

# **Evaluation of Xcel Energy's Business Lighting Efficiency Program**

Provided to

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## Executive Summary

The Colorado Lighting Efficiency program offers cash rebates to business customers who purchase and install qualifying energy-efficient lighting equipment in existing or new construction facilities. The retrofit program serves existing businesses of all sizes, offering one-to-one rebates for installation of ten types of lighting measures.

The primary objective of this evaluation was to determine the net-to-gross (NTG) ratio of the prescriptive rebate component of the Business Lighting Efficiency Program. The evaluation also included process and marketing objectives. The study was directed to assess where there are existing market barriers exist and how the existing program can overcome these barriers through marketing, training, product, and financial support. This work object included an examination of the existing program structure and as well as an assessment of experiences and perceptions of the program on the part of the participating and nonparticipating trade allies. This evaluation included the following tasks:

- Interviews with eight Xcel Energy staff members.
- Interviews with 15 participant and 11 nonparticipant trade allies
- Survey of 150 participant and 151 nonparticipant businesses
- Interview with program managers and evaluation managers for 11 implementers of business lighting programs across the United States.

## Findings

The Colorado Business Lighting Efficiency Program has successfully reached its target goals for applications and kW reductions in both 2007 and 2008. The vast majority of participants (96%) are satisfied with the program, with only 4% of participants reporting that program experience was worse than they had expected. Fully 99% of participants reported that the installed equipment performed as they had expected. Participant trade allies report that they regularly market the program to their customers during their regular business development process. The findings indicate the program has led to shifts in equipment stocking patterns and has caused some firms to market high efficiency products to a greater degree. Trade allies report that product availability and product quality are not significant issues at this point in time.

In summary, the program is working as intended with no major issues identified by this evaluation. As it is now configured, the program is well received by customers. The measures included produce substantial benefits for participants and Xcel Energy non-participants. This evaluation found the program to be well managed and with no major issues regarding its current operations.

This evaluation finds a couple of conditions that suggest that the program will have to adjust its focus at some time in the future in order to continue this success. First among these is a need to expand the market of trade allies and dig deeper in to the base of smaller customers. The current program depends on its largest customers for a large portion of its activity and savings, and there are questions as to how long this dependence on the largest customers is sustainable. Second, the interviews and the survey also identified issues with the application and rebate processing process that, if addressed, will likely encourage more participation.

The study examined the current assumptions about program savings and the calculated a net-to-gross ratio. The assumption for energy saving are reasonable. The current assumption for NTG is 96% and derived from the Best Practice report from Quantum Consulting<sup>1</sup> and that figure is higher than the values modeled after the method used by the other commercial lighting programs we examined. Those programs have a range of 100% to 60%. As a relatively new effort, it is expected that this program's NTG ratio would be on the higher end of this range. This evaluation included an estimation of the NTG ratio using an experimental process currently being tested by the California Public Utilities Commission (CPUC). The approach was still under development during our study and subject to various interpretations as to approach and analysis. We could not duplicate the final interpretation, which came out after we had finished our survey, and would have required re-interviewing all respondents. The result that most closely conforms to this final California approach yields a NTG ratio of approximately 73%. While this may prove a viable value in California, the Quantum study and our interviews with other utilities done as part of this study suggest that 73% is low for a newly introduced program in Colorado. A more reasonable value lies somewhere between the existing assumption of 96% and the 73% using the imperfect application of the California approach. Our recommendation is that the program reduce the current assumption from 96% to 84%, representing a splitting the difference between the current value and the derived value in this study.

The survey results show that larger customers are much more likely to have lower NTG ratios. This finding further supports the need for the program to push its marketing and outreach efforts toward strategies that more effectively reach smaller customers.

The sections below provide a more detailed summary of these findings. This is followed by a set of recommendations that Xcel Energy should consider adopting.

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<sup>1</sup> National Energy Efficiency Best Practices Study, Volume NR-1-Non-Residential Lighting Best Practices Report. Quantum Consulting, Inc. December 2004

## Lessons from Other Business Lighting Programs

Business lighting programs represent one of the biggest sources of energy saving in most energy efficiency program portfolios. One objective of this study was to compare the design and structure of this program with other programs in order to identify potential areas for refining the design of this program. As such, the research included a review of industry “*best practices*” for business lighting programs, and in-depth interviews with program managers and evaluators connected with 11 different lighting programs across the United States. All of the programs reviewed have a structure that concentrates on three vital functions: defining the eligible measures, processing applications, and supporting trade allies. Strategies that make these three functions as simple and seamless as possible to the end-user define “best practice” for these programs.

In all programs reviewed, most materials and marketing efforts are aimed at trade allies. While the principal trade allies are lighting contractors, a broader definition includes electricians, lighting designers, architects, electrical engineers, lighting supply houses, big box home improvement centers, hardware stores, and lighting distributors and manufacturers. Few companies spend substantial funds marketing to the end user. All utilities mentioned trade ally meetings or trade shows as a potential outlet for utility-developed marketing materials. Supporting trade allies means making customer representatives knowledgeable both about lighting opportunities and program processing steps. To supplement customer representatives, several programs have a dedicated staff person responsible for trade ally support. Creation of such a position frees up time for the program managers and account representatives.

One of the most important issues confronting programs is the creation of rebate application and processing structures that collect the necessary information in a manner that trade allies and customers do not find burdensome. Lighting applications are recognized as being more complicated than applications for other commercial and industrial efficiency measures, both because there are more types of measures included, and because more information is required on the applications. Moving toward on-line applications and electronic processing of rebates serves to reduce processing issues and payment delays and is considered to be *best practice* moving forward.

A total of twenty-four different measures are included in the 11 programs reviewed; no single program rebates all of these measures, with the most being one utility that offers incentives for all but three. The average number of measures offered is seventeen. Xcel Energy now offers rebates on 11 of the identified measures.

Utilities are wrestling with the development of quality assurance (Q/A) processes that ensure reliable savings but are not costly for the utility or burdensome for customers. QA steps are typically woven throughout the overall design, beginning with the development of marketing materials and installation guidelines, and continuing through training on installation techniques and the selection of lighting

measures. Many programs stress that training trade allies is a key element of both a QA approach and an effective trade ally strategy.

Most utilities use a self-reporting method consisting of participant surveys to derive estimates of free ridership and spill over. Estimates of net-to-gross (NTG) in kWh vary but, in general, fall anywhere between 60-100%.

### **Expanding Program Markets**

As is appropriate for a young, developing program, Xcel Energy focused its attention on reaching its largest customers and developing a core set of trade allies to deliver the program. Establishing the Lighting Advisory Board brought together the most important trade allies and helped Xcel Energy market the program. It also ensured that the program process was understood and its requirements were compatible with these trade allies' interests. Using the large Managed Account Managers as liaisons helped draw the largest customers seeking energy efficiency into the program.

The data indicate that current program is heavily dependent on large customers and a small set of trade allies. Internal data shows that the top ten customer participants account for more than 25% of the total kW reduction. The top ten identified trade allies are responsible for almost half of the total rebates.

As the program matures, the dependence on this strategy will become a challenge. Indications suggest that the large firms have already done most of the simple T-12 conversions possible. The survey finds that these larger firms also have lower NTG ratios.<sup>2</sup>

Reaching downward to broader markets is not an easily accomplished task. Xcel Energy will need to broaden its program scope to reach far more trade allies and customers. This expansion of program efforts is necessary because, as the program chases the untapped potential by drawing in smaller operations, it will require more firms to meet the same production goals. The one-to-one connection of trade ally-customer-utility that works effectively at the Managed Account level is not likely to be as sustainable in the same way when targeting the market of smaller customers.

As Xcel Energy expands toward smaller market players, both trade allies and customers, the effort will require a much greater commitment to training and outreach of all parties involved in the process. Xcel Energy's effectiveness in reaching smaller customers without dedicated Managed Account Managers is already an issue. Trade allies report that BSC Representatives, the liaison to the next level of business customers, do not appear to be well informed about the

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<sup>2</sup> While the downturn in the economy is a major factor, the drop in total activity in 2008 versus 2007 may be a sign that mining the largest users is reaching a saturation point.

lighting program and lighting technologies. The research suggests that many of these representatives are more often in a reactive mode, rather than a proactive mode and that there appears to be insufficient time allocated to promoting DSM programs by these staff. This suggests that a dedicated Lighting Program trade ally liaison may be needed.

Reaching the smaller customers will require some broader mass-market approaches. Of critical importance are the suggested changes to the application and processing process that are discussed in the next subsection. The survey also suggests that Xcel Energy will need to broaden its definition of trade allies and reach out more to big box and hardware stores; retail outlets that smaller firms report they frequent for advice and equipment. The interviews also found uneven market awareness across high efficiency lighting product categories. This was true for both end users and those trade allies with whom they interact (architects and engineers and contractors). Program awareness was quite low among the nonparticipant lighting firms interviewed and, with one or two exceptions, it seems that there has been little direct outreach to these lighting firms.

### **Improving the Application Process**

In addition to building up market awareness and product delivery capabilities, the program must make it easier for customers to apply and receive rebates. While most of the current customers and active trade allies are satisfied with the process, there is acknowledgement that the application form has grown more complicated, and that there is steep learning curve to being able to submit claims without issues. A substantial number of applications are reportedly being returned (approximately 33%), and a large percentage of these are returned because of items that are not completed, missing documentation, and inclusion of items not eligible for rebates. Ballast requirements are noted most often as issues.

The distributed nature of Xcel Energy's rebate processing may be improved substantially through use of new technology and, specifically, the development of an on-line processing system that could be accessed by all relevant parties at multiple stages in the process. Creating an on-line application is a first and necessary step to bring in more applications. The report finds that the processing of rebates in Minnesota adds a layer of complexity and slows processing times.

In addition, some participants indicated that feedback from Xcel Energy to the applicants could be improved. Contractors find it frustrating to not be able to get up-to-date status information on an application. Even more frustrating for these allies is when they call Xcel Energy in to find that there is a problem with an application and learn that a problem which had not been brought to the attention of the applicant but was delaying job processing. Hiring a staff person to troubleshoot rejected applications and serve as a liaison to the processing staff is one possible way to relieve this issue.

## **Recommendations**

In summary, the program is viewed internally as offering an important resource for Xcel Energy's DSM goals, and that improvements may be necessary if the program is to be scaled up for attainment of more aggressive goals. Specific steps that may be needed include:

**Commit to expanding the reach of trade ally marketing.** This involves:

- Hiring a full time trade ally liaison focused solely on the lighting program;
- Broadening the definition of trade allies to include home improvement and hardware stores where smaller business customers say they get most of their advice and equipment;
- Expand the number of training and outreach events for trade allies;
- Addressing time prioritization for BSC Representatives to enable these representatives to spend more time marketing the program to small and medium-sized business customers;
- Developing an enhanced web presence for the program;

**Improve the application process to make it easier to use and quicker to process rebates.** This involves:

- Development of an on-line application and processing system; and
- Hiring a staff person to troubleshoot rejected applications and serve as a liaison to the processing staff;

**Continue to track NTG situation.** It is recommended that Xcel Energy assume a NTG ratio for the current program at 84%. This is the halfway point between the current assumption and the approximate value derived in this study using the California methodology. There are several reasons why, this study suggests that the derived value is too low, and the 84% is recommended. One, the calculated value ignores spillover, and this study identified spillover by participants contacted. Two, the study was not able to perfectly duplicate the California method, as it was evolving as the study progressed. One of the changes required that this study use an estimated value for one of the three key parameters, as it was too late to go back and re-interview participants. Third, it is the opinion of the authors of this report, that the California methodology overestimates free ridership for newer programs, because it does not compensate for respondent bias against using the highest ratings in a 0-10 rating scale.

The NTG value captured in this study is a snapshot of the NTG and subject to change over time as program and external factors influence the marketplace. Programs in California and other places with large, long-term efficiency efforts have seen large drops in NTG ratios for some of their biggest energy saving lighting measures. Xcel Energy can insulate itself, somewhat, from this happening by continually pushing the program into lesser developed markets.

**Recommend updating key parameter in the program technical assumptions.**

This study did not perform a thorough examination of every assumption used by the program. The assumptions are included as Appendix G. One value used in the 2009 program assumptions should be updated to reflect current prices and product performance. This observation includes:

- The assumed cost of CFLs is higher than typical market prices.

## Chapter 1: Introduction

### 1.1 Program Description

The Colorado Lighting Efficiency program offers cash rebates to business customers who purchase and install qualifying energy-efficient lighting equipment in existing or new construction facilities. Xcel Energy provides rebates to encourage customers to purchase energy-efficient lighting sources and to lower the premium price associated with this equipment. Xcel Energy designed the program with the following features:

- Prescriptive rebate amounts designed to influence decision-makers into choosing higher efficiency options for all types of lighting.
- Rebates are available for both retrofit and new construction opportunities.
- An application form with full instructions that provide the customer and vendor with an easy way to apply for the rebates.
- Additional brochures that explain the advantages of higher efficiency lighting systems.
- The program manager and staff have access to technical resources (e.g., Lighting Research Center, E Source) so that Xcel Energy can be at the forefront of promoting the best in high efficiency lighting.
- Promotional efforts targeting customers and trade allies.

The Lighting Efficiency Program includes four components: retrofit rebates, new construction rebates, custom efficiency rebates, and redesign study funding and rebates. This scope of this evaluation is limited to the retrofit rebate component.

The retrofit program serves existing businesses of all sizes, offering one-to-one rebates for installation of ten types of lighting measures. These measures include:

- Standard T-8 lamps with electronic ballasts
- Super T-8 lamps with electronic ballasts
- T-5 lamps with electronic ballasts
- High bay T-8 with electronic ballasts
- Hardwired compact fluorescent lamps (CFL)
- Metal Halide and High Pressure Sodium Fixtures
- Metal Halide Pulse Start
- Occupancy sensors
- LED exit signs
- Delamping

Business customers wishing to participate in the program must install one or more of the eligible measures and submit an application to Xcel Energy. The application is processed by Xcel Energy and the rebate is then sent to the account holder or its designee. Rebates cannot exceed 50% of the cost of the project.

Program performance is shown in Table 1.1. Program goals were achieved in each year.

**Table 1.1: Program Achievement in 2007 and 2008**

	Applications Approved (#)	Total Rebate (\$)	Estimated Demand Reduction (kW)
2007	781	\$2,678,746	15,149
2008	652	\$2,469,965	11,189

## **1.2 Purpose of this Evaluation**

The primary objective of this evaluation was to determine the net-to-gross (NTG) of the retrofit rebate component of the Business Lighting Efficiency Program. The evaluation also included process and marketing objectives. The study was directed to assess where there are existing market barriers and how the existing program can overcome these barriers through marketing, training, product, and financial support. This object included examination of the existing program structure and characterization of the participating and nonparticipating trade allies.

## **1.3 Evaluation Methodology**

This evaluation included the following tasks:

- Interviews with eight Xcel Energy staff members.
- Interviews with 15 participant and 11 nonparticipant trade allies
- Survey of 150 participant and 151 nonparticipant businesses
- Interview with program managers and evaluation managers for 11 implementers of business lighting programs across the United States.

## **1.4 Organization of Report**

This report is organized by study function. Chapter 2 reports on the staff interviews. Chapter 3 reports on the interviews with trade allies. In Chapter 4, a summary of interviews with 10 implementers of business lighting programs is presented. Chapter 5 presents the result of the participant and nonparticipant surveys. Chapter 6 provides a summary of the report and recommendations.

## **Chapter 2: Staff Interviews**

Interviews were conducted with a total of eight staff associated with implementing the Lighting Efficiency Program. A broad in-depth interview guide was developed for this purpose, and the specific focus of each interview was tailored to address areas that were relevant to the responsibilities of the interviewee. Key topics that were discussed included:

- Rebate Levels
- Marketing
- Rebate Applications and Processing
- Rationale for Offering the Program

Although not comprehensive of all staff, the range of responses provide an indication of the key issues as viewed from an internal perspective and highlight potential areas of priority for on-going program refinement.

### **2.1 Rebate Levels**

Rebate levels are perceived by staff to be generally appropriate. There is a sense within the company that it takes longer to get rebates in place, or to modify existing rebates, within Xcel Energy's Colorado service territory. It was noted that some customers and vendors perceive inconsistencies in some of the incentives. Rebates also vary to some degree across Xcel Energy's service territory, and this is difficult to explain to national account customers who may be participating in Xcel Energy lighting programs in multiple service areas.

### **2.2 Marketing**

One of the key avenues for marketing the program is through trade allies, and Xcel Energy has staffed a position that is explicitly responsible for managing these relationships. This person is responsible for conducting outreach with the trade ally community by attending trade association meetings and other gatherings to present program information and answer related questions. This position is viewed as important for this program as well as Xcel Energy's other commercial rebate programs. A Lighting Advisory Board was also set up specifically to inform the design and operation of this program. Although not as active as it was earlier, the importance of maintaining and communicating with this network of stakeholders is recognized and intentions are to continue working with this group.

Two types of accounts for DSM customers exist at Xcel Energy: Managed accounts and Business Solutions Center (BSC) accounts. Managed accounts are the largest accounts, accounts with an assigned contact. BSC are not generally assigned to specific accounts, but address issues for all other "unassigned" accounts. While the Managed Account Managers are able to market this and other DSM programs to their customers (with DSM goals and Customer Service goals each supposed to

occupy approximately one-third of an account rep's time), BSC Representatives typically have far less time to market the program. As a result, BSC DSM goals are reportedly not being met, and the overall Colorado goal is perceived as being carried by the Managed accounts. BSC Representatives are reportedly more often in a reactive mode, rather than a proactive mode and there appears to be insufficient time allocated to promoting DSM programs by these staff. BSC Representatives are reported to have basically one hour per week to be off the phone and able to work on this program.

General marketing would reportedly be improved by an enhanced web presence. With the current corporate structure set up to manage the Xcel Energy website, the needs of the DSM efforts may not be fully met. It was also reported that greater coordination of advertising efforts, between the corporate marketing group and the BSC group, would be beneficial.

Related to marketing, respondents were asked about the usefulness of the system that is utilized to manage account contacts. Responses varied but, in general, the system is not perceived to be as useful as desired:

### ***2.3 Rebate Applications and Processing***

The application forms are viewed internally as being fairly straightforward, although more involved than the applications for other prescriptive measures. Applications submitted by Managed accounts typically go through the Account Manager. Smaller customers will submit directly, while a majority of national accounts have third parties processing their rebates. Internally, lighting applications are perceived as requiring more work, in comparison to motors and cooling applications. The lighting application is not necessarily more complicated, but more involved, more time consuming, and takes longer to process. Because of the nature of lighting end uses, Xcel Energy reportedly requires more information for lighting applications than for other programs, and this additional information is often responsible for the rejection of applications. A substantial number of applications are reportedly being returned (approximately 33%), and a large percentage of these are returned because of items that are not completed, missing documentation, and inclusion of items not eligible for rebates.

The invoice requirements are reportedly difficult for some types of customers, such as schools, where large scale retrofit projects are often bid on a fixed price basis, with payments to contractors based on percent complete rather than specific equipment installed. As such, the school district may not actually ever receive a detailed invoice specifying the equipment counts installed and to get this information requires an extra level of effort on the part of the contractor than may have initially been expected.

One of the challenges highlighted during staff interviews was rebate processing. As presently structured, rebates are centrally processed in Minnesota. While it is

recognized that this contributes to economies of scale in administration, this centralization is also perceived as contributing to delays in processing. It was suggested that having an on-site rebate processing function in Colorado would be beneficial in reducing processing time. Currently, if there is an issue with an application, for example, the application will often be returned to Colorado via internal company mail. If the person processing rebates was on-site, it was felt that they might be in a better position to simply resolve the issue in person. At the very least, a local support person would be preferable.

The distributed nature of Xcel Energy's rebate processing may be enhanced substantially through the use of new technology and, specifically, the development of an on-line processing system that could be accessed by all relevant parties at multiple stages in the process. One staff person cited a program operated in another utility that is completely on-line.<sup>3</sup> On-line application forms are perceived as being desirable both internally and externally, and even viewed as necessary if the program is going to be able to scale up to meet future goals. However, implementing an online process may be a lower priority for the existing IT department.

## **2.4 Rationale for Offering the Program**

As one question in the interviews, staff was asked about their understanding of the reason for Xcel Energy offering this program. The answers offered indicate a consistent level of understanding among program staff, although there may be merit to developing an even more consistent message (or mission statement) that all staff recognize. Rationale for offering the program, as noted, include:

*To incent customers so that we don't have to build new power plants – 'the best kWh saved is the one you don't use'.*

*All of this came to be because we are growing, and we need to produce more electricity. We proposed to the PUC to build another power plant, there was a deal made that allowed Xcel Energy to build the plant, but the company had to give something in return – energy efficiency. We provide incentives to customers to be more energy efficient, to conserve more, not just because of a rebate.*

*To encourage efficiency so that we don't have to put more money into growing power plants.*

*Conservation is a good policy in general instead of building power plants.*

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<sup>3</sup> As discovered through the benchmarking exercise (See Chapter 3), many programs, notably those run by KEMA, utilize the web to a significant degree, in terms of providing applications and offering other project management support online.

*Because we are regulated to do it. Xcel Energy is offering this to reduce carbon impact and I notice that the whole company is shifting toward that emphasis. Saving another coal fired power plant, and earning money off of it.*

## Chapter 3: Utility Benchmarking

### 3.1 Introduction and Overview

An effective prescriptive lighting program builds upon the successes and understands the pitfalls of other similar programs. Research and interviews with key staff involved in peer utility programs not only provide information on experiences on these successes and failures but also, if taken as a whole, provide a patchwork of program ideas to choose from. These program attributes can be drawn upon in designing and/or re-designing any one program. Therefore, a primary element of this study for Xcel Energy involves benchmarking peer utility programs.

To successfully benchmark prescriptive lighting rebate program activities of other utilities, the following three primary tasks were carried out:

1. Assessed previous best practices research on commercial lighting programs and impact evaluations;
2. Reviewed readily-available impact evaluation reports of other utilities; and
3. Interviewed program managers, evaluators and others involved in lighting program activities.

This section illustrates the findings of these three activities.

### 3.2 Methodology

Best practices for energy efficiency programs have been researched and presented by a Pacific Gas and Electric Company-sponsored website called, *Best Practices Benchmarking for Energy Efficiency Programs* available at [www.eebestpractices.com](http://www.eebestpractices.com).<sup>4</sup> The research done for this project includes reports covering best practices of overall energy efficiency portfolio approaches and commercial lighting program offerings of electric utilities.

According to the website, the purpose of the best practices project was “to develop and communicate excellent practices nationwide in order to enhance the design, implementation, and evaluation of energy efficiency programs. The project uses a benchmarking methodology to identify best practices for a wide variety of program types” (2008).

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<sup>4</sup> The two best practices reports reviewed were the portfolio best practices report available at [http://www.eebestpractices.com/pdf/Portfolio\\_BP\\_Report.pdf](http://www.eebestpractices.com/pdf/Portfolio_BP_Report.pdf) and the non-residential lighting report available at <http://www.eebestpractices.com/Summary.asp?BPProgID=NR1>. Accessed January 26, 2009.

In addition to our review of the best practices study described above, the research team conducted in-depth interviews with representatives from several utilities and program implementers working throughout the U.S. on both well-established and newly-implemented prescriptive lighting programs.

Contacts were made with representatives of eleven different commercial lighting programs.

The initial set of conversations was solely with program managers (their actual titles vary). These talks centered on a set of questions developed based on the best practices research. The categories discussed included program processes, trade ally strategies, quality assurance (QA) and inspections, free ridership, and marketing, leaving time for general suggestions and comments. Some of the specific information was also drawn from the programs' websites as well as relevant reports and other documents provided by the interviewees.

After reviewing the findings from the program manager interviews, it was determined that supplementary information on *free-ridership* issues was needed. Thus, additional interviews were performed with program evaluators and planners to answer the remaining questions. The evaluators often pointed us toward evaluation reports for further information.

### **3.3 Summary of Reviewed Program Elements**

The most important elements of program design depend on various factors and need to be chosen wisely in order to streamline program activities. These elements include everything from customer eligibility and incentive level determination to marketing and trade ally strategy.

This section discusses program design and operations findings stemming from the best practices literature and interviews with program managers. Table 3.2 illustrates some of the key program operation design findings from the program manager interviews. The table does not include information from the second round of conversations focused solely on *free-ridership*. The last section of this chapter will discuss findings dealing with free-ridership and net-to-gross estimations.

#### **3.3.1 Customer and Measure Eligibility**

As Table 3.2 illustrates, the program processes for participation vary by program. Customer eligibility has been found to be restricted to certain sizes of projects or rate class of customers. The best practices report for lighting indicates that caps on project size are rare among commercial lighting programs. The best practice report does not mention project size criteria for the other programs.

Overall, the interviews have shown that customer eligibility is based on various factors including rate class, facility type/location, project size, or square footage/total measure count. The interviews brought more light to this issue of a cap. It was found that caps on project size are non-existent or only applied to very

large projects (e.g. \$500,000 or over). One utility differs from the others and caps at \$7,500 per project, a cap with much more impact. However, that utility is in the process of developing a more robust program design and the cap has been called into question.

Additionally, several utilities limit the amount of incentive to a percentage of overall project cost. The best practices report shows that the programs studied in that report vary in this limitation. Some utilities claim they offer incentives up to 100%; others limit it to up to 50%. It is unclear how much the offer actually is on average. The interviews with program managers indicate that maximum incentives are either non-existent or cover up to 30, 70, or 100% of the project cost. In other words there is no standard practice in this regard.

The incentive levels have been determined in fairly common ways such as calculation of avoided costs, wattage reduction, and one or two year payback periods.

Recommendations offered by staff of other programs, in terms of the incentive structure, included the following:

*Structure the incentives so they will last.*

*Pay attention to the price point for incentive levels as a "5% move in the price can send a very strong signal,"*

*Pay attention to the drivers including the structure of the incentives and the nature of the contractors' sales approach. In other words, if you don't spell it out, then a contractor will run with it as best suits his/her needs.*

*High incentives are the key.*

In other words, according to other experienced programs, a few basic components make up a successful incentive structure. First, starting and staying with high incentives may be more sustainable than structuring incentives that need to be altered often or do not provide enough motivation to participants. Second, paying attention to the price point, or the point at which the demand is relatively high, leads to more effectiveness. Structuring incentive levels based on demand may provide for the most success. Lastly, understanding that the structure of incentive levels may affect the work of contractors is also important.

The Consortium for Energy Efficiency (CEE) retains a list of measures offered by commercial lighting programs.<sup>5</sup> According to this datasheet, Xcel Energy offers incentives for eleven out of the twenty-four measures listed. On the high end, one

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<sup>5</sup> The CEE's list of commercial lighting measure offerings is available at <http://www.cee1.org/files/FINALCommercialLightingProgramSummary.xls> Last accessed January 26, 2009.

utility offers incentives for all but three. The average number of measures offered is seventeen. LEDs are rarely offered. Several utility representatives cautioned to be careful with LED, as its market readiness is uncertain. This may be a widely held belief. A few utilities, nonetheless, have included several types of LED lighting. One utility emphasized the importance of staying “at the front-end, leading edge of new technologies (e.g. high performance T8s).”

Pre-installation approval is required for all programs studied through the interviews except one program. The different program “recommends” pre-approval to reserve funding but does not require it. All programs require customer and contractor signatures on applications. The contractor (not the customer) is the primary contact with the majority of utilities. Interestingly, at ETO, projects over a certain size call for an additional pre-approval phone interview in addition to the standard application.

**Table 3.2: Lighting Rebate Program Design Findings from Program Manager Interviews**

Incentive Cap	Maximum incentive as a % of total project cost	Pre-installation approval*	Pre installation inspection requirement	Post installation inspection requirement	Customer Eligibility
No	70% of total project cost	Yes.	No	~5%. No formal process.	Rate class
\$500,000	100%	Yes, if project > \$750	Yes, if > \$5000	Yes, if > \$5000	<ul style="list-style-type: none"> <li>• Have a project site in Oregon</li> <li>• Be improving an existing structure</li> <li>• Be commercial or institutional facility</li> </ul>
\$20k per location	30%	Yes.	Occasional	10%	<300kW. Operating hrs > 2 on summer weekdays
No	No	Yes, if > \$2500	No	Try to if > \$2500. ~Around 5%.	<10,000 sq. ft. <100 total measure count
No	4 Tiers	Yes, if > \$7500	Up to 100%	Up to 100%	Rate class
\$500,000 / customer ID	No	Yes, if >\$25,000	Not required, but may happen if >\$25,000	10%	Rate class
\$1,800,000	100%	No, but recommended to reserve incentive funds by phone.	No, unless equipment is similar to equipment receiving a rebate in the past	Yes, if > \$7000, otherwise random inspections	The program offers rebates to all non-residential customers regardless of size or monthly electric demand.
No (rate class)	No	Eligibility confirmation. Pre-approved contractors	Used to be 100%. Now a little less	Used to be 100%. Now a little less	Rate class
\$7500	70%	Yes	Not formalized	Not formalized	Based on project size

\* Pre-installation approval is a simple paperwork review or an engineering review to confirm that all measures being installed are eligible measures. If all measures are eligible, applicant will receive the prescriptive rebate amount. These reviews vary in form and may or may not require the same review process as custom projects.

### 3.3.2 Trade Allies, Marketing and Partnerships

Trade allies (vendors and contractors) are the backbone of prescriptive lighting rebate programs. The contractors, in particular, are responsible for many program activities including applications, installation, and marketing. Thus, a utility's relationship with the contractors doing the work is one of the most important elements of a successful lighting rebate or incentive program. Likewise, without being sensitive to the needs of trade allies, a lighting program may not achieve its goals.

Several design ideas mentioned in the best practices report support emphasis on these relationships.<sup>6</sup> The report uses language such as vendors and contractors interchangeably. For the purposes of our study, the term trade allies will cover both realms. The most noteworthy best practices for the utility regarding trade ally strategy, outside of quality assurance and verification<sup>7</sup>, are as follows:

- *Developing and maintaining strong relationships with lighting vendors and contractors* – As contractors are the critical program delivery mechanism for prescriptive lighting programs, relationships with these folks are especially critical for programs that rely on contractors to do the marketing.
- *Using electronic project management tools* – Electronic project management tools may streamline processes for high-volume programs by shrinking turnaround time and administrative costs.
- *Tracking trade ally activity* – Tracking trade ally activity highlights high-volume measures and vendors as well as the most active contractors.
- *Implementing a contractor screening/training/certification process* – Screening encourages high quality installations from dependable contractors and also feeds into over quality assurance, which is discussed in more detail in the following section.
- *Using an easy, simplified process for trade allies to participate* – Contractors are key driver of program marketing and delivery; therefore the easier the process it is for them to participate, the more streamlined are program processes.
- *Making customer eligibility easy for contractors to determine* – Contractors that fully understand how the customer eligibility criteria works will

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<sup>6</sup> Exhibit NR1-E3 in the best practices report provides a summary of the best practices for non-residential lighting programs.

<sup>7</sup> Information on best practices for Quality Assurance and Verification is provided in the following section.

understand how best to market the program. See Section 3.3.1 above for more information.

- *Leveraging utility credibility to help trade allies sell the program* – In some markets, customers have a more positive view of the utility than contractors; therefore leveraging the utility credibility is effective.
- *Using door-to-door marketing and turnkey services* – Face-to-face marketing may be more effective in some markets. Likewise, turnkey services reduce many program hassles and the costs of seeking out information, especially for small businesses.
- *Combining a moderate mass-market effort with a process of strongly motivating and leveraging contractor marketing for prescriptive programs* – Overall program awareness may be enhanced through such mass market efforts.
- *Leveraging partnerships with cities and community based organizations* – Bringing contractors, vendors, and the utility together through community based organizations' activities and/or city functions can provide leverage for marketing adding overall credibility.

The trade ally strategy was a topic discussed in detail in the interviews. The strategies for working with trade allies, typically referring to lighting contractors, but also including in some cases distributors and manufacturers, are widely accepted as key to any commercial lighting program. Every interviewee highlighted the importance of trade allies in marketing and selling the program to customers and installing measures successfully.

Several program managers expressed the importance in their viewpoint of managing relationships with trade allies. One program manager says to “dedicate a staff person to work with the trade allies, a one point of contact, someone who has the time to answer their calls and work with them.” In fact, a *trade ally liaison* position has been developed at several other utilities. This position's sole responsibility is interaction with trade allies. Creation of such a position frees up time for the program managers.

Furthermore, trade allies are often included in a list, which provides information to customers on how to choose a contractor for lighting projects. The lists, however, vary in criteria for inclusion. Some are more restrictive than others and it is decidedly clear that less restrictive lists are more attractive to contractors. Similarly, a rewards or recognition program for lighting contractors exist at a few utilities. These programs have been very successful and enhance relationships with trade allies.

Marketing efforts were also discussed with the program managers. In general, marketing has not been very extensive with only a couple of utilities making significant efforts in this regard. Usually, marketing is viewed as a responsibility of the lighting contractors. Most program administrators explained that trade allies are in the best position to market the program. Selling efficient lighting products is viewed as a win-win situation.

In addition, two utilities have both developed their own significant documentation of program guidelines, which at least on the surface, seem to clearly explain program offerings and other program features. Most program managers also discussed their web presence as a significant marketing tool, especially for marketing trade allies. Two programs are examples of sound web marketing. Materials are often aimed at trade allies, namely lighting contractors, rather than end-use customers. All utilities mentioned trade ally meetings or trade shows as a potential outlet for utility-developed marketing materials. All utilities host or co-host meetings with trade allies, although some programs have more extensive training sessions than others. One utility said to “establish yourself as the go-to resource for cutting edge information, the one your contractors go to for finding out info on a new product or whatever.”

The best practices report also highlighted partnerships as key to a successful lighting program. According to the report on best practices for lighting programs, as with many other type of energy efficiency programs, leveraging partnerships with cities and community-based organizations provides significant benefits to the utility program including offering marketing leverage for the program administrator and offering credibility and economies of scale for contractors.

These partnerships can bring vendors, contractors, utility reps, and customers together. Community based organizations (CBOs) can be used to link vendors and contractors. Some utilities leveraged CBOs to bring customers to vendors. This is viewed in the report as a good way to get to hard-to-reach communities and organize educational and outreach events. Partnerships were a topic not heavily discussed in the interview process.

The interviews have shown that partnerships are very commonplace between utilities and contractors. Fewer partnerships involving vendors and customers were found. Statewide programs are the best examples of such partnerships. Other utilities have developed an organization filling this role to some. One utility is looking into more regional collaboration opportunities, according to staff. Similarly, another utility has developed working groups of utility representatives to facilitate regional collaboration.

### **3.4 Quality Assurance and Verification**

Another element of best practices integral to an effective lighting program is the quality assurance of contractor work. Several best practices outlined in the best

practices report can ensure that the installations of efficient lighting are of the highest quality. Best practices in this area include the following:

- *Decision-making based on number of vendors, types of measures, the project volume, and the variability in the size of projects* – Utilizing this information can enhance overall quality assurance-based inspections.
- *Obtaining a good sample of vendor and measure types* – Possession of a high quality sample of vendors, contractors, and measure types provides that various trade allies, job types, and measures are being inspected.
- *First-job inspections mandatory* – Inspecting new contractors has been seen as particularly beneficial.
- *On-site post-installation inspections – check that all specified equipment was installed and installed properly* – Such inspections dissuade vendors from failing to completely and accurately installing all rebated measures.
- *Collection of pre-existing wattage information (either through the program or a real-time independent evaluation)* – To accurately estimate savings and other program impacts, the collection of wattage information prior to the installation is key. This has been done either through the program or real-time independent evaluations.
- *Governance of post-inspection levels by cost-effectiveness considerations and results from an initial set of inspections early in the implementation process* – The best practices report mentions that a “good rule of thumb is 10-20% for a high-volume program” for post-inspections. Interviews with other programs’ staff confirm this rule.

The interviews with program managers have shown that QA can be provided in a number of ways. One step not mentioned in the best practices report to ensure QA is developing and requiring customer surveys after installation, which can be used to evaluate contractor performance. One utility has chosen to use surveys instead of requiring post-install inspections and has found some measure of success through this process. The interviews have also shown that QA can be provided through the development of marketing materials, installation guidelines, and training on installation techniques, lighting measures, and overall program design.

Training is a key element to effective lighting programs. The interviews have shown that training varies widely by utility. Some have built training as a core component of the program. Again, for prescriptive lighting programs, QA and trade ally strategies must be integrated to ensure effectiveness and success. Training trade allies is a key element of both a QA approach and effective trade ally strategy. Trade ally strategy findings were discussed in a previous section.

QA is also enhanced through an effective inspection process. Inspection processes, both pre- and post-, were discussed in the interviews with program managers. Assuring high quality installations of high efficiency lighting measures can be

provided in a number of ways, with inspections providing the only onsite assurance. Utilities varied in inspection processes as illustrated in Table 3.2. The findings from the program manager interviews have shown variance both in pre- and post- installation inspection methods and criteria. Some key findings from the interviews regarding inspections are as follows:

- Pre-installation inspections are not always required. There are some requirements for pre-install inspections based on project size.
- Post-install inspections are more common than pre-install inspections. 5-10% is common.

A couple of utilities emphasized the importance of inspections:

*Tell the lighting contractors they could be inspected.*

*Do a lot of inspections at the start of a program. Less will be needed later.*

These comments suggest first, that contractors may feel the pressure to perform quality work if they are aware at all times that they could be inspected. Second, during the first stages of a program, it is very important to have a sufficient number of inspections. In other words, it may be the case that more equals better. This might also be the case for a program such as Xcel Energy's, which is going through a major upgrade and overhaul.

### **3.5 Third Party Evaluations and Attribution**

To ensure that the program is meeting its annual goals, both process and impact evaluations are conducted by utilities. Utilities vary in how routine these evaluations are. Newer programs are less likely to have an available evaluation. Several evaluations have been reviewed.

The best practices report mentions that evaluations should study operating hours routinely through lighting logger or other end use monitoring techniques. Process evaluations should include vendor input on processes. Vendor satisfaction should be obtained as well. The application, incentive payments, and inspection processes should be thoroughly reviewed at least every few years. All evaluations should be conducted in a timely manner and involve program staff in the process. Findings from evaluations should be valued and integrated into program management. Additionally, program planning will benefit from estimations of net and gross impacts.

As the portfolio best practices report notes a major challenge facing any team charged with developing a portfolio of utility energy efficiency programs is building an understanding of the "maturity in certain energy efficient equipment markets, leading to high market saturation levels and/or increased free-ridership".<sup>8</sup>

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<sup>8</sup> Itron, Inc. National Energy Efficiency Best Practices Study. Volumes P1 – *Portfolio Best Practices Report*. Prepared for California Best Practices Project Advisory Committee. Pacific Gas and Electric Company. July 2008. See

The maturity in the lighting market is not apparent, so research into this issue is valuable to Xcel Energy. Through the initial set of interviews with program managers, it was found that some program managers were unaware of free rider estimates for the measures included in their programs. The subsequent interviews with evaluation managers at these same utilities revealed that free-ridership rates were often estimated. Awareness and tracking of free ridership by program managers is prudent given that changes in the free-ridership levels for relied upon measures can affect the amount of incentive that may be offered and in some cases the continued inclusion of the measure in the program.

The research team felt free ridership to be an important issue as it can impact the reliability of savings estimates and influence program planning. As a result, the team decided to research this issue to a greater extent. As referenced earlier, a second set of interviews with utility program evaluators and planners was conducted to build a firmer understanding of how free ridership is calculated, why it is calculated, whether or not spillover estimates are also made, and how these estimates are used (if they are) in program planning. In general, the research team found that utilities differ in the importance they place on free-ridership in program planning.

A few utilities pointed out that since their lighting program is “contractor-driven” they do not see free-ridership as a major issue. However, estimates in the 60-70% range may be too conservative if they are not accounting for spillover. As one staff stated, “an increase in free ridership is not necessarily a bad thing, especially if spillover is also increasing”.

As Table 3.3 illustrates, utilities are estimating free-ridership (and spillover as well) for a variety of reasons including resource planning, regulatory reporting, and to meet evaluation guidelines. Most utilities use a self-reporting method consisting of participant surveys to derive estimates of free ridership (and spill over). Estimates of net-to-gross (NTG) in kWh vary somewhat, but in general, they fall anywhere between 60-100%. Four out of the nine utilities have estimated NTG as somewhere between 95-100%. Two utilities both estimate lower NTG ratios at 63%.

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[http://www.eebestpractices.com/pdf/Portfolio\\_BP\\_Report.pdf](http://www.eebestpractices.com/pdf/Portfolio_BP_Report.pdf) . Accessed January 28, 2009.

**Table 3.3 Net-to-Gross Ratios and Free Ridership Rationale by Utility**

Program	Year	NTGR (kWh)	Methods	Primary Driver(s)
Prescriptive and custom programs	N/A	70% (plan)	Assumption based on DEER	Resource planning and program improvement
Building Efficiency	2004	83%	Self-reported method	Resource planning and program improvement
Commercial - Lighting	June 2005- July 2006	71%	Self-reported method	Regulatory reporting and annual resource planning
Pre-Established, Quick and Easy	2003-2006	113%, 52%	Self-reported method	Resource planning and program improvement
Lighting	2002	99%	Self-reported method	Regulatory reporting and annual resource planning
Sure Bet Commercial Customers	N/A	63%	Deemed. Based on CA values	Resource planning and program improvement
C&I Lighting	2001-2005	109% (39% FR and 79% spillover)	Self-reported method	Resource planning, New state-wide evaluation guidelines
Small Business	2005	95%*	Self-reported method	Resource planning and program improvement
Prescriptive Lighting	2005-2006	96%	Self-reported method	Resource planning and program improvement
Commercial - Prescriptive Lighting	2005-2007	64%	Self-reported method	Regulatory compliance

\*Does not include non-participant spillover, expressed as Realization Rate

### 3.6 Summary

Through the review of best practice literature available and interviews with key staff, commercial lighting program have shown to have several common program design elements such as concentration on a trade ally strategy, and in general,

similar participation processes. However, several differences among the utilities can also be noted. In particular, measures, inspection processes, and impact evaluation methodologies differ by a wide degree. Nonetheless, Xcel Energy can draw upon the strengths mentioned in this section to enhance its program.

## **Chapter 4: Interviews with Lighting Firms**

### **4.1 Background**

Telephone interviews were completed with 15 participating lighting firms: lighting contractors, electrical contractors, electrical distributors, and lighting distributors. An additional 11 interviews were conducted with lighting firms that did not actively participate in the Prescriptive Lighting program. These included manufacturers' reps, distributors, and design firms. The interviews were completed in the fourth quarter of 2008, and were used to assess program strengths and weaknesses and identify priorities for program refinements for the coming year. Participants were asked to describe program satisfaction levels and the factors which shaped their experiences with the program, in particular the application process, data requirements, support from program staff, and incentives and equipment coverage. Nonparticipants were questioned about their awareness and views of the program and reasons for nonparticipation. All interviews addressed equipment availability and quality in the marketplace, and trends in product preferences within the commercial sector. This chapter summarizes the findings from this research.

### **4.2 Overview**

While the degree of satisfaction with this program is a bit tepid among participant lighting firms, the program is providing value to participating firms and they regularly market its availability to customers during their regular business development processes. All interviewed participants include mention of the program to a greater or lesser degree as they seek new business. That being said, the program is seen as having room for improvement with respect to the quality of support from utility personnel and some elements of the incentive structure. It also appears that the current approach of having customers fill out the applications creates issues, which can delay projects and reduce the overall levels of satisfaction for both participating customers and their contractors.

As for impact in the market, the findings indicate the program has led to shifts in equipment stocking patterns and has caused some firms to market high efficiency products to a greater degree. The data also reveal uneven market awareness across high efficiency lighting product categories. This was true for both end users and those with whom they interact (architects and engineers and contractors). Product availability and product quality are not significant issues at this point in time.

Further detail is provided below.

### **4.3 Program Component Issues**

#### **4.3.1 Satisfaction with Prescriptive Lighting Program**

In the aggregate, participant satisfaction ratings were on the low side for a lighting rebate program. Averaging only a 3.4 on a five-point scale<sup>9</sup>, it is noteworthy that 4 out of 15 gave the program a rating of below 3 (the neutral point on the scale) and only a single respondent gave the program the top rating. This is atypical for a program of this type. It may be that this somewhat weak rating reflects the relative youth of the program in the Colorado market, the changes in Xcel Energy's program(s) over time and the elevated expectations created by the former program design, which was more attractive to a number of participants.

The newness of the program may offset a portion of the low satisfaction level. Given that the program is currently being assessed and altered, the level of satisfaction determined for this study was for a program with different parameters. The new program will have significant changes; and some of these changes may address satisfaction levels. Nonetheless, it is important to have a baseline understanding of participant satisfaction, as the offset of satisfaction is not easily determined.

The primary reasons given for the lower scores were difficulty / lack of clarity for the customers or for the lighting firms themselves as they tried to fill out the application. Other areas of dissatisfaction had to do with rebate levels being too low overall, or being inconsistent in incenting the most efficient options. Multiple participants who had difficulty getting questions resolved to their satisfaction also raised dissatisfaction with program personnel as an issue.

When higher scores were given to the program, the primary reason was often the helpfulness of program personnel in answering questions and navigating the application process. Given the linkage between overall program experiences and the responsiveness of program personnel, it is clear this is an area of importance for future program success.

#### **4.3.2 Incentives**

With respect to incentives, some lighting firms prefer a flat, performance-based incentive with a single dollar per kWh applied across the board. Those who favored this incentive structure felt it provided the appropriate price signals to achieve the best results, the results, which realize the maximum energy savings. Other respondents had different perspectives, and suggested looking at the costs of one option relative to others to make sure that the most efficient options were financially attractive after factoring in the program incentives. One respondent

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<sup>9</sup> Where 1 represented "not at all satisfied" and 5 represented "extremely satisfied"

made the case that options that required greater maintenance should be accorded larger incentives.

One of the more important issues raised with respect to program incentives addressed the relative scale of the rebates and the apparent disconnect between incentive structure and perceived program objectives. These comments indicate room for improvement on more complex lighting rebates such as de-lamping. The last comment suggests that pre-qualifying or training contractors could improve market penetration and lighting contractor participation.

*Sometimes the rebates don't necessarily make sense. There are higher rebates for the highest efficiency lamps but they don't necessarily provide the most benefit to the client. Super T-8 replacement often results in turning off the lights due to excessive brightness. They rebate the product and not the installation. It doesn't always produce the best result.*

*The way it is set up for retrofit, some things that save more energy gets less rebate and vice versa. And if you don't find it in there then you get into the custom program, which takes forever to get the money. None of the rebates are enough for the retrofit process. What we look for in the retrofit is about a 2 year payback, so the goal is \$600-700/kW saved.*

*I'd like to see them going to a DSM bid program ...like we used to do with Xcel Energy. This program is fine, but when you go in and try to get rid of older T8 lighting, it's hard to do with this rebate policy. It favors the technology rather than the savings (super T-8s are an example).*

With respect to specific measures, some respondents would like to see greater incentives for:

- Converting T-8 to F-28 or F-25
- 28 W lamp (incentive not equal to that offered for the less efficient Super T-8)
- De-lamping

One participant addressed facility de-lamping as an area in need of attention. In his view, proper de-lamping practice should involve the installation of reflectors. This respondent felt that the prescriptive program did not accommodate reflectors, pushing jobs of this sort to the custom program. His preference would be to have the prescriptive program adjusted to more easily accommodate de-lamping with reflector installations.

Finally, one respondent requested a clearer definition of the incentives for de-lamping, in particular, whether or not this is an additive incentive, i.e., is the de-lamping in addition to the rebate incentive for the installed equipment.

### **4.3.3 Application Process**

Participants were asked to rate their satisfaction with the rebate application process on a 5-point scale. In the aggregate, their opinions averaged a 3.7 rating. The range of comments on the application process suggests that regular training events aimed at both the contractors and Xcel Energy administrative staff – including discussions and demonstrations of application procedures – would significantly benefit the program. This is especially the case given the apparent frustration implied in the negative comments.

Positive comments include:

*It's no problem getting the rebate. They just want some backup which they should insist on, no onerous demands on the customer. It's simple.*

*The process is simple, straight forward, not a lot of extra steps. Not the simplest either.*

*It's easy. I just do the front end to it. It's fine. We provide it.*

Comments that offered suggestions on change or voiced dissatisfaction include:

*Actually it's pretty simplified. It does get pretty confusing when you get involved estimating the ballast for the super T8 lights. Just allow any ballast to be used.*

*There's more paper work than there was years ago. It's still pretty simple but over time the paperwork has gotten more involved.*

*The initial set up was great but the follow through was terrible. There is a hassle factor on the rebates for customers. They set up the program with guidelines, but when they try to get the rebates the customer gets confused on the difference between stated and actual (measures, models, etc).*

*I know the applications have changed, and even the reps from Xcel Energy don't have the one I had. Fixtures that used to be on the form aren't there any more. In some cases we haven't received rebates due to discrepancies.*

*Start over. Revamp the whole thing. You run into a contractor trying to explain to a building manager how the rebates work and they just get confused. Or the building manager may have to justify with an accounting manager a 5-year payback on energy efficient lighting. The program is confusing.*

When prompted about whether they had experienced problems with documenting ballast factors, four of fourteen participants indicated that they had. Three out of the four suggested these problems were not substantial and had been resolved.

With respect to the level of detail required for the invoicing, there were some complaints from participants but, overall, the level of acceptance of the program's requirements is satisfactory.

*Probably had to tweak a few of them, but nothing serious.*

*They give a nice example of that. I haven't had any issues from customers.*

*It is quite a bit, but since I've done so many for (another utility), I know why they need the information and I don't mind doing it.*

*No, it hasn't been a problem. A slight learning curve with the application at first.*

*Our invoice has all the info Xcel Energy wants/needs.*

Most participating firms (9 of 14) had had one or more applications returned to them for additional information. The reactions to the experiences were wide-ranging. Some viewed the requested information as straightforward and appropriate, other felt the questions were repetitive and that earlier explanations were lost on the point of contact. Similar to the earlier comments about the application process, these suggest that training for contractors or Administrative staff may be in order.

#### **4.3.4 Experience with Account Managers**

The quality of customer support from program personnel appears to vary significantly from one office to another. Very mixed feedback was received on the quality of the support. Personnel in the Denver office received accolades more than once. At the same time, other participants were frustrated by the Account Managers' lack of understanding of the lighting industry and lighting products. Better account management deserves scrutiny as an area for program improvement for the coming year. Training or support materials for account reps may need to be upgraded. As in many cases, the ability to work closely with account reps from the utility is a key to program success. As illustrated in the following comments, those contractors with good relationships to their account representative had generally positive comments about the program and its benefits

Several comments were quite positive:

*They were wonderful. I was very surprised at how helpful and polite.*

*The rep was extremely helpful. Her help was essential. The process is not that refined. And without her help I wouldn't have gotten anywhere.*

*I don't want to give anybody a perfect score, but they've been very helpful. It's easy to find someone to help you. Customer service-wise I'm very pleased.*

Several comments praised the account reps, but noted that they were often too busy to be totally helpful. Others questioned their helpfulness because they were not adequately informed about the program or lighting technologies.

*They are overwhelmed, understaffed. They just can't be available for all of our needs.*

*For the most part these are the guys that we wrestle with and teach. They also have the magic wand. Something of an obstacle, though they want to be helpful. Stewards of the program so they have to be watchful and they have to know what you're doing.*

*Usually my local rep is totally befuddled and I have to contact a rep in the Denver area to get anything done.*

*Contacting the Xcel Energy people about lighting is difficult because they don't understand the lighting.*

Timeliness in processing applications is critical. The importance of keeping program process timelines compatible with lighting project timelines was stressed. This area of concern was even voiced by one nonparticipant firm and may be a barrier to participation.

*It has to happen within the timeframe of the project, not two-three weeks and four or five phone calls.*

*One thing I recognize from what I've seen is the need to improve the turnaround time on the rebate processing. Xcel Energy wants to get involved early on in a project to specify their lighting options for customers, especially on big projects. The timelines often interfere with compliance to obtain energy efficient lighting options.*

In addition, some participants indicated there is an issue of insufficient feedback from Xcel Energy to the applicants. Contractors report frustrations trying to obtain status information on an application. Even more frustrating is when contractors call in to find that there is a problem with an application, a problem which had not been brought to the attention of the applicant but which was delaying job processing. If the contractor had not called to inquire about the status of the application, the applicant would not have known there was a problem that was standing in the way of rebate processing.

## 4.3 Equipment Issues

### 4.3.1 Satisfaction with Qualifying Equipment

Respondents were also asked to rate the program with respect to the qualifying products covered. On a scale of 1 – 5, scores on satisfaction with the qualifying lighting technologies averaged 3.6. Not surprisingly, the ratings given were higher when respondents felt that the product coverage was appropriate, lower when the perceptions were that key product categories were missing or that certain combinations were not accommodated.

Respondents were asked what types of equipment, if any, they would recommend adding to the program. LED options were, far and away, the most commonly suggested items to be added to the program. Several other items were mentioned as well, usually only by a single respondent. The products suggested for inclusion in the program included:

- LED
- LED cove lighting
- LED high bay replacements
- Refrigeration LEDs
- 65 BR/LED
- LED fixtures
- Controls and sensors
- More variety of T5s (including the 6 lamp fixture)
- Wave dimmers
- Fiber optic lighting
- Induction fluorescents

### 4.3.2 Product Quality

For the most part, the quality of high efficiency lighting products covered by the program is viewed as satisfactory.

*Product quality has not really come up. ...The quality has been good.*

*We've maybe had one to four fixtures we had to go out and replace. But they aren't any more or less high quality. Some occupancy sensors had early failure rates. Overall though, quality has not been a problem. Quality has gotten better.*

*No problems, they're getting much better, 300% better. Electronic ballasts are lasting much longer.*

*Some of the CFL's aren't great. We've seen up to 20% failure rates - premature failure within 2 months of installation. We've had to do some re-lamping.*

*Some of the CFLs have exaggerated their longevity claims. In the beginning they had some problems. With the less expensive EnergyStar fixtures, they still have some problems.*

*The one problem area we've seen has been with LEDs. The reliability, the product life. More than five percent of the fresh installs have problems.*

*Problems with ballasts and problems with LEDs have been intermittent issues. Typically these are associated with manufacturer transitions.*

*A lot of vendors' high-bay T5's are just crap.*

*I think the influx of motion detectors on high bay fixtures coming from California have had issues of the ballasts going bad. But in general, it's not really a problem.*

While a number of comments were made on this subject, overall product quality does not appear to be an area of substantial concern at this time. However, this issue should continue to be monitored, especially as newer products are added to the program to track whether any new problem areas emerge in the future.

### **4.3.3 Product Availability**

Product availability is not a significant issue in today's market although occasionally it is necessary for contractors to backorder products. Product types that are more likely to require backordering are those involving certain decorative fixtures and other specialty situations in new construction. One respondent mentioned ultra low ballast fixtures and perimeter cove lighting needing backordering, although he too indicated that supply is not generally a problem.

## **4.4 Experience and Knowledge of Firms**

### **4.4.1 Comparison with Other Utility Programs**

About two-thirds of the participating contractors and one of the nonparticipants interviewed have experience with other utilities' efficient lighting programs. Among those expressing an opinion, three felt the programs were fairly comparable to Xcel Energy's, two felt the program is superior, and three preferred the other programs. One indicated it was hard to compare programs. The preferred programs either had higher incentives or an easier application process or better on-line information about qualifying products.

*Of all the utility companies across the country, it's pretty simple and straightforward, pretty easy to do.*

*The prescriptive program is not near as good as other utilities', not flexible either.*

*It's difficult to understand the prescriptive program because there are so many options of lighting you can work with and it's very confusing, especially when you can offer a lot of different options, it puts you in a box.*

*I use the custom program because it provides a lot of creativity and flexibility for us as lighting contractors.*

*With larger customers, Xcel Energy's program is over the top. It's great, one of the best in the country. For others, [smaller customers], who are equally important to us, the 800# response is pretty poor and sometimes it just gets lost.*

Based on this range of comments on other utilities' lighting programs, additional market research may be in order to establish a common or competitive level of incentive in the Xcel Energy service territory.

#### **4.4.2 Promotion of the Program**

The program and its rebates are widely used in participants' business development processes: every participating lighting firm interviewed will at minimum mention the program's availability to customers. A number automatically work up estimates that include the program incentives as an itemized element.

*We mention the rebates in discussing the project with clients.*

*We'll do a survey or audit first. We scope out the product and savings and then mention the rebate and its impact on payback period.*

*When you're presenting something to a customer you put together the cost and the rebate together so they see net and payback.*

*I just mention the rebates to the customer. If there is a large HVAC incentive I mention that too. Sometimes it stops at the point when the customers contact the Utility.*

*We list it as a credit at the bottom of a proposal. Upon the approval of the energy program, this is what your cost would be. We have it as a line item on the proposal.*

*I just mention that if you have outdated lighting there is an incentive that can pay for a third to half of project cost. We use it as a tool.*

The foregoing comments indicate that lighting contractors commonly use the Xcel Energy rebates as a marketing tool. Moreover, the utility can further promote the incentives through lighting contractors by educating the contractors on the business advantage of presenting the rebates to customers.

When asked if there were any circumstances under which they would discourage their customers from applying for the rebate, the majority of participants said no.

*No, never. That helps me sell.*

*Shouldn't be any reason. It's free money.*

*No. Most of the time that's a big selling point for customers.*

*No. It doesn't have a negative impact for me. Help close the sale. I'd be a fool to discourage.*

The contrary responses identified a couple situations in which the time and effort would not be seen as justified. For one respondent, the trigger for deciding against program participation would be if it appeared that the project specs would put them in to the custom program rather than the prescriptive program.

*Only if they're going through some other program where they can't double-dip. Or if they want to start the work right away and they needed pre-inspection.*

*I would encourage the customer to have me involved. The only reason I wouldn't encourage them is if I wasn't getting paid for my time. It is very time consuming. I have encouraged it with other customers who may or may not have followed through with Xcel Energy.*

*When the nature of the audit and recommendations fall into the custom category, because of the low incentives and the work involved.*

The fact that these comments arose in discussions about the Prescriptive Lighting program suggests a need to differentiate the two programs for lighting contractors.

A number of the firms interviewed in the nonparticipant research have no direct contact with the end user. Their client base tends, instead, to be architects and engineers. As such, these firms do not have an opportunity to promote the program directly to those eligible to submit the application. More importantly, a number of these firms do not have a working familiarity with the program and so are in no position to work in sync with the program in an intentional manner.

Fulfillment contractors do not appear to play a large role in this market. There was no knowledge of such experiences with such firms in the area. A number of the respondents interviewed indicated that they are, themselves, providing the needed assistance to customers in filling out the application. Others do less, handing the matter off to the customer.

#### 4.4.3 Market Awareness of Energy Efficient Technologies

Customer awareness of efficient lighting technologies is on the low side, with the exception of standard T-8s. Other options have less recognition in the commercial market at the end user level.

Wholesalers and lighting specifiers who work primarily with architects, engineers, and retailers rather than end users painted a somewhat different picture of market awareness of technology options. Here, metal halide fixtures, high-pressure sodium fixtures, and LEDs were equally familiar as T-8s.

**Table 4.1: Awareness of Energy Efficient Lighting Options<sup>10</sup>**

Technology	Awareness among end users	Awareness Among A & Es, Retailers and Contractors
High-bay T8's	2.4	2.6
Super T8's	2.0	1.7
High-bay T5's	2.4	2.3
Standard T8's	3.0	3.4
Hardwired CFL's	2.1	2.8
Metal Halide & High Pressure Sodium Fixtures	2.7	3.7
LED's	2.3	3.4

#### 4.4.4 Customer Decision Process

Although there were conflicting opinions about where the market stands today in its willingness to look at the longer view versus frontend costs, most of the feedback on customers' decision making focused on cost issues. This suggests that, from the perspective of the lighting firms interviewed, the program is addressing the most significant barrier to broader market penetration of high efficiency lighting. Illustrative comments on the topic of customer decision processes included the following:

*Everybody's looking for any energy savings they can get whether it's the lighting or the fixtures. They look for the best savings and products they can get. Even if they have to pay a little more up front to realize the long term benefit they still look for those options.*

*Customer awareness is so low that they have little impact [on what gets specified for a project]. Contractors are more of an influencer there. The owner is focused more on price. That's where the contractor has an*

<sup>10</sup> Where 1 represents "not at all aware" and 5 represents "extremely aware"

*opportunity to sell a product based not just on initial cost, but with the long term savings factored in.*

*Customers are looking at 'What do I need to do to upgrade and what is the payback from Xcel Energy?'*

Select segments of the market have purchasing policies which guide their selection of lighting products. Those sectors most likely to have such policies in place are governmental bodies, schools, and national-level corporations. Smaller firms, firms that are local rather than regional or national, are less likely to have purchasing policies in place. Contractor perceptions of customer purchasing policies are reflected in the following comments:

*It's out there but there are no specific categories of customer that have these policies. Owner personality probably determines the policy.*

*Overall, no, our customers do not. Usually the efficiency is driven by the utility companies.*

*Yes, some customers have such policies. We're still in a world where cost dominates: energy efficiency and costs are often conflicting values.*

*Most schools do. They go by a candle/foot requirement. They go by LEED building standards.*

*Yes. Most of them are going from T-12's to T-8's. Some are going to LED and T-5 with new construction and remodels.*

*They tend to be more high end, larger companies who are more aware of energy efficiency in general; LEED certification applicants.*

*Some do, if they are part of a LEED program and have to go green. Government or state, nation-wide companies. Locals - not at all.*

The range of these comments suggests that the small to medium commercial market may benefit from more “cost-benefit” information on efficient lighting standards.

#### **4.4.5 Trends in the Market**

There was a diversity of opinions about trends at the product category level and little or no consensus about where the strongest shifts are occurring. The only real consensus is that the market is changing and interest in efficient products is growing. Apart from this core point, it appears that this movement is taking place across multiple product categories as is evident from the comments below:

*LED's are going to be the wave of the future, but right now cost is an obstacle. No doubt.*

*I think the LED revolution is coming. It's going to be very expensive. The GE, Phillips, Sylvania's are getting very energy efficient. More efficient ballasts.*

*Everyone is interested in LEDs, but they don't understand the product well enough.*

*LED. This is a stronger trend than CFLs.*

*T-5's are the way they're going. Recessed LED lighting and LED cans. And we've done a lot of LED installations in building signs, not just LED exit lighting. This is a big opportunity.*

*T5, T8 high bays retrofitting from T-12 to T8 and T5 and T8 high bays.*

*They're going with 28 watt lamps with a quality ballast. Cutting lamps down, wattage down, more occupancy sensors. Push reflectors or efficiency kits*

*More metal halide and LED.*

*Occupancy sensors, day lighting, auto dimming.*

*The biggest one is occupancy sensors. Everybody is going to that now.*

*More of the occupancy sensors: ceiling mount sensors.*

*We think that there is a lot in lighting controls and dimming; energy savings without disruption of instant switching. Currently the cost of dimming ballast is exorbitant. But we think that's a function of demand outpacing supply. Mandated dimming by someone like SCE might impact the manufacturers' ability to provide it while cost goes down and energy payback improves.*

*Daylighting impacts on energy usage.*

*Going from the HID to fluorescent high bay, and going to high lumen T-8 products. A trend in low wattage T8 products.*

*I think everyone is going to CFL's, T-8's are starting to go away, Super T-8's are popular, and of course everything is electronic ballast anymore. T-5 H.O. We're even hearing about a new T-3, super low wattage.*

*Many of our customers are shying away from less efficient light sources (incandescent) to LED, CFL and metal halide. And still meeting stricter energy codes enforced on them.*

*They are all thinking of energy efficiency, specifically with dimmers: Lutron recently came out with a dimmer product that is really popular. And then occupancy sensors, etc.*

*Everybody's looking for any energy savings they can get whether it's the lighting or the fixtures. They look for the best savings and products they can get. Even if they have to pay a little more up front to realize the long term benefit they still look for those options.*

The story here, as presented through these comments, is about diversity in the market, both in terms of lighting specific knowledge and energy efficiency awareness. The challenge and opportunity is in presenting options for a wide range of markets, from residential to commercial and light industrial.

#### **4.5 Reasons for Nonparticipation**

To ascertain how the Prescriptive Lighting program might achieve greater levels of participation in the future, our research examined what factors were associated with nonparticipation. The chief reasons cited for nonparticipation were:

- lack of knowledge of the program
- lack of an identified contact person
- price barriers of high efficiency products
- project-specific design or aesthetic criteria

With one or two exceptions, program awareness was quite low among the nonparticipant lighting firms interviewed. It seemed that there had been little direct outreach to these lighting firms. Sources of information about the program were as likely to be word of mouth from their customers or looking up information on-line. With the program being designed to a consumer-applicant framework, it seems that there has been little effective communications to manufacturers, distributors, or specifiers. A majority of these respondents indicated they did not have a working familiarity with the program. This is a missed opportunity for the Prescriptive Lighting program to leverage the market influence of lighting suppliers and specifiers.

The lack of information on program specifics and the lack of personal points of contact are areas that Xcel Energy could easily remedy with a renewed outreach push in 2009.

Other reasons given for the lack of participation in the program were project-driven and had to do with first cost barriers on certain high end products and project-specific design and aesthetic criteria. If cost-effective, Xcel Energy may want to

selectively make some adjustments to incentive levels to address the price barriers, which still impede greater adoption of some high efficiency measures. Some suggestions for structuring incentive levels are made in Section 3.3.1 above.

#### **4.6 Net to Gross**

Based upon the self-reports of our respondents, it appears that recommending energy efficient options is commonplace in the lighting sector. Among our survey sample, 87% of participants and 82% of nonparticipants indicated that they always recommend high efficiency options. Participants report that the program has increased the frequency of their attempts to sell high efficiency products (up from 65% of the time).

This research does not provide sufficient detail to estimate the frequency of recommendation by specific measure types, so additional granularity cannot be provided from the interviews alone. The capture of efficiency opportunities in the market is limited by first cost considerations. The rebates have ameliorated this market barrier and appear to have increased adoption levels. Nearly half of the participants interviewed (6 of 12) have altered their equipment stocking and marketing practices in response to the program.

Sales which do result in the purchase of high-efficiency products make up 47% of the transactions of participating lighting firms. These firms estimate that 83% of customers with qualifying projects do apply for program rebates.

Even nonparticipants acknowledged that energy efficiency programs impact their stocking patterns, although some put other priorities such as project timelines and budget first. The impacts of national programs are evident as well. The following comments reflect the feedback from nonparticipants on the impact of energy efficiency programs in general.

*Yes. We stock more T8s*

*Yes, to some degree. Again a lot of our fixtures are more decorative design for incandescent and have been updated for more energy efficient light sources. More because of programs like EnergyStar "Change a bulb, change the world," rather than utility company based programs.*

*We try to talk the client into the quickest (project timeline impact), most efficient, best product available. They may work with custom or designer fixtures and we always offer something that is more available and efficient as a comparable lighting solution that is energy efficient. Our projects with the most likely impact involve working in government projects or remodels. Our new construction projects may not due to the Architectural design and lighting specifications.*

#### **4.7 Other Suggestions and Comments**

In addition to the feedback described previously, a few other recommendations were offered. These included the following:

*I just need to know more about it. Who is my point of contact in the south Denver metro area? I'm 75% there; I just need to know more about the program.*

*Just want to get more information about the program. If you could email me information, or provide an email address for the program with Xcel Energy, that would help.*

*I wonder if it might be as good a promotion for Xcel Energy to reach out or recommend practices to design firms, engineers, lighting designers that are on top of these energy efficient efforts. They get involved with supplying fixtures with 10-15 fixtures that they consider standard, but which may be restrictive in terms of what good lighting and energy savings might be. Try to avoid the problem of limiting available lighting options. Lighting technology is changing almost as rapidly as computers, its constantly evolving. Try to tap into LEED Accredited lighting designers, engineers and such to see what the upcoming trends are and how they can be included in the program going forward.*

*Xcel Energy should enhance some of the marketing options through their web site: give some examples of how the savings benefits the customer. Maybe create a web application showing the number of fixtures and the overall savings based on usage. They could create a standard that everyone can use there rather than relying on contractors to interpret and sell the program to customers.*

*We need some method to show them the benefit of the energy savings vs. capital expense.*

From these comments, we gather that contractors are thinking creatively about how to alter the program to better meet their needs. Xcel Energy may find it helpful to review these comments to understand the range of ideas out there in the contractor market.

### 4.8 Profile of the Respondents

The table below provides a profile of the firms interviewed in this research.

**Table 4.2: Characteristics of Interviewed Lighting Firms**

	Participants (n=15)	Nonparticipants (n=11)
<b>SCALE</b>		
National	29%	-
Regional	53%	-
Local	14%	-
<b>FIRM SIZE</b>		
Fewer than 5 employees	30%	27%
6 – 50 employees	40%	55%
Over 50 employees	30%	18%
<b>REVENUES</b>		
Up to \$500,000	17%	0%
\$500k - \$5 million	42%	45%
Over \$5 million	42%	36%

## Chapter 5: Analysis of Customer Survey

A survey of participant and nonparticipant customers was initiated to determine net-to-gross values, program satisfaction, and customers' awareness and attitudes towards energy efficient lighting. Data Development Worldwide, LLC, (DDW) conducted the survey in December 2008 and January 2009. The participant survey instrument is included as Appendix A. The nonparticipant survey is included as Appendix B.

### 5.1 Methodology

#### 5.1.1 Sample Design

Xcel Energy's database provided a list of all accounts that received a rebate under the Prescriptive Lighting Program. Firms receiving incentives through the Custom Lighting Program were not included in the analysis. The original dataset included 1411 separate rebates. However, many of these entries represented different locations of the same organization. Because the calls were being made to the organization, it was necessary to create a unique list of firms and organizations. The list included 685 participants.

The original RFP called for a sample of 200 participants for the study. Because the original list contained only 685 names, some of which contained insufficient contact information, it was decided to offer a \$25 incentive to each participant to try to increase the response rate. The final number of completed participant surveys was 150. The study also completed 151 nonparticipant surveys drawn from a list of 5,000 business accounts, randomly selected. Table 5.1 shows the sample and population comparisons.

**Table 5.1: Comparison of Sample and Population of Participants**

	Participant Sample	Participant Population
Number	150	685
Mean kW lighting reduction	32.7	38.9
Standard Deviation of kW	61	114
Minimum kW Value	0.1	0.07
Maximum kW Value	404	2,238
Median kW	7.7	7.9

DDW made repeated attempts to reach every firm included in the population of 685 participants. Thus, the sample represents not a random sample of participants, but instead a self-selected sample of those accessible and willing to participate. The sample is slightly skewed in that none of the seven largest participants, as measured by projected kW demand reduction, was included in the sample.

### 5.1.2 Sample Weighting

The calculation of the net-to-gross (NTG) values requires that values be weighted to reflect overall contribution to peak reduction. Without weighting, the NTG value for a firm replacing two lamps would be given the same importance as that given a firm replacing 100,000 lamps. When relevant, the results are provided with weighted and unweighted values. The weighting factor used in this study is the relative amount of kW reduction as shown in the following equation.

$$\text{Weighting Factor} = \text{kW demand reduction} / \text{Mean kW demand reduction}$$

## 5.2 Survey Findings

### 5.2.1 Characteristics of the Samples

Because the kW reduction is not available for the nonparticipant sample, it is necessary to compare samples using other characteristics collected as part of the survey. The survey asked respondents, "What is the total occupied floor area of this premise excluding enclosed parking garage area?" Table 5.2 shows the responses for the samples. It is clear that the participant sample, particularly the weighted version, is influenced by the larger organizations in Xcel Energy's territory.

**Table 5.2: Size of Organizations**

	Participants		Non-Participants
	Unweighted	Weighted	
Under 2000	0%	0%	19%
2000 to 3999	3%	0%	21%
4000 to 6999	7%	1%	15%
7000 to 14999	8%	1%	14%
15000 to 49999	25%	7%	11%
50000 to 74999	11%	14%	1%
75000 and Larger	46%	77%	19%
	100%	100%	100%

The respondents were also asked about their enclosed parking garages. Only 16% of the unweighted participant sample, and 4 percent of the nonparticipant sample had enclosed garages. As Table 5.3 shows, the participants were more likely to have enclosed garages, and participants' garages tended to be larger than those of nonparticipants.

**Table 5.3: Size of Enclosed Parking**

	Participants		Non-Participants
	Unweighted	Weighted	
1000-24999	1%	2%	3%
25000-74999	3%	2%	0%
75000+	12%	22%	4%
Total	16%	27%	7%

Table 5.4 shows the number of buildings controlled by each respondent. Surprisingly most of the respondents could not answer this, probably because they worked in the facility management and not real estate management capacity.

**Table 5.4: Number of Buildings**

	Participants		Non-Participants
	Unweighted	Weighted	
1-5	39%	38%	34%
6-10	7%	17%	5%
11-20	3%	4%	1%
more than 20	3%	7%	0%
Don't Know	49%	34%	60%
Total	100%	100%	100%

Table 5.5 shows that about two-thirds of the participant respondents own their property. Compared to participants, the nonparticipant sample has more renters.

**Table 5.5: Ownership Status**

	Participants		Non-Participants
	Unweighted	Weighted	
Owner Occupied	68%	69%	59%
Leased	32%	31%	41%
Total	100%	100%	100%

Table 5.6 shows the type of building complex of each respondent. More than half of the respondents represent single buildings. The weighted sample is heavily comprised of multi-building complexes.

**Table 5.6: Building Types**

	Participants		Non-Participants
	Unweighted	Weighted	
Part of a building	8%	8%	19%
1 building, single footprint	43%	29%	39%
1 building w/multiple footprints	25%	23%	15%
Small multi-building	6%	2%	10%
Multi building campus	18%	38%	16%
Total	100%	100%	100%

Another way to measure size is to use number of employees. As Table 5.7 shows, the participant sample is skewed towards firms with larger numbers of employees. Table 5.8 indicates that the participant sample represents older, more established organizations.

**Table 5.7: Number of Employees**

	Participants		Non-Participants
	Unweighted	Weighted	
1-10	17%	13%	73%
11-24	16%	2%	11%
25-49	20%	10%	7%
50-74	10%	8%	5%
75-99	6%	4%	2%
100-149	8%	3%	0%
150-399	13%	33%	2%
400-999	6%	16%	0%
1000+	6%	11%	0%
	100%	100%	100%

**Table 5.8 Age of Organization**

	Participants		Non-Participants
	Unweighted	Weighted	
Before 1900	1%	9%	1%
1901-1949	3%	3%	4%
1950-1979	25%	17%	19%
1980-1989	23%	27%	16%
1990-1999	23%	10%	20%
2000-2007	21%	26%	37%
Don't know/refused	3%	8%	3%
	100%	100%	100%

The final table, Table 5.9, shows the types of businesses represented in the participant and non-participant samples, using the Xcel Energy classifications. A new category, labeled "General Office/Office Building," was included because many respondents mentioned this category.

**Table 5.9: Business Classification**

	Participants		Non-Participants
	Unweighted	Weighted	
Chemicals, Allied Products	1%	3%	0%
Educational Services	7%	15%	4%
Health Services	3%	1%	3%
Restaurants/Other Food	3%	2%	7%
Retail Other	11%	1%	19%
Manufacturing	23%	19%	7%
Wholesale	10%	18%	11%
Public Admin	1%	8%	1%
Other Services	13%	7%	28%
Miscellaneous/Unidentified	7%	6%	7%
Finance/Insurance/Real Estate	4%	3%	7%
Utilities/Transportation	2%	1%	3%
General Merchandise Stores	0%	0%	0%
Agriculture	0%	0%	0%
General Office/Office Building	15%	14%	5%
	100%	100%	100%

**Implications of Differences between Participant and Nonparticipant Samples.**

Tables 5.2 through 5.9 provide clear evidence that the two samples are not drawn from the same population. Besides the obvious implication that the nonparticipant sample cannot be used as a control for the participant sample, the differences have broader implications for future program direction. It is safe to assume that the nonparticipant sample is a better reflection of the composition of the entire Xcel Energy business population, the distribution of which has many smaller, newer business customers.

To date, the program has attracted a disproportionate share of larger customers. This is likely influenced by the means by which the program is marketed via account representatives serving these larger customers, and lighting trade allies who service the bigger firms. While this is a prudent approach for a new program such as Business Lighting Efficiency, the program must eventually dip lower into the remaining market if it is to continue to succeed. Focusing on the larger, easier to reach customers may amplify free-rider levels and poses equity concerns. It also ignores a major portion of the remaining energy saving potential in the commercial and industrial sectors. The broader implication is that strategies that worked to

attract the large, easily reached customers may be less effective in reaching smaller customers.

### 5.2.2 Program Measures Taken

Both participants and nonparticipants were asked what lighting measures they had installed in 2007 and 2008. For participants, the question specified measures installed as part of the program. Table 5.10 provides the percentages of each lamp type installed. The results show some activity by nonparticipant, but nothing approaching the program participants' levels.

**Table 5.10: Number of Measures Mentioned**

	Participants		Non-Participants
	Unweighted	Weighted	Unweighted
Super T-8	30%	30%	3%
Standard T-8	37%	36%	5%
High Bay T-8	17%	21%	2%
High Bay T-5	14%	18%	3%
Hardwired CFLs	9%	11%	2%
Metal Halide, High Pressure Sodium	7%	4%	1%
LED	11%	11%	3%

The survey recorded the number of measure types installed by each respondent. As Table 5.11 indicates, many of the participants could not identify the specific type of lighting measure they had installed. Most of the participants mentioned only one type of measure.

**Table 5.11: Number of Different Measures Mentioned**

	Participants		Non-Participants
	Unweighted	Weighted	Unweighted
Measure or Measures not Identified	21%	22%	79%
Installed One Type of Measure	53%	45%	10%
2 Measures	13%	22%	1%
3 Measures	8%	9%	1%
4 Measures	3%	2%	0%
5 Measures	1%	0%	1%
6 Measures	1%		0%

Nonparticipants were asked if they had changed any of their ballasts in 2007 and 2008. Seventy-one out of 151 (47%) have changed ballasts. One nonparticipant recalled getting a rebate, while 64 said they did not receive a rebate, and six could

not remember. Nonparticipants were asked what was the reason for changing their ballasts. Forty-nine noted that the old equipment had failed, 11 were seeking energy efficiency, six were renovating, three were moving into a new facility, and one wanted brighter lights.

Both participants and nonparticipants were asked if they had participated in other Xcel Energy programs. Table 5.12 indicates that many participants are taking advantage of other programs. This fact suggests that a core of firms is keyed into Xcel Energy's portfolio, and that they find ways to take advantage of programs.

**Table 5.12: Involvement in Other Xcel Energy Programs**

	Participants (n=150)	Non- participants (n=151)
Participated in Other Xcel Energy in 2007-2008	43 (29%)	6 (4%)
Participated in Other Xcel Energy in 2004-2006	18 (12%)	3 (2%)

The vast majority of nonparticipants had never heard of Xcel Energy's Business Efficiency Lighting Program. Only one-quarter of the respondents knew of the program. Eleven out of 151 nonparticipants mentioned the availability of lighting rebates, two mentioned custom design, and seven mentioned information or training.

Respondents were asked how they learned of the Business Efficiency Lighting Program. As Table 5.13 indicates, contact with the contractors is the overwhelming source for those joining the program. Surprisingly almost none of the nonparticipants who knew of the program learned of it through their contractor.

**Table 5.13: How Respondents Learned of the Program**

	Participant with Multiple Sources (unweighted number)	Participants with Only Most Important Source (unweighted number)	Nonparticipant
Respondent Approached Contractor	34	30	0
Respondent Approached Utility	2	2	0
Contacted by Utility Account Manager	27	23	5
Contacted by Contractor	41	40	1
Utility Brochure	6	4	15
Bill Insert	6	5	13
Word of Mouth coworkers	15	14	1
Word of Mouth others	12	11	0
Media	0		3
Trade Journal	0		0
Manufacturer	1	1	0
Internet	4		0

Table 5.14 shows the reasons why firms participated. Saving money is the most cited reason, with protecting the environment, replacing old equipment, and obtaining a rebate mentioned by at least 20 participants.

**Table 5.14: Why Firms Participated**

	Participant with Multiple Sources (unweighted number)	Participants with Only Most Important Source (unweighted number)
Acquiring latest technologies	6	2
Saving money on electric bills	105	84
Obtaining rebate	23	8
Replacing old or broken equipment	28	21
Improving performance of employees	13	5
Helping to protect the environment	33	10
Recommended by contractor	2	0
Part of broader office remodeling	5	4
Brighter lighting	9	0
To be more energy efficient	5	0

Table 5.15 shows that in most of the cases, the equipment either replaced working equipment (77% of the time) or was new equipment (5%). In 3% of the cases, the equipment replaced non-functioning equipment.

**Table 5.15: Condition of Replaced Equipment**

	Participants
New equipment installed did not replace pre-existing equipment	7
Replaced equipment was fully functional	113
Replaced equipment was functioning, but with significant problems	24
Replaced equipment had failed or did not function	6

Those nonparticipants who said they were aware of the Xcel Energy Lighting Program were asked why they had yet to participate. The reasons are presented in Table 5.16. The overwhelming reason why customers had not participated is because they were unaware of the program.

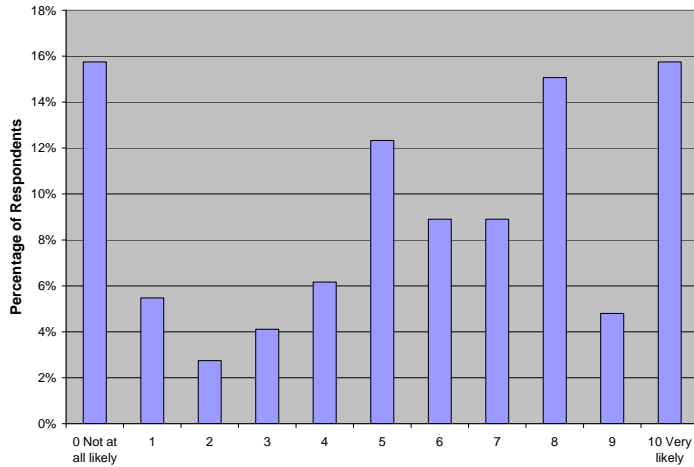
**Table 5.16: Why Firms Have Not Participated**

	Number	Percentage of Respondents
I had not heard of the program	115	76%
Current lighting is sufficient	10	7%
Too Expensive to Replace at this Time	6	4%
Not Budgeted	5	3%
Not gotten to yet, no time	3	2%
I forgot	2	1%
Eligible Equipment Too Expensive	2	1%
We are moving	2	1%
Can make changes	2	1%
Other	4	3%
Total	151	100%

Nonparticipants were asked what is the likelihood they would participate in the next two years. Figure 5.17 shows that many believe that they will participate. Of the group that does not think they will participate, 16 have no lighting changes anticipated, 9 have no budget, 6 do not want to bother, 4 are small businesses with

minor lighting costs, 3 rent their space and have no control over lighting, and 1 does not want to install energy efficient lighting,

**Figure 5.17: Likelihood Firm Will Participate in Next Two Years**



**5.2.3 Interaction with Lighting Trade Allies**

Participant respondents were asked to name the type of company, if any, they used to design or install the measures they had installed under the Lighting Efficiency program. Nonparticipants were asked to report where they got their equipment and advice when they needed new lighting. As Table 5.18 denotes, participants rely on a different set of trade allies as compared to the trade allies’ nonparticipants use. If the program intends to reach the nonparticipant it will need to reach down to the big box and hardware stores that this group relies upon.

**Table 5.18: Type of Trade Ally Firms Use for Lighting**

	Participant (unweighted number)	Nonparticipant (unweighted number)
Contractor/electrician	91	38
Engineering firm	4	1
Energy service firm	8	1
Lighting design firm	16	9
Lighting design store	3	
Big Box store	0	51
Wholesale/industrial store/supply house	0	12
Local hardware store	2	14
Other	7	10
Internal staff	19	5
Light supply store	3	5
Landlord	0	4

Participant respondents were asked if the trade ally used on the project was somebody they had worked with before. Seventy-nine of 124 respondents (64%) had a previous relationship with the firm.

Participant respondents were asked what the important factors were in choosing the particular project they chose. Those nonparticipants who had not done a lighting project were asked to identify the factors that would be important if they were to do a project in the future. Table 5.19 indicates that participants have different concerns than nonparticipants have. Participants place importance on the contractor and the quality and timeliness of the work. Those not actually implementing a project focus more on the costs.

**Table 5.19: Important Factors in Choosing the Proposal**

	Participants	Non-participants	
		Did Install Lamps	Did Not Install Lights (If needed in future, what would be important)
Needed Urgent/Immediate Replacement	3	1	
Timeliness of Response (Not urgent/immediate)	9	1	
Ability to Get Rebate Incentive	8	0	0
Worked with Contractor Before	43	0	1
Contractor Seemed Easiest to Do Business With	6	0	
Contractor Reputation/Referral	18	0	
Better Non-Energy Performance	2	2	
Other	5	3	
Low Upfront Cost			64
Lower Maintenance Costs			25
Better Comfort Brighter Lighting			20
Payback	3		2
Ease of Installation	1		4

Respondents were asked if they reviewed equipment or materials that offered different levels of energy efficiency. A little more than half of the participant respondents (66 out of 122) and half (9 out of 18) of the nonparticipants who implemented a project said they looked at various levels of energy efficiency. Figure 5.20 shows the responses to the question “How important was the input from the provider you worked with in deciding which specific equipment to install?” Most thought the information was important, with nonparticipants more likely to rate the information from their provider as “extremely important.”

**Figure 5.20: The Importance of Information from Trade Ally**

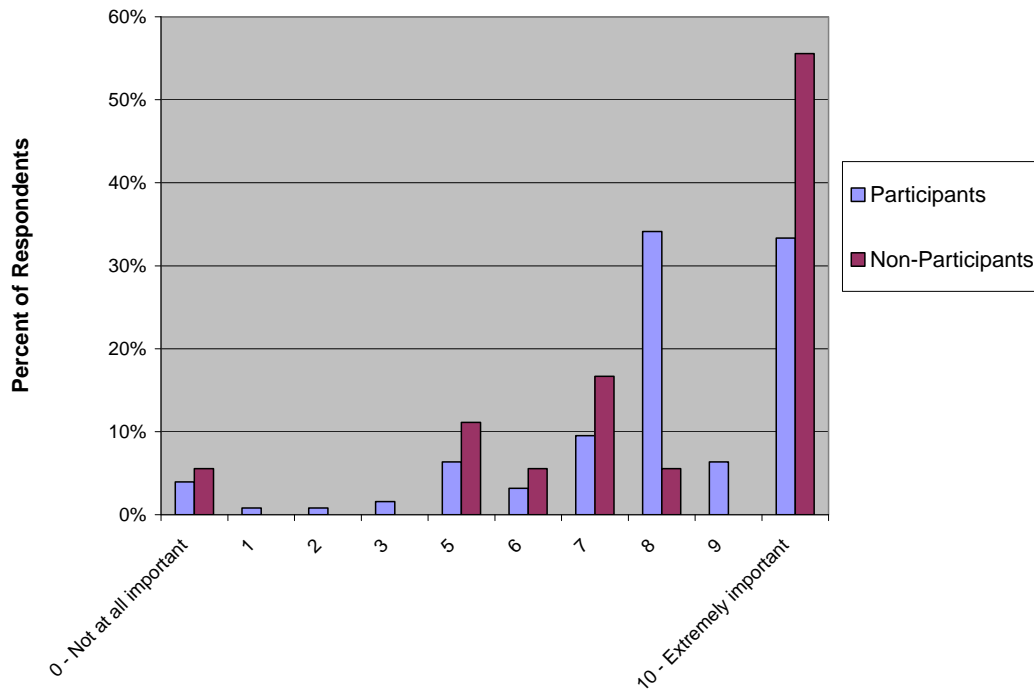
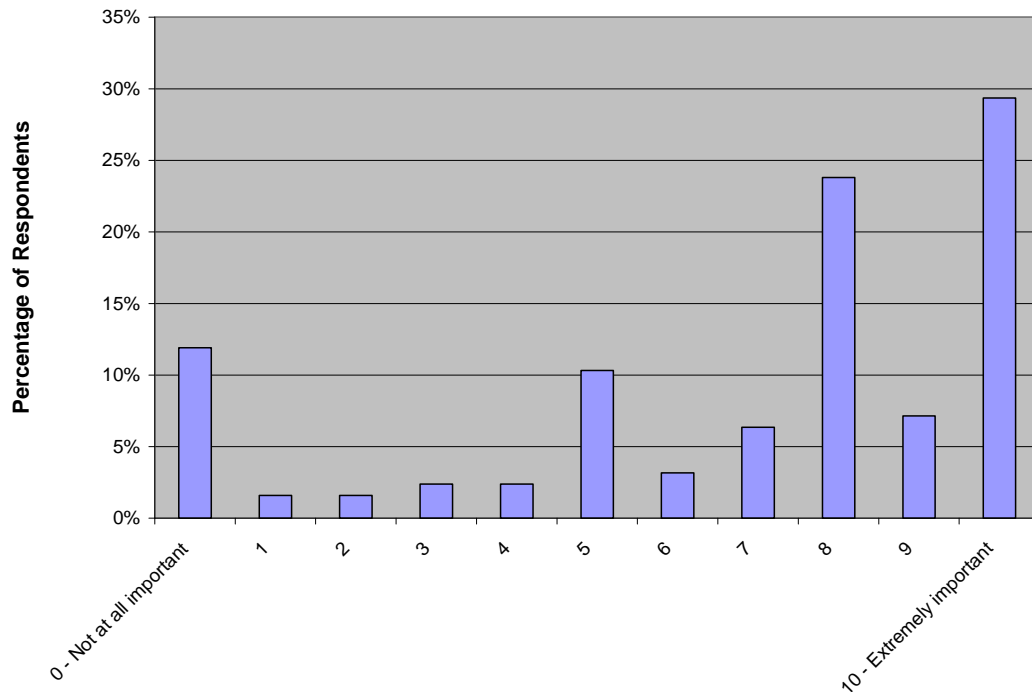


Figure 5.21 shows the ratings participants gave to the importance of trade ally input on deciding to join the program. More than half of the respondents gave a score of 8 or better, suggesting that trade allies are a substantial influence on program participation.

**Figure 5.21: Importance of Trade Ally in Participating in Program**

### 5.2.4 Net to Gross Protocol

**Protocol:** The NTG calculation model used in this study is modeled after the draft protocols developed for the California Public Utilities Commission.<sup>11</sup> This calculation uses a self-reporting approach that identifies three categories of questions.

- **Timing and Selection.** Measures the most important factor among all influences on the decision to implement the measure.
- **Program Influence.** Estimates the perceived importance of the program relative to other factors.
- **No Program.** Measures the likely action taken now and in the future, had the program not been available.

This approach calculates three separate scores for each component, using a 0 to 10 scale. The average of these three component scores is divided by 10 to determine the fraction of the total savings that is net of free-ridership. (If a score of 8 is the

<sup>11</sup> CPUC Nonresidential NTG Estimation Approach, January 11, 2008. See also, "Guidelines for Estimating Net-to-Gross Ratios Using Self-Report Approaches," CPUC Energy Division and Master Evaluation Contractor Team, October 15, 2007. It should be noted that after completion of this portion of the study, a final approach was issued of the approach.

average score of the three component scores, than .8 or 80% of the total gross savings is considered the net savings. In the following subsections, each component score is explained followed by the survey results.

The California protocols include a recommended set of survey questions that to a large degree were used in this survey. Some modifications were made and will be noted in the detailed discussion about each component.

### **5.2.5 Example of NTG Survey Questions and Scoring Method.**

The NTG method calculates a single composite score for each participant respondent. This composite score is set as the average score from the three NTG categories of questions described above. The composite score for each person is then averaged using the estimated kW's saved as a weighting factor. This weighted average NTG score is the one used to describe the net portion of the whole program's savings. To help illustrate how the composite score is calculated, the following four tables, Tables 5.22 to 5.25, are provided.

Table 5.22 provides an explanation of the scoring for the first category of questions: the Timing and Selection category. This category measures the most important factor influencing the decision to install lighting among all the factors that could be an influence. Some of these influences are program related, including: availability of the rebate; information provided through a recent feasibility study, energy audit or other type of technical assistance provided through any of the Xcel Energy programs; information from Lighting Efficiency Program or Xcel Energy; endorsement or recommendation by Lighting Efficiency staff. And others are rival influences, including: corporate policy or guidelines; payback on the investment; standard practice in our business/industry; previous experience with the lighting measures you installed; a recommendation from an auditor, vendor, or consulting engineer; and the age or condition of the old equipment.

In most cases, the rating for each influence factor is set by the response to the question in 19c of the survey in Appendix A.

*I'm going to ask you to rate the importance of the program as well as other factors that might influence your decision to implement the lighting measures you implemented. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 10, where 0 means not at all important and 10 means very important, so that an importance rating of 8 shows twice as much influence as a rating of 4.*

*Now, using this 0 to 10 rating scale, where 0 means "Not at all important" and 10 means "Very important," please rate the importance of each of the following in your decision to implement the lighting measures you implemented at this time*

For three of the rival questions, payback, standard practice, and corporate policy, high scores trigger additional questions to determine if there are program influences involved. For example, payback may be the most important factor, but the survey asks “how important was the rebate in making the project meet the payback criteria your company requires before making investments.” Similarly the survey asked respondents with a high corporate policy score “is your corporate policy the same whether or not rebates are available.” Using these qualifying questions, modifications are made to these three rival questions.

The Timing and Selection score is the highest program related score found.

**Table 5.22: Example of Timing and Selection Category Scoring**

	Respondent A	Respondent B	Respondent C
<b>Program Related Factors</b>			
Availability of the rebate;	7	9	9
Information provided through a recent feasibility study, energy audit or other type of technical assistance provided through any of the Xcel Energy programs;	5	4	6
Information from Lighting Efficiency Program or Xcel Energy;	2	10	5
Endorsement or recommendation by Lighting Efficiency	3	6	2
<b>Rival Factors</b>			
The age or condition of the old equipment	6	9	10
Previous experience with the lighting measures you installed	5	9	5
A recommendation from an auditor or consulting engineer	4	9	4
Recommendation from a vendor/supplier	3	9	8
Standard practice in our business/industry <includes supplemental questions>	4	9	7
Corporate policy or guidelines<includes supplemental questions>	2	9	9
Payback on the investment<includes supplemental questions>	5	9	9
<b>Final Score for Timing and Selection Category</b>	<b>7</b>	<b>10</b>	<b>9</b>

Table 5.23 shows the scoring for the second category of questions: Program Influence. This category estimates the perceived importance of the program relative to other factors. The question asked is:

*In your earlier responses you mentioned [insert ranking rival factors] as being important factors in your decision to install the lighting project we discussed. Using a 0 to 10 rating scale where 0 means Lighting Program was much less important and 10 means Lighting Program was much more important, please rate the overall importance of the Lighting Efficiency*

*Program versus these other factors, we just mentioned, in your decision to implement the lighting project.*

**Table 5.23: Example of Program Influence Category Scoring**

	Respondent A	Respondent B	Respondent C
Relative Importance of Lighting Program	4	10	7
<b>Final Score for Program Influence Category</b>	<b>4</b>	<b>10</b>	<b>7</b>

Table 5.24 shows the scoring the final category: No Program. This category measures the likelihood that action would be taken now, or in the future, had the program not been available. In this case it is necessary to establish if the project would have been done in the absence of the program. The likelihood of the project being completed is adjusted by the timing of the project. Programs that would have had a high likelihood of being completed and being done soon receive a low score. Programs with a low likelihood that might have been done a few years from now have a high NTG score.

**Table 5.24: Example of No Program Category Scoring**

	Respondent A	Respondent B	Respondent C
A) Regarding the installation of this equipment, if the program had not been available, what is the likelihood that you would have installed exactly the same item/equipment	6	2	10
B) You indicated in your response to the previous question that there was an [X] in 10 likelihood that you would have installed the same equipment if the Lighting Efficiency Program had not been available. When do you think you would have installed this equipment? Please express your answer in months within 6 mos (NTG=0) 6 months to a year (NTG=0.063) 1 to 2 years (NTG=0.25) 2 to 3 years (NTG=0.5) 3-4 years (NTG=0.75) >4 years, Never (NTG=1.0)	Within 6 months 0.063	>4 years 1.00	1 to 2 years 0.25
<b>Final Score for No Program Category</b> $10 - (A*(1-B))$	$10 - (6*.937)$ <b>4.4</b>	$10 - (2*0)$ <b>10</b>	$10 - (10*.75)$ <b>2.5</b>

Table 5.25 shows the composite score for each of the three categories. This is the average of the three scores for each respondent. If an unweighted average NTG were calculated it would be the average composite scores times 10. An example of the weighting process is also calculated assuming that these are the only three respondents and their 150 kW saved represents the entire sample. The weighted scores for Respondent A is 51 (5.1 \* 10 kW), for Respondent B is 1000 (10 \* 100 kW) and for Respondent C is 248 (6.2 \* 40 kW). The weighted total of 1299 is divided by 150 kW and multiplied by 10 yielding a weighted average NTG score of 87%.

**Table 5.25: Example of Composite NTG Scoring**

	Respondent A 10kW	Respondent B 100 kW	Respondent C 40 kW
Final Score for Timing and Selection Category	7	10	9
Final Score for Program Influence Category	4	10	7
Final Score for No Program Category $10 - (A*(1-B))$	4.4	10	2.5
<b>Final Composite Score</b>	5.1	10	6.2
<b>Average unweighted NTG = 71 %</b>			
<b>Averaged weighted NTG = 87 %</b>			

### 5.2.6 Responses to Individual NTG Questions

The following section presents results of each individual NTG question and the average scores for each of the three categories. Because the composite score for each respondent involves a compilation based on responses to numerous questions within each category of questions, and the selection of the average score among the three category of question scores, the average responses to each question are in themselves meaningless. The discussion is included so that readers have some idea how respondents answered each question. Those wishing to just view the final NTG composite score results should jump right to the 5.2.7 Composite NTG Score.

The survey begins with a question about the timing of customer awareness of the program. The survey asks if the respondent became aware of the program before or after deciding to do the program and implementing the project. The results of these survey questions are presented in Table 5.26. The answers are not used in the calculation, but do provide a measure of underlying knowledge about program and its influence on project implementation.

**Table 5.26 Timing of Learning about Existence of Lighting Program**

	Unweighted	Weighted
Before Project Conception	66 %	68 %
Before Project Implementation	19 %	11 %
After Project Implementation	15 %	13 %
Don't Know	3 %	8 %

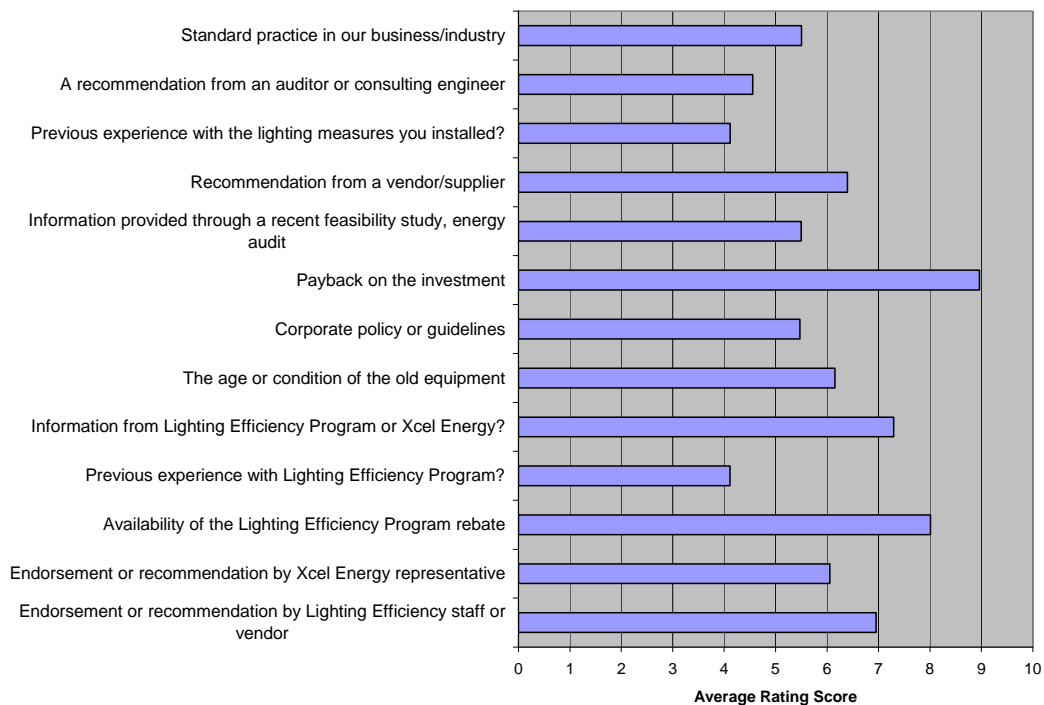
**Timing and Selection Sub-score.** This component asks respondents to score the importance of factors, some of which are program-related such as training, rebates, technical assistance, and some of which are external, such as age of equipment, vendor influence, corporate policy, standard industry practice, payback, and previous experience with measure. Each factor is scored on a 0 to 10 scale. If a

program-related factor scores highest, that score is the Timing and Selection score used.

Some of the external factors, payback, corporate policy, industry standard practice, and vendor influence require further questions to determine if the influence has program effects embedded in the answer. For example, a respondent may note that the vendor's influence was the most important reason that led to the implementation of the measure. However, when the vendor is contacted it is determined that the program incentives were the vendor's prime reason for recommending the equipment.

Figure 5.27 provides the unweighted average scores given by the 150 respondents. Payback scores the highest, followed by availability of rebate. It should be noted that these average scores of each component are not used in the calculation. Scores for the three components for each individual is calculated and the average of these is weight averaged to determine the final composite score.

**Figure 5.27: Average Scores for Timing and Selection Factors**



The key to this component is determining if a rival factor outscores a program factor. In Table 5.28, the number of times each rival factor was the highest is recorded. It is important to note that there is overlap in these numbers; as one respondent may have scored several rival factors above the program-related factors. The rival factors in bold are those where follow-up questions are used to determine if factor has underlying program effects. In the California protocol, the vendor factor also includes a set of follow up questions for the vendor. In this study this

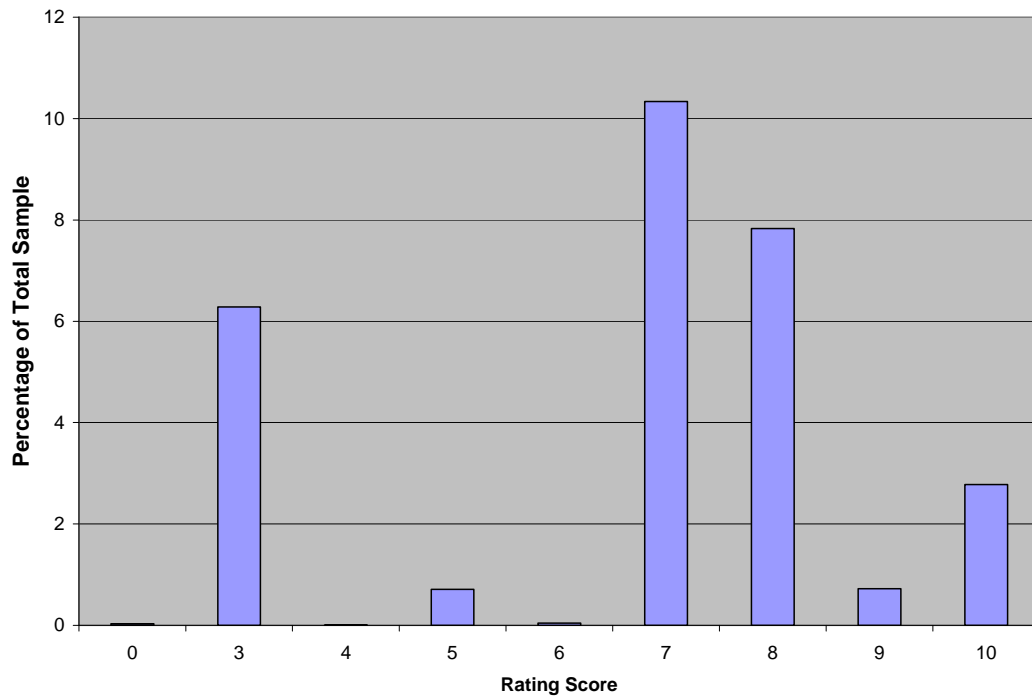
was not done for cost considerations, and the vendor score was not considered a factor. Below is a description of the additional questions used to determine if the payback, corporate policy, and standard practice do not have program-related effects.

**Table 5.28: Number of Respondents with Rival Factors above Program Factors**

	Total Responses Scoring Higher than Program Component Scores	Total After Specific Battery Questions	Percentage of 150 Sample	Percentage of Weighted Sample2
The age or condition of the old equipment	22	22	15%	3%
Previous experience with the lighting measures you installed	5	5	3%	1%
A recommendation from an auditor or consulting engineer	5	5	3%	2%
Recommendation from a vendor/supplier	9	0	0%	0%
<b>Standard practice in our business/industry</b>	3	3	2%	0%
<b>Corporate policy or guidelines</b>	3	1	1%	0%
<b>Payback on the investment</b>	30	30 (scores are adjusted)	20%	29%

Bold entries trigger additional battery of questions

Payback. Thirty out of 150 participating respondents had a payback score that exceeded one of the program scores. On a weighted basis they represented a larger 28.8% of the total kW. These respondents were asked; "How important was the financial incentives you received in making the project meet the payback criteria your company requires before making investments?" Figure 5.29 shows the responses. These scores are used as the final payback related score.

**Figure 5.29: Reported Payback Scores**

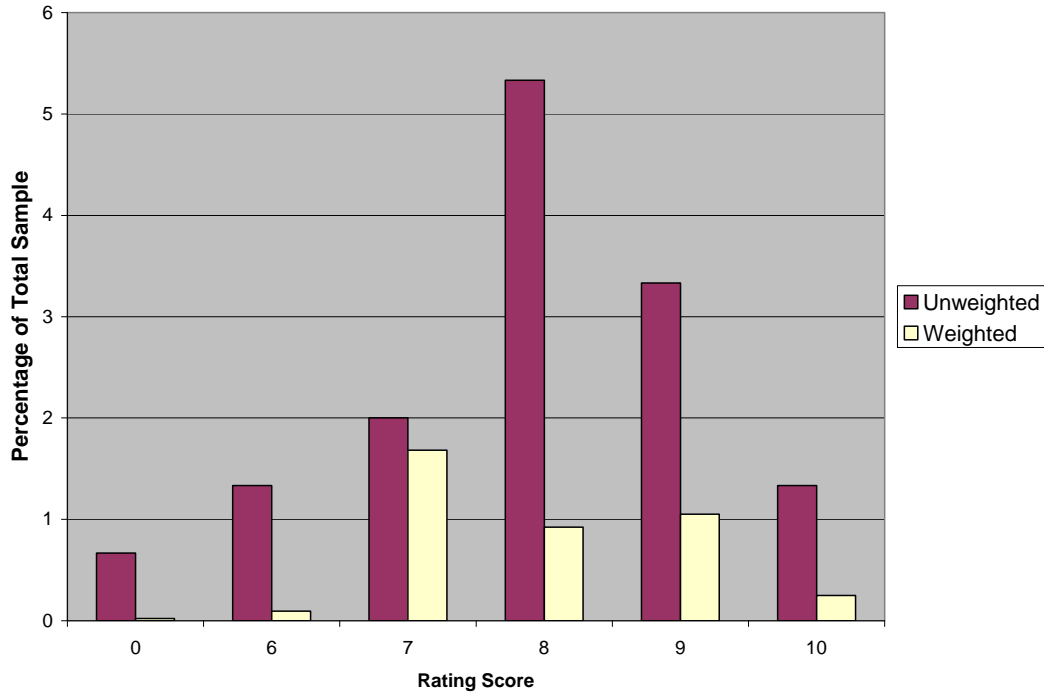
Corporate Policy. Respondents ranking corporate policy above program related scores were asked, “Does your organization have a corporate environmental policy to reduce environmental emissions or energy use? Some examples would be to “buy green” or use sustainable approaches to business investments.” Only 3 of the 150 respondents had a corporate policy score that was higher than one of the program component scores. When these three are weighted they represent less than 0.1% of the total. Only one of the three thought that the corporate policy was a more important factor in deciding to implement the specific measures.

Standard Practices. Only 3 of the 150 respondents noted that standard practices of their industry were a more important factor than were the program components. In all three cases, the standard practice was more important than the program components were in determining the specific measures scored.

**Program Influence Sub-score.** The Program Influence component asked each respondent to rate the relative importance of the rival factors vis-à-vis the program related factors. The survey instrument omitted this question unless the rival scores exceeded the other timing and selection scores. The initial assumption was that the highest score of the three components, and not the average of the three components, was the scoring approach; and therefore we limited call backs to only those respondents where a high score in the Program Influence component would markedly change the highest score found. Only 25 respondents with rival factors above the program-related scores in the Timing and Selection component were re-contacted. Figure 5.30 shows the responses of the 25 respondents. The unweighted

mean is 7.8 with a standard deviation of 2.1. The weighted mean is 7.9 with a standard deviation of 1.2

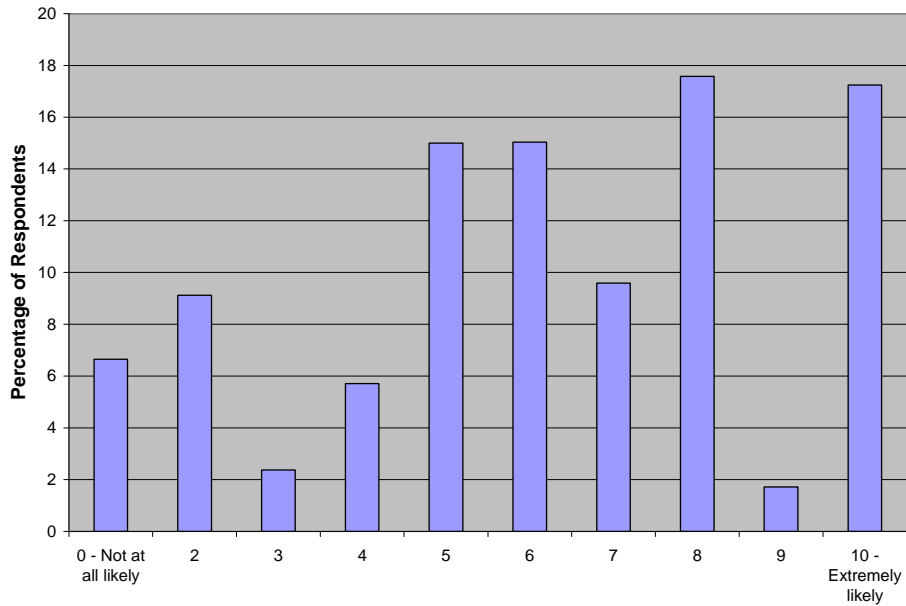
**Figure 5.30: Responses to Program Influence Question**



The absence of a Program Influence score for most respondents is a potential problem when it is included in the average score of the three component scores. Leaving out the Program Influence score from the majority of respondents was likely to result in a lower NTG ratio because this component was almost always the highest score among the three components. We used the average value of 7.8 as a surrogate for the other respondents; however, because the group that answered represented participants with lower NTG scores in the other components, it is likely that the actual numbers would have been higher had we asked the question of each of them.

**No Program Sub-score.** The third component score is the No Program component, which asked what the respondent would have done in the absence of a program. This component involves a series of questions. The first establishes whether the respondent would have installed the same equipment if the program were not available, shown in Figure 5.31. It then queries to determine if there were alternatives considered, see Table 5.32. A third question asked if the person would have done the alternative or nothing, see Table 5.33. The final question asked for the timing of the project if the program were not available.

**Figure 5.31: What Is Likelihood You Would Have Installed Exactly the Same Equipment?**



**Table 5.32: - Did You Consider Any Alternatives to the Lighting Measures?**

	Weighted Number	Percent
Yes	632	13
No	4234	87
Total	4866	100

Those responding yes in Table 5.32 are asked if they would, in the absence of the program, do the alternative or do nothing. As Table 5.33 shows, most would have done the alternative.

**Table 5.33: Done Nothing versus Done Alternative**

	Weighted Number	Percent
Installed the alternative just described	611	13
Done nothing	19	.4
Don't Know	2	.0
Total	632	13

The final question, shown Table 5.34, asks to determine if project would have been deferred if there were no program. The values provided are used to adjust for partial free-ridership. Almost half of the respondents would have completed the project within the next 6 months.

**Table 5.34: Deferral of Projects**

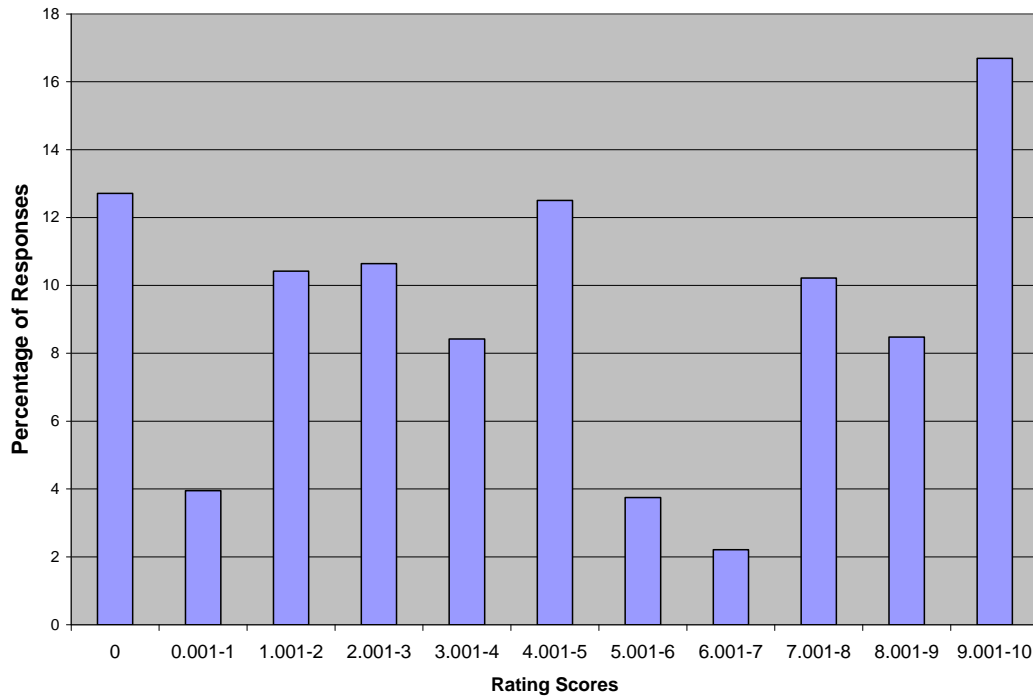
	Percentage of Responses	Deferral Value
No Response	11%	1
Less than 6 months	40%	1
6 months to 1 year	20%	0.94
1 year to 2 years	2%	0.75
2 years to 3 years	11%	0.5
3 years to 4 years	7%	0.25
4 or more years	10%	0

The final calculation of the No Program component score uses the following formula:

$$\text{No Program Score} = 10 - (\text{likelihood done exactly same} * (1 - \text{Deferral Value}))$$

The distribution of No Program Component score is shown in Figure 5.35.

**Figure 5.35: Distribution of No Program Scores**



**5.2.7 Composite NTG Score.**

The final NTG score involves selecting the average score from the three component scores described above. The results are shown in Table 5.36 and illustrated in Figure 5.37. This would suggest a NTG ratio below the currently used value of

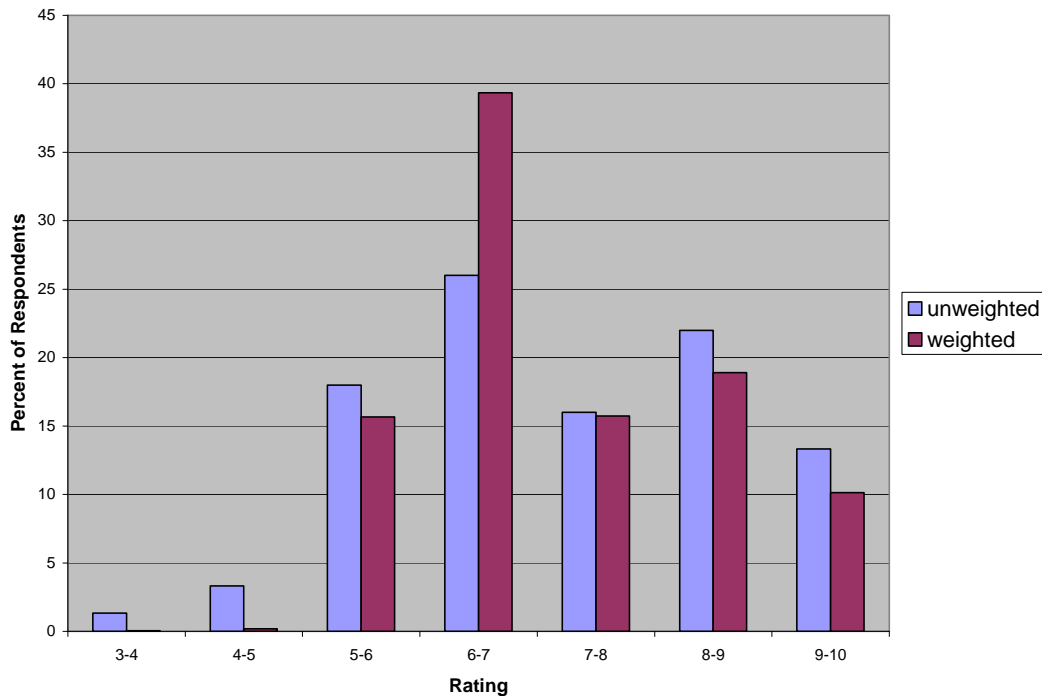
96%. The 73% value is towards the lower end of the range of NTG ratios found in our interview of business lighting programs across the country. Given the relative newness of the program, the number seems low relative to other programs of similar vintage. It also must be remembered that the approach has yet to be totally tested, and our application, using a draft version was not fully implemented. A number half way between these two extremes (84%) would be a reasonable value, until further analysis can be performed.

**Table 5.36: Mean Net to Gross Score**

	Mean Score	Confidence Interval*
Weighted Score using Average Score (7.8) for Missing Program Influence Scores	73%	±3%
Unweighted Score using Average Score (7.8) for Missing Program Influence Scores	73%	±2%

\* At 90% confidence

**Figure 5.37: Distribution of Composite NTG Scores (Using 7.8 for Missing Program Influence Scores)**



The NTG ratio will also be affected by the type of customers and the type of measures included in the program. As was noted at the beginning of this chapter, the program tends to attract firms that are larger than average as compared to the general population of firms in the service territory. Table 5.38 shows the relationship between firm square footage and the NTG value. This table confirms that almost all of the high free ridership levels (low NTG scores) are found in the

largest firms. While only 26% of the weighted smaller firms have NTG's scores below seven, 64% of the weighted larger firms have NTG scores below seven. By contrast, 63% of the smaller firms and 26% of the larger firms have NTG scores in the 7 to 8.99 range. Increasing the number of smaller firms in the program may be an effective way to keep the NTG ratio higher.

**Table 5.38: Cross-tabulation of NTG Scores and Firm Square Footage**

	Less than 75,000 ft <sup>2</sup>	More than 75,000 ft <sup>2</sup>
	Weighted n (percent of column)	Weighted n (percent of column)
NTG Score 0 to 6.999	287 (col% 26% )	2401 (col% 64%)
NTG Score 7 to 8.999	693 (col% 63%)	991 (col% 26%)
NTG Score 9 and up	116 (col% 11% )	377 (col% 10%)

Pearson Chi Square Test is significant at less than 0.0005

### 5.2.8 Spillover

Several questions were included to determine if there was any participant spillover: instances where participants subsequently installed qualifying equipment but did not receive rebates. Table 5.39 shows the number of people who since receiving the lighting rebate, installed additional lighting equipment at their facilities for which they did not receive the rebate.

**Table 5.39: Non-rebated Measures Taken Since Participation (n=150)**

	Percentage unweighted
Yes	28%
No	69%
Don't know	3%

Table 5.40 provides an unweighted characterization of how many measures were installed without rebates. Some of the measures would not qualify as spillover because they did not qualify or they were done outside the service territory. The reasons given for not applying include:

- I just chose not to (7)
- Too much work or trouble to fill out rebate forms (5)
- I was in a hurry to complete work (3)
- Have not got around to yet (3)
- I thought program ended (2)
- Building not in Xcel Energy territory (2)
- Did not think measures qualified (2)

**Table 5.40: Types of Measures**

	1 to 10	More than 10
Super T-8	2	8
Standard T-8	3	6
High Bay T-8	1	1
High Bay T-5	1	4
Hardwired CFLs	0	2
Metal Halide, High Pressure Sodium	0	1
LED	2	2
Other	2	2

### 5.2.9 Program Satisfaction

A final section of the survey is devoted to questions on program satisfaction. Table 5.41 shows the status of respondents' rebate checks.

**Table 5.41: Rebate Check Status**

	Number (unweighted)	Percentage
Have Received Rebate Check	131	87%
Have Not Received Rebate Check	4	3%
Have Receive Some	3	2%
Contractor Received	2	1%
Don't Know	10	7%
Total	150	100%

Respondents were asked how they rated the program experience and the performance of the equipment they installed. As Table 5.42 indicates, most of the respondents were pleased with the program and the equipment they installed

**Table 5.42: Satisfaction with Program and Equipment (unweighted totals)**

	Overall program experience with Xcel Energy	The performance of the new equipment or system
Much worse than expected	2	1
Somewhat worse than expected	4	1
About as expected	76	51
Somewhat better than you expected	27	39
Much better than you expected	38	57
Totals	147	149

The few reasons for dissatisfaction were:

- Program: The application took too long to complete/was too complicated (3)
- Program: Getting help or answers from Xcel Energy was hard (2)
- Program: Rebate was a fraction of what was expected (1)
- Equipment: Savings were less than promised by contractor (2)

Only one out of the 150 respondents removed any of the equipment installed. This person removed standard T-8's. The problem was in the ballasts.

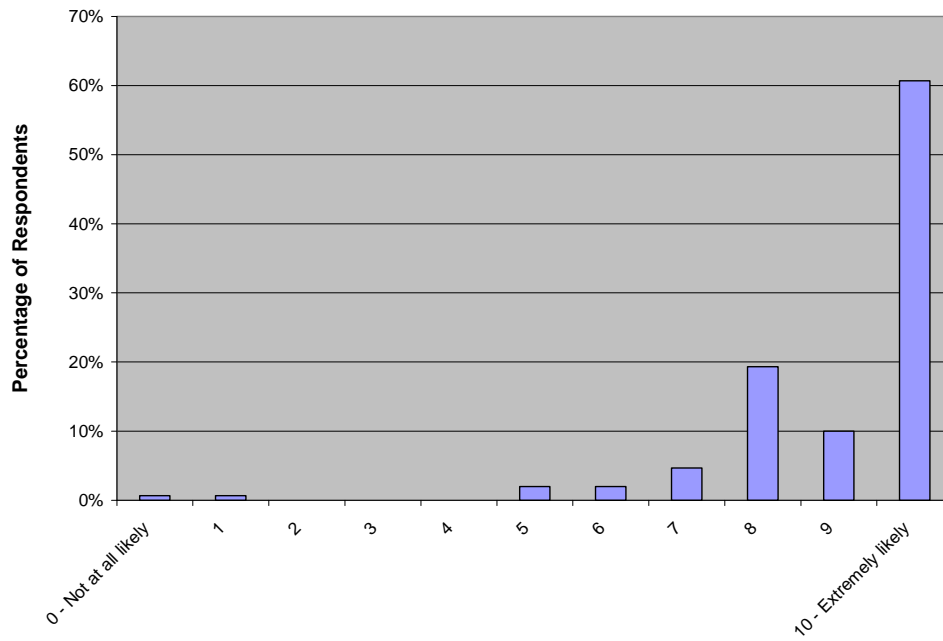
Respondents were asked, "Has your experience with the program increased, decreased, or had no impact on your confidence that energy-efficient investments will reduce your energy bills?" Table 5.43 shows that participation increased participants' confidence.

**Table 5.43: Program Impact on Confidence in Energy Saving**

	Number (unweighted)	Percentage
Increased	121	81%
Decreased	2	1%
Had no impact	24	16%
Don't Know	3	2%
Total	150	

Figure 5.44 shows the participants' measure of how likely they would be to actively consider energy-efficient products when installing or replacing energy-using products in the future. Again, the majority said they are likely to continue doing energy efficiency.

**Table 5.44: Likelihood of Considering Additional Energy Efficiency Measures**



## Chapter 6: Conclusions and Recommendations

The Colorado Business Lighting Efficiency Program has successfully reached its target goals for applications and kW reductions in both 2007 and 2008. The vast majority of participants (96%) are satisfied with the program, with only 4% of participants reporting that program experience was worse than they had expected. Fully 99% of participants reported that the installed equipment performed as they had expected. Participant trade allies report that they regularly market the program to their customers during their regular business development process. The findings indicate the program has led to shifts in equipment stocking patterns and has caused some firms to market high efficiency products to a greater degree. Trade allies report that product availability and product quality are not significant issues at this point in time.

In summary, the program is working as intended with no major issues identified by this evaluation. As it is now configured, the program is well received by customers. The measures included produce substantial benefits for participants and Xcel Energy non-participants. This evaluation found the program to be well managed and with no major issues regarding its current operations.

This evaluation finds a couple of conditions that suggest that the program will have to adjust its focus at some time in the future in order to continue this success. First among these is a need to expand the market of trade allies and dig deeper in to the base of smaller customers. The current program depends on its largest customers for a large portion of its activity and savings, and there are questions as to how long this dependence on the largest customers is sustainable. Second, the interviews and the survey also identified issues with the application and rebate processing process that, if addressed, will likely encourage more participation.

The study examined the current assumptions about program savings and the calculated a net-to-gross ratio. The assumption for energy saving are reasonable. The current assumption for NTG is 96% and that figure is higher than the values modeled after the method used by the other commercial lighting programs we examined. Those programs have a range of 100% to 60%. As a relatively new effort, it is likely that this program's NTG ratio would be on the higher end of this range. This evaluation included an estimation of the NTG ratio using an experimental process currently being tested by the California Public Utilities Commission (CPUC). The approach was still under development during our study and subject to various interpretations as to approach and analysis. Our results, which are effected by flaws in the implementation of the test approach, produced answers in the 70-80% range. The survey results show that larger customers are much more likely to have lower NTG ratios. This finding further supports the need for the program to push its marketing and outreach efforts toward strategies that more effectively reach smaller customers.

The sections below provide a more detailed summary of these findings. This is followed by a set of recommendations that Xcel Energy should consider adopting.

### **6.1 Lessons from Other Business Lighting Programs**

Business lighting programs represent one of the biggest sources of energy saving in most energy efficiency program portfolios. One objective of this study was to compare the design and structure of this program with other programs in order to identify potential areas for refining the design of this program. As such, the research included a review of industry “*best practices*” for business lighting programs, and in-depth interviews with program managers and evaluators connected with 11 different lighting programs across the United States. All of the programs reviewed have a structure that concentrates on three vital functions: defining the eligible measures, processing applications, and supporting trade allies. Strategies that make these three functions as simple and seamless as possible to the end-user define “best practice” for these programs.

In all programs reviewed, most materials and marketing efforts are aimed at trade allies. While the principal trade allies are lighting contractors, a broader definition includes electricians, lighting designers, architects, electrical engineers, lighting supply houses, big box home improvement centers, hardware stores, and lighting distributors and manufacturers. Few companies spend substantial funds marketing to the end user. All utilities mentioned trade ally meetings or trade shows as a potential outlet for utility-developed marketing materials. Supporting trade allies means making customer representatives knowledgeable both about lighting opportunities and program processing steps. To supplement customer representatives, several programs have a dedicated staff person responsible for trade ally support. Creation of such a position frees up time for the program managers and account representatives.

One of the most important issues confronting programs is the creation of rebate application and processing structures that collect the necessary information in a manner that trade allies and customers do not find burdensome. Lighting applications are recognized as being more complicated than applications for other commercial and industrial efficiency measures, both because there are more types of measures included, and because more information is required on the applications. Moving toward on-line applications and electronic processing of rebates serves to reduce processing issues and payment delays and is considered to be *best practice* moving forward.

A total of twenty-four different measures are included in the 11 programs reviewed; no single program rebates all of these measures, with the most being one utility that offers incentives for all but three. The average number of measures offered is seventeen. Xcel Energy now offers rebates on 11 of the identified measures.

Utilities are wrestling with the development of quality assurance (Q/A) processes that ensure reliable savings but are not costly for the utility or burdensome for customers. QA steps are typically woven throughout the overall design, beginning with the development of marketing materials and installation guidelines, and continuing through training on installation techniques and the selection of lighting measures. Many program stress that training trade allies is a key element of both a QA approach and an effective trade ally strategy.

Most utilities use a self-reporting method consisting of participant surveys to derive estimates of free ridership and spill over. Estimates of net-to-gross (NTG) in kWh vary but, in general, fall anywhere between 60-100%.

## **6.2 Expanding Program Markets**

As is appropriate for a young, developing program, Xcel Energy focused its attention on reaching its largest customers and developing a core set of trade allies to deliver the program. Establishing the Lighting Advisory Board brought together the most important trade allies and helped Xcel Energy market the program. It also ensured that the program process was understood and its requirements were compatible with these trade allies' interests. Using the large Managed Account Managers as liaisons helped draw the largest customers seeking energy efficiency into the program.

The data indicate that current program is heavily dependent on large customers and a small set of trade allies. Internal data shows that the top ten customer participants account for more than 25% of the total kW reduction. The top ten identified trade allies are responsible for almost half of the total rebates.

As the program matures, the dependence on this strategy will become a challenge. Indications suggest that the large firms have already done most of the simple T-12 conversions possible. The survey finds that these larger firms also have lower NTG ratios.<sup>12</sup>

Reaching downward to broader markets is not an easily accomplished task. Xcel Energy will need to broaden its program scope to reach far more trade allies and customers. This expansion of program efforts is necessary because, as the program chases the untapped potential by drawing in smaller operations, it will require more firms to meet the same production goals. The one-to-one connection of trade ally-customer-utility that works effectively at the Managed Account level is not likely to be as sustainable in the same way when targeting the market of smaller customers.

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<sup>12</sup> While the downturn in the economy is a major factor, the drop in total activity in 2008 versus 2007 may be a sign that mining the largest users is reaching a saturation point.

As Xcel Energy expands toward smaller market players, both trade allies and customers, the effort will require a much greater commitment to training and outreach of all parties involved in the process. Xcel Energy's effectiveness in reaching smaller customers without dedicated Managed Account Managers is already an issue. Trade allies report that BSC Representatives, the liaison to the next level of business customers, do not appear to be well informed about the lighting program and lighting technologies. The research suggests that many of these representatives are more often in a reactive mode, rather than a proactive mode and that there appears to be insufficient time allocated to promoting DSM programs by these staff. This suggests that a dedicated Lighting Program trade ally liaison may be needed.

Reaching the smaller customers will require some broader mass-market approaches. Of critical importance are the suggested changes to the application and processing process that are discussed in the next subsection. The survey also suggests that Xcel Energy will need to broaden its definition of trade allies and reach out more to big box and hardware stores; retail outlets that smaller firms report they frequent for advice and equipment. The interviews also found uneven market awareness across high efficiency lighting product categories. This was true for both end users and those trade allies with whom they interact (architects and engineers and contractors). Program awareness was quite low among the nonparticipant lighting firms interviewed and, with one or two exceptions, it seems that there has been little direct outreach to these lighting firms.

### ***6.3 Improving the Application Process***

In addition to building up market awareness and product delivery capabilities, the program must make it easier for customers to apply and receive rebates. While most of the current customers and active trade allies are satisfied with the process, there is acknowledgement that the application form has grown more complicated, and that there is steep learning curve to being able to submit claims without issues. A substantial number of applications are reportedly being returned (approximately 33%), and a large percentage of these are returned because of items that are not completed, missing documentation, and inclusion of items not eligible for rebates. Ballast requirements are noted most often as issues.

The distributed nature of Xcel Energy's rebate processing may be improved substantially through use of new technology and, specifically, the development of an on-line processing system that could be accessed by all relevant parties at multiple stages in the process. Creating an on-line application is a first and necessary step to bring in more applications. The report finds that the processing of rebates in Minnesota adds a layer of complexity and slows processing times.

In addition, some participants indicated that feedback from Xcel Energy to the applicants could be improved. Contractors find it frustrating to not be able to get up-to-date status information on an application. Even more frustrating for these

allies is when they call Xcel Energy in to find that there is a problem with an application and learn that a problem which had not been brought to the attention of the applicant but was delaying job processing. Hiring a staff person to troubleshoot rejected applications and serve as a liaison to the processing staff is one possible way to relieve this issue.

## **6.4 Recommendations**

In summary, the program is viewed internally as offering an important resource for Xcel Energy's DSM goals, and that improvements may be necessary if the program is to be scaled up for attainment of more aggressive goals. Specific steps that may be needed include:

**Commit to expanding the reach of trade ally marketing.** This involves:

- Hiring a full time trade ally liaison focused solely on the lighting program;
- Broadening the definition of trade allies to include home improvement and hardware stores where smaller business customers say they get most of their advice and equipment;
- Expand the number of training and outreach events for trade allies;
- Addressing time prioritization for BSC Representatives to enable these representatives to spend more time marketing the program to small and medium-sized business customers;
- Developing an enhanced web presence for the program;

**Improve the application process to make it easier to use and quicker to process rebates.** This involves:

- Development of an on-line application and processing system; and
- Hiring a staff person to troubleshoot rejected applications and serve as a liaison to the processing staff;

**Continue to track NTG situation.** It is recommended that Xcel Energy assume a NTG ratio for the current program at 84%. This is the halfway point between the current assumption and the approximate value derived in this study using the California methodology. There are several reasons why, this study suggests that the derived value is too low, and the 84% is recommended. One, the calculated value ignores spillover, and this study identified spillover by participants contacted. Two, the study was not able to perfectly duplicate the California method, as it was evolving as the study progressed. One of the changes required that this study use an estimated value for one of the three key parameters, as it was too late to go back and re-interview participants. Third, it is the opinion of the authors of this report, that the California methodology overestimates free ridership for newer programs, because it does not compensate for respondent bias against using the highest ratings in a 0-10 rating scale.

The NTG value captured in this study is a snapshot of the NTG and subject to change over time as program and external factors influence the marketplace. Programs in California and other places with large, long-term efficiency efforts have seen large drops in NTG ratios for some of their biggest energy saving lighting measures. Xcel Energy can insulate itself, somewhat, from this happening by continually pushing the program into lesser developed markets.

**Recommend updating key parameter in the program technical assumptions.**

This study did not perform a thorough examination of every assumption used by the program. The assumptions are included as Appendix G. One value used in the 2009 program assumptions should be updated to reflect current prices and product performance. This observation includes:

- The assumed cost of CFLs is higher than typical market prices.

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## Appendix A: Customer Survey Instrument

#04-1706



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### XCEL ENERGY COLORADO LIGHTING EFFICIENCY

### PROGRAM PARTICIPANTS PROCESS EVALUATION SURVEY

– SCREENER/MAIN QUESTIONNAIRE –

– CATI –

***INCLUDE ALL SCREENER INFORMATION IN PROGRAM***

***(IF PROGRAM CONTACT IN SAMPLE, USE THE FOLLOWING WORDING:)***

- 1a. Hello, this is **(INTERVIEWER NAME)** calling from Data Development Worldwide on behalf of Xcel Energy May I please speak with **(PROGRAM CONTACT)**? **(IF NEEDED:)** My understanding is that **(PROGRAM CONTACT)** is responsible for making energy-related decisions for your firm at this location – may I please speak with him/her?

***(IF NO PROGRAM CONTACT IN USE THE FOLLOWING WORDING:)***

- 1b. Hello, this is **(INTERVIEWER NAME)** calling from Data Development Worldwide on behalf of Xcel Energy. I would like to speak with the person most knowledgeable about your participation in the Xcel Energy lighting program for your firm at this location.

***(FOR ALL)***

***(IF NEEDED)***

- 1c. We're calling to do a follow-up survey on your firm's participation in the 2007-08 Xcel Energy Colorado Business Lighting Efficiency program.

***(IF NEEDED)***

- 1d. This is a very important fact-finding survey among firms that have participated recently in an energy efficiency program sponsored by Xcel Energy. We are NOT interested in selling anything, and responses will not be connected with your firm in any way. Xcel Energy wants to understand how businesses think about and manage their energy consumption.

**(IF NEEDED)**

- 1e. **(PROVIDE XCEL Energy CONTACT NAME AND PHONE DISPLAYED BELOW IF RESPONDENT ASKS.)**

Carla Hahn, Lighting Efficiency Program Manager, 303-294-2696

**(RECORD OUTCOME OF Q.1a-1e HERE)**

- 1 Current individual is best contact **(ASK Q.2)**
- 2 Transferred to best contact **(ASK Q.2)**
- 3 Given best contact's name and number Record for future contact  
**(RECORD FOR FUTURE CONTACT)**
- 99 Don't know/refused **(THANK AND TERMINATE)**

**(WHEN CORRECT RESPONDENT IS ON-LINE (REPEAT AS NEEDED WHEN CURRENT INDIVIDUAL IS BEST CONTACT))**

2. Hello, this is **(INTERVIEWER NAME)** calling from Data Development Worldwide, a national energy market research firm. Today we're conducting a very important survey on behalf of Xcel Energy, among participants in their 2006-2008 Lighting Efficiency program in Colorado. It should take approximately 12 to 15 minutes, and it's an important opportunity to make sure your views are represented. We believe you'll find it quite interesting.

Can I confirm that you're responsible for making energy-related decisions for your firm at this location?

**(IF NEEDED:)**

This is a fact-finding survey only – we are NOT interested in selling anything, and responses will not be connected with your firm in any way. Xcel Energy wants to understand how businesses think about and manage their energy consumption. **(IF NEEDED: PROVIDE Xcel Energy CONTACT NAME AND PHONE)**

**(RECORD OUTCOME OF Q.2)**

- 1 Current individual is best contact **(ASK Q.3)**
- 2 Transferred to best contact **(REPEAT Q.2 W/BEST CONTACT)**

- 3 Given best contact's name and number Record for future contact  
**(RECORD FOR FUTURE CONTACT)**  
 99 Don't know/refused **(THANK & TERMINATE)**

As a token of appreciation for your time in participating in this research, we will send you a check for \$25 for completing the survey.

<b>PROGRAM AWARENESS, SOURCES OF AWARENESS, AND PARTICIPATION</b>
---

3. First, we'll be talking about the topic of energy efficiency at your business – specifically, different changes your firm may have made in lighting equipment, or changes you could make, that will help your firm save energy. Just to confirm, in 2007-08 did your firm participate in the Xcel Energy Lighting Efficiency program at this location? **(IF NEEDED:)** This is a program where your business received a rebate for installing one or more energy-efficient lighting products covered under the program.
- 1 Yes, participated in Lighting Efficiency as described **(SKIP TO Q.4)**  
 2 Yes, participated in Lighting, but at other location **(SKIP TO Q.4)**  
 3 Yes, participated in Xcel Energy program, but don't recall that as the name **(SKIP TO Q.4)**  
 4 NO, did NOT participate in Lighting Efficiency program **(ASK Q.3a)**  
 99 DK/refused **(ASK Q.3a)**
- 3a. Is it possible that someone else at your location actually dealt with the lighting installation? Or maybe you installed lighting at your location in 2007 or 2008, but the installer dealt with the program paperwork?
- 1 Someone else dealt with it **(ASK TO SPEAK WITH THAT INDIVIDUAL; BEGIN AT Q.2)**  
 2 Installed lighting measures (but don't recall rebate or program) **(ASK Q.3b)**  
 3 Applied for program/have not installed lighting measures yet **(TERMINATE BUT KEEP SCREENER INFO)**  
 98 Other (SPECIFY:) \_\_\_\_\_ **(TERMINATE BUT KEEP SCREENER INFO)**  
 99 DK/refused **(TERMINATE BUT KEEP SCREENER INFO)**
- 3b. For the rest of the survey I'll be referring to your participation in the Lighting Efficiency program specific to Colorado, even though you may not have been involved in all of the program paperwork and details. That's not unusual.
- (ASK EVERYONE)**

4. What specific lighting fixtures do you recall installing during 2006 to 2008, as part of this program? (**READ LIST**) (**RECORD ALL MENTIONS. PROBE AS NEEDED FOR CLARITY REGARDING MOST APPROPRIATE RESPONSE CATEGORY.**)
- 8 Replaced T-12's with Super T-8's
  - 9 Replaced T-12's with Standard T-8's
  - 1 Installed High-bay T8's
  
  - 3 Installed High-bay T5's
  
  - 5 Installed Hardwired CFL's
  - 6 Installed Metal Halide & High Pressure Sodium Fixtures
  - 7 Installed LED's
  - 97 Other (Specify?) \_\_\_\_\_
  - 98 (**DO NOT READ**) Have NOT YET installed measures (**TERMINATE**)
  - 99 (**DO NOT READ**) DK/refused
5. Have you received your rebate check for participating in the program? (**DO NOT READ**) (**RECORD ONE**)
- 1 Yes, have received rebate check(s)
  - 2 No, have not received rebate check(s)
  - 3 Have received some, but not all, rebate checks
  - 4 Don't recall/didn't know there was a rebate involved
  - 5 Contractor received rebate check
  - 99 DK/refused
- 6a. Besides the Lighting Efficiency program, did you participate in any OTHER energy efficiency programs offered by Xcel Energy, in 2006-08?
- 1 Yes (**ASK Q.7a**)
  - 2 No (**ASK Q.7a**)
  - 99 DK/Refused (**ASK Q.7a**)
- (**ASK EVERYONE**)
- 7a. Besides participating in Lighting Efficiency or any other Xcel Energy programs in 2006-08, did your firm participate in any Xcel Energy energy efficiency programs prior to 2006, at (ADDRESS FROM SAMPLE)?
- 1 Yes (**ASK Q.8**)
  - 2 No (**ASK Q.8**)
  - 99 DK/Refused (**ASK Q.8**)

8. OK, for the rest of the survey I'd like you to respond in terms of your knowledge and experience regarding the 2006-08 Lighting Efficiency program, not earlier program years. How did you learn about the Lighting Efficiency program? (**DO NOT READ CATEGORIES; ENTER ALL THAT APPLY**)

- 1 Respondent approached contractor/ESCO/A&E firm/other 3rd party
- 2 Respondent approached utility concerning another matter and learned about the program
- 3 Contacted by utility account manager
- 4 Contacted by contractor/ESCO/A&E firm/other 3rd party
- 5 Utility brochure in mail
- 6 Bill insert
- 7 Word-of-mouth from friends or co-workers within the company
- 8 Word-of-mouth from friends or other business associates outside the company
- 9 Television, radio, newspaper ad
- 10 Magazine or trade journal
- 11 Participation in previous years
- 12 Manufacturer information/suggestion
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA/refused

**(ASK Q.9 IF MORE THAN ONE RESPONSE GIVEN TO Q.8; OTHERWISE, SKIP TO Q.10.)**

**(PN: AUTO ENCODE SINGLE RESPONSE FROM Q.8 INTO Q.9)**

9. Which of these was the most influential on your decision to participate in the 2006-08 Lighting Efficiency program? (**ENTER ONLY ONE CATEGORY; IF NECESSARY, PROMPT WITH RESPONSES GIVEN IN Q.8.**)

**(PROGRAMMER: ONLY SHOW RESPONSES FROM Q.8)**

- 1 Respondent approached contractor/ESCO/A&E firm/other 3rd party
- 2 Respondent approached utility concerning another matter and learned about the program
- 3 Contacted by utility account manager
- 4 Contacted by contractor/ESCO/A&E firm/other 3rd party
- 5 Utility brochure in mail
- 6 Bill insert
- 7 Word-of-mouth from friends or co-workers within the company
- 8 Word-of-mouth from friends or other business associates outside the company
- 9 Television, radio, newspaper ad
- 10 Magazine or trade journal
- 11 Participation in previous years

- 12 Manufacturer information/suggestion
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA/refused

***(ASK EVERYONE)***

10. Why did your company participate in the Lighting Efficiency program?  
***(DO NOT READ CATEGORIES; ENTER ALL THAT APPLY)***

- 1 Acquiring the latest technology
- 2 Saving money on electric bills
- 3 Obtaining a rebate
- 4 Replacing old or broken equipment
- 5 Knowing the program was sponsored by utility
- 6 Improving measure performance for employees and/or customers
- 7 Helping to protect the environment
- 8 Previous experience with other utility programs
- 9 Recommended by utility account managers
- 10 Recommended by contractors
- 11 Participation in previous years
- 12 Part of a broader office remodeling/renovation
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA/refused

***(ASK Q.11 IF MORE THAN ONE RESPONSE GIVEN TO Q.10; OTHERWISE SKIP TO Q.12.)***

11. Which of these was the MOST important reason? ***(ENTER ONLY ONE CATEGORY; IF NECESSARY, PROMPT W/RESPONSES GIVEN IN Q.10.)***  
***(PN: AUTO ENCODE SINGLE RESPONSE FROM Q.10 INTO Q.11)***

- 1 Acquiring the latest technology
- 2 Saving money on electric bills
- 3 Obtaining a rebate
- 4 Replacing old or broken equipment
- 5 Knowing the program was sponsored by utility
- 6 Improving measure performance for employees and/or customers
- 7 Helping to protect the environment
- 8 Previous experience with other utility programs
- 9 Recommended by utility account managers
- 10 Recommended by contractors
- 11 Participation in previous years
- 12 Part of a broader office remodeling/renovation
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA/refused

**(ASK EVERYONE)**

12. Which of the following statements best describes the performance and operating condition of the equipment you replaced as part of the 2006-08 program? **(READ LIST. RECORD ONE RESPONSE)**

- 1 New equipment installed did NOT replace pre-existing equipment
- 2 Replaced equipment was fully functional
- 3 Replaced equipment was functioning, but with significant problems
- 4 Replaced equipment had failed or did not function
- 99 **(DO NOT READ)** DK/NA

13. What type of company, if any, did you use to design or install the measures you had installed under the Lighting Efficiency program? **(READ LIST IF NECESSARY)**

- 1 Contractor or electrician **(ASK Q.14 & 15)**
- 2 Engineering firm **(ASK Q.14 & 15)**
- 3 Energy services firm **(ASK Q.14 & 15)**
- 4 Lighting design firm **(ASK Q.14 & 15)**
- 5 Lighting design store **(SKIP TO Q.19a)**
- 6 Home improvement center **(SKIP TO Q.19a)**
- 7 Local hardware store **(SKIP TO Q.19a)**
- 96 External other (SPECIFY:) \_\_\_\_\_ **(ASK Q.14& 15)**
- 97 Internal Staff (SPECIFY:) \_\_\_\_\_ **(SKIP TO Q.19a)**
- 98 Other (SPECIFY:) \_\_\_\_\_ **(SKIP TO Q.19a)**
- 99 DK/refused **(SKIP TO Q.19a)**

14. Had you worked with this provider before your participation in the program?

- 1 Yes
- 2 No
- 99 DK/NA

16. What factors were important in accepting the proposal you chose for this work? **(DO NOT READ LIST. RECORD ALL RESPONSES.)**

- 1 Needed urgent/immediate replacement
- 2 Timeliness of response (not urgent/immediate)
- 3 Lower price/up-front cost
- 4 Lower maintenance cost
- 5 Ability to get rebate/incentive
- 6 Worked with contractor before/prior experience
- 7 Contractor seemed easier to do business with
- 8 Contractor reputation/referral

- 9 Equipment reputation/recommendation
- 10 Higher efficiency level
- 11 Better non-energy (comfort, quality) performance
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA

17. Did you review equipment or materials that offered different levels of energy efficiency, when deciding which specific equipment or materials to install?

- 1 Yes, reviewed different efficiency levels
- 2 No, did NOT review different efficiency levels
- 99 DK/NA

18a. On a scale of 0 to 10 with 0 being not at all important and 10 being extremely important, how important was the input from the provider you worked with in deciding which specific equipment to install?

Record score 0 to 10 # \_\_\_\_\_  
99 DK/NA

18b. On the same scale, how important was the input from the provider you worked with in deciding to participate in the 2006-08 program?

Record score 0 to 10 # \_\_\_\_\_  
99 DK/NA

#### **NET-TO-GROSS QUESTIONS:**

***(ASK EVERYONE:)***

19a. When did you first learn about the Lighting Efficiency Program? Was it BEFORE or AFTER you first began to think about implementing the measures you installed?

- 1 Before (***SKIP TO Q.19c***)
- 2 After (***ASK Q.19b***)
- 99 Don't Know (***ASK Q.19c***)

19b. Did you learn about the Lighting Efficiency Program BEFORE or AFTER you decided to implement the specific measures you eventually installed?

- 1 Before
- 2 After
- 99 Don't Know/refused

***(READ: PROGRAM DESCRIPTION:)***

19c. The Lighting Efficiency Program promotes energy efficiency improvements in commercial/industrial facilities. I'm going to ask you to rate the importance of the program as well as other factors that might influence your decision to implement the lighting measures you implemented. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 10, where 0 means not at all important and 10 means very important, so that an importance rating of 8 shows twice as much influence as a rating of 4.

Now, using this 0 to 10 rating scale, where 0 means "Not at all important" and 10 means "Very important," please rate the importance of each of the following in your decision to implement the lighting measures you implemented at this time. **(RECORD 0 to 10, 99=DK/NA)**

<b>(ROTATE)</b>	<b>Not At All Important</b>										<b>Very Impo</b>
a. The age or condition of the old equipment.....	0	1	2	3	4	5	6	7	8	9	
b. Availability of the Lighting Efficiency Program rebate .....	0	1	2	3	4	5	6	7	8	9	
c. Information provided through a recent feasibility study, energy audit or other type of technical assistance provided through any of the Xcel Energy programs .....	0	1	2	3	4	5	6	7	8	9	
d. Recommendation from a vendor/supplier .....	0	1	2	3	4	5	6	7	8	9	
e. Previous experience with the lighting measures you installed?.....	0	1	2	3	4	5	6	7	8	9	
f. Previous experience with Lighting Efficiency Program? .....	0	1	2	3	4	5	6	7	8	9	
g. Information from Lighting Efficiency Program or Xcel Energy? .....	0	1	2	3	4	5	6	7	8	9	
h. A recommendation from an auditor or consulting engineer .....	0	1	2	3	4	5	6	7	8	9	
i. <b>Standard practice in our business/industry</b> ....	0	1	2	3	4	5	6	7	8	9	
j. Endorsement or recommendation by Lighting Efficiency staff or vendor.....	0	1	2	3	4	5	6	7	8	9	
k. Endorsement or recommendation by Xcel Energy representative .....	0	1	2	3	4	5	6	7	8	9	
l. <b>Corporate policy or guidelines</b> .....	0	1	2	3	4	5	6	7	8	9	
m. <b>Payback on the investment</b> .....	0	1	2	3	4	5	6	7	8	9	
n. And is there anything else that I may have missed? (SPECIFY) .....	0	1	2	3	4	5	6	7	8	9	

Now I would like you to think about the action you would have taken with regard to the installation of this equipment if the Lighting Efficiency program had not been available.

19d. Regarding the installation of this equipment, if the program had not been available, what is the likelihood that you would have installed exactly the same item/equipment, using a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely"?

\_\_\_\_\_ **(RECORD SCORE 0 TO 10)**

99 Don't know/Refused

***(IF Q.19d IS GREATER THAN 0, ASK Q.19h. OTHERWISE SKIP TO Q.19e)***

19h. You indicated in your response to the previous question that there was an **(RESPONSE TO Q.19d)** in 10 likelihood that you would have installed the same equipment if the Lighting Efficiency Program had not been available. When do you think you would have installed this equipment? Please express your answer in months.

- 1 At the same time
- 2 Within **(INSERT MONTHS)** \_\_\_\_\_
- 3 Never
- 99 Don't know

19e Did you consider any alternatives to the lighting measures (installed/removed) with the rebate from the Lighting Efficiency Program which you would have implemented in the same time frame if the rebate had not been available?

- 1 Yes **(ASK Q.19f & 19g)**
- 2 No **(SKIP TO INSTRUCTION BEFORE Q.20)**
- 99 Don't know **(SKIP TO INSTRUCTION BEFORE Q.20)**

19f. Please describe the alternative which you most likely would have installed if the Lighting Efficiency Program had not been available. Please be as specific as possible and include both efficiency level and quantities. **(RECORD VERBATIM)**

---

19g. In the absence of the rebate from the Lighting Efficiency Program, is it more likely that you would have done nothing or is it more likely that you would have installed the alternative that you just described?

- 1 Installed the Alternative just described
- 2 Done nothing
- 99 Don't know

***(IF RESPONDENT HAS DIFFICULTY SPECIFYING ANSWER IN MONTHS, READ:)*** Would it have been... ***(READ LIST)***

- 1 Within 6 months?
- 2 6 months to 1 year later

- 3 1 - 2 years later
- 4 2 - 3 years later?
- 5 3 - 4 years later?
- 6 4 or more years later
- 99 Don't know

### ***ADDITIONAL DECISION MAKER QUESTIONS***

#### **PAYBACK BATTERY**

***(TO GET THE PAYBACK QUESTION, Q.19c ITEM M HAS TO BE GREATER THAN 5 AND BE GREATER THAN OR EQUAL TO EACH AND ALL OF THE RESPONSES TO Q.19c items b,c,f,g,j,k)***

20. On a 0 to 10 scale with 0 being not at all important and 10 being extremely important. How important was the financial incentives you received in making the project meet the payback criteria your company requires before making investments?

\_\_\_\_\_ (***RECORD SCORE 0 TO 10***)  
99 Don't know/Refused

#### **CORPORATE POLICY BATTERY**

***(TO GET THE POLICY QUESTION Q.19c ITEM L HAS TO BE GREATER THAN 5 AND BE GREATER THAN OR EQUAL TO EACH AND ALL OF THE RESPONSES TO Q.19c items b,c,f,g,I,j,k)***

21. Does your organization have a corporate environmental policy to reduce environmental emissions or energy use? Some examples would be to "buy green" or use sustainable approaches to business investments.

- 1 Yes (***ASK Q.22***)
- 2 No (***SKIP TO INSTRUCTION BEFORE Q.24***)
- 99 Don't know (***SKIP TO INSTRUCTION BEFORE Q.24***)

22. What specific corporate policy influenced your decision to adopt or install MEASURE? (***RECORD VERBATIM***)

---

- 22a. Is your company's policy the same whether there is or is not incentives available for energy efficiency?

- 1 Yes

- 2 No  
99 Don't know
- 22b. Had that policy caused you to adopt the lighting measures at this facility before participating in this Program?
- 1 Yes  
2 No
23. Which was more important in your decision to implement the specific measure(s) that that was(were) eventually adopted or installed; the Lighting Efficiency Program incentives and other features or your corporate policy?
- 1 Lighting Efficiency Program  
2 Corporate Policy  
3 Both equally important  
99 Don't know

**STANDARD PRACTICE BATTERY**

***(TO GET THE STANDARD PRACTICE QUESTIONS, Q.19c ITEM i HAS TO BE GREATER THAN 5 AND BE GREATER THAN EACH AND ALL OF THE RESPONSES TO Q.19C ITEMS b,c,f,g,j,k)***

24. Approximately, how long has the lighting measures you received rebates for been standard practice in your industry?  
***(READ LIST IF NECESSARY)***
- 1 Less than 1 yr  
2 1-2 years  
3 3-4 years  
4 5-6 years  
5 More than 6 years  
99 Don't know
25. Does your company ever deviate from the standard practice?
- 1 Yes  
2 No  
99 Don't know
26. Under what conditions does your company deviate? ***(RECORD VERBATIM)***

27. Does the practice deviate if there is or is not energy efficiency rebates available?
- 1 Yes
  - 2 No
  - 99 Don't know
28. Which was more important in your decision to implement the specific measure(s) that that was(were) eventually adopted or installed; the Lighting Efficiency Program incentives and other features or your industry's standard practice?
- 1 Lighting Efficiency Program
  - 2 Industry's standard practice
  - 3 Both equally important
  - 99 Don't know

***(ASK EVERYONE)***

**PROGRAM SATISFACTION**

29. Next I'm going to ask a few questions about your 2006-08 Lighting Efficiency program experience, both with Xcel Energy, as well as with a design or installation firm if you used one. First, would you say that the overall program experience with Xcel Energy was ... ***(READ LIST)?***
- 1 Much better than you expected ***(SKIP TO Q.31)***
  - 2 Somewhat better than you expected ***(SKIP TO Q.31)***
  - 3 About as expected ***(SKIP TO Q.31)***
  - 4 Somewhat worse than expected, or ***(ASK TO Q.30)***
  - 5 Much worse than expected ***(ASK TO Q.30)***
  - 99 ***(DO NOT READ)*** DK/NA ***(SKIP TO Q.31)***
30. What happened that caused you to find the program experience worse than you expected?
- 1 Took too long to be paid
  - 2 The application was complicated, took too long to complete
  - 3 Getting help or answers from Xcel Energy was hard
  - 4 Finding products that qualified was difficult
  - 5 I had problems with the inspectors
  - 6 Other (SPECIFY)
  - 99 DK/NA

***(ASK EVERYONE:)***

31. Compared to the equipment or system you had before, has the performance of the new equipment or system been ... (**READ LIST**)

- 1 Much better than you expected (**SKIP TO Q.34**)
- 2 Somewhat better than you expected (**SKIP TO Q.34**)
- 3 About as expected (**SKIP TO Q.34**)
- 4 Somewhat worse than expected, or (**ASK Q.32**)
- 5 Much worse than expected (**ASK Q.32**)
- 99 (**DO NOT READ**) DK/NA (**SKIP TO Q.36**)

(**ASK EVERYONE:**)

32. What happened that caused you to find the experience with the equipment you installed to be worse than you expected? (**DO NOT READ LIST**)

- 1 Light intensity is too low
- 2 Light quality/color rendition is not as high as expected
- 3 Lamps flicker
- 4 Lamps take too long to turn on
- 5 Too much glare
- 6 Controllers do not operate as expected
- 7 Do not like the look/style of equipment
- 99 DK/NA

33a. Have you removed any of the equipment that was installed as part of this lighting for any reasons?

- 1 Yes (**ASK Q.33b & Q.33c**)
- 2 No (**SKIP TO Q.34**)
- 99 Don't know (**SKIP TO Q.34**)

33b. What equipment have you removed? (**READ LIST IF NECESSARY. ACCEPT ALL THAT APPLY**)

(**PROGRAMMER: SHOW ONLY MENTIONS IN Q.4**)

- 8 Super T-8's
- 9 Standard T-8's
- 1 High-bay T8's
- 3 High-bay T5's
- 5 Hardwired CFL's
- 6 Metal Halide & High Pressure Sodium Fixtures
- 7 LED's
- 97 Other
- 98 Have NOT YET installed measures
- 99 DK/refused

33c. Why did you remove this equipment? (**ACCEPT ALL THAT APPLY**)

**(ASK EVERYONE:)**

- 1 Aesthetics
- 2 Lamp performance
- 3 Lamp quality
- 4 Remodeling
- 5 Change in function
- 99 Don't know

**(ASK EVERYONE:)**

34. Has your experience with the program increased, decreased, or had no impact on your confidence that energy-efficient investments will reduce your energy bills?

- 1 Increased
- 2 Decreased
- 3 Had no impact
- 99 DK/NA

35. On a scale of 0 to 10 with 0 being not at all likely and 10 being extremely likely, please rate how likely will you be to actively consider energy-efficient products when installing or replacing energy-using products for your business in the future?

\_\_\_\_\_ (**RECORD SCORE 0 TO 10**)  
99 DK/NA

36. On a scale of 0 to 10 with 0 being not at all important and 10 being extremely important, please rate the importance of your 2006-08 program experience in influencing your likelihood of considering energy efficiency in the future.

\_\_\_\_\_ (**RECORD SCORE 0 TO 10**)  
99 DK/NA

**Spillover Questions**

37. Since receiving the lighting rebate, have you installed additional lighting equipment at your facilities for which you did not receive the rebate?

- 1 Yes (**ASK Q.38**)
- 2 No (**SKIP TO Q.40**)
- 99 Don't know (**SKIP TO Q.40**)

**(ASK Q.38 FOR EACH ITEM MENTIONED IN Q.4)**

38. How many additional units of the following lamp types have you installed that did not receive rebates? How many additional **(INSERT ITEM)** have you installed? **(RECORD NUMBER)**

**(PROGRAMMER: INCLUDE IN LIST ONLY THOSE MEASURES THAT WERE MENTIONED IN Q.4)**

- Super T-8's..... \_\_\_\_\_
- Standard T-8's..... \_\_\_\_\_
- High-bay T8's ..... \_\_\_\_\_
- High-bay T5's ..... \_\_\_\_\_
- Hardwired CFL's ..... \_\_\_\_\_
- Metal Halide & High Pressure Sodium Fixtures .. \_\_\_\_\_
- LED's ..... \_\_\_\_\_
- Other..... \_\_\_\_\_
- Have NOT YET installed measures..... \_\_\_\_\_
- DK/refused ..... \_\_\_\_\_

**(ASK Q.39 IF RESPONSE TO ANY ITEM IN Q.38 > 0. OTHERWISE SKIP TO Q.40)**

39. What is the reason that you did not receive a rebate? **(DO NOT READ LIST)**

- 1 I just chose not to
- 2 Too much work or trouble to fill out rebate forms?
- 3 I was in a hurry to complete work?
- 4 Other, specify
- 99 Don't know/Refused

**Classification Data**

**(ASK EVERYONE)**

40. Which of the following best describes the business type at the location where the lighting measure that received the rebate was installed? **(READ LIST)**

- 1 Chemicals, Allied Products
- 2 Educational Services
- 3 Health Services
- 4 Restaurants/Other Food
- 5 Retail Other
- 6 Manufacturing
- 7 Wholesale
- 8 Public Admin

- 9 Other Services
- 10 Miscellaneous/Unidentified
- 11 Finance/Insurance/Real Estate
- 12 Utilities/Transportation
- 13 General merchandise stores
- 14 Agriculture
- 16 General office/Office building
- 15 Something else (SPECIFY)
- 99 Don't know

41. What kind of premise is this? Is it...(**READ LIST**)?

- 1 Part of a bldg
- 2 1 building, single footprint
- 3 1 building w/multiple footprints
- 4 Small multi-building
- 5 Multi building campus
- 98 Something else (Specify)

42. What is the total occupied floor area of this premise excluding enclosed parking garage area? (**PROBE FOR BEST ESTIMATE. RECORD SQUARE FEET.**)

\_\_\_\_\_ ft

42a. If the premise has an enclosed parking garage, approximately what is the floor area?

\_\_\_\_\_ ft

99 No parking garage

(IF Q.41 = 1 or 2, SKIP TO Q.44)

43. How many buildings are part of this premise?

\_\_\_\_\_

44. Is this premise owner-occupied or leased?

- 1 Owner Occupied
- 2 Leased

45. What year was this business established at (ADDRESS FROM SAMPLE)?

RECORD YEAR: \_\_\_\_\_

46. How many full-time equivalent employees work at this premise?

RECORD NUMBER: \_\_\_\_\_

Those are all of my questions. So that we can send you your \$25 honorarium for participating in this survey, could I please verify the spelling of your first and last name and you mailing address.

NAME: \_\_\_\_\_

ADDRESS1: \_\_\_\_\_

ADDRESS2: \_\_\_\_\_

CITY: \_\_\_\_\_

STATE: \_\_\_\_\_

ZIP: \_\_\_\_\_

**Thank you for your time and help and have a nice day.**

### **Supplemental Question**

*In your earlier responses you mentioned [insert ranking rival factors] as being important factors in your decision to install the lighting project we discussed. Using a 0 to 10 rating scale where 0 means Lighting Program was much less important and 10 means Lighting Program was much more important," please rate the overall importance of the Lighting Efficiency Program versus these other factors, we just mentioned, in your decision to implement the lighting project.*

## Appendix B: Nonparticipant Survey

#04-1706



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### XCEL ENERGY COLORADO LIGHTING EFFICIENCY

### PROGRAM NON-PARTICIPANT PROCESS EVALUATION SURVEY

– SCREENER/MAIN QUESTIONNAIRE –

– CATI –

***INCLUDE ALL SCREENER INFORMATION IN PROGRAM***

***(IF PROGRAM CONTACT IN SAMPLE, USE THE FOLLOWING WORDING:)***

- 1a. Hello, this is **(INTERVIEWER NAME)** calling from Data Development Worldwide on behalf of Xcel Energy May I please speak with **(PROGRAM CONTACT)**? **(IF NEEDED:)** My understanding is that **(PROGRAM CONTACT)** is responsible for making energy-related decisions for your firm at this location – may I please speak with him/her?

***(IF NO PROGRAM CONTACT IN USE THE FOLLOWING WORDING:)***

- 1b. Hello, this is **(INTERVIEWER NAME)** calling from Data Development Worldwide on behalf of Xcel Energy. I would like to speak with the person most knowledgeable about your participation in the Xcel Energy lighting program for your firm at this location.

- 1c. DELETED

***(IF NEEDED)***

- 1d. This is a very important fact-finding survey among firms that have participated recently in an energy efficiency program sponsored by Xcel Energy. We are NOT interested in selling anything, and responses will not be connected with your firm in any way. Xcel Energy wants to understand how businesses think about and manage their energy consumption.

***(IF NEEDED)***

- 1e. ***(PROVIDE XCEL Energy CONTACT NAME AND PHONE DISPLAYED BELOW IF RESPONDENT ASKS.)***

Carla Hahn, Lighting Efficiency Program Manager, 303-294-2696

***(RECORD OUTCOME OF Q.1a-1e HERE)***

- 1 Current individual is best contact ***(ASK Q.2)***
- 2 Transferred to best contact ***(ASK Q.2)***
- 3 Given best contact's name and number Record for future contact  
***(RECORD FOR FUTURE CONTACT)***
- 99 Don't know/refused ***(THANK AND TERMINATE)***

***(WHEN CORRECT RESPONDENT IS ON-LINE (REPEAT AS NEEDED WHEN CURRENT INDIVIDUAL IS BEST CONTACT)***

2. Hello, this is ***(INTERVIEWER NAME)*** calling from Data Development Worldwide, a national energy market research firm. Today we're conducting a very important survey on behalf of Xcel Energy It should take less than 10 minutes. It's an important opportunity to make sure your views are represented. We believe you'll find it quite interesting.

Can I confirm that you're responsible for making energy-related decisions for your firm at this location?

***(IF NEEDED:)***

This is a fact-finding survey only – we are NOT interested in selling anything, and responses will not be connected with your firm in any way. Xcel Energy wants to understand how businesses think about and manage their energy consumption. ***(IF NEEDED: PROVIDE Xcel Energy CONTACT NAME AND PHONE)***

***(RECORD OUTCOME OF Q.2)***

- 1 Current individual is best contact ***(ASK Q.3)***
- 2 Transferred to best contact ***(REPEAT Q.2 W/BEST CONTACT)***
- 3 Given best contact's name and number Record for future contact  
***(RECORD FOR FUTURE CONTACT)***
- 99 Don't know/refused ***(THANK & TERMINATE)***

**PROGRAM AWARENESS, SOURCES OF AWARENESS, AND PARTICIPATION**

3. First, we'll be talking about the topic of energy efficiency at your business – specifically, different changes your firm may have made in lighting equipment, or changes you could make, that will help your firm save energy. In 2006-08 did your firm participate in the Xcel Energy Lighting Efficiency program at this location? *(IF NEEDED:)* This is a program where your business received a rebate for installing one or more energy-efficient lighting products covered under the program.

- 1 Yes, participated in Lighting Efficiency as described *(TERMINATE)*  
 4 NO, did NOT participate in Lighting Efficiency program *(ASK Q.4)*  
 5 NO, did NOT receive rebate (but did participate in program) *(ASK Q.4)*  
 99 DK/refused *(ASK Q.4)*

*(ASK EVERYONE)*

4. What specific lighting fixtures do you recall installing during 2006 to 2008? *(READ LIST) (RECORD ALL MENTIONS. PROBE AS NEEDED FOR CLARITY REGARDING MOST APPROPRIATE RESPONSE CATEGORY.)*

- 8 Replaced T-12's with Super T-8's  
 9 Replaced T-12's with Standard T-8's  
 1 Installed High-bay T8's  
 3 Installed High-bay T5's  
 5 Installed Hardwired CFL's  
 6 Installed Metal Halide & High Pressure Sodium Fixtures  
 7 Installed LED's  
 97 Other (Specify?) \_\_\_\_\_  
 98 *(DO NOT READ)* Have NOT YET installed measures *(TERMINATE)*  
 99 *(DO NOT READ)* DK/refused

- 5a. Have you changed any of the ballasts at your facility in the last two years?

- 1 Yes (ASK Q.5b)  
 2 No (SKIP TO Q.5c)  
 99 DK/NA (SKIP TO Q.5c)

- 5b. What was the ballast factor of the units you installed?

## RECORD VERBATIM

99 DK/NA

5c. Have you received any rebates from Xcel Energy for any of these installations?

- |        |  |              |
|--------|--|--------------|
| 1      | Yes, have received rebate check(s)                     | ASK Q5d      |
| 2      | No, have not received rebate check(s)                  | SKIP TO Q5e  |
| 3      | * Don't recall/didn't know there was a rebate involved | SKIP         |
| TO Q5e |  |              |
| 5      | Contractor received rebate check                       | SKIP TO Q5e  |
| 99     | DK/refused   | SKIP TO Q.5e |

5d. Are you certain you received a rebate from Xcel Energy for these lighting measures?

- |    |       |           |
|----|-------|-----------|
| 1  | Yes   | TERMINATE |
| 2  | No    | ASK Q5e   |
| 99 | DK/NA | ASK Q5e   |

5e. What was the primary reason for installing the new lighting?

- |    |                                  |
|----|----------------------------------|
| 1  | Renovate/remodel                 |
| 2  | New facility                     |
| 3  | Old lighting needed replacing    |
| 4  | Vendor/contractor recommendation |
| 5  | Management recommendation        |
| 6  | Energy Efficiency                |
| 88 | Other                            |
| 99 | DK/NA                            |

6a. Have you participate in any OTHER energy efficiency programs offered by Xcel Energy, in 2006-08?

- |    |                                    |
|----|------------------------------------|
| 1  | Yes ( <i>ASK Q.6b</i> )            |
| 2  | No ( <i>SKIP TO Q.7a</i> )         |
| 99 | DK/Refused ( <i>SKIP TO Q.7a</i> ) |

*(ASK EVERYONE)*

7a. Besides participating in Lighting Efficiency or any other Xcel Energy programs in 2006-08, did your firm participate in any Xcel Energy energy efficiency programs prior to 2006, at this location?

- |    |                                |
|----|--------------------------------|
| 1  | Yes ( <i>ASK Q.7c</i> )        |
| 2  | No ( <i>ASK Q.7c</i> )         |
| 99 | DK/Refused ( <i>ASK Q.7c</i> ) |

7c Prior to today had you ever heard of Xcel Energy's Business Lighting Efficiency Program?

- 1 Yes ASK Q7d
- 2 No SKIP TO Q8c
- 99 DK/NA SKIP TO Q8c

7d What features have you heard about?

- 1 Rebates for lighting
- 2 Custom design support
- 3 Information and/or training
- 4 Other, specify
- 99 DK/NA

8. How did you learn about the Lighting Efficiency program? (***DO NOT READ CATEGORIES; ENTER ALL THAT APPLY***)

- 1 Respondent approached contractor/ESCO/A&E firm/other 3rd party
- 2 Respondent approached utility concerning another matter and learned about the program
- 3 Contacted by utility account manager
- 4 Contacted by contractor/ESCO/A&E firm/other 3rd party
- 5 Utility brochure in mail
- 6 Bill insert
- 7 Word-of-mouth from friends or co-workers within the company
- 8 Word-of-mouth from friends or other business associates outside the company
- 9 Television, radio, newspaper ad
- 10 Magazine or trade journal
- 11 Participation in previous years
- 12 Manufacturer information/suggestion
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA/refused

8b. Why have you not participated in the Xcel Energy Lighting Efficiency Program? [do not read, choose multiple answers]

- 1 I forgot to file the rebate
- 2 Rebate process takes too long
- 3 The equipment did not qualify for rebate
- 4 My contractor advised against it.
- 5 Current lighting is sufficient
- 6 Not budgeted
- 7 Too expensive to replace equipment at this time

- 8 I had not heard about the program
- 9 The eligible equipment was too expensive
- 10 I didn't like the quality of the equipment
- 11 Other, specify
- 99 Don't know

8c. The Xcel Energy Business Lighting Efficiency program provides rebates and technical assistance for businesses that install high efficiency lighting. Rebates range from \$5 to \$9 per lamp for replacing T12 lamps with T8 lamps; all the way up to \$125 for replacing hi bay HID lamps with high bay fluorescents. Now that you have heard of the program, on a scale of 1 to 10 with 1 being very unlikely and 10 being very likely, how likely is it that you will participate in the Lighting Program in the next two years?

- 1 Record score 0 to 10 ASK Q8d if less than 4
- 99 DK/NA SKIP TO Q15b

[If Q8c <4 ask Q8d. OTHERWISE SKIP TO Q15b]

8d. Why have you stated that you are unlikely to participate in the program?

- 1 I do not anticipate changing any lighting in the next two years
- 2 I do not want to install energy efficient lamps
- 3 I rent the facility and do not control; lighting
- 4 I do not want to bother with utility program
- 5 There is no budget to change lighting in the next two years.
- 6 Our company has other priorities at this time
- 7 Lighting represents only a small expense
- 8 Rebate levels are too low or payback is too high
- 9 Other, specify
- 99 Don't know

15b. When you need new lighting for your business where do you go to get equipment and advice?

- 1 Contractor or electrician
- 2 Engineering firm
- 3 Energy services firm
- 4. Lighting design firm
- 5 General/other [SPECIFY:] \_\_\_\_\_
- 6 USE Internal Staff, specify
- 7 Specialty lighting store
- 8 Big box home improvement store
- 9 Local hardware store
- 0 Other, specify
- 99 DK/refused

[If Q4 1 through 7 any of them = yes, then ask; otherwise skip to Q18c]

16 In the lighting projects you mentioned having completed in 2006-08, what factors were important in selecting the equipment you chose to install?  
(***DO NOT READ LIST. RECORD ALL RESPONSES.***)

- 1 Needed urgent/immediate replacement
- 2 Timeliness of response (not urgent/immediate)
- 3 Lower price/up-front cost
- 4 Lower maintenance cost
- 5 Ability to get rebate/incentive
- 6 Worked with contractor before/prior experience
- 7 Contractor seemed easier to do business with
- 8 Contractor reputation/referral
- 9 Equipment reputation/recommendation
- 10 Higher efficiency level
- 11 Better non-energy (comfort, quality) performance
- 98 Other (SPECIFY:) \_\_\_\_\_
- 99 DK/NA

17. Did you review equipment or materials that offered different levels of energy efficiency, when deciding which specific equipment or materials to install?

- 1 Yes, reviewed different efficiency levels
- 2 No, did NOT review different efficiency levels
- 99 DK/NA

18a. On a scale of 0 to 10 with 0 being not at all important and 10 being extremely important, how important was the input from the provider you worked with in deciding which specific equipment to install?

Record score 0 to 10 # \_\_\_\_\_  
99 DK/NA

[If Q4 1 through 7 all are = no, then ask Q18c. OTHERWISE SKIP TO Q21

18c. If your building required a lighting equipment change. what factors would be important in selecting the equipment you choose to install? [RECORD ALL RESPONSES.]

- 1 Need for urgent/immediate replacement
- 2 Timeliness of response (not urgent/immediate)
- 3 Lower price/up-front cost
- 4 Lower maintenance cost

- 5 Ability to get rebate/incentive
- 6 Worked with contractor before/prior experience
- 7 Contractor seems easier to do business with
- 8 Contractor reputation/referral
- 9 Equipment reputation/recommendation
- 10 Higher efficiency level
- 11 Better non-energy (comfort, quality) performance
- 12 Payback period
- 88 Other [SPECIFY:] \_\_\_\_\_
- 99 DK/NA

**(ASK EVERYONE)**

21. Does your organization have a corporate environmental policy to reduce environmental emissions or energy use? Some examples would be to "buy green" or use sustainable approaches to business investments.

- 1 Yes (*ASK Q.22aa*)
- 2 No (*SKIP TO Q.35*)
- 99 Don't know (*SKIP TO Q.35*)

22aa. Does it include any requirements on the type of lighting that you need to install?

- 1 Yes ASK Q22ab
- 2 No SKIP TO Q22a
- 99 DK/Refused SKIP TO Q22a

22ab What are the specifics of that policy?

- 1 RECORD VERBATIM ASK Q22a
- 99 Don't know ASK Q22a

22a. Is your company's policy the same whether there is or is not incentives available for energy efficiency?

- 1 Yes SKIP TO Q35
- 2 No SKIP TO Q35
- 99 Don't know SKIP TO Q35

35. On a scale of 0 to 10 with 0 being not at all likely and 10 being extremely likely, please rate how likely will you be to actively consider energy-efficient products when installing or replacing energy-using products for your business in the future?

\_\_\_\_\_ (**RECORD SCORE 0 TO 10**)  
99 DK/NA

### Classification Data

(**ASK EVERYONE**)

40. Which of the following best describes the business type at the location where the lighting measure that received the rebate was installed? (**READ LIST**)

- 1 Chemicals, Allied Products
- 2 Educational Services
- 3 Health Services
- 4 Restaurants/Other Food
- 5 Retail Other
- 6 Manufacturing
- 7 Wholesale
- 8 Public Admin
- 9 Other Services
- 10 Miscellaneous/Unidentified
- 11 Finance/Insurance/Real Estate
- 12 Utilities/Transportation
- 13 General merchandise stores
- 14 Agriculture
- 16 General office/Office building
- 15 Something else (SPECIFY)
- 99 Don't know

41. What kind of premise is this? Is it...(**READ LIST**)?

- 1 Part of a bldg
- 2 1 building, single footprint
- 3 1 building w/multiple footprints
- 4 Small multi-building
- 5 Multi building campus
- 98 Something else (Specify)

42. What is the total occupied floor area of this premise excluding enclosed parking garage area? (**PROBE FOR BEST ESTIMATE. RECORD SQUARE FEET.**)

\_\_\_\_\_ ft

42a. If the premise has an enclosed parking garage, approximately what is the floor area?

\_\_\_\_\_ ft  
99 No parking garage

(IF Q.41 = 1 or 2, SKIP TO Q.44)

43. How many buildings are part of this premise?

\_\_\_\_\_

44. Is this premise owner-occupied or leased?

1 Owner Occupied

2 Leased

45. What year was this business established at this location?

RECORD YEAR: \_\_\_\_\_

46. How many full-time equivalent employees work at this premise?

RECORD NUMBER: \_\_\_\_\_

Those are all of my questions.

**Thank you for your time and help and have a nice day.**

## Appendix C: Peer Utility Interview Guide

### QUESTIONS FOR PROGRAM MGRS

#### INTRO

*Important to stress: I am interested in your lighting rebate program -- not custom lighting at this point.*

#### GENERAL

Briefly, what is your role and how long have you been in this position?

Does the utility implement the program internally?

Do you coordinate any program activities or documentation with other utilities in your region or state or a community based organization?

#### PROCESS

Briefly, what is the process for a customer to participate in your program?

#### *Probes:*

Does this program contain a pre-approval process? Is there a pre-application?

Do you require a pre-installation inspection and, if so, who completes it?

Who submits an application -- the customer or a contractor?

Is there any direct interaction between the customer and the PUD?

May I get a copy of your rebate application form so that I can get an idea for the level of detail you require?

Do you require detailed invoices to accompany the application?

#### TRADE ALLY STRATEGY

Briefly, what is the role of trade allies?

How does the program add value to the businesses of contractors?

How do you communicate these benefits to contractors?

#### *Probes:*

Who is the first point-of-contact with contractors?

Do you keep a list of approved contractors? If yes, how does a contractor get on the list?

What do contractors have to do to STAY on the list?

What sorts of concerns/questions do you hear from contractors?

How do you engage trade allies? Monthly/quarterly breakfasts, educational seminars, etc.

Do you host trade ally meetings?

○ If yes, what are these meetings about?

○ If no, why not?

Can you describe the training process?

○ Contents?

○ Certification?

- How many training sessions?
- Who is responsible for developing training materials, hosting meetings, keeping in touch with contractors, etc?

### **Q/C and INSPECTIONS**

How would you characterize your Quality Control and Inspection Process?

*Probes:*

What are your QC protocols?

What types of inspections do you do?

- When during the process?
- Who?
- Third-party?
- Pre and post?
- What % of jobs do you inspect?
- Protocols for new contractors?

What types of results have you found from your Q/C process?

Do you perform billing analyses?

Is a post-installation inspection required and, if so, who completes this inspection?

What percent of installations are inspected?

Do you verify hours-of-use assumptions with lighting loggers?

### **INCENTIVES AND ELIGIBILITY**

How do you determine incentive levels?

Are there minimum and/or maximum project sizes that limit customer eligibility?

*Probes:*

May I get a copy of your rebate list and corresponding incentives?

How do new technologies get added to the eligible list?

Are there any additional technologies that you are considering adding to your program? If yes please describe.

In terms of eligibility, are there any criteria for (1) size or type of customer, or (2) size or type of project?

### **FREE RIDERSHIP**

Regarding free ridership, have you made any estimates for your program?

### **MARKETING**

How would you characterize your overall marketing strategy?

*Probes:*

What is the role of Trade Allies in marketing this program?

What else could Trade Allies do to increase participation in the program?

Are there any marketing materials that you have developed for this program that you might be able to send to me?

**Wrap-up**

Can you think of anything that distinguishes your program from others?

What lessons learned would you offer up for someone designing a new program for implementation?

Is there anything else you think I would be interested in knowing about your program that I've not already asked about?

## Appendix D: Internal Staff Interview Guide

### Xcel Colorado Lighting Program Evaluation Process Interview Questions

1. Briefly, what are your roles and responsibilities within the company and with the CO Prescriptive Business Lighting Efficiency program?
2. Are you familiar with the goals of the program? If yes, how were you informed regarding these goals? What are the goals and objectives for this program?
  - a. KW (demand savings/peak demand reduction)
  - b. KWh (energy savings/carbon footprint/etc.)
  - c. other?
3. Please provide an overview of how this program operates, including your role within the implementation process.
  - a. Marketing
  - b. Applications
  - c. Q/C (quality control (??))
  - d. Payment
  - e. Other
4. What are the significant risks that potentially affect the success of this program?
  - a. Technical / economic risks?
  - b. Market risks?
  - c. Organizational risks?
5. What are your thoughts regarding the rebate and application processes?
6. How do you view the role of our trade allies, and how are you involved with these relationships? How are these relationships managed?
  - a. Are these relationships leveraged effectively?
  - b. How could these relationships be improved?
  - c. Are there any types of trade allies that are particularly attracted to this program? Are there other types that avoid this program?
  - d. What are the major issues voiced by trade allies?
7. What steps are taken to:

- a. Ensure reliability of estimated operating hours?
  - b. Minimize free ridership?
  - c. Maximize the participation level?
  - d. Ensure consistency within the process?
  - e. Inform vendors/customers/Account Managers?
8. What types of support exist to help customers identify EE opportunities?
- a. Do customers take advantage of these opportunities?
  - b. Do Account Managers take advantage of these opportunities?
  - c. Are there ways that you see to improve this information for customers?
9. What concerns, if any, do you have regarding the rebate levels?
10. What types of reporting mechanisms are in place (internal and/or external)?
- a. Are these reports sufficient for management purposes?
  - b. Are there any issues with data quality?
  - c. Are there additional types of information that you would like to have ?
  - d. How accessible and current is the data?
  - e. How effective is current data as a tool to track lighting program contacts/opportunities?
11. What factors, if any, impede or limit the future success of this program?
- a. Scalability?
  - b. Sustainability?
  - c. Reliability?
12. What are the biggest challenges to the success of the program? (similar to 9, but open-ended)
13. What is your understanding of why a utility offers an energy efficiency program?
14. Is there anything you believe you need to support you in performing your role related to this program more effectively?
15. Do you have any ideas you would like to share on how to improve the program?
16. In your opinion, how does the CO Prescriptive Business Lighting Efficiency program stack up against other CO DSM opportunities that are available?

## Appendix E: Participant Lighting Contractor Interviews

### Xcel Energy Participant Lighting Contractor Interviews

#### SCREENER

*Hello, my name is \_\_\_ and I am calling from EMI in Seattle. We are working with Xcel Energy to evaluate the success of their prescriptive lighting rebate program in Colorado. As part of this evaluation, we have been asked to speak with contractors who have participated in this program in order to solicit feedback based upon their experiences. Are you the best person to speak with about this program?*

If not, note better person, and ask if they are available: \_\_\_\_\_

*Is this a good time to talk about the program? I have a set of questions that should take approximately 10 minutes or so, depending upon your experiences and involvement with the program. All information is kept anonymous, with our job being to synthesize and summarize the range of responses provided to us.*

If cannot talk now, schedule a call back: \_\_\_\_\_ (time / date)

#### BACKGROUND

1a. For background, please tell me what types of services you provide for your clients.

1b. And does your company work outside of the area served by Xcel Energy?

2. When did you first get involved in this program?

#### SATISFACTION

3. And, overall, on a scale of 1-5, with "1" being not at all satisfied, and "5" being extremely satisfied, how satisfied are you with your experiences in this program?

What is your reason for giving it this ranking?

#### TECHNOLOGIES

4. Using the same 1-5 scale, how satisfied are you with the range of lighting technologies that are included in this program?

What is your reason for giving this ranking?

5. Are there any technologies that you would recommend adding to the list of eligible lighting technologies?

None  
Specify:

And Why?

### **APPLICATION PROCESS**

6. Using the same scale of 1-5, how satisfied are you with the rebate application process for this program?

What is your reason for giving this ranking?

7. What recommendations, if any, would you have for improving the rebate application process?

None  
Specify:

8. Have you experienced an application being returned to you with a request for additional information? If so, what was the nature of the information requested?

None  
Specify:

9. Have you experienced any issues related to documenting ballast factors for the rebate application?

None  
Specify:

10. Have you experienced any issues related to the level of detail required for invoices?

None  
Specify:

11. Are there any times when you might discourage a customer from applying for a rebate?

None  
Specify:

12. Do any of your customers use third-party rebate fulfillment companies (e.g., Real Win-Win, Energy Logic, Coleman-Hines, Prenova). What are your experiences in working with these firms? What sort of influence do they have on equipment specs?

None

Specify: (track any problems by the company involved)

## MARKETING

13. How do you market lighting projects to customers, generally?

14. How do you use the program in this marketing process?

Please describe:

15. On a scale of 1-5, with 1 being "not at all aware" and 5 being "extremely aware," how aware are customers of energy efficient lighting options?

Fluorescent T8 lamps with electronic ballasts

Fluorescent Super T8 lamps with electronic ballasts

Fluorescent T5 lamps with electronic ballasts

High-bay fluorescent T8 lamps with electronic ballasts

High-bay fluorescent T5 HO lamps with electronic ballasts

Hardwired compact fluorescent fixtures (CFLs)

Industrial multi-CFL fixtures

Metal halide & high pressure sodium fixtures

Pulse start metal halide fixtures

Reflectors

Occupancy sensors and photocells

LED exits signs

16. Do your customers have purchasing policies in effect for lighting? If so, what types of customers are these? What types of lighting do these policies most commonly specify? (probe re. chains and program impact)

Please describe:

17. Do you work with account executives in relation to this program? If so, how would you characterize this involvement?

18. What, if anything, could Xcel Energy do to promote the program to customers and increase participation?

Please describe:

19. Do you work in other utility service areas with lighting efficiency programs? If so, how do these programs compare to your experiences with Xcel?

### **STOCKING, AVAILABILITY, QUALITY, AND TRENDS**

20. Have you experienced any difficulties in obtaining lighting products that are energy efficient?

None  
Specify:

21. Have you experienced any issues with the quality of energy efficient lighting products available for installation?

None  
Specify:

22. What trends do you see related to lighting equipment choices that customers are making?

Probe: do you notice any trends related to energy efficient lighting equipment?

23. For comparison purposes, how large is your business?

No. employees: \_\_\_\_\_  
Approx. gross annual sales: \_\_\_\_\_

### **NET-TO-GROSS QUESTIONS**

In answering the following questions, please respond based on your business within the area served by Xcel Energy.

N1. In what percent of sales situations/transactions did you recommend energy efficient lighting before you learned about this program?

1. Record percentage  
-8. Don't know  
-9. Refused

N2. In what percent of sales situations/transactions do you recommend energy efficient lighting now that you have worked with the program?

1. Record percentage  
-8. Don't know

-9. Refused

N3. Approximately, what percentage of the dollar volume of your sales of energy efficient lighting in Xcel's service territory are qualifying equipment/ products.

1. Record PERCENTAGE

-8. Don't know

-9. Refused

(IF LESS THAN 100% in N2)

N4. In what situations do you NOT encourage your customers to purchase energy efficient models if they qualify for a rebate? Why is that?

1. RECORD VERBATIM

N5. Of those installations of Energy Efficient Lighting in Xcel Energy service territory that qualify for incentives, approximately what percentage do not receive the incentive?

- 1. record Percentage

- 9 refused

N6. Why do they not receive the incentive? (open end)

1. RECORD VERBATIM

-8. Don't know

-9. Refused

N7. Have you changed your product inventory practices as a result of the Xcel Energy program?

1. Yes [If yes, how? \_\_\_\_\_]

2. No

-8. Don't know

-9. Refused

N8. If you work outside of the area served by Xcel, Do you promote energy efficient models equally in all areas, regardless of whether or not utility incentives are available?

1. Yes

2. No

-8. Don't know

-9. Refused

Do you have any other recommendations or comments about this program?

Thank your for your time and your feedback.

## Appendix F: Non-Participant Lighting Contractor Interviews

### SCREENER

*Hello, my name is \_\_\_ and I am calling from EMI in Seattle. We are working with Xcel Energy to evaluate the success of their prescriptive lighting rebate program in Colorado. As part of this evaluation, we have been asked to speak with in their service area to solicit feedback based upon their experiences. Are you the best person to speak with about this program?*

If not, note better person, and ask if they are available: \_\_\_\_\_

*Is this a good time to talk about the program? I have a set of questions that should take approximately 10 minutes or so, depending upon your experiences. All information is kept anonymous, with our job being to synthesize and summarize the range of responses provided to us.*

If cannot talk now, schedule a call back: \_\_\_\_\_ (time / date)

### BACKGROUND

1. For background, please tell me what types of services you provide for your clients?
2. Are you familiar with the prescriptive lighting program offered by Xcel? (If no, skip to Q5)
3. (If yes) Have you ever participated in this program? If so, when did you first get involved in this program?
4. When did you stop participating in the program?

*(switch drop outs to the participant survey)*

### TECHNOLOGIES

5. Do any of your customers use third-party rebate fulfillment companies (e.g., Real Win-Win, Energy Logic, Coleman-Hines, Prenova). What are your experiences in working with these firms? What sort of influence do they have on equipment specs?

None

Specify: (track any problems by the company involved)

**MARKETING**

6. How do you market lighting projects to customers, generally?

Please describe:

7. On a scale of 1-5, with 1 being “not at all aware” and 5 being “extremely aware,” how aware are customers of energy efficient lighting options? (check rebate list)

High-bay T8's
Super T8's
High-bay T5's
Standard T8's
Hardwired CFL's
Metal Halide & High Pressure Sodium Fixtures
LED's
Other

8. Do your customers have purchasing policies in effect for lighting? If so, what types of customers are these? What types of lighting do these policies most commonly specify? ( probe re. chains and program impact)

Please describe:

9. What, if anything, could Xcel Energy do to promote the program to customers and increase participation?

Please describe:

10. Do you work in other utility service areas with lighting efficiency programs? If so, what has been your experience with these programs?

**STOCKING, AVAILABILITY, QUALITY, AND TRENDS**

11. Have you experienced any difficulties in obtaining lighting products that are energy efficient?

None

Specify:

12. Have you experienced any issues with the quality of energy efficient lighting products on the market?

None

Specify:

13. What trends do you see related to lighting equipment choices that customers are making?

Probe: do you notice any trends related to energy efficient lighting equipment?

14. For comparison purposes, how large is your business?

No. employees: \_\_\_\_\_

Approx. gross annual sales: \_\_\_\_\_

### **NET-TO-GROSS QUESTIONS**

N1. In what percent of sales situations do you recommend energy efficient lighting equipment ?

1. Record percentage

-8. Don't know

-9. Refused

N3. Approximately, what percentage of the dollar volume of your sales of energy efficient lighting in Xcel's service territory are qualifying equipment/ products.

1. Record PERCENTAGE

-8. Don't know

-9. Refused

Is there a reason why you have NOT participated in the Xcel Energy lighting rebate program?

N7. Have you changed your product inventory practices as a result of the Xcel Energy program?

1. Yes [If yes, how? \_\_\_\_\_]

2. No

-8. Don't know

-9. Refused

N8. If you work outside of the area served by Xcel, Do you promote energy efficient models equally in all areas, regardless of whether or not utility incentives are available?

1. Yes
2. No
- 8. Don't know
- 9. Refused

Do you have any other recommendations or comments about this program?

Thank your for your time and your feedback.

## Appendix G: Technical Assumptions

### DEEMED SAVINGS TECHNICAL ASSUMPTIONS

#### Program: Lighting Efficiency

Prescriptive rebates will be offered for replacement lighting equipment. New Construction rebates will be offered for new facilities or spaces overhauled for a new purpose.  
 Custom rebates are available for lighting-related improvements that are not prescriptive.

#### Algorithms:

Electrical Demand Savings (Customer kW)	= ( kW_Base - kW_EE ) x HVAC_cooling_kW_savings_factor
Electrical Energy Savings (Customer kWh/yr)	= ( kW_Base - kW_EE ) x Hrs x HVAC_cooling_kWh_savings_factor
Natural Gas Savings (Dth)	= ( kW_Base - kW_EE ) x Hrs x HVAC_heating_penalty_factor
Lighting Controls -Electrical Energy Savings (Customer kWh/yr)	=(kW connected ) x (1-PAF) x Hrs x HVAC_cooling_kWh_savings_factor
Lighting Controls -Electrical Demand Savings (Customer kW)	=(kW connected) x (1-PAF) x HVAC_cooling_kW_savings_factor
Lighting Controls -Natural Gas Savings (Dth)	=(kW connected) x (1-PAF) x Hrs x HVAC_heating_penalty_factor
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

#### Variables:

Hrs	= Annual Operating Hours. Hours to be obtained from Table 2. The type of facility is to be supplied by the customer.
kW_Base	= Baseline fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 3 is an example of a Standard Fixture information table.

kW_EE	= High Efficiency fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 3 is an example of a Standard Fixture information table.
HVAC_cooling_kWhsavings_factor	= Cooling system energy savings factor resulting from efficient lighting from Table 1. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_cooling_kW savings_factor	= Cooling system demand savings factor resulting from efficient lighting from Table 1. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_heating_kW savings_factor	= Heating system penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has air conditioning. A value of -0.00088738 Dth/kWh given by (Reference 4).
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. CF will be determined based on customer provided building type in table 2.
Measure Life	= Length of time the lighting equipment will be operational, see Table 6 for Measure Lifetimes
Baseline Cost	= Cost of the baseline technology. For Retrofit, the cost is 0 since the baseline is to continue to operate the existing system. For New Construction, the cost is that of the lower efficiency option. Costs given by (Reference 5) and vendors.
High Efficiency Cost	= Cost of the High Efficiency technology. Costs given in Deemed Fixture Table (Reference 4)
kW connected	Total connected fixture load, determined as the sum of stipulated fixture wattages from Deemed Fixture Table.
PAF	Stipulated power adjustment factor based on control type from Table 4.
TDLF	Transmission Distribution Loss Factor = 6.39%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-gross = 96% (Reference 5)
Incremental operation and maintenance cost	= Other annual savings or costs associated with the electrical savings. For Lighting, this consists of additional natural gas for heating. Methodology given by (Reference 4).

**Provided by Customer:**

Number of Fixtures  
Lighting equipment type

**Verified during M&V:**

Yes  
Yes

Building type Yes  
 Existence of air conditioning Yes

**Assumptions:**

- Each replacement lighting fixture is going in on a one-for-one basis for existing fixtures. New construction fixtures are put in on a one-for-one basis instead of lower efficiency options.
- In the Technical Assumptions, one will note that the Operating Hours does not appear, but rather a modified version. The methodology defines kW Savings on the basis of difference in kW with the HVAC Cooling demand factor. The Annual Energy Savings takes into account any heating that has to be added.

**Table 1: HVAC Interactive Factors (Reference 2)**

HVAC system	HVAC_cooling_kWhsavings_factor	HVAC_cooling_kWsavings_factor
Heating only	1.00	1.00
Heating and cooling	1.11	1.33

**Table 2: Coincident Peak Demand Factors and Annual Operating Hours by Building Type (Reference 1 and 3)**

Building Type	CF	Annual Operating Hours
Office	78%	3435
Restaurant	94%	4156
Retail	94%	3068
Grocery/Supermarket	94%	4612
Warehouse	96%	2388
Elemen./Second. School	73%	2080
College	71%	5010
Health	84%	3392
Hospital	84%	4532
Hotel/Motel	51%	2697
Manufacturing	96%	5913
Other/Misc.	96%	2278
24-Hour Facility	94%	8234
Safety or Code Required	96%	8760

**Table 3: Example of T8 Lighting-Reference 6 - Full table in Deemed Fixture Table tab**

Technology	kW
1 Lamp T12	0.039
1 Lamp T8	0.031

**Table 4: Stipulated Power Adjustment Factors (Reference 1 and 7) - Full table in Deemed Fixture Table tab**

Control Type	PAF
no controls	1.00
Occupancy Sensor - Wall Mount	0.70
Occupancy Sensor - Ceiling Mount	0.70
Daylighting - Continuous Dimming	0.57
Daylighting - Multiple Step Dimming	0.65
Daylighting - On/Off	0.73

**Table 5: Total Connected Fixture Wattages (Reference 7) - Full table in Deemed Fixture Table tab**

Connected Fixtures	kW_connected
1 2-lamp T8 32W EL Ballast Fixture	0.058
2 2-lamp T8 32W EL Ballast Fixtures	0.116
3 2-lamp T8 32W EL Ballast Fixtures	0.174
4 2-lamp T8 32W EL Ballast Fixtures	0.232
1 4-lamp T8 32W EL Ballast Fixture	0.112
2 4-lamp T8 32W EL Ballast Fixtures	0.224
3 4-lamp T8 32W EL Ballast Fixtures	0.336
4 4-lamp T8 32W EL Ballast Fixtures	0.448

**Table 6: Measure Lifetimes in Years (Reference 4)**

Measure	Lifetime in Years
CFL less than 19W	5
Low Wattage T8 Lamps	8
Integrated 25W Ceramic Metal Halide	7
T8 Lighting Systems	18
T5 Lighting Systems	18
Lighting Controls	18

**Changes from 2008**

Baseline efficiencies updated. High efficiency values updated. More measures added to program. Cost information updated from various sources. Methodology now looks at market segment rather than a single operating hours value for all participants.

**References**

1. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant. CF and hours
2. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method for Minnesota, presented on page 28 of the 11/93 issue of the ASHRAE Journal - "Calculating lighting and HVAC interactions".
3. Technical Reference User Manual No. 2004-31, Efficiency Vermont, 12/31/04. CF and Hours
4. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs, Measure life
5. Net-to-Gross factor from National Energy Efficiency Best Practices Study(<http://www.eebestpractices.com>)
6. Lighting Efficiency input wattage guide, Xcel Energy, July, 2008, kW
7. CL&P and UI program Savings Documentation modified for 3022 Daylight Hours in Denver CO

Deemed Fixture Tabulation

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
(1) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.025	(1) F40T12 48" 34W lamps, energy saving magnetic ballast	0.043	\$41.45	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	\$43.45	
(3) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.072	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.106	\$53.45	
(4) F32T8 48" 32W Lamps with a high efficiency, low ballast factor electronic ballast	0.096	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	\$56.45	
(1) F32T8 48" 32W Lamp with a high efficiency, high ballast factor electronic ballast	0.037	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	\$32.78	
(2) F32T8 48" 32W Lamp with a high efficiency, normal ballast factor electronic ballast	0.055	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.106	\$37.49	
(2) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast	0.073	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	\$37.49	
(3) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballast	0.083	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	\$44.33	
(2) F32T8 48" 32W Lamps with a high efficiency, low ballast factor electronic ballast	0.048	(1) F96T12ES 8' 60W lamp, energy savings magnetic ballast	0.075	\$47.49	
(4) F32T8 48" 32W Lamps with a high efficiency, low ballast factor electronic ballast	0.096	(2) F96T12ES 8' 60W lamps, energy savings magnetic ballast	0.123	\$60.11	
(4) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballast	0.108	(2) F96T12ES 8' 60W lamps, energy savings magnetic ballast	0.123	\$60.11	
(4) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast	0.141	(4) F96T12ES 8' 60W lamps, energy savings magnetic ballast	0.246	\$86.52	
(1) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.025	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	\$32.78	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.106	\$37.49	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	\$37.49	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(1) F96T12ES 8' 60W lamp, energy savings magnetic ballast	0.075	\$37.49	
(1) F28T5 lamp with ~1.0 ballast factor electronic ballast	0.032	(1) F40T12 48" 34W lamps, energy saving magnetic ballast	0.043	\$46.50	
(2) F28T5 lamps with ~1.0 ballast factor electronic ballast	0.063	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	\$49.00	
(3) F28T5 lamps with ~1.0 ballast factor electronic ballast	0.095	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.106	\$67.50	

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
(4) F28T5 lamps with ~1.0 ballast factor electronic ballast	0.126	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	\$70.00	
Fluorescent, (1) 96", T-8 lamp, electronic ballast	0.058	Fluorescent, (1) 96", T-12 lamp, magnetic ballast	0.075	\$93.45	\$20.00
(1) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.062	Incandescent, (1) 150W lamp	0.150	\$27.00	\$26.75
(1) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.062	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	\$27.00	\$27.00
(1) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.062	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.106	\$48.00	\$48.00
(2) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.117	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	\$32.00	\$32.00
Fluorescent, (2) 96", T-8 lamp, low power factor electronic ballast	0.094	Fluorescent, (2) 96", T-12 lamp, magnetic ballast	0.123	\$103.45	\$20.00
(2) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.117	Metal Halide, (1) 150W lamp	0.190	\$192.88	\$110.00
(2) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.117	Metal Halide, (1) 175W lamp	0.215	\$192.88	\$110.00
(3) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.179	Metal Halide, (1) 250W lamp	0.295	\$222.17	\$110.00
(4) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.234	Metal Halide, (1) 400W lamp	0.458	\$293.31	\$110.00
(6) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.358	Metal Halide, (1) 400W lamp	0.458	\$293.31	\$110.00
(8) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.468	Metal Halide, (1) 750W lamp	0.850	\$372.31	\$110.00
(10) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.585	Metal Halide, (1) 1000W lamp	1.080	\$407.31	\$110.00

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
(3) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast, high bay	0.093	Metal Halide, (1) 150W lamp	0.190	\$140.00	\$42.50
(3) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast, high bay	0.093	Metal Halide, (1) 175W lamp	0.215	\$140.00	\$42.50
(4) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.112	Metal Halide, (1) 250W lamp	0.295	\$153.00	\$63.75
(4) F32T8 48" 32W Lamps with a high efficiency, very high ballast factor electronic ballasts, high bay	0.154	Metal Halide, (1) 250W lamp	0.295	\$153.00	\$63.75
(6) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballasts, high bay	0.186	Metal Halide, (1) 400W lamp	0.458	\$260.00	\$85.00
(8) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.224	Metal Halide, (1) 400W lamp	0.458	\$265.00	\$90.00
(12) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.336	Metal Halide, (1) 750W lamp	0.850	\$397.50	\$127.50
(16) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.448	Metal Halide, (1) 1000W lamp	1.080	\$530.00	\$170.00
(18) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.68	Metal Halide, (1) 1000W lamp	1.080	\$534.00	\$174.00
(20) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.755	Metal Halide, (1) 1000W lamp	1.080	\$538.00	\$178.00
(3) Fluorescent, 48" T-8 lamps, VHLO Ballasts	0.279	Metal Halide, (1) 400W lamp	0.458	\$163.00	\$7.00
(6) Fluorescent, 48" T-8 lamps, VHLO Ballasts	0.555	Metal Halide, (1) 750W lamp	0.850	\$242.00	\$28.00
(8) Fluorescent, 48" T-8 lamps, VHLO Ballasts	0.793	Metal Halide, (1) 1000W lamp	1.080	\$334.00	\$26.00

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
Screw-In CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 1-A 15W, no ballast	0.015	\$6.79	\$4.31
Screw-In CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 1-A 25W, no ballast	0.025	\$6.79	\$4.31
Screw-In CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 1-A 40W, no ballast	0.040	\$6.79	\$4.31
Screw-In CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 3-A 15W, no ballast	0.045	\$6.79	\$4.31
Screw-In CFL, 1-CF 15W, magnetic ballast	0.017	Incandescent, 1-A 60W, no ballast	0.060	\$6.79	\$4.31
Screw-In CFL, 1-CF 15W, magnetic ballast	0.017	Incandescent, 1-PAR 65W, no ballast	0.065	\$6.79	\$4.31
Screw-In CFL, 1-CF 11W, magnetic ballast	0.013	Incandescent, 1-A 50W, no ballast	0.050	\$6.79	\$4.31
Screw-In CFL, 1-CF 11W, magnetic ballast	0.013	Incandescent, 2-A 25W, no ballast	0.050	\$6.79	\$4.31
Hard-Wired CFL, 2-PL 42W, 1 electronic ballast	0.093	Metal Halide, 100W, magnetic ballast	0.129	\$83.42	\$40.00
Hard-Wired CFL, 2-PL 32W, 1 electronic ballast	0.068	Mercury Vapor, 100W, magnetic ballast	0.125	\$92.87	\$50.00
Hard-Wired CFL, 2-PL 26W, 1 electronic ballast	0.052	Metal Halide, 70W, magnetic ballast	0.090	\$79.37	\$40.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 1-A 150W, no ballast	0.150	\$112.24	\$50.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 2-A 75W, no ballast	0.150	\$112.24	\$50.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 3-A 50W, no ballast	0.150	\$112.24	\$50.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 3-A 60W, no ballast	0.180	\$112.24	\$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 2-A 150W, no ballast	0.300	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 3-A 100W, no ballast	0.300	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 2-PAR 150W, no ballast	0.300	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 1-PS30 300W, no ballast	0.300	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 2-A 100W, no ballast	0.200	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 3-A 75W, no ballast	0.225	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 40W, no ballast	0.160	\$102.62	\$50.00

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 60W, no ballast	0.240	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 75W, no ballast	0.300	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 100W, no ballast	0.400	\$102.62	\$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 1-PS30 200W, no ballast	0.200	\$102.62	\$50.00
Hard-Wired CFL, 1-PL 32W, magnetic ballast	0.033	Incandescent, 2-A 60W, no ballast	0.120	\$76.35	\$40.00
Hard-Wired CFL, 1-PL 32W, magnetic ballast	0.033	Incandescent, 3-A 40W, no ballast	0.120	\$76.35	\$40.00
Hard-Wired CFL, 1-PL 32W, magnetic ballast	0.033	Incandescent, 1-R 120W, no ballast	0.120	\$76.35	\$40.00
Hard-Wired CFL, 1-PL 32W, 1 electronic ballast	0.036	Metal Halide, 50W, magnetic ballast	0.062	\$76.35	\$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 1-A 100W, no ballast	0.100	\$74.60	\$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 2-A 50W, no ballast	0.100	\$74.60	\$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 1-R 100W, no ballast	0.100	\$74.60	\$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 1-PAR 100W, no ballast	0.100	\$74.60	\$40.00
Hard-Wired CFL, 1-PL 23W, magnetic ballast	0.024	Incandescent, 2-A 40W, no ballast	0.080	\$76.17	\$40.00
Hard-Wired CFL, 1-PL 23W, magnetic ballast	0.024	Incandescent, 1-R 90W, no ballast	0.090	\$76.17	\$40.00
Hard-Wired CFL, 1-PL 23W, magnetic ballast	0.024	Incandescent, 1-PAR 85W, no ballast	0.085	\$76.17	\$40.00
Hard-Wired CFL, 1-PL 20W, magnetic ballast	0.022	Incandescent, 1-A 75W, no ballast	0.075	\$76.17	\$40.00
Hard-Wired CFL, 1-PL 20W, magnetic ballast	0.022	Incandescent, 1-R 75W, no ballast	0.075	\$76.17	\$40.00
Hard-Wired CFL, 1-PL 20W, magnetic ballast	0.022	Incandescent, 1-PAR 75W, no ballast	0.075	\$76.17	\$40.00

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
250W Metal Halide, magnetic ballast	0.291	Mercury Vapor, 400W, magnetic ballast	0.454		\$161
175W Metal Halide, magnetic ballast	0.209	High Pressure Sodium, 250W, magnetic ballast	0.295		\$161
400W Metal Halide, magnetic ballast	0.456	Mercury Vapor, 1000W, magnetic ballast	1.080		\$ 253.00
Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
150W Pulse Start Metal Halide, energy saving magnetic ballast	0.167	175W Metal Halide, magnetic ballast	0.209	\$161	\$30
175W Pulse Start Metal Halide, energy saving magnetic ballast	0.191	250W Metal Halide, magnetic ballast	0.291	\$161	\$30
200W Pulse Start Metal Halide, magnetic ballast	0.232	250W Metal Halide, magnetic ballast	0.291	\$280	\$30
320W Pulse Start Metal Halide, magnetic ballast	0.367	400W Metal Halide,, magnetic ballast	0.456	\$283	\$30
360W Pulse Start Metal Halide, magnetic ballast	0.418	400W Metal Halide, magnetic ballast	0.456	\$283	\$30
750W Pulse Start Metal Halide, magnetic ballast	0.814	1000W Metal Halide, magnetic ballast	1.077	\$381	\$30
2W LED Exit Sign	0.002	30W Incandescent Exit Sign	0.03		\$80.00
0.25W LEC Exit Sign	0.00025	40W Incandescent Exit Sign	0.04		\$80.00
F32T8 25W Lamp on a standard efficiency, normal ballast factor ballast	0.0213	F32T8 32W Lamp on a standard efficiency, normal ballast factor ballast	0.0272	\$4.00	\$2.00
F32T8 28W Lamp on standard efficiency, normal ballast factor ballast	0.0238	F32T8 32W Lamp on a standard efficiency, normal ballast factor ballast	0.0272	\$4.00	\$2.00
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-R 75W	0.075	\$192	\$57
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-R 100W	0.100	\$192	\$137
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-R 120W	0.120	\$192	\$136
Ceramic Metal Halide, 1-PAR 39W, electronic ballast	0.045	Incandescent, 1-R 150W	0.150	\$222	\$166
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-PAR 100W	0.100	\$192	\$132
Ceramic Metal Halide, 1-PAR 39W, electronic ballast	0.045	Incandescent, 1-PAR 150W	0.150	\$222	\$161
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-PAR 150W	0.150	\$192	\$132
Ceramic Metal Halide, 1-SE 150W, electronic ballast	0.168	Incandescent, 1-PS40 500W	0.500	\$222	\$152
Ceramic Metal Halide, 1-SE 175W, electronic ballast	0.189	250W Metal Halide, magnetic ballast	0.291	\$131	\$159
Ceramic Metal Halide, 1-SE 250W, electronic ballast	0.275	400W Metal Halide, magnetic ballast	0.456	\$253	\$37
Ceramic Metal Halide, 320W, electronic ballast	0.349	400W Metal Halide, magnetic ballast	0.456	\$253	\$292
Ceramic Metal Halide, 350W, electronic ballast	0.38	400W Metal Halide, magnetic ballast	0.456	\$253	\$292
Ceramic Metal Halide, 400W, electronic ballast	0.435	400W Metal Halide, magnetic ballast	0.456	\$253	\$298

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
No Lighting controls	1.00	no controls			\$0.00
Occupancy Sensor - Wall Mount	0.70	Occupancy Sensor - Wall Mount			\$55.00
Occupancy Sensor - Ceiling Mount	0.70	Occupancy Sensor - Ceiling Mount			\$125.00
Daylighting - Continuous Dimming	0.70	Daylighting - Continuous Dimming			\$65.00
Daylighting - Multiple Step Dimming	0.80	Daylighting - Multiple Step Dimming			\$65.00
Daylighting - On/Off	0.90	Daylighting - On/Off			\$65.00
High Efficiency Low Ballast Factor Electronic Ballasts	kW EE	Standard Electronic Ballasts	kW Base		
1 Lamp T8 32W Fixture	0.025	1 Lamp T8 32W Fixture	0.031		\$55.00
2 Lamp T8 32W Fixture	0.048	2 Lamp T8 32W Fixture	0.058		\$55.00
3 Lamp T8 32W Fixture	0.072	3 Lamp T8 32W Fixture	0.085		\$55.00
4 Lamp T8 32W Fixture	0.096	4 Lamp T8 32W Fixture	0.112		\$55.00

