C) Onsite sample size	54	54	54
(D) Per-household purchases with program predicted (A÷C)	1.79	1.70	2.00
(E) Per-household purchases without program (B÷C)	1.08	1.00	1.29
(F) Net program purchases per household predicted (D-E)	0.71	0.70	0.71
(G) Incented CFLs per household	0.43	0.43	0.43
Total net impact observed (F÷G)	1.65	1.63	1.65

* Calculations subject to minor rounding error.

6.5 Comparison Programs

Table 38 provides a summary of parameters that have been applied to recent CFL programs around the country. The parameters vary widely based on the year of the study and the policy regarding the how data were collected and analyzed.

Table 38. Summary of Secondary Research Results

	Area	Program Year(s) Evaluated	Coincidence Factor	Free Ridership	Spillover	NTG	In-Service Rate	Leakage	Interac-tion Effects
Efficiency Vermont, Preliminary Savings Claim	Vermont	2008				90%			
MA Energy Star Lighting Program MPER	Massachusetts	2007	7.60%			197%			
Database for EE Resources (DEER) Update	California	2006-2007	8.10%	20%		80%*	90%		
Wisconsin Focus on Energy	Wisconsin	2007				76%			
Efficiency Maine Lighting Program	Maine	2006		20%	30%	110%			
APS MER	Arizona	2005-2007	10%	31%	9%	78%	90%	21%	10%
CA Residential Retrofit Upstream Lighting Program Evaluation	California	2006-2008	6.4%	46%		54%*	67%	4%	

*CA does not include spillover in the NTG calculation. Note that the 2006-2008 report was released publically on December 10, 2009 and is still considered a draft report, thus the final numbers may differ from those presented here.

6.5.1 California

The 2006 through 2008 California Upstream Lighting Program incentivized approximately 93 million "twister" style CFLs. During this time, downstream marketing efforts through separate marketing and outreach (M&O) initiatives were also implemented to encourage residents to adopt energy-efficient measures such as ENERGY STAR programmable thermostats and CFLs. Since California first began promoting CFLs in 1989, much progress has been made throughout the past couple decades to increase market actor participation. More recently, the program has shifted its focus from big box chains to less traditional retail channels, such as grocery, drug, and discount stores.[34]

Three investor-owned utilities (IOUs) participated in the CPUC's CFL program. The recommended NTG ratio for these IOUs was 0.54.[35] While this ratio was lower than that for the Xcel Energy Home Lighting Program, the CPUC program has been in place much longer, plus cannot claim spillover savings.

6.5.2 Wisconsin

The Wisconsin Focus on Energy Lighting Program—or the Residential Lighting Program (RLP)—began in 1998 and focuses on promoting ENERGY STAR lighting products. Marketed

[34] The Cadmus Group, Itron, Jai J Mitchell Analytics, KEMA, PA Consulting Group, Summit Blue. Residential Retrofit High Impact Measure Evaluation Report. Prepared for the California Public Utilities Commission Energy Division, Section 15.6. December 7, 2009.

[35] The CPUC report is currently being publicly vetted, thus the final recommended NTG ratio may differ from that presented here. The report can be downloaded from http://www.energydataweb.com/cpuc/.

under the annual Change-A-Light, Change-the-Word campaign, the RLP works with the entire manufacturing and distribution chain of ENERGY STAR lighting products to accelerate consumer awareness and knowledge, attract retail partners, and increase both the availability and purchase of these products. Until recently, most of the program focused on rebate coupons through the mail. More recently though, the program has shifted to in-store coupons and, very recently, upstream programs. In 2007, the NTG ratio was estimated at 0.76, and has declined steadily since 2005 (when it was estimated at 1.24) and 2006 (0.81).

6.5.3 Massachusetts

The Massachusetts ENERGY STAR Lighting Program represents an ongoing effort to encourage use of ENERGY STAR-rated lighting among residential customers though catalog sales, retail coupons, buy-downs, mark-downs, and consumer education. For the 2006 analysis, NTG was estimated to be from 1.97 to 2.74. Evaluators recommended using the conservative end of the range to report NTG at 1.97 for 2007, and recommended the program sponsor assume a NTG of 1.39 for 2008.[36]

6.5.4 Connecticut

The CFL program in Connecticut largely has an upstream focus and uses a buy-down approach to discount CFL prices. Program materials (as with most programs) are provided to help with advertisement and customer education. Until 2006, the program also incorporated catalog and retail coupons. As with the Xcel Energy CFL program in Colorado, the Connecticut program was part of a multistate modeling effort. However for Connecticut, the multistate model uses observed CFL purchases per household in the numerator to calculate the NTG ratio. The preliminary analysis estimated the 2008 NTG for Connecticut was approximately 0.67. However, since 2008, the CFL program in Connecticut has increased its promotion of specialty CFLs which had not been captured in the NTG calculation.[37]

6.5.5 Vermont

In 2008, the NTG ratio for Efficiency Vermont was .90. Efficiency Vermont's 2007-2008 Plan focused on strategies to take them past early adopters for energy efficiency and into more mature markets, putting emphasis on the promotion of specialty CFLs such as three-way, dimmable, and encapsulated CFLs. In addition, in the spring of 2008, Efficiency Vermont began offering incentives for LED lighting.

6.5.6 Arizona

Arizona Public Service (APS) utilized a self-report approach for estimating NTG for it's 2005-2007 lighting program. The evaluation estimated free-ridership at 31%, but spillover at only 9%, far below other market based evaluation approaches.

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[36] Nexus Market Research, Inc. Market Progress and Evaluation Report (MPER) for the 2007 Massachusetts ENERGY STAR Lighting Program, page 53. July 1, 2008.

[37] Nexus Market Research, Inc. Preliminary Results of the Multistate CFL Modeling Effort, page 55. November 22, 2009. Retrieved from the Connecticut Energy Efficient Trust fund on 12/14/09.

6.5.7 **Maine**

Efficiency Maine has two implementation strategies for their CFL incentive programs, similar to Xcel Energy. The first component is a in store coupon program where customers fill out a coupon form when purchasing ENERGY STAR bulbs or fixtures at a program participating store. The second is a markdown strategy where retailers are provided incentives to reduce the price of qualifying lighting. Nexus Market Research estimated 29% free-ridership for markdown CFLs and 20% free-ridership for recent coupon purchases. They also documented 23% participant spillover for markdown CFLs and 30% participant spillover for recent coupon purchases. Overall net-to-gross ratios were .94 for markdown CFLs and 1.10 for coupon CFLs.[38]

[38] Process and Impact Evaluation of the Efficiency Maine Lighting Program, Nexus Market Research and RLW Analytics, April 2007.

7 Baseline and Technical Assumptions Analysis

This section analyzes and verifies the Baseline and Technical Assumptions methodology employed by Xcel Energy for computing the savings from the CFL Home Lighting Program. There were six primary elements which required verification:

1. Wattage displaced by IOU-discounted CFL products (delta watts)
2. Average daily hours-of-use (HOU)
3. Average percent operating at peak (coincidence factor, or CF)
4. Residential/Non-Residential
5. Leakage
6. Storage/Installation Rate
7. Other Considerations

7.1 Summary of Key Findings

Table 39 provides a summary of key technical assumptions evaluated. The basis for Cadmus' recommendations is primarily the most recent 2008 Upstream Lighting study in California. The CA Upstream Lighting Study is the largest metering study ever conducted, with over 1,200 sample points collected within the past 2 years. As Xcel Energy expressed interest in the California methodology for calculating NTG, the accompanying technical assumptions used by California were considered a good reference point for comparing and contrasting the assumptions used by Xcel Energy. Consideration was also given as noted in the detail findings for differences between the two states in program elements such as the maturity of the program and the resulting saturation of CFLs.

Table 39 Summary of Technical Assumptions Analyzed

Factor	Definition	Xcel Energy Assumption	Cadmus Recommendation	Notes
Delta Watts	Incandescent to CFL ratio	3.4	3.6	Recommendation based on CA 2008 Upstream Lighting Evaluation
Hours of Use (HOU)	Average number of hours per day CFLs are turned on	3.1 daily HOU	2.3 daily HOU	Accounts for 2008-2009 saturation levels. HOU would decline in 2010 given increased saturation.
Coincidence Factor (CF)	Percent of lighting KWh that is coincident with peak demand	8.0%	8.0%	6.4% -10% acceptable range
Customer Type	Residential program sales to nonresidential customers	NA	6% sales to nonresidential	CA 2008 Upstream Lighting Evaluation
Leakage	Program sales to non-Xcel Energy customers	NA	Not evaluated	Leakage would likely trade-off with sales from other utility program bulbs sold to XE customers
Storage / Installation Rate	Average percent of bulbs purchased in 2008-2009 that were not installed	About 10%	18.2%	XE 10% comes from the difference between .9 NTG and negotiated .8 currently used in CO
Generator kWh achievement	Percent of bulbs never installed	NA	1%	CA 2008 Downstream Lighting Study

7.2 Delta Watts

Xcel Energy's Home Lighting Program assumed an average CFL equivalent incandescent wattage of 65.3 and the installed savings assumption used an average CFL wattage of 19.0. The difference between the two is an average delta watts value of 46.3 (or an incandescent to CFL wattage ratio of 3.4).

The most recent 2006-2008 California Upstream Lighting Evaluation[39] conducted lighting inventories at approximately 1,200 homes and found average incandescent wattage of 61.7 watts. Compared to an average CFL program wattage of 17.2 watts, the study assumed an average delta watts value of 44.5 (or an incandescent to CFL ratio of 3.6).

According to 2009 data provided by Xcel Energy, the average CFL program wattage was 15.5 watts. Table 40 below outlines the number of CFLs that were sold as program bulbs by the beginning of 2009. It is recommended that Xcel Energy assume this average program wattage as

[39] KEMA, Inc, The Cadmus Group, Itron, Inc, PA Consulting Group, Jai J. Mitchell Analytics, Draft Evaluation Report: Upstream Lighting Program. Prepared for the California Public Utilities Commission, Energy Division. December 10, 2009.

opposed to its previously assumed 19 watts since these program data are available. *By using the incandescent to CFL wattage ratio of 3.6* from the 2006-2008 California Upstream Lighting Evaluation, it can be determined that the average equivalent incandescent wattage within Xcel Energy's Colorado territory is 55.6 watts, for a delta watts of 40.*1*. Once all 2009 program information is submitted by the retailers, Xcel Energy plans to update their calculations with the latest average CFL program wattage.

Table 40. CFL Wattage for 2009 Program Bulbs Sold Through September

CFL Wattage	Total Number Sold
7	1,869
10	1,516
11	6,304
13	47,547
14	235
15	16,735
16	668
18	7,690
20	1,714
23	14,446
26	2,543
32	526
42	273
Total	102,066
Weighted Average	15.5

The 2008 California Upstream Lighting Study also found that delta watts were not related to CFL saturation. Other factors that would potentially affect the baseline wattage, including lamp type, fixture type and existing CFL saturation, were explored and found not to have identifiable effects on average non-CFL wattage. The average wattage of IOU-discounted CFLs was subtracted from comparable average non-CFL wattages to determine delta watts.

7.3 Average Daily Hours-of-Use (HOU)

Estimates of the baseline average daily hours-of-use (HOU) for the Xcel Energy Home Lighting Program were derived from the 2002 DOE National Lighting Characterization study. The value used for Xcel Energy's forecasting estimates was an annualized HOU of 1,119 hours per year. This corresponds to approximately 3.1 daily HOU.

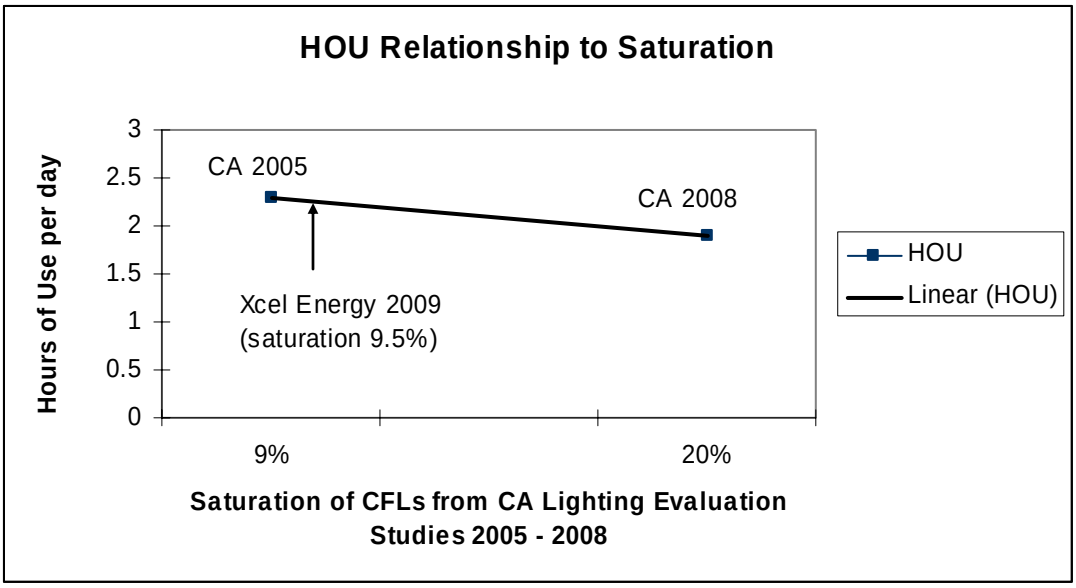
Consistent with the Xcel Energy assumptions, a comparison of the recent large-scale metering efforts in California indicate that HOU of use is negatively correlated with CFL saturation: as CFL saturation increases, HOU decreases. Residential customers, therefore, tend to first replace their highest use fixtures with CFLs, and then replace lower use fixtures. For example, as shown in Table 41, HOU dropped from approximately 2.3 hours a day in 2005 to 1.9 hours per day in the most recent California Study.

Table 41. Change of HOU over time

Study	Year of Metering	Saturation (% of Sockets with CFLs)	Average Daily HOU
CLASS [40]	2003-2004	9.0%	2.3
Draft Evaluation Report: Upstream Lighting Program	2008-2009	20.4%	1.9

As presented earlier in this study, CFL saturation in Xcel Energy's Colorado service territory, based on Cadmus administered site visits in October 2009, is estimated at 16.2%. Saturation of the beginning of 2008, however, is estimated at 2.8% (based on an increase of 7 bulbs per home in 2008 and 2009). The average saturation, therefore, is approximately 9.5%. Assuming a linear relationship in between saturation and HOU, *the average incented CFL from the Xcel Energy Home Lighting Program used 2.3 hours per day***,** or 839.5 hours per year (see Figure 24). Based on current saturation estimates, however, CFLs installed in early 2010 would be expected to be used approximately 2.0 hours per day.

Figure 24. Relationship of CFL Saturation and Hours of Use



Cadmus also considered regional factors that could affect HOU calculations. A 2008 metering study[41] in New England, for example, found a daily average hours of use of 2.8, presumably higher due to more winter lighting hours compared to California. The HOU from California was

40 RLW Analytics, California Lighting and Appliance Efficiency Saturation Study (CLASS), 2005.

[41] Nexus Market Research, RLW Analytics, Inc., and GDS Associates; Residential Lighting Markdown Impact Evaluation; Prepared for markdown and buydown sponsors in Connecticut, Massachusetts, Rhode Island and Vermont; January 2009.

used as the benchmark for Colorado because it was a larger study than the one in New England and the state's geographic latitude overlaps that of Colorado.

7.4 Peak Coincidence Factor (CF)

As shown in Table 42, the assumed CF used by Xcel Energy of 8.0% is within the range of other recent studies. The CF is calculated differently for each utility based on the unique peaking characteristics of its territory, but a CF within the range of 6.4%-10% is reasonable. *Xcel Energy should continue using 8.0% as the CF.*

Table 42. Comparison Studies for Peak Coincidence Factor

Comparison Study	Area	Program Year(s) Evaluated	Coincidence Factor
MA Energy Star Lighting Program MPER	Massachusetts	2007	7.6%
Database for EE Resources (DEER) Update	California	2006-2007	8.1%
APS MER	Arizona	2005-2007	10%
CA Residential Retrofit Upstream Lighting Program Evaluation	California	2006-2008	6.4%

7.5 Residential vs. Non-Residential

Xcel Energy assumes that 100% of lighting products rebated through the Colorado Home Lighting program are installed in residential locations. Data collected for the CA Upstream Lighting Evaluation, however, indicated that 94% of all IOU-discounted CFLs were purchased by residential customers, and 6% were purchased by nonresidential customers. For the individual CA utilities, the residential to nonresidential CFL sales ratio was as follows:

- Pacific Gas & Electric (PG&E): residential 945; nonresidential 6%
- Southern California Edison (SCE): residential 94%; nonresidential 6%
- San Diego Gas & Electric (SDG&E): residential 95%; nonresidential 5%

Cadmus recommends Xcel Energy adjust technical assumptions to reflect the 94%/6% residential v. nonresidential "split." Note that this change would increase savings, as non-residential customers typically have higher energy savings (due to higher hours of use) and demand savings (due to a higher coincidence factor). Also, the application of the CA residential vs. non-residential split may even be conservative because the distribution channels in California were more heavily focused on discount stores and small groceries, which presumably sell a higher percentage of bulbs to residential rather than non-residential customers.

7.6 Leakage

Leakage is defined as the purchase and installation of IOU-discounted lighting products by non-IOU customers. Without collecting primary data, Cadmus cannot provide an estimated rate of leakage. This type of data collection was outside the scope of the evaluation (e.g., customer intercept surveys). Cadmus believes the incidence of leakage in Xcel Energy Colorado service territory to be non-significant, however, due to the fact that leakage would presumably trade-off with other utilities that are running CFL promotions in Colorado. As noted in the NTG section, there is a significant amount of CFL activity among municipal and cooperative utilities in Colorado. *Leakage, therefore, need not be a consideration in the technical assumptions.*

7.7 Storage/Installation Rates

As shown in the study, the tremendous increase in CFL sales in 2008-2009 in Colorado has also lead to a relatively high (over 18%) rate of CFL storage. In other words, over 18% of the CFLs purchased in 2008-2009 remained in storage at the end of 2009. This may be a result of the low cost program bulbs, CFL sales in multipacks, replication of "stockpiling" behavior as with incandescent bulbs (despite the longer lifetime with CFLs), or other factors. Recent research in California, however, has shown that the vast majority of these bulbs will get installed within two years of purchase.

During the site visits conducted by Cadmus in Colorado, all residents were asked when they purchased each of their CFLs. There were 8.8 CFLs purchased per household in 2008 and 2009. Of those 8.8 CFLs that were purchased, 1.6 CFLs (18.2%) went into storage. By the end of 2009, the average Xcel Energy Colorado household had 8.7 CFLs installed and 1.8 in storage. Cadmus recommends that Xcel Energy assume that 18.2% of the bulbs purchased during 2008-2009, therefore, were in storage to be installed at a future date.

Table 43. Purchase, Installation, and Storage Rates

Year	Purchased	Installed	Storage
2008-2009	8.8	7.2	1.6

There are at least two approaches for handling the savings for these bulbs. Under the first option, Xcel Energy can claim all the savings at the end of 2009, discounting the savings to reflect that the measures will not be installed until future years. An example of that approach is presented in Table 44.

Table 44 Example of Net Present Value of Savings based on Installation Rate[42]

Year Installed to Year Removed	Lifetime Savings[42]	Installation Rate by Year	Weighted Savings
Years 0-8	$28.07	81.8%	$22.97
Years 1-9	$26.99	10.0%	$2.70
Years 2-10	$25.96	7.2%	$1.87
Years 3-11	$24.96	0.0%	$0.00
Years 4-12	$24.00	0%	$0.00
Years 5-13	$23.08	0%	$0.00
Total		99%	$27.53

The primary drawback with this approach, however, is that it overstates the first year kWh savings estimates. For the bulb lifetime savings, however, there is little difference in claiming the savings one to two years prior to actual installation, and any discrepancies can by accounted for by applying a discount rate[43].

The second approach to handling bulbs in storage is to stagger the claimed savings of the bulbs to coincide with actual bulb installation. This is not unlike commercial programs, like a non-residential new construction program or business audit program that might require a substantial upfront investment for savings that are not realized until one or two years later. The primary drawback to this approach is reliance on more complex logistics to track and claim savings over time. This requirement to wait until measures are installed, however, is now current policy in California, and is likely to be adopted in other states such as Illinois.

7.8 Other Considerations

- *Generator kWh achievement claimed for the CO Home Lighting program should be 99%.* This is based findings from the CA 2008 Downstream Lighting Study that indicate 1% of bulbs are never installed.
- Xcel Energy calculates no O&M savings associated with CFL installations. Cadmus did not evaluate O&M savings.

[42] Model should be calibrated with variables such as the current interest rate, kWh/bulb annual savings, and energy costs. Placeholders for those variables were used in this example but may not reflect actual values used by Xcel Energy.

[43] Note this analysis does not account for changes in kWh savings that will likely result from the upcoming EISA standards that begin phase-in in 2012. In other words, the annual kWh savings will decrease towards the latter year of the CFL life as EISA begins taking effect and decreasing the lighting baseline load. Note the standards have impacts on CFL lifetime savings calculations regardless of how installation rate is handled.

8 Appendices:

Appendices are provided separately from this report. Contents of the appendices is outlined below:

8.1 Appendix A: Data Collection Instruments

1. Lighting Phone Survey (Random)
2. Lighting Phone Survey with Ace Hardware Participants
3. On-Site Survey Data Collection Form
4. Retail Store Manager Survey
5. Corporate Level Retail Survey
6. Manufacturer Survey
7. Internal Interview Guide

8.2 Appendix B: Detailed Survey Results

1. Ace Hardware Cross-tabulations
2. Random Cross-tabulations

8.3 Appendix C: Preliminary Results of The Multistate CFL Modeling Effort