XCEL ENERGY

Colorado Lighting Efficiency Net-to-Gross Follow-up Research

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Introduction

Xcel Energy contracted with EMI Consulting and its partner Apex Analytics to perform follow-up research from the 2018 commercial and industrial (C&I) evaluation of the Lighting Efficiency Product in Colorado. The product offers prescriptive and custom rebates to Xcel Energy electric business customers who install qualifying energy-efficient lighting equipment. Rebates are offered to encourage C&I customers to purchase energy-efficient lighting by lowering the upfront premium costs associated with this equipment. The Lighting Efficiency Product relies heavily on an active trade partner network. While Xcel Energy did not actively endorse or promote individual trade partners, this group played an integral part in advancing the product.

A primary objective of this follow-up research was the estimation of the prospective net-to-gross ratio (NTGR) for the 2020 program year via participating customer surveys and market actor interviews. Additionally, the research team assessed the feasibility of collecting full category C&I lighting sales data through organizational discussions and provided supplemental insight for product baselines through participating customer surveys. This summary includes the key findings and recommendations from our research.

Methods

Participating Customer surveys (n=78)

Participant Trade Partner Interviews
(High Performers n=15, Mid/Low Performers n=26)

Non-Participant Trade Partner interviews (n=9)

Manufacturer/Distributor interviews (n=14)

Fielding:
August – October 2019

Summary of Key Findings

The research team estimated a **prospective 2020 NTGR of 0.73** for the product, recognizing **the product's role in increasing the sales volume** of efficient lighting equipment.

90% of rebated installations **replaced fully-functional fixtures** and **operating lights**. The lighting equipment replaced would have **continued to function** for an **average of 3.8 years**.

The research team explored the availability of full category C&I lighting sales data. A **coordinated effort with NAED** offers the **most promising opportunity.**

Net-to-Gross

Prospective Net-to-Gross Ratio

.73
Recommended Prospective NTGR

The final recommended prospective NTGR is based on a forecasted estimate drawing on **retrospective NTGR values** as well as input from **trade partners' forward-looking view** of the lighting market.

EXECUTIVE SUMMARY

2019 Colorado Lighting Efficiency NTG Follow-up

Retrospective Program Participant NTGR Analysis

Product Component Score

Rebate's influence on customer's decision to install a qualifying lighting equipment, where 0 was Not at All Influential and 10 was Extremely Influential.

The return on investment (8.9) and simple payback period (8.7) of the rebate were rated as the **most influential product elements.**

No Product Score Adjusted for Timing

51% also reported they would have **installed the same measures if the product had not been available.**

61% of participants who reported they would have installed the same measures reported they would have **delayed by at least a year**.

Quantity Adjustment

19% of customers would have **installed fewer efficient lighting measures had the product not been available.** On average, these participants would have installed 57% fewer measures than they installed through the product.

Findings represent a **slight decrease** in the NTGR relative to the 2017 value reported in the 2018 evaluation, which is **consistent with a rapidly evolving lighting market**.

Forecasted Trade Partner NTGR Analysis

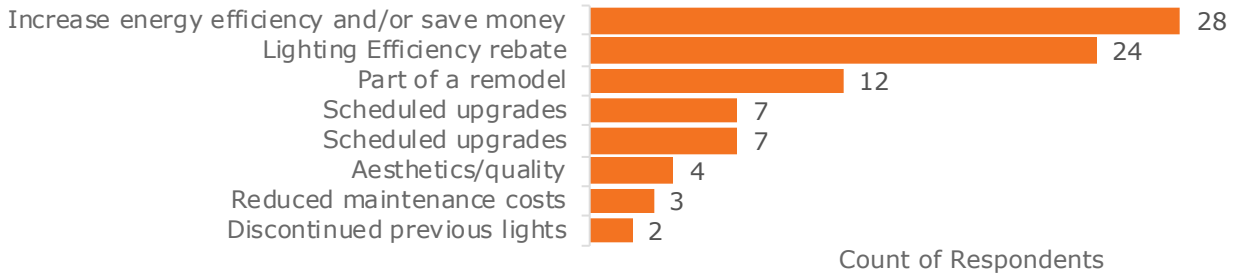
Trade partner interview findings suggest **LED** is the **predominant technology** in the market and the product has **impacted key aspects of trade partners' businesses**.

4 out of 5 Trade partners reported **LEDs** made up **at least 90%** of the fixtures and retrofit kits they sold.

2 out of 3 Trade partners reported product participation had **influenced** the **services/products** they provided or the **customers they served**.

Early Replacement and Sales Data Feasibility Research

Participants most often reported replacing functioning lighting products because they wanted **to increase energy efficiency and/or save money** or to **take advantage of Xcel Energy rebates**.



A current effort by NAED asks distributor members to **contribute data in exchange** for receiving **aggregated reports and analytical tools** across all distributors.

Conclusions & Recommendations

Xcel Energy's Lighting Efficiency Product continues to influence the lighting market, accelerating adoption of LED light fixture and retrofit kits

The Lighting Efficiency Product has a greater impact on sales volume than market share of LED fixtures and retrofit kits.

Xcel Energy should adopt a 2020 NTGR of 73% for downstream measures in the Lighting Efficiency Product. The 73% figure balances findings from participant surveys with findings from trade partner interviews, taking into account the strengths and weaknesses of each, as well as changes in program delivery.

Future efforts to assess product attribution should continue to evaluate changes in the volume of LEDs sold with and without the product. Incorporating a consideration of quantity into both the trade partner NTG approach and the participant-focused, retroactive NTG approach were critical to fully capturing the influence of the product in this research, and quantity increases will be a central element of product influence going forward.

Trade partners are responsive to incentive offerings, providing an opportunity for Xcel Energy to target key technologies and applications.

Xcel Energy should continue to carefully consider which types of lighting equipment will provide the greatest benefit to the product and should set incentive levels to encourage installation of those equipment types. Xcel Energy may opt to focus higher incentives on lighting equipment types with the greatest savings potential or on types that need additional support to accelerate market transformation and increase market share. Future evaluation research could help to prioritize lighting products for targeted incentives.

Downstream rebates have limited impact on maintenance installations; Xcel Energy's recent shift to midstream incentives for many measures may cover these installations more effectively.

Xcel Energy should continue to monitor the lighting market and ensure that products frequently installed as maintenance measures are included in the midstream product. Xcel Energy can leverage its engagement with trade partners to identify which measures are most often purchased for maintenance installations and which are most often purchased for retrofits. Future evaluation research could also assess which measures are used for maintenance and which hare used for retrofits.

1. INTRODUCTION

Xcel Energy offers a comprehensive array of energy services and products to its customers, including demand side management (DSM). For the evaluations of its 2018 and 2019 products, Xcel Energy sought to understand the role each product plays in changing the marketplace, to analyze that influence on customer choices, and to use the findings to improve customer experience and ensure industry-leading product performance. To accomplish this, Xcel Energy contracted with EMI Consulting and its partner Apex Analytics to evaluate five products offered in Colorado and Minnesota in 2019.[1] This included follow-up research from the 2018 C&I lighting evaluation of the Lighting Efficiency Product in Colorado[2], which is discussed in this report. This introduction includes an overview of the product and the evaluation approach and describes the organization of the report.

1.1 PRODUCT OVERVIEW

The Lighting Efficiency Product offers prescriptive and custom rebates to Xcel Energy electric business customers who install qualifying energy efficient lighting equipment. Rebates are offered to encourage commercial and industrial (C&I) customers to purchase energy efficient lighting by lowering the upfront premium costs associated with this equipment. Between Q3-2018 and Q1-2019, the Lighting Efficiency Product claimed over 90 GWh in energy savings from the custom and retrofit rebate components (Table 1-1).[3] Since the prescriptive retrofit and custom rebates make up the majority of savings in this product, and the product plans to discontinue incentives for new buildings, the research team focused efforts on those two channels.

Table 1-1. Lighting Efficiency Product Gross Savings, by Product Channel, Q3 2018 through Q1 2019

Product Channel	Savings (kWh)	% of Total
Retrofit	74,853,675	82%
Custom	16,071,698	18%
Total	90,925,373	100%

Source: Apex Analysis of Product Tracking Data. Population: PY2018-PY2019 participants.

The Lighting Efficiency Product offers rebates on a variety of lighting technologies within each product channel. Linear LED lighting, troffers, and custom lighting measures contributed most to overall product energy savings (Table 1-3). Custom

[1] The products selected for evaluation in 2019 include: Heating Efficiency (CO), Motor & Drive Efficiency (CO), Single Family Weatherization (CO), Energy Efficient New Homes (MN).
[2] https://www.xcelenergy.com/staticfiles/xe/PDF/Lighting-Efficiency-Evaluation.pdf
[3] Note that the new construction component was dropped following the completion of the 2018 evaluation in January of 2019, so is not included in this table.

lighting measures are lighting products that do not fit into the prescriptive rebate requirements; often this occurs when a customer is not conducting a 1:1 replacement, or the baseline equipment is not within the prescriptive parameters.

In 2019, Xcel Energy made a significant change to the Product. Specifically, as of July 1, 2019, the Lighting Efficiency Product shifted its incentive strategy for lamp measures from a downstream offering to a midstream offering.[4] The product now offers downstream incentives only for fixtures, controls, and LED retrofit kits.

Between Q3-2018 and Q1-2019, the Lighting Efficiency Product claimed over 90 GWh in energy savings from the custom and retrofit rebate channels (Table 1-2).[5] However, after excluding discontinued lamps, the overall product savings claims for this time period is reduced by over 30%; the retrofit product component alone decreased by 40%. The research team only evaluated continued fixtures, controls, or LED retrofit kits in order to exclude discontinued or products that transitioned to the midstream product

Table 1-2. Lighting Efficiency Product Gross Savings, by Product Channel, With and Without Discontinued Products, Q3 2018 through Q1 2019

	All rebated products		Products Continued After 7/1/19	
Product Channel	**Savings (kWh)**	**% of Total**	**Savings (kWh)**	**% of Total**
Retrofit	74,853,675	82%	44,563,419	73%
Custom	16,071,698	18%	16,071,698	27%
Total	**90,925,373**	**100%**	**60,635,117**	**100%**

Table 1-3 shows how the incentivized measure mix changed when the product discontinued downstream lamp incentives. Previously, 25% of the product savings was comprised of linear LEDs. Excluding the discontinued and midstream lamp types from our analysis had the effect of increasing the savings contribution of LED area lighting (15%), LED troffers (23%), custom lighting (27%), and high bay LED fixtures (19%) substantially.

[4] Downstream incentives are incentives paid directly to the end-user. In the case of the Lighting Efficiency Product, midstream incentives are paid to lighting distributors.
[5] The research team is targeting participants from the most recent three quarters to reduce recall bias. The research team relied on application close date to summarize the product totals and planned sampled yet will attempt to sample initially from those participants with the most recent application creation dates first.

Table 1-3. Lighting Efficiency Product Savings, by Measure Category

Measure Category	% of Total Savings (kWh) [a]	
	All rebated equipment	Equipment continued after 7/1/19
LED Linear[b]	25%	1%
LED Troffer	20%	23%
Custom Lighting	18%	27%
LED High Bay	13%	19%
LED Area Lighting	10%	15%
LED Parking Garage Lighting	3%	5%
LED Exterior Lighting	3%	4%
LED Interior Fixture	3%	4%
LED Outdoor Canopy or Soffit lighting	1%	1%
LED Lamps – HID Base	1%	0%
LED PL/G base	1%	0%
Occupancy Sensor	1%	0%
LED Exit Sign	<1%	1%

[a] *Additional measures contributing less than 1% of product savings are LED street lighting and LED refrigerator and freezer cases. No network lighting controls were rebated during this timeframe.*
[b] *Linear LEDs includes LED linear tubes and LED linear ambient fixtures. A full mapping for each of the product measure names to the measure categories is presented in the appendices.*
Source: Apex Analysis of Product Tracking Data. Population: Q3-2018-Q1-2019 participants

The Lighting Efficiency Product relied heavily on an active trade partner network. While Xcel Energy did not actively endorse or promote individual trade partners, this group played an integral part in advancing the product. Internally, Xcel Energy relied on account managers and the Business Solutions Center (BSC) to market and facilitate this product. Both account managers and BSC representatives were incentivized to complete efficiency projects with their customers and informed and assisted participants in the application process.

1.2 RESEARCH OVERVIEW

The research team designed a comprehensive research plan for the Lighting Efficiency Product to provide information on three key research topics:

- **Estimate the Net-To-Gross Ratio (NTGR):** Estimate the prospective NTGR for the 2020 program year.
- Assess the feasibility of **collecting full category C&I lighting sales data.**
- Provide supplemental insight for **product baselines**, including the percent of functional fixture replacements and proportion of lighting replaced as part of remodel projects.

Table 1-4 presents an overview of the research topics and data sources used in this follow-on research of the Colorado Lighting Efficiency Product.

Table 1-4. Lighting Efficiency Product Evaluation Framework

Research objectives	Estimate net-to-gross ratio	C&I lighting sales data	Product baselines
Research topics	Free ridership Participant spillover Trade partner spillover Trade partner market predictions	Feasibility of collecting full category C&I lighting sales data	Proportion of installations replacing fully functional lighting
Data sources	Participant surveys Participant trade partner and distributer interviews Non-participant trade partner interviews	Organizational discussions	Participant surveys

Source: 2019 Xcel Energy Lighting Efficiency Product Research Plan.

The following sections describe in further detail the data sources used for this follow-on research including:

- Participant Surveys
- Market Actor Interviews (including participant trade partners, distributors, and non-participating contractors)

PARTICIPANT SURVEYS

The research team conducted telephone surveys with participating customers using customer records from Xcel Energy for the sample frames. The research plan used for this project can be found in Appendix A. Sample sizes for the participant surveys were set at levels adequate to provide a 90% level of confidence with a minimum of +/- 10% relative precision for the product as a whole. The research team stratified the survey sample to ensure high achieving measures, such as custom, LED troffers, and high bay were sufficiently represented in the achieved survey results.

For the purposes of this research, a participating customer was defined as any customer that closed a Lighting Efficiency Product project during July 2018, through March 2019. During the 2018 effort, the research team discovered a significant proportion of participant contacts managed more than one participant site. When the research team surveyed a participant that managed more than one participant site, the team assessed through the survey whether the decision-making process was uniform throughout the sites, or if it differed. If the process differed, the survey responses would apply to a single site, when it was uniform, their responses

applied to all relevant sites on record. Table 1-5 provides the target surveys, and achieved surveys.

Table 1-5. Lighting Efficiency Product Targeted and Achieved Surveys, by Strata

Strata	Achieved Surveys	Target Surveys
Troffer/Area/High Bay	43	35
Custom Lighting	15	15
Other Measures	20	20
Total	**78**	**70**

Source: Participating Customer Survey.

The participant survey was also designed to address the following:

- Functionality of replaced lighting equipment
- Level of free-ridership
- Product-induced spillover effects

The participant survey is presented in Appendix B.

MARKET ACTOR INTERVIEWS

The research team conducted in-depth interviews with three related groups of Lighting Efficiency Product market actors:

1. Participating trade partners,
2. Non-participating trade partners, and
3. Manufacturers/distributors.

Participant trade partner and manufacturer/distributor interviews were primarily used to estimate prospective NTGR and to provide insight into LED market shares.[6] Because of the limited focus of this effort, the interviews were shorter in duration than the 2018 evaluation; helping to reduce respondent fatigue and ensure respondents focus on the product attribution-relevant questions. Note that due to the overlays between trade partner (installers) and manufacturer/distributor (e.g. some distributors install, and some installers distribute), the research team combined the results into a single trade partner estimate.

The research team stratified the participating trade-partner interviews between higher-and-lower-performers to ensure a representative group. The research team defined higher-performers as trade partners whose projects[7] receive more than 1% of total product rebate dollars, while lower-performers less than 1% of rebate

[6] Trade partner interviews will also be used to help identify potentially late adopting customer segments to target for the CO Lighting Baseline study.
[7] The research team removed projects containing discontinued Lighting Efficiency measures. Targeted high performers represent >1% of continued product rebate dollars.

dollars. The population of 325 partners was sufficient to reach the targeted number of surveys (Table 1-6).

The research team conducted interviews with manufacturers and distributors to help the product gain insight from a more complete market actor perspective. Market actors upstream of direct product interaction offer a different perspective into the lighting market than the trade partners and will also contribute to the prospective NTGR[8] and the concurrent lighting baseline research. Note that interview questions determined whether trade partners were placed in the installer or manufacturer/distributor strata; some trade partners were initially placed in the installer strata but were later moved to the distributer strata based on interview responses.

The non-participant trade partner interviews, new for the 2019 research, contributed to non-participant spillover, naturally occurring adoption[9], and remaining opportunities for efficient lighting transformation within Xcel Energy's service territory. Xcel Energy identified non-participants as trade partners that participated in prior years but not in 2018 or 2019. Table 1-6 provides targeted and achieved market actor interviews.

Table 1-6: Lighting Efficiency Product Market Actor Target and Achieved Sample, by Survey Strata

Market Actor	Strata	Achieved Interviews	Target Interviews
Participant Trade Partner (installer)	High Performers	15	12
	Mid/low Performers	26	28
Non-Participant Trade Partner (installer)	N/A	9	15
Manufacturer/distributor	N/A	14	5-10

Source: Market Actor Interviews.

The market actor interview guides are presented in Appendix B.

[8] The research team has assumed that Xcel Energy will provide manufacturer and/or distributor contact information, including information for market actors that sell both efficient and inefficient lighting products.

[9] The non-participating trade partners that report no influence from the product may serve as a baseline to compare against participating partners, resulting in a proxy for naturally occurring adoption.

1.3 REPORT ORGANIZATION

Further detail on the research approach is presented in the following chapters. The following sections are organized as components of the impact evaluation results. As illustrated in Table 1-4 above, each data collection activity contributed to multiple research objectives. Specifically:

- Chapter 2 reviews the approach and results of the impact evaluation and the attribution of product impacts using a customized NTGR analysis,
- Chapter 3 reviews research findings on by early replacement and sales data feasibility.
- Chapter 4 presents conclusions and recommendations.
- Finally, detailed, descriptive methodology information, research plans, and survey instruments can be accessed in this report's appendices.

2. IMPACT FINDINGS

A primary objective of this follow-up research was the estimation of the net-to-gross ratio (NTGR) for the Xcel Energy Lighting Efficiency Product in Colorado. For demand-side management (DSM) products, the NTGR is a metric that estimates the influence of the product on the target market. It is used to adjust reported gross energy savings to account for energy efficiency that would occur in the absence of a product, and it is also used as a benchmarking indicator of product effectiveness.

NTGR results can indicate opportunities for Xcel Energy to adjust the design and implementation of its products to increase the cost-effectiveness of individual products and the entire portfolio. The NTGR includes several factors that create differences between gross and net savings, such as free-ridership and spillover. The research team estimated a retrospective NTGR based on data provided by customers and trade partners, and then recommended a prospective NTGR based on trade partner estimates of future sales with and without the product. Note that, while a NTGR of 1.0 is often seen as desirable, it may not be appropriate for all product designs depending on a variety of factors (including the maturity of the product and the technologies it promotes, product intervention strategies, and cross-product coordination strategies). The research team has taken care to present our NTGR results with this context in mind.

This chapter presents:

- **Key impact findings –** The key findings section presents the recommended prospective NTGR based on the research team's synthesis of findings from market actors and peer utilities.
- **Approach –** The approach section presents an overview of the research team's methods to calculating the recommended NTGR.
- **Net-to-gross ratio inputs –** This section presents qualitative and quantitative data that support the NTGR calculations.

2.1 KEY IMPACT FINDINGS

The participating customer surveys and trade partner interviews confirmed that the Lighting Efficiency Product has played an important role both in individual projects and in transforming the C&I lighting market towards LEDs. Interviews with participating customers indicate that the product is influential in convincing customers to install high efficiency lighting in their commercial facilities, both increasing project size and accelerating installation. This research also found that the C&I lighting market has shifted rapidly toward LED technologies. Participating trade partners reported that a large majority of their LED fixture and retrofit kit sales (92%) were LEDs, describing LEDs as the best solution for most lighting applications and noting that LED availability had increased. Trade partners anticipated that further growth above this already-high LED share would be limited.

While the LED share of fixture and retrofit kit sales was high and likely to remain high, the Lighting Efficiency Product continues to increase the volume of LED sales in Xcel Energy's territory. The product's incentives function as a sales tool that helps trade partners convince customers to proactively upgrade working lighting equipment. Without that sales tool, trade partners reported, and participant interviews confirmed, fewer businesses would undertake lighting upgrades and some of those that did so would pursue smaller projects. Participant surveys confirm that a large proportion of Lighting Efficiency Product installations represent early replacement of functioning lighting equipment.

Recognizing the product's role in increasing the sales volume of efficient lighting equipment, **the research team recommends a prospective NTGR of 73% for the 2020 Lighting Efficiency Product.**

2.2 NET-TO-GROSS APPROACH

The final recommended prospective NTGR is based on a forecasted estimate drawing on retrospective NTGR values as well as input from trade partners' forward-looking view of the lighting market. The retrospective estimate used a self-report approach (SRA) based on participant survey results in combination with trade partner responses. The projected analysis used the trade partner interviews to assess the future market for LEDs and expected market "lift" of the Lighting Efficiency Product. The research team then used additional data to construct a logical narrative of product attribution, and finalize the NTGR for the product.

In general, NTGR consists of three components: (1) free-ridership, (2) participant spillover, and (3) non-participant spillover. In addition, we collected information to help forecast a project NTGR in the future. To estimate these components, the data inputs to the NTGR analysis included:

- Participant surveys – focused on project-level effects
- Market actor interviews – focused on overall market effects

Table 2-1 outlines the primary data used for each NTGR input which are discussed in more detail below.[10]

[10] The research team assessed non-participant spillover in two ways. Retrospective non-participant spillover estimates came from trade partner reports of the qualified lighting equipment they sold that did not receive support from the product. Prospective non-participant spillover estimates reflect sales that non-participating trade partners reported were attributable to the product.

Table 2-1. Lighting Efficiency Product NTGR Inputs

Approach	Net-to-Gross Components	Participant Surveys (n=78)	Participant Trade Partner Interviews (n=55)	Non-Participant Trade Partner Surveys (n=9)
Forecasting from Retrospective Estimates	Free-ridership	✓	✓	
	Participant Spillover	✓		
	Non-Participant Spillover		✓	
Estimating from Market Actor Reports	Participant Net-to-Gross		✓	
	Non-Participant Spillover			✓

Source: Apex Analytics

FREE-RIDERSHIP

Free-ridership is a measure of the amount of a product's claimed savings that would have occurred in the absence of the product. Free-ridership is assessed on a scale from 0 to 10, where 10 indicates that the product had 100% free-ridership and all product savings would have occurred without any of the product's rebates or assistance.

To determine free-ridership, the research team started with the Core Nonresidential Protocol from the *2016 Illinois Statewide Technical Reference Manual (TRM) for Energy Efficiency Version 6.0, Attachment A of Volume 4: Cross-Cutting Measures and Attachments*, using three components of free-ridership, a "Product Components" score, a "No Product" score, and a timing adjustment. The research team customized this methodology to better match the design of the Lighting Efficiency Product and incorporate findings from the 2016 Xcel Energy evaluations and 2018 cognitive interviews.

Adaptations to the Illinois algorithm used in the 2018 Lighting Efficiency Product evaluation included removing the product influence free-ridership score and setting no product free ridership score to zero if the respondent either (a) first heard about the measure from Xcel Energy, the product, or a product-affiliated trade partner, or (b) respond "no" to a binary question asking if they would have installed the exact same measure if the product had not been available.

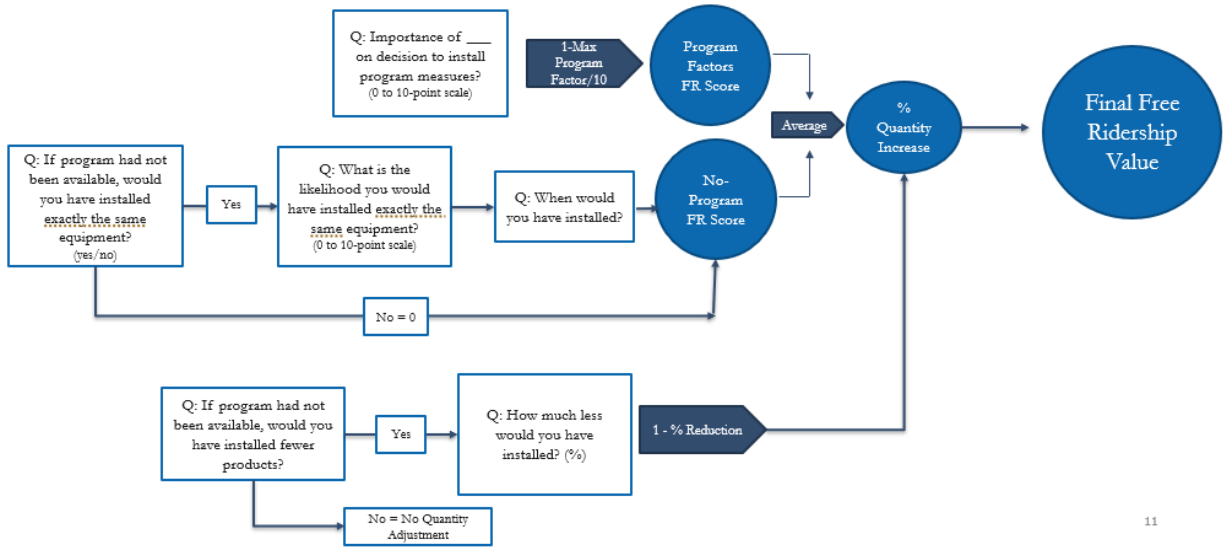
As a new adaptation for the current research, the research team added a "quantity factor" to its assessment of free-ridership to account for the possibility that participants would have installed fewer measures without the product. This addition reflected findings from the previous evaluation suggesting that the volume of measures sold would have been lower absent the product. The research team asked participants whether they would have installed fewer measures had incentives not been available and, if so, how many they would have installed.

Under this approach, the free-ridership score is based on four components:

- A *Product Components* score, assessing the participant's perception of the importance of various product components in their decision to carry out the energy-efficient project;
- A *No-Product* score, based on the participant's intention to carry out the energy-efficient project without product funds;
- A *Timing Adjustment*, based on the participant's perception of when they would have carried out the project in the absence of the product.
- A *Quantity Adjustment*, based on the participant's estimate of the quantity of products they would have installed in the absence of the product.

When combined, these components assess the likelihood of free-ridership on a scale of 0 to 10, with the two scores averaged and the timing and quantity adjustments applied to create a final free-ridership score. Figure 1 illustrates how these components come together to produce the final free ridership value.

Figure 1. Participating Customer Free-ridership Algorithm for the Efficiency Lighting Product



Source: Apex Analytics

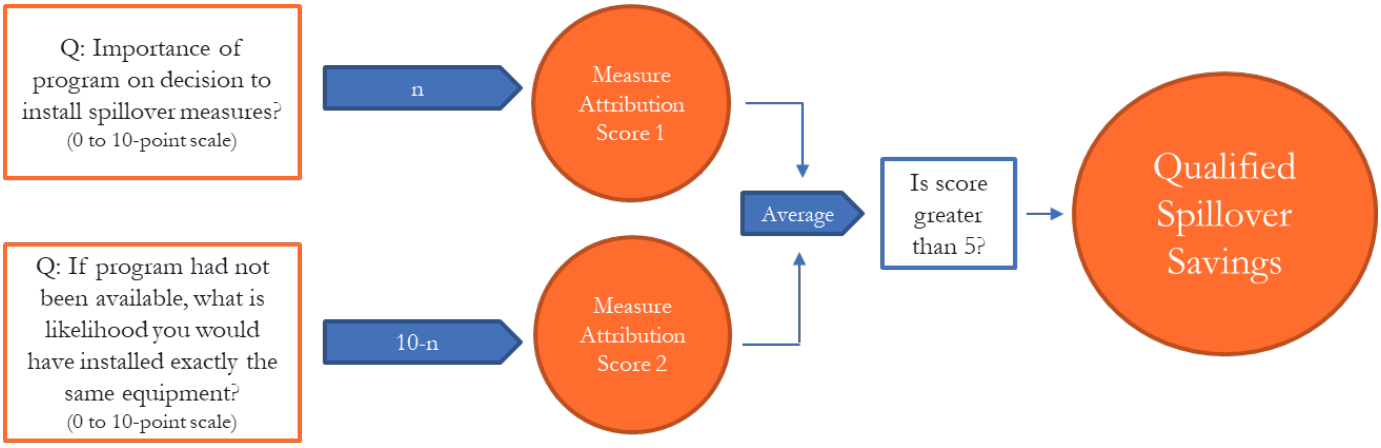
SPILLOVER

Spillover is a measure of the amount of energy savings that occur due to the product that are *not* captured in the product's claimed energy savings.

To capture participant spillover, the research team asked participating customers for information about any additional energy efficient equipment installed outside of the product (for which they did not receive a rebate). The surveys also probed for information on the importance of Lighting Efficiency Product in participant installation decisions and the likelihood that the measures would have been installed if they had not participated in the product. The research team computed

savings estimates for all identified spillover equipment following the flowchart reported in Figure 2. The product's spillover ratio was calculated by dividing the total spillover savings by the product's total energy savings.

Figure 2. Lighting Efficiency Product Participant Spillover Protocol



Source: Apex Analytics Analysis

Because the product works closely with trade partners, the research team also evaluated nonparticipant spillover resulting from participant trade partners. Trade Partner nonparticipant spillover, in this instance, is defined as sales of eligible products that did not receive rebates but were influenced by the product through participant trade partners. This occurs when the trade partner recommends eligible products because of the education and training from Xcel Energy, but the customer does not apply for the rebate for various reasons (e.g., too much paperwork, too busy). The research team calculated nonparticipant spillover as the *potential* savings multiplied by the *max product score,* or:

$$\%\ Spillover = (kWh_{potential} * ProgramScore_{max})/kWh_{surveyed}$$

The research team calculated the potential spillover savings input through trade partner telephone surveys collecting two values: percent of products sold eligible for product incentives, and the percent of eligible products sold that do not receive a rebate. The calculation for this potential spillover savings is:

$$\Delta kWh_{potential} = Q3\ 2018\ to\ Q1\ 2019\ rebated\ kWh\ * \%\ of\ products\ eligible\ * \%\ products\ eligible\ that\ did\ not\ recieve\ rebate$$

Finally, trade partners assessed the extent the Lighting Efficiency Product influenced the sale of these non-rebated products. Specifically, trade partners assessed the importance of the product on the following three components

1. Sales of non-rebated products
2. Efficient lighting product recommendations (past and current product)
3. Efficient lighting product stocking

The research team calculated the maximum product importance rating from the above components (i.e., the *Max Product score* in the equation) to assess the influence the product had on non-rebated lighting product sales. In this instance, the average max product score was 9.0, indicating the product had significant impact on these non-rebated product sales. To create a final spillover estimate, the research team calculates the total kWh of trade partner nonparticipant spillover divided by the total kWh of those trade partners that were surveyed to convert the value into a percentage that is then applied to the population of trade partners.

PROJECTED NET-TO-GROSS INDICATORS

Trade partner interviews also offer important insights into what the market for LED products are expected to be going forward. The research team asked participant trade partners to predict both absolute sales volume and market share of LED fixtures and retrofit kits in 2020 under two scenarios: (1) that the product continues with "business as usual", and (2) that the product had never existed and would not support LEDs in 2020.[11]

DETERMINATION OF NET-TO-GROSS RATIO

The research team calculated the product's initial retrospective net-to-gross ratio using the following formula:

$$Retrospective\ NTGR = 1 - (Free - ridership\ Ratio) + (Participant\ Spillover\ Ratio) + (Trade\ Partner\ Spillover\ Ratio)$$

The research team calculated the volume of 2020 sales attributable to the product as the difference between trade partners' estimates of with- and without-product sales. As summarized in the formula below, the NTGR was calculated as the ratio of the volume of sales attributable to the product to the projected volume of rebated sales in 2020. To predict rebated sales in 2020, the research team applied the percentage of sales the respondent reported occurred outside the product in the past year to their predicted 2020 sales.

$$Prospective\ NTGR = \frac{LED\ sales\ volume\ with\ program - LED\ sales\ volume\ without\ program}{Rebated\ LED\ sales\ volume}$$

The research team weighted individual respondent-level NTGRs by their estimated sales volume, calculated by dividing their reported product sales by the proportion of sales they reported occurring outside the product, to arrive at a final trade partner projected NTGR value.

[11] Note this represents a change in wording from previous surveys, which asked about a scenario in which the product ceased to support LED measures in the future. By asking about a scenario in which the product would not only be available in the future, but had never existed, the research team sought to capture a more complete picture of the product's market effects over time.

2.3 FORECASTED NET-TO-GROSS RATIOS FROM RETROSPECTIVE ESTIMATES

The research team used all the information collected about the product to construct a logical, internally-consistent, and coherent narrative of product attribution that attempted to identify all possible pathways of Xcel Energy influence. Based on these results, we developed a final recommended prospective NTGR that is consistent with this narrative. This included results from two primary sets of analysis:

1. Retrospective Program Participant NTGR Analysis
2. Forecasted Trade Partner NTGR Analysis

RETROSPECTIVE PROGRAM PARTICIPANT NTGR ANALYSIS

The first approach the research team used to estimate a prospective NTGR involved identifying a linear trendline between the participating customer 2017 retrospective NTGR estimate from the prior evaluation and the new, retrospective 2019 NTGR. This section presents the results of the research team's analysis to forecast a prospective NTGR for 2020 based on retrospective estimates. It then provides additional detail on each component of the 2019 retrospective NTGR value.

The current research found an overall participant free ridership of 13.6%, participant spillover of 0.1%, non-participant spillover of 4.4%, and a retrospective NTGR of 90.9% (Table 2-2).

Table 2-2. Lighting Efficiency Product Retrospective NTGR Findings

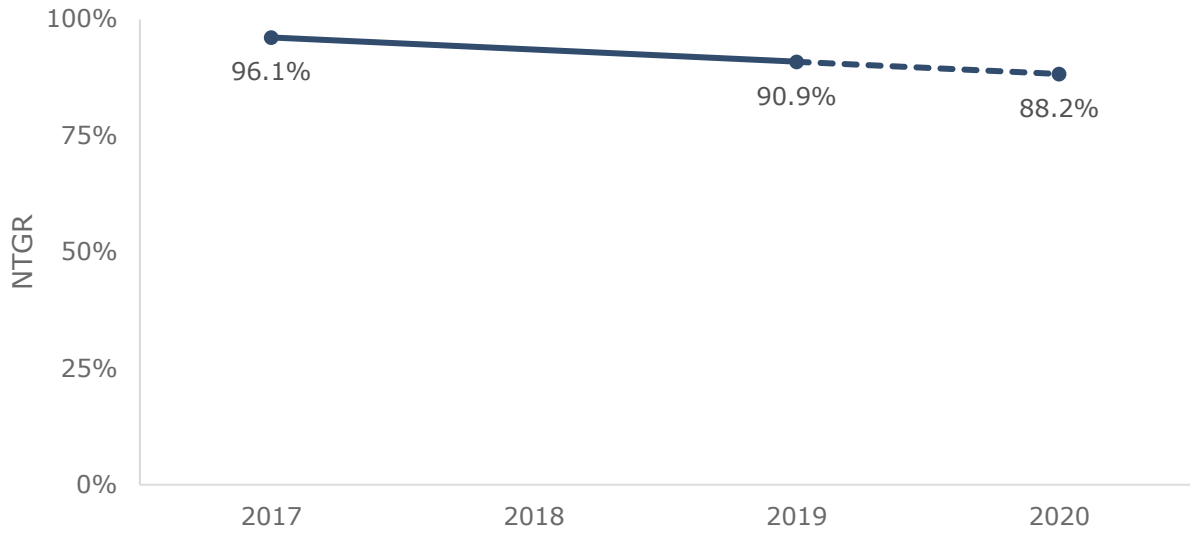
Retrospective Net-to-Gross Components	Evaluated Estimate	
	2019	**2017**
Free-ridership	13.6%	8.2%
Participant Spillover	0.1%	2.2%
Trade Partner Non-Participant Spillover	4.4%	2.1%
Retrospective NTGR	**90.9%**	**96.1%**

Source: Apex Analytics Analysis

As Table 2-2 above shows, these findings represent a slight decrease in the NTGR relative to the 2017 value reported in the 2018 evaluation, which is consistent with a rapidly evolving lighting market. Projecting that change into 2020 yields a prospective NTGR of 88.2% (Figure 3).[12]

[12] The participant survey conducted for the 2018 evaluation included participants with participation dates listed from January 2016 through October 2017. The 2018 survey respondents' average participation date was January 2017. The participant survey for the 2019 follow-up research included

Figure 3: Projected 2020 NTGR Based on Retrospective Estimates



Source: Apex Analytics Analysis of participant survey and participating trade partner interview data

As described in the approach section, the retrospective NTGR estimate is based on three primary data inputs: free ridership, participant spillover, and non-participant spillover. This section explores each of these results in more detail, including qualitative data that supports the results.

Free-Ridership Results

There are three components of the participant free-ridership score: a product component score, no-product score adjusted for timing, and a quantity adjustment. The following sections describe findings related to each component.

Product Component Score

The product component score assesses the importance of the product in influencing customers' decisions to install energy efficient technologies. Survey responses suggest that Xcel Energy was important in influencing customers' decisions to install products that qualified for Lighting Efficiency Product rebates. The survey assessed the importance of 13 factors on customers' decisions to install efficient lighting. Four of these factors reflect direct product influence on the decision,[13] while surveys probed on four additional factors to determine whether they reflected product influence.[14] The remaining five factors were independent of the product.

participants with participation dates ranging from August 2018 through March 2019. The 2019 survey respondents' average participation date was January 2019.

[13] The dollar amount of the rebate, recommendation by Xcel Energy staff, and Xcel Energy marketing efforts.

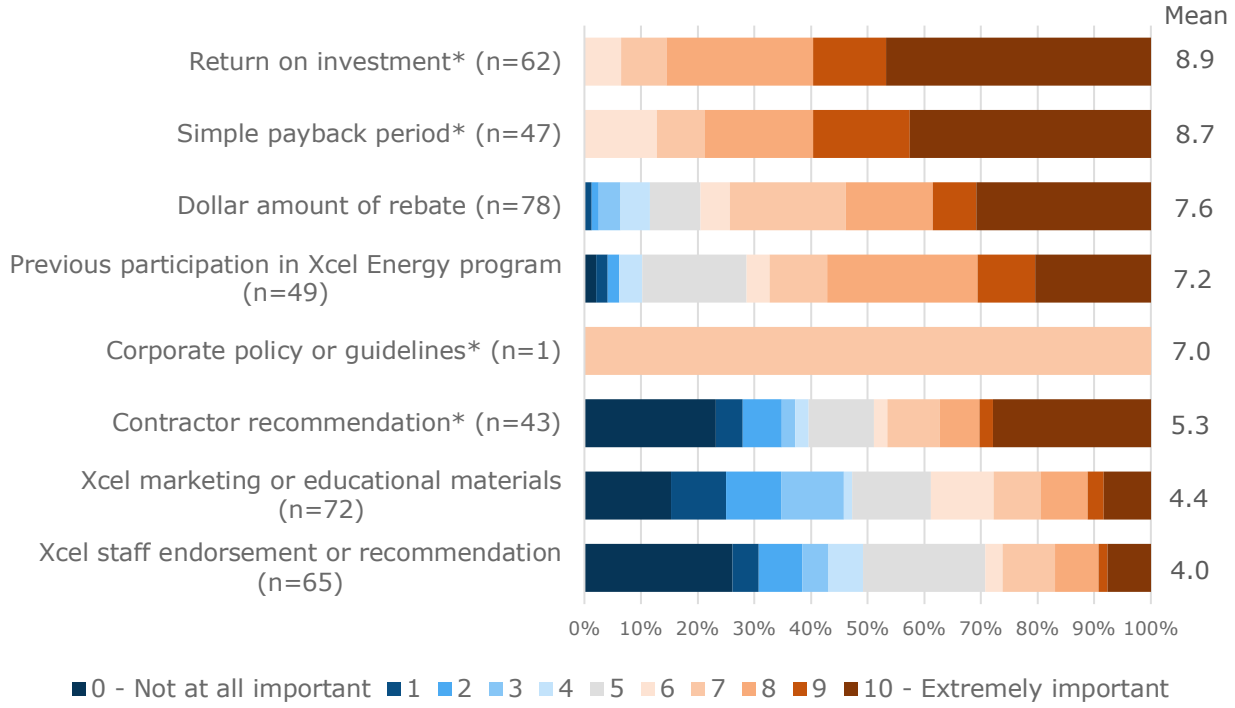
[14] Contractor recommendation, depending on whether the contractor reported product influence on the products they recommend, payback period and return on investment, depending on whether the rebate impacted those metrics, and corporate policy, depending on whether Xcel Energy influenced development of that policy.

A majority of respondents (55%) gave the highest possible rating to the importance of at least one factor reflecting product influence in their lighting purchase decision. The factors receiving the highest ratings were the project's return on investment (ROI) and simple payback period (Figure 4). The survey verified that the Xcel Energy rebate impacted the customer's calculation of ROI and simple payback period and considered it a product factor only if the customer confirmed it had. Most survey respondents who considered payback period and ROI in their calculations reported incorporating the incentive into their calculations. More than four-fifths (83%) reported considering the Xcel Energy incentive in their calculation of ROI, while approximately two-thirds reported considering the incentive in their simple payback calculations.

The research team determined whether the contractor recommendation was a product factor based on the interviewed contractor's rating of the product's influence on the lighting equipment they stock and recommend.[15] Only three respondents rated contractor recommendation the highest among all the product factors, meaning this rating impacted their free-ridership scores.

[15] Customer survey respondents named 43 contractors who installed their lighting upgrades. Thirteen of those contractors completed interviews as part of this evaluation, eight of whom qualified as product factors. As a majority of the interviewed contractors qualified as product factors, the research team considered recommendations from contractors that were not interviewed to be a product factor. This approach is based on the qualifications reported in section 3.1.1.3 in the IL TRM Cross-Cutting Measures protocol: http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_4_X-Cutting_Measures_and_Attach_020817_Final.pdf

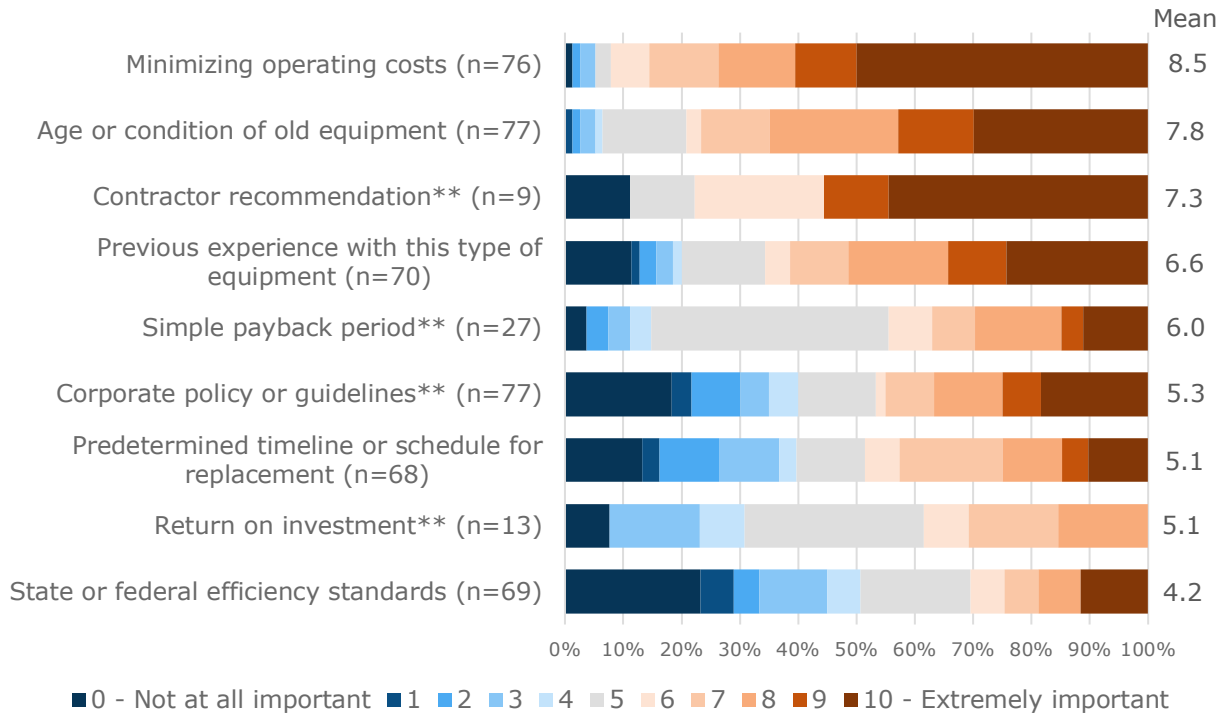
Figure 4: Importance of Product Factors in Decision to Install Lighting Equipment



** Includes only respondents for whom follow-up survey questions determined item was a product factor*
Source: Apex Analytics analysis of participant survey data

As with the product factors, the non-product factor that participants rated most highly reflect the financial benefits of lighting upgrades: the reduced maintenance costs resulting from installation of efficient lighting technologies (Figure 5).

Figure 5: Importance of Non-Product Factors in Decision to Install Lighting Equipment

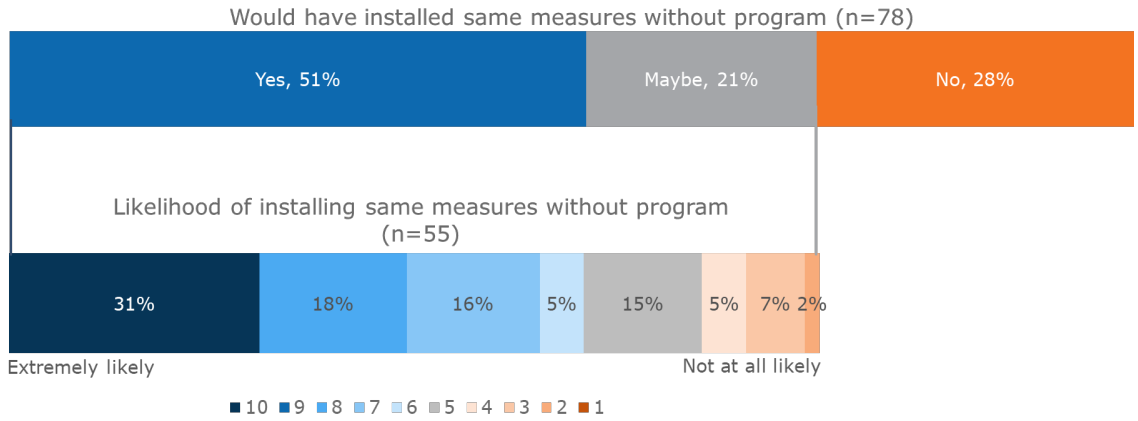


*** Includes only respondents for whom follow-up survey questions determined item was not a product factor.*
Source: Apex Analytics analysis of participant survey data

No Product Score

The no-product score asks participants to predict what action they might have taken had the product not been available. Despite their generally high ratings of the importance of the product in their decision to install efficient lighting, roughly half the survey respondents (51%) also reported they would have installed the same measures if the product had not been available. An additional 21% were unsure if they would have installed the same measures. Respondents' ratings of their likelihood of installing the same measures absent the product were largely consistent with their categorical responses (Figure 6). Half (50%) of all respondents rated their likelihood of installing the same measures at a six or higher on a scale from zero to ten.

Figure 6: Likelihood of Installing Same Measures in Absence of Product(n=78)

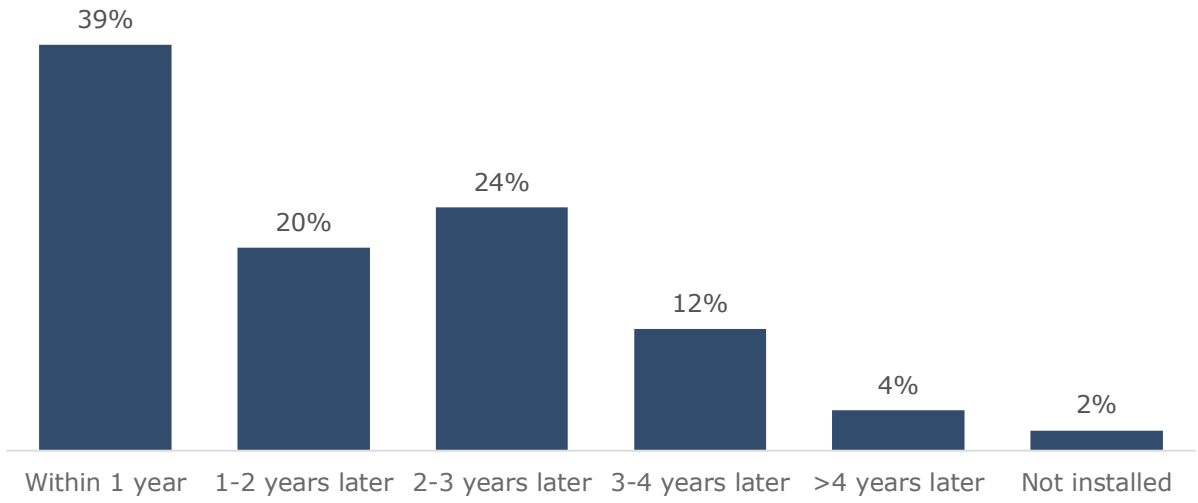


Source: Apex Analytics analysis of participant survey findings

Timing Adjustment

While respondents reported they would have installed the same measures absent the product, survey findings indicate that Xcel Energy accelerated the installation of efficient lighting products for most. A majority (61%) of participants who reported they would have installed the same measures reported they would have delayed their projects by at least a year (Figure 7).

Figure 7: Timing of Efficient Lighting Installation Absent Product (n=51)



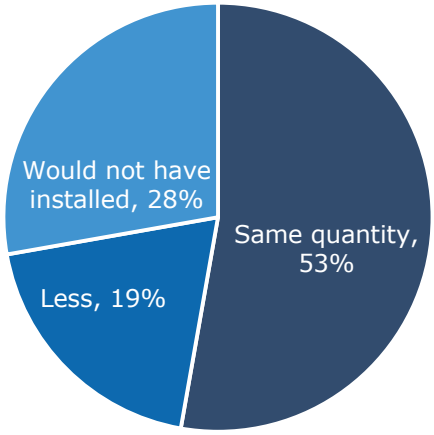
Source: Apex Analytics analysis of participant survey findings

Quantity Adjustment

The quantity adjustment considers the reduction in quantity of measures participants would install absent the product. Survey findings indicate that 19% of customers would have installed fewer efficient lighting measures had the product

not been available (Figure 8). On average, these participants would have installed 57% fewer measures than they installed through the product.

Figure 8: Quantity of Efficient Lighting Measures Installed Absent Product (n=72)



Source: Apex Analytics analysis of participant survey data

Free Ridership Estimate

The research team weighted the average free-ridership estimate for each measure by the proportion of savings represented in the 2018 product, for an overall product free-ridership estimate. Individual measure level average free-ridership values are offered in Table 2-3.[16]

Table 2-3. Lighting Efficiency Product Retrospective Free-ridership Estimates by Survey Strata

Strata	Average FR	Contribution to Savings	n = (sites)
Troffer/Area/High Bay	12%	84%	43
Custom	26%	10%	15
Other Measures	20%	6%	20
Combined	14%		78

Source: Apex Analysis of Participating Customer Survey Results and participant database. Population=All responding participating customers. n=78 (sites)

[16] Note the free-ridership estimates are not statistically valid at the measure level; they are provided for qualitative purposes.

Spillover Results

The research team assessed two types of spillover: participant spillover, resulting from participating customers installing additional measures without product support as a result of their participation in the Lighting Efficiency product and non-participant spillover, resulting from participating trade partners' sales of qualified products that did not go through the Product.

Participant Spillover

The research team found an overall participant spillover of 0.1%. Four participating customers reported a total of five qualified spillover measures. Qualified spillover measures reported were: linear LEDs, screw-in LEDs, LED signage, and LED can lights. Participating customers reported they did not apply for a rebate on these lighting products because they were not aware of the rebates, did not want to devote the time and effort required to complete the paperwork, or needed to complete the project more quickly than the rebate process would allow.

Nonparticipant Spillover

The research team assessed nonparticipant spillover as qualified products participating trade partners sold that did not receive Xcel Energy rebates. The research found evidence of 4.4% non-participant spillover through trade partners.

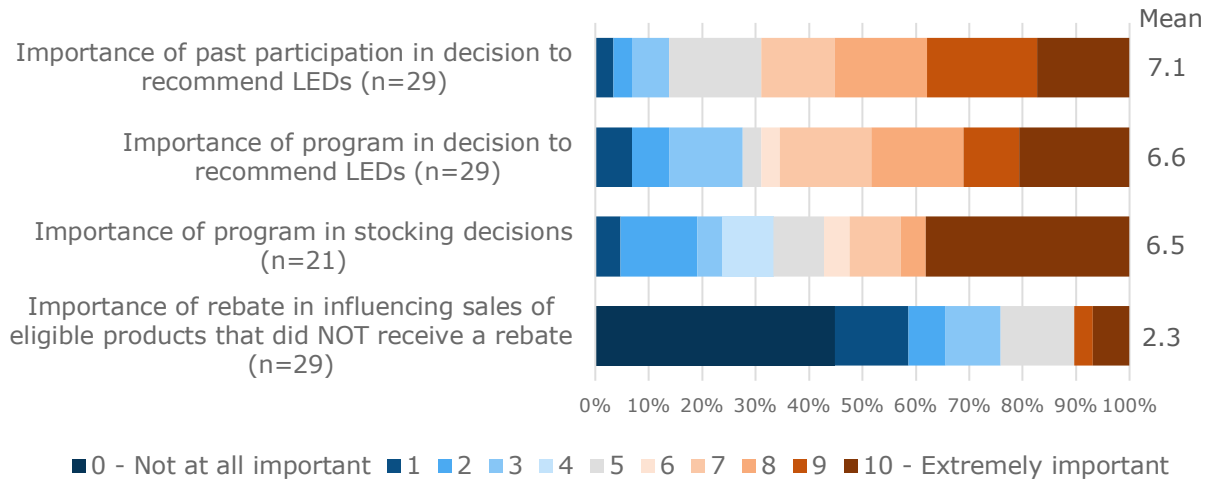
Participating trade partner interviews suggest that a large majority of partners' qualified product sales go through the Lighting Efficiency product. More than two-thirds (69%) of interviewed participating trade partners reported that fewer than 10% of their qualified lighting sales did not go through the product, including 40% who reported no qualified sales outside the product. In all, survey findings suggest that 5% of qualified products participating trade partners sell do not go through the Lighting Efficiency product.

Trade partners most often reported these products did not go through the Lighting Efficiency product because the projects were too small: the incentive for installing only a few qualified fixtures did not justify the effort required to go through the product. According to one trade partner, "if I'm selling three light [fixtures]…that's an email I have to print and sign. Another example is, if we change a broken exit sign, we don't even go down that path because of the time, and they have to wait for a check – somebody is not getting paid, typically us." Other reasons trade partners cited for not pursuing rebates on these sales included customers failing to provide them with needed information, the need to complete projects more quickly than the rebate process allowed, and ineligible projects, including those not involving one-for-one fixture replacements.

The research team assessed the product's influence on sales outside the product, as well as influence on trade partner recommendation and stocking practices with regard to efficient lighting equipment to determine the extent to which sales that did not receive rebates were attributable to the product. Trade partners reported their past participation in the Product was the most influential aspect in their decision to recommend LED light fixtures and retrofit kits to their customers (Figure 9). Adjusting the proportion of outside-product sales to account for product

influence on trade partner actions yielded a non-participant spillover estimate of 4.4%.

Figure 9: Product Influence on Trade Partners Reporting Outside Product Sales



Source: Apex Analytics analysis of participant survey data

FORECASTED TRADE PARTNER NTGR ANALYSIS

The second approach the research team took to estimate a prospective NTGR involved assessing the difference between interviewed trade partners' anticipated sales of LED fixtures and retrofit kits in 2020 with the product and in a scenario in which the product was not available in 2020 and had never been offered. Trade partners generally anticipated moderate growth in their sales of LED fixtures and retrofit kits in 2020, assuming continued product support, reporting a weighted average expected increase in sales of 17%. Interviewed trade partners cited their project pipelines and recent sales trends, company growth goals, increasing customer awareness of LEDs, and continued development of LED technologies for these expectations.

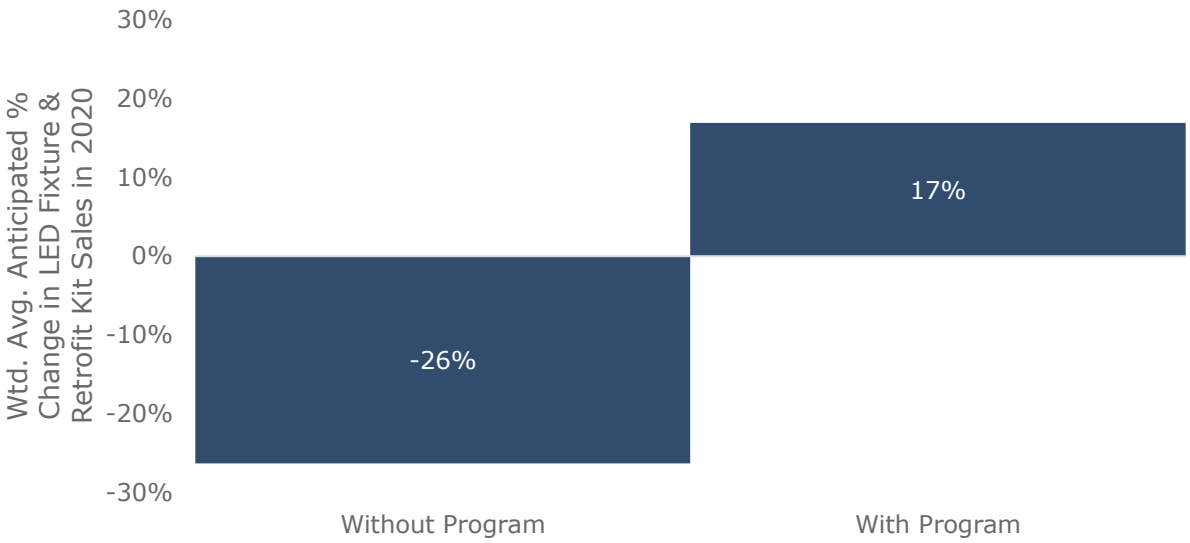
Participating trade partners expected, on average, a sharp decline in sales of LED fixtures and retrofit kits in 2020 relative to 2019 in the scenario in which the product would not be, and had not been, available. Interviewed trade partners reported an average expected decline in sales of 26% without the product, citing the increased difficulty of selling projects with longer payback periods. As one trade partner stated, "it is already slowing people down making decisions by just reducing the rebates, which they have done over the past couple of years. [If] you take them away totally, it would be very difficult for especially the smaller jobs to get payback."

Another trade partner reported the difficulty of selling lighting upgrades without rebates might lead their company to look for opportunities outside of Xcel Energy's territory if rebates were not available. This trade partner said, "The rebates sell the

LEDs for me, without rebates I'm not selling new LEDs to customers. If Xcel Energy rebates went away, I'd probably look into territories that do have rebates."

Note that if trade partners reported they would likely be out of business in 2020 if the Xcel Energy rebates were not available, the evaluation team set those respondents' without-product sales value to zero, giving the product full attribution for their 2020 sales. Figure 10 shows participating trade partners' average anticipated change in sales of LED light fixtures and retrofit kits in 2020, relative to their 2019 sales, with and without the product.

Figure 10: Anticipated Change in 2020 Sales with and without Product



Source: Apex Analytics analysis of participant trade partner interview data

As noted above, the research team combined the results into a single trade partner estimate due to the overlays between trade partner (installers) and manufacturer/distributor (e.g. some distributors install, and some installers distribute). The research team calculated a net-to-gross value for each participating trade partner reflecting the proportion of their anticipated 2020 rebated sales attributable to the product. The research team then weighted those values by each participant's estimated 2020 sales volume.[17] This resulted in an anticipated 2020 NTGR of 50% based on trade partner estimates.

[17] Sales volume was estimated based on the volume of sales reported through the product and the proportion of sales the participant reported outside the product. While respondents were asked to estimate their 2019 unit sales volume, not all were able or willing to do so. Using calculated values allowed for greater consistency in estimates and allowed the analysis to include respondents not providing a past-year sales estimate.

Table 2-4: Trade Partner Prospective NTGR Estimates

Trade Partner Group	2020 NTGR	Contribution to Savings	Number of Respondents
All Installers	38%	32%	30
Distributors	54%	68%	14
Combined	**50%**	**100%**	**44**

Source: Apex Analytics analysis of participating trade partner interview data

The remainder of this section draws on trade partner interview data to add context to these findings including:

- Business Type
- LED Market Share
- Role of Incentives in Lighting Sales
- Differences In Trade Partners By NTGR
- Non-Participant Trade Partner Spillover, and
- Overall Market Effects

Trade Partner Business Types

The interviewed trade partners represented a diverse range of business types, with respondents divided relatively evenly between lighting contractors, electrical contractors, and manufacturers and distributors (Table 2-5). Respondents also included some firms with both distribution and installation capabilities, as well as a few Energy Service Companies (ESCOs) and other firms focused specifically on efficiency projects.

Table 2-5: Interviewed Participating Trade Partner Business Types

Type of Firm	Number of Respondents
Lighting contractor	17
Electrical contractor	16
Distributor/manufacturer	15
Combined Distributor/Installer	4
ESCO and other Efficiency-Focused	4

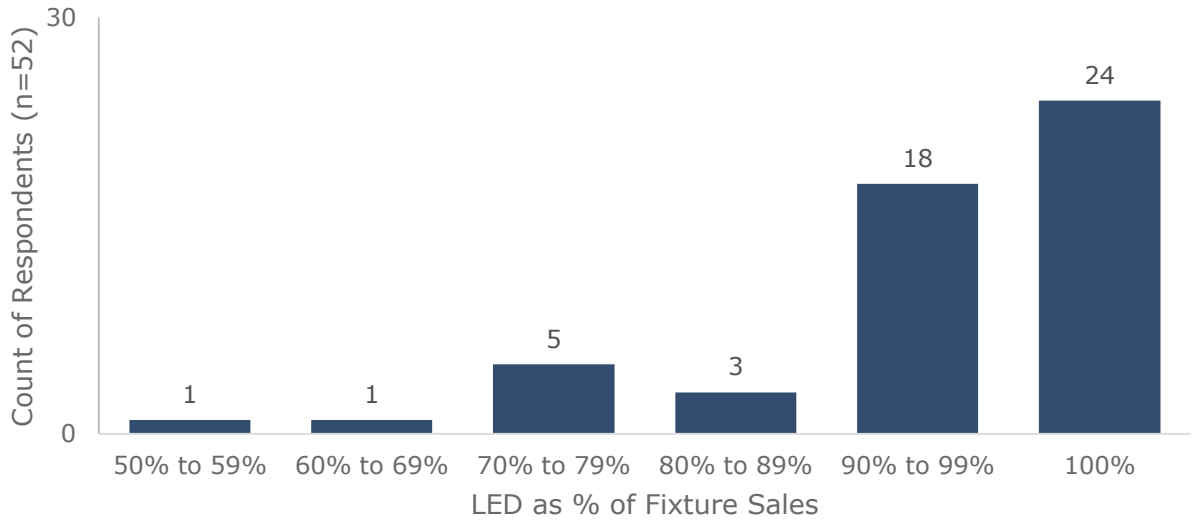
Source: Apex Analytics analysis of participant trade partner interview data

The interviewed trade partners also varied in the customers they serve, working in commercial and industrial facilities ranging from small businesses to large, national chains, to large industrial and warehouse facilities. Finally, trade partners reported providing a range of services to those facilities, with some focused on managing projects across portfolios of facilities, some focused on coordinating efficiency product offerings, and some focused on installation.

LED Market Share

Trade partner interview findings suggest that LED is the predominant technology in the light fixture and retrofit kit market. Almost half (24 of 52) of the interviewed trade partners reported all the fixtures and retrofit kits they sold in the past year were LEDs, and four-fifths (42 of 52) reported LEDs made up at least 90% of the fixtures and retrofit kits they sold (Figure 11).

Figure 11: LED Share of Participating Trade Partner Fixture and Retrofit Kit Sales

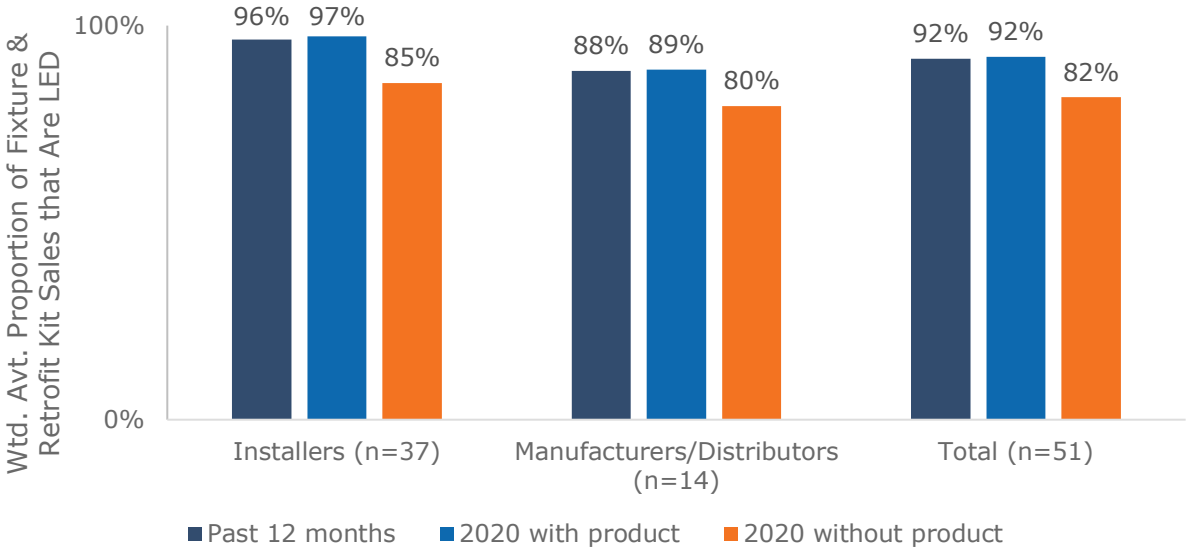


Source: Apex Analytics analysis of participating trade partner interview data

Participating trade partners anticipated their LED shares would remain high even in the absence of the product. Trade partners reported that manufacturers were increasing the availability of LED fixtures and retrofit kits and decreasing the availability of less efficient technologies. As one trade partner described, "Every time [a manufacturer] does a dog and pony show and shows me new products, it's LEDs; I can't remember the last time I had a dog and pony show where somebody showed up with something that wasn't." The interviewed trade partners also suggested they viewed LEDs as the best lighting solution in most applications. As one trade partner stated, "the world has changed to LED, there is not a reason to do anything else" in most cases.

As a result, while distributors and larger installers, in particular, anticipated they would sell a larger share of non-LED technologies if the product were not available, a large majority of their fixture and retrofit kit sales would remain LEDs. As discussed below, trade partners anticipated that the absence of the product would have a stronger impact on their LED sales volume than on their LED market share (Figure 12). According to one trade partner, "My company is 100% LED, so the program doesn't change my business. But I also can't run without it."

Figure 12: LED Share of Fixture and Retrofit Kit Sales With and Without Lighting Efficiency Product



Role of Incentives in Lighting Sales

As described above, participating trade partners anticipated a notable decline in their sales of LED fixtures and retrofit kits in absence of the product. Respondents suggested this decline would result from the loss of Lighting Efficiency Product incentives as a sales tool. According to one trade partner, "Xcel pushes that decision over the edge…it's that extra little push that customers need to make that decision."

Trade partners noted that Lighting Efficiency Product rebates help to reduce the payback period for lighting upgrades. Trade partners reported, and customer survey results confirmed, that payback period is a key motivator for participants. One trade partner stated that rebates "bring the cost of the job to a point that puts it in reach for the small business owner…it brings the project ROI, break-even point, into a time that the decision maker is more OK with…that one-to-three or two-to-four-year range. Without rebates, when we are looking at four-to-six year ROI times, it's a much harder sale." Another trade partner said, "I'd be recommending [LEDs], but since we're doing energy projects, the payback period would be beyond the threshold of customers wanting to invest their money in that particular solution, meaning lighting as a whole wouldn't be as attractive as putting that money somewhere else."

In addition to reducing payback periods, trade partners reported that Lighting Efficiency Product incentives can help to increase sales by providing an implicit, third-party endorsement of certain products. According to one trade partner, "because Xcel Energy is offering a rebate product, that lends credibility to the LED technology. If it's a technology Xcel Energy is willing to supplement, it's a technology the customer can trust and depend on." The Lighting Efficiency Product's history of changing incentives as the market shifts can also help trade

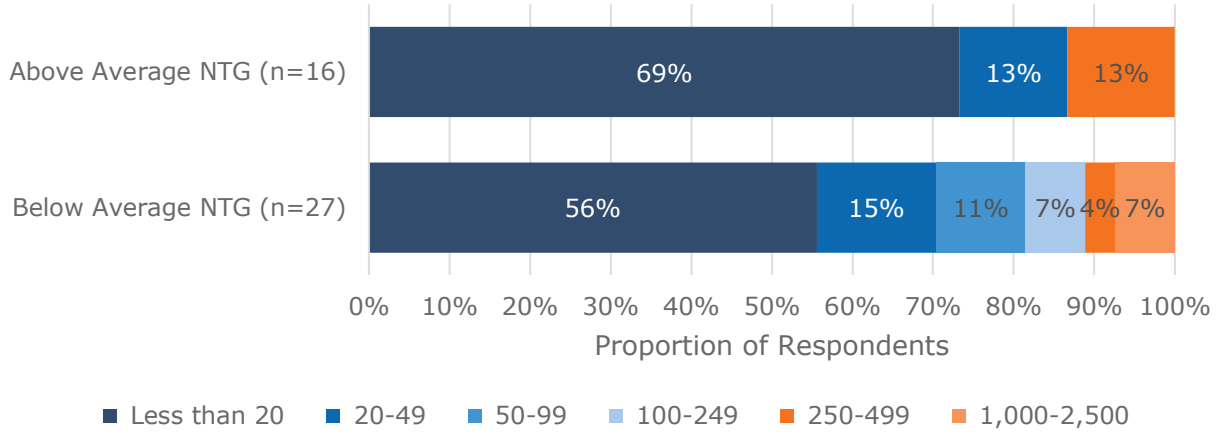
partners increase sales by providing a sense of urgency for customers to act before the incentives change. One trade partner said, "the other thing rebates do is create a sense of urgency in the customer…[without rebates] it's a lot more, 'I'm going to wait and see where prices go from here on LEDs.'"

The ways trade partners reported the Lighting Efficiency Product had impacted their business illustrate the importance of incentives as a sales tool. Trade partners reported selecting certain types of lighting projects to target in response to the incentive levels available for different lighting applications. For example, two trade partners reported that, when Xcel Energy offered lucrative incentives for outdoor lighting, they had reached out to customers specifically promoting those types of projects.

Differences in Trade Partners by NTGR

The research team compared participating trade partners on a variety of factors to understand variation in the NTGRs. Trade partners whose NTGRs were above the 50% weighted average were generally smaller companies, with 69% reporting they had fewer than 20 employees in Colorado, relative to 56% of those whose NTGRs were below the weighted average (Figure 13).[18] Consistent with this finding, participating trade partners whose NTGRs were above the weighted average reported selling an average of 16,617 LED fixtures and retrofit kits (unit sales) in the past 12 months, notably lower than the average unit sales of 35,538 that trade partners whose NTGRs were below the average reported.

Figure 13: Trade Partner Reported Number of Employees in Colorado by NTGR

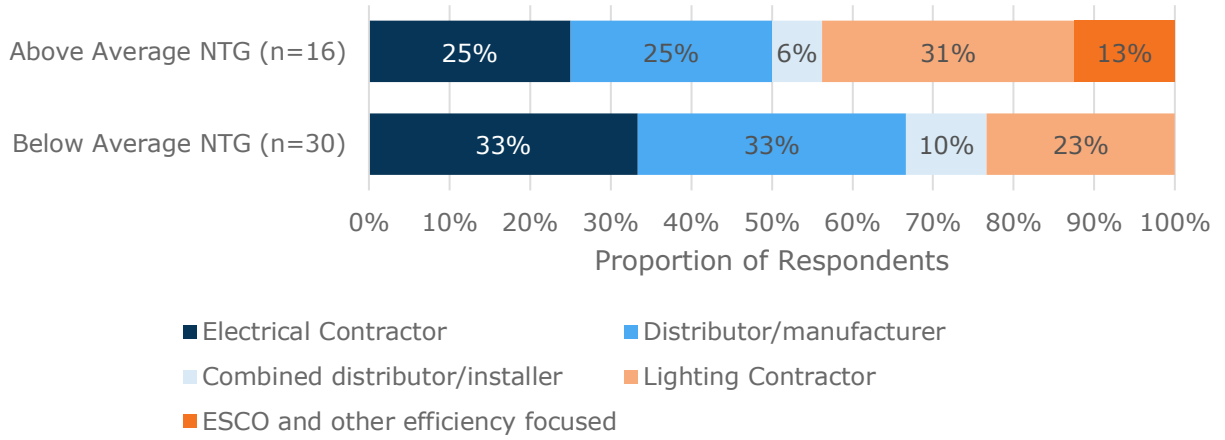


In addition to differences in business size, trade partners with above average NTGRs were more likely to represent business types more directly focused on efficient lighting retrofits. Specifically, trade partners with above average NTGR

[18] Except where noted, the figures listed in this section are not statistically significant. The trade partner interview sample size limits our ability to generate statistically significant findings at a granular level. However, the data qualitatively indicate some notable trends.

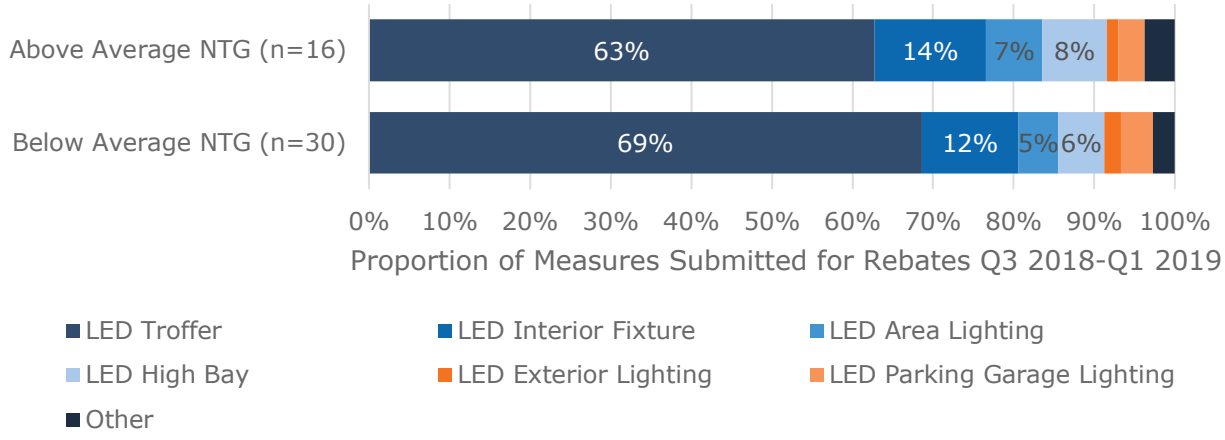
values were more likely to be lighting contractors or other efficiency-focused businesses, while those with below average NTGR values were more likely to be distributors, general electrical contractors, or have multiple roles in the market.

Figure 14: Trade Partner Business Type by NTGR



The distribution of measures trade partners with NTGR values higher than the weighted average installed through the product during the evaluation period did not notably differ from the distribution of measures trade partners with below average NTG values installed. Trade partners with above average NTG values were slightly more likely to install LED interior lighting, area lighting, and high bays, and less likely to install LED troffers, but these differences were small and not statistically significant (Figure 15).

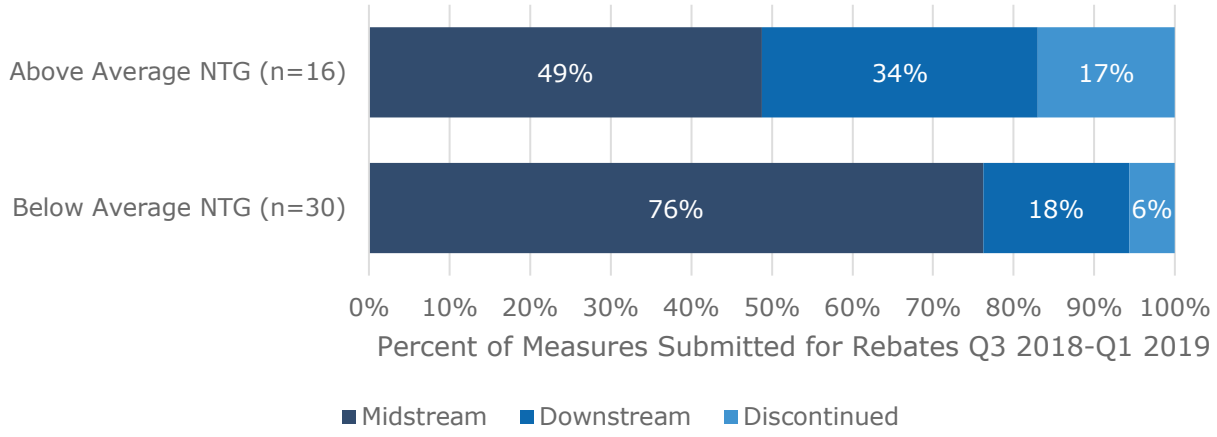
Figure 15: Distribution of Measures Submitted for Downstream Rebates Q3 2018 – Q1 2019 by Trade Partner NTGR



More notable differences in measures submitted to Xcel Energy arose when the research team expanded the analysis to include measures that Xcel Energy shifted to a midstream delivery approach or discontinued in the summer of 2019. Specifically, measures shifted to midstream delivery made up a significantly larger

portion of sales for trade partners whose NTGRs were lower than the weighted average.[19] Trade partners whose NTGRs were higher than the weighted average, in contrast, installed a larger portion of measures that remained eligible for downstream incentives (Figure 16). This is consistent with the finding that trade partners with higher NTGRs were generally those for whom lighting retrofits were a more central part of their business. The measures for which Xcel Energy continued to provide downstream incentives were primarily measures installed in lighting retrofits, while measures shifted to the midstream program were more likely to be included in maintenance installations.

Figure 16: Distribution of Measures Submitted for Rebates Q3 2018 – Q1 2019 by Measure Status Following 2019 Product Updates, by Trade Partner NTGR



Non-Participant Trade Partner Spillover

The research team interviewed non-participating trade partners, identified as trade partners who had been active in the product at one time but had not submitted any recent projects, to identify any influence the product may have on these companies' LED sales and assess naturally-occurring LED uptake. The research team determined that roughly half (32 of 59) of the identified sample of non-participating trade partners was either no longer active in the lighting market or did not have valid contact information. The research team ultimately completed interviews with nine non-participating trade partners, seven of whom were able to provide estimates of their LED fixture and retrofit kit unit sales in the past 12 months.

Four of the seven interviewed trade partners reported the Lighting Efficiency Product had influenced their business practices, and three of those anticipated their sales in 2020 would be higher with the product than they would be had the product not existed.[20] These three respondents anticipated the product would increase their sales by approximately 3,200 units in 2020, an increase equivalent to 15% of the

[19] P=.07
[20] The fourth respondent did not plan to install commercial lighting in Xcel Energy territory in 2020.

total anticipated 2020 sales for the seven respondents providing data. Extrapolating this increase in sales to the identified non-participant population results in an estimate of 12,391 product-influenced LED fixtures and retrofit kits that non-participating trade partners will sell in 2020.

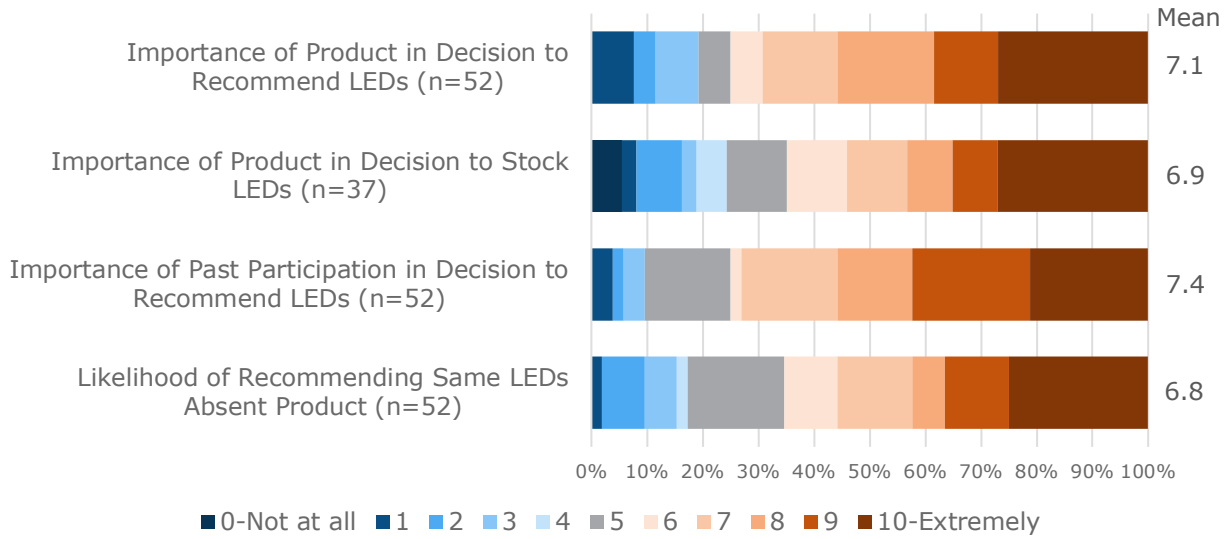
The interviewed non-participating trade partners were generally small firms, and commercial lighting was often not a primary focus of their businesses. As a result, non-participating trade partners' sales volume of LED fixtures and retrofit kits was considerably smaller than that of participating trade partners. Interview findings suggest that participating trade partners will sell a total of approximately 3.8 million LED fixtures and retrofit kits in 2020, while non-participating trade partners will sell a total of approximately 81,000. Given the difference in the volume of sales between participating and non-participating trade partners, the product-influenced LED fixtures that non-participating trade partners are likely to sell in 2020 represent a spillover value of 0.36%.

Market Effects

In addition to estimating the impact Xcel Energy's Lighting Efficiency product has had on their sales, participating trade partner interviews probed on the extent to which the product had impacted key aspects of trade partners' businesses. Two-thirds of the interviewed trade partners (38 of 57, 67%) reported their participation in the product had influenced changes in the services or products they provided or the customers they served. Trade partners cited the potential for the incentive to act as a sales tool and discussed efforts to target LED lighting measures with the greatest incentives. One respondent reported the product "has an influence on the direction of certain product offerings, or even the direction of targeted business. For example, when the exterior rebates bumped up…[we] shifted a lot of resources toward exterior lighting and pushed those products."

Interviews probed on key elements of product influence, and trade partners generally gave high ratings to the influence of the product on their business. More than 70% of respondents (37 of 52, 71%) rated at least one item as a nine or higher on a ten-point importance scale. Respondents gave the highest rating to the importance of their past participation in their decision to recommend LEDs (Figure 17).

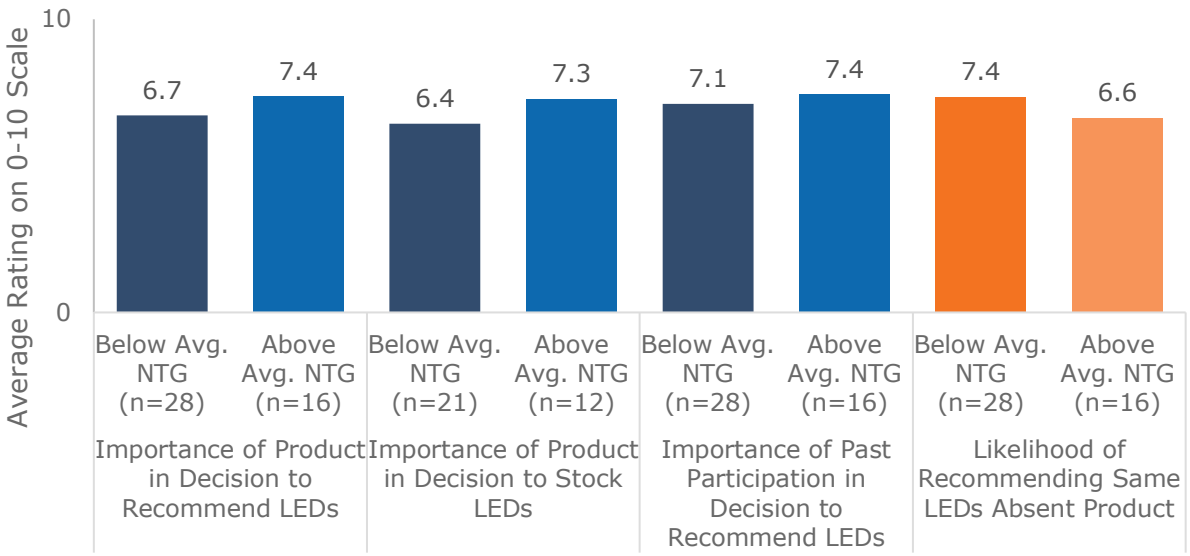
Figure 17: Participating Trade Partner Ratings of Product Influence on Recommendations and Stocking



Despite their high ratings of product importance, trade partners were also reported a relatively high likelihood that they would recommend the same LED light fixtures and retrofit kits if the product were not available. Respondents most often explained apparent discrepancies between their importance ratings and their likelihood of recommending LEDs absent the product by elaborating that they view LEDs as the best option in many situations and that LEDs provide benefits beyond the incentives. Some respondents stated that their businesses were built around providing LED lighting. This finding is similar to the market share and sales findings in previous sections, as many of these respondents predicted that they would sell fewer LEDs if the product were not available, but their measure mix would remain the same.

Trade Partners' ratings of product influence on their business decisions were largely directionally consistent with the NTG values derived from their anticipated change in sales with and without the product. Trade partners whose NTG values were above the weighted average (50%) gave higher average ratings of product influence in all areas and lower average ratings of the likelihood they would recommend the same lighting measures absent the product (Figure 18).

Figure 18: Average Rating of Market Effects Items by Respondent NTG



Source: Apex Analytics analysis of participating trade partner interview data

Trade partners whose NTG values were below the weighted average gave the highest ratings to the importance of their past participation in their decision to recommend LED fixtures and retrofit kits. In open-ended responses, some noted that the product had a greater influence on their businesses when LEDs were newer to the market. According to one trade partner, "Five or six years ago, there were still plenty of situations where LED wasn't the best fit. The technology wasn't there. The rebate was more influential in shifting opinion to go to LED at that point."

INTEGRATION OF RESULTS – RECOMMENDED NET-TO-GROSS

The research team used data from participating customers and trade partners to develop two initial NTGRs (88.2% and 50%, respectively), then followed the framework provided in the Illinois TRM for combining participant and trade partner values, while considering the unique aspects of Xcel Energy's Lighting Efficiency Product. This process allows the research team to provide justifiable results that represent the Xcel Energy Lighting Efficiency Product.

The Illinois TRM protocol recommends that the research team assesses the individual NTGRs based on considerations of the likely bias, accuracy, and representativeness of the results. Specific questions include:

1. How likely is the approach to provide a more accurate estimate of free ridership?
2. How valid and reliable is the data collected and the analysis performed (i.e., consider non-response bias, missing data (e.g., whether data collected was based on recollection or record keeping?), and
3. How representative is the sample (accounting for sampling error {confidence and precision}, and non-response bias, and any sample frame bias)?

Accuracy (Question #1)

Both the participating customer and trade partner have different biases. The trade partners and customers could have a social desirability (i.e., a "green" or environmental) bias, stating that they are socially responsible and would sell/purchase energy efficient lighting without product intervention, resulting in an underestimation of product influence.

However, there is also the concern with a "gaming" bias, where respondents understand that the Lighting Efficiency Product is being graded on their answers, and respondents want to provide the "right" answer as a form of reciprocity for the rebate and support they have received. For example, one interviewed trade partner began their response to the question of why they anticipated their LED sales without the program would change by saying "Whatever makes Xcel continue their programs. We really like them." The trade partner went on to explain the impact of the product on their lighting sales, but this light-hearted response demonstrates the trade partner's awareness that their responses could impact a program that benefits them. This bias leads to an overestimation of product influence.

These two biases (social desirability and gaming) work in opposite directions and likely impact both trade partners and customers. It is also possible that the gaming bias is less pronounced as mature trade partners (presumably those that were highly influenced by the program) provided a lower NTGR than other trade partners.

Additionally, consistency checks in the participating customer survey reveal that some respondents may not understand the intent of the survey questions or gave potentially inconsistent responses between questions. Roughly one-fifth of survey respondents (15 of 78, 19%) gave inconsistent responses, in all cases reporting they would have installed the same measures at the same time despite earlier responses indicating the product had been influential in their decision-making. In contrast, the trade partner interview format allowed interviewers to more thoroughly probe and question potential inconsistencies to create accurate responses.

Validity (Question #2)

Past participants will have a bias for over-reporting influence as their perception is based on a snap-shot in time and does not reflect the changing market landscape. The participating customer was faced with estimating their actions based on a counterfactual that didn't occur; however, they do have first-hand knowledge of the specific factors that contributed to their personal decision. In addition, the customer perspective applied prospectively may overstate future product influence in light of increasing product availability, decreasing price, and general naturally-occurring adoption (i.e., the trajectory of naturally occurring LED adoption may not be linear, as assumed in Figure 3).

Trade partners have to estimate future sales volumes, both with continued product support and assuming the product never existed; both are estimates of an

uncertain future. As noted above, trade partners with lower-than-average NTGRs reported the highest ratings to the importance of their past participation in their decision to recommend LED products; these respondents may not have fully considered the direct and indirect effects of their past participation in estimating sales in a scenario in which the product had never existed. Trade Partners play a pivotal role in the future success of the product, particularly because many of them have built their business around Xcel Energy incentives. As such, trade partner results are an important component of prospective NTG. Customer participants are unlikely to maintain the same mature relationship with the Lighting Efficiency Product as their involvement may be limited to projects over one or two years.

Trade partners also do not have visibility into the customer's unique decision-making process. For example, as described below, a large portion of the installations that received Lighting Efficiency rebates were early replacements. Trade partners acknowledged this in open-ended responses, although the interviews did not ask them about it directly. While trade partners included some consideration of these early replacements in their estimates of sales with and without the product, they may not have fully appreciated the importance of rebates on customer decisions to move forward with early replacement upgrades or the impact this reduction in sales would have on their overall business model.

However, trade partners have a key advantage over customers in that they have visibility into market trends and influences and can estimate future product opportunities with more clarity. Similarly, while market actors can report on market trends (given their continuous involvement), they may under-report product influence on accelerated replacements.

Summarizing the validity assessment, both the trade partners and customers have different threats to validity; the magnitude and impact of these threats are unknown.

Representativeness of the samples (Question #3)

The participating customer and trade partner samples were both highly representative of the current measure mix offered by the Lighting Efficient Product. The sample was stratified to ensure the combined responses represent the current measure mix, and measures moved to midstream products or discontinued were not included in the final sample. The research team applied the same filters to the trade partner sample. Trade partner respondents represent 40% of the Q3 2018-Q1 2019 lighting efficiency savings from representative measure offerings; Customer participant respondents represent 15%.

Confidence and precision estimates were also similar between both trade partners and participating customers. At 90% confidence, achieved trade partner precision was 21%, while participating customers achieved 17% precision.

One challenge present in both the participating customer and trade partner responses is the representativeness of the sample for future product activities. Specifically, the lighting efficiency product offerings are consistently evolving with the changing market conditions; the active trade partners and participating customers present in our 2018 may be different than those moving forward. One way to assess the representativeness of the trade partners mix is to evaluate the presence of mature trade partners (i.e., those that have been highly active in the past) in the final respondent mix.

The research team defined mature trade partners as the Xcel Energy Trade Partner Award Winners, as these trade partners have been highly active in Xcel Energy's lighting products in the past. These trade partners have strong connection with the product and are expected to continue their involvement, even when the product changes offerings. In this instance, 13 of the 15 2018 Xcel Energy Trade Partner Award winners completed interviews as part of this effort, indicating that mature active trade partners are represented in the trade partner results. Anecdotally, NTGRs for mature trade partners were similar, although slightly lower, than the rest of the trade partner sample. It is not possible to assess the representativeness of the participating customer sample in future product iterations, as participants largely vary from year to year.

Combining Customer and Trade Partner Responses

In consideration of the bias, accuracy, and representativeness of the two NTGRs, the research team believes both estimates represent different, valid estimates of product attribution, and both estimates have strengths and weaknesses; Table 2-7 summarizes these.

Table 2-6. Lighting Efficiency Product Research Strengths and Limitations

Research Task	Strengths	Potential Biases / Limitations
Customer Surveys (2018 & 2019)	• Factors in historical influence. • Based on participating customer perspectives and decision making.	• Future trend analysis may overstate future product influence in light of increasing product availability, decreasing price, and general naturally occurring adoption
Participating Trade Partner, Manufacturer, Distributer Interviews	• Relies on partners close to product. • Provides the market-based perspective of sales (e.g., What the general population is purchasing) and LED market share trajectory	• Social desirability bias. • Challenge to estimate future product impact. • May not fully account for cumulative direct and indirect product influences. • Do not always know when customers fill out rebate forms. • Potential confusion with midstream product. • Could underestimate project accelerations.
Non-Participating Trade Partner Interviews	• New perspective on market, can capture other market effects. • Provides the market-based perspective of sales (e.g., What the non-participant population is purchasing). • Uninfluenced trade partners may serve as baseline LED market share and sales volumes.	• Difficult to identify non-participants. • May understate influence if unaware of product in market and/or influence on customer decisions. • Difficult to estimate market share of non-participants

Based on these strengths and limitations, the research team recommends a 60/40 weighting of the participant and trade partner NTGR estimates. Specifically, the research team downgraded the influence of the trade partner NTGR because trade partners with higher NTGRs installed a greater share of measures that remained in the downstream program. Trade partner interviews for this evaluation occurred shortly after the shift in delivery approach and may not have fully captured its effects; trade partners may have mentally combined the midstream products with the downstream, even though the questions were worded precisely to refer to downstream measures only.

Additionally, ratings of product influence were closest between trade partners with above-average NTGRs and those with below-average NTGRs on the historical influence of the product. This could suggest that some trade partner respondents did not fully consider the cumulative effect the product has had on their business over time when estimating sales in the without product scenario. As such, the research team recommends taking a 60/40 weighting of the participant and trade

partner NTGR estimates, for a final recommended prospective NTGR of 73% (Table 2-7).

Table 2-7: Trade Partner Prospective NTGR Estimates

NTG Respondent	2020 NTGR	Assigned Weight
Participating customers	88%	60%
Trade Partners	50%	40%
Combined	73%	100%

Source: Apex Analytics analysis

3. EARLY REPLACEMENT AND SALES DATA FEASIBILITY RESEARCH

In addition to calculating a recommended NTGR, the research team researched two specific items identified in the 2018 Lighting Efficiency Product evaluation. Specific research objectives are listed in the bullets below:

- Assess the feasibility of collecting full category C&I lighting sales data for use in future NTGR estimations.
- Provide supplemental insight for product baselines, including the percent of functional fixture replacements and proportion of lighting replaced as part of remodel projects.

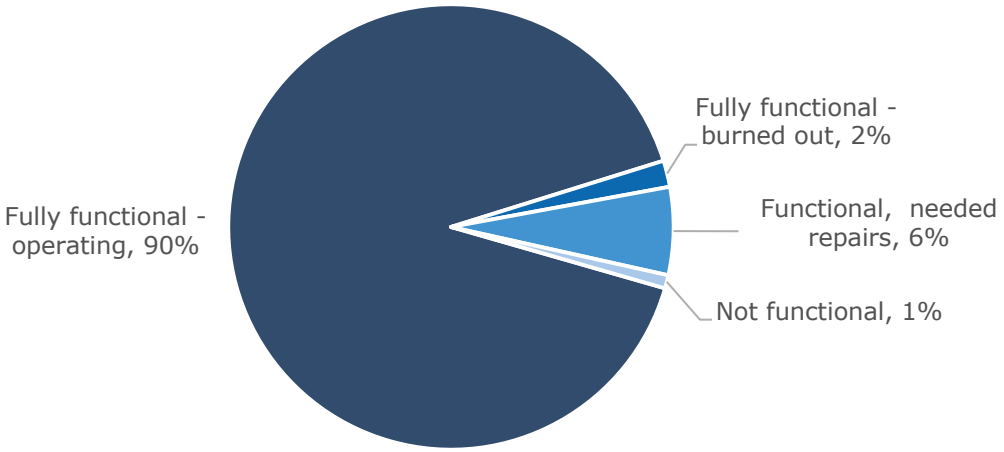
To accomplish these objectives, the research team elicited feedback from participating customers to research the product baselines and communicated with over a dozen organizations during the sales data feasibility research. This chapter presents key findings from the early replacement and sales data feasibility assessment. These findings, along with findings from the impact evaluation, inform the conclusions and recommendations presented in the next chapter.

3.1 EARLY REPLACEMENT

The research team primarily drew on participant survey data to determine the proportion of projects receiving Lighting Efficiency Product rebates that represented early replacement.[21] Survey findings indicate that 90% of the installations receiving Lighting Efficiency Product rebates replace fixtures that were fully functional and the lights were operating (Figure 19). More than half of the customer survey respondents (41 of 76) reported that all the lights they replaced were fully functional and operating.

[21] Note that additional analyses and quantification of early replacement vs. replace on failure is covered under a separate memo entitled "Colorado C&I Lighting Baseline Assessment".

Figure 19: Condition of Replaced Equipment



Source: Apex Analytics analysis of participant survey data

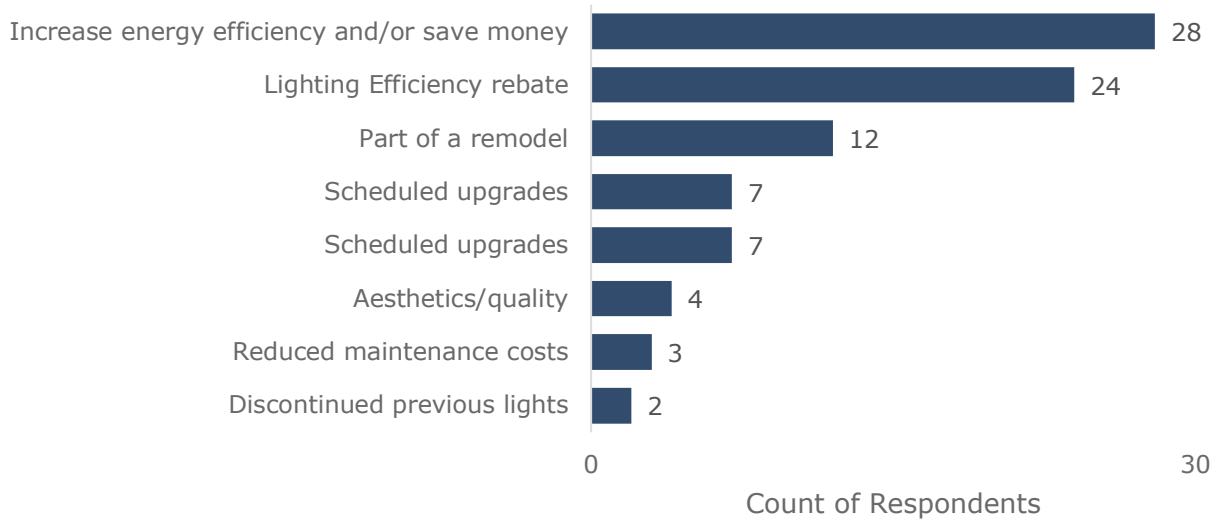
Respondents indicated that approximately two-thirds of the lighting equipment replaced through the product likely would have lasted two years or more had they not replaced it (Figure 20).

Figure 20: Anticipated Remaining Life of Replaced Lighting Equipment (n=63, percentages weighted by quantity installed)

Source: Apex Analytics analysis of participant survey data

Participants most often reported replacing functioning lighting products because they wanted to increase energy efficiency and/or save money or to take advantage of Xcel Energy rebates. Respondents reported a desire to take advantage of non-energy benefits of efficient lighting, like reduced maintenance costs and improved aesthetics, less frequently.

Figure 21: Reasons for Replacing Functioning Lighting Equipment (n=38, multiple responses allowed)



Source: Apex Analytics analysis of participant survey data

3.2 SALES DATA FEASIBILITY RESEARCH

Xcel Energy tasked the research team with investigating the availability of C&I lighting sales data for Colorado. Apex Analytics has been investigating data sources for C&I Lighting sales and shipment counts by state over the last several months; the discussions with lighting research organizations are salient to this project, so we summarize them below.

SEARCH EFFORT

The research team communicated with over a dozen organizations in our search for sources of C&I Lighting sales data. These included:

- **National Electric Manufacturers Association (NEMA):** This group compiles indices for lighting market share by bulb type, including reports on linear shipments.
- **Electrofed Canada:** This Canadian nonprofit organization fills a similar role to NEMA in Canada, and is capable of producing sector and regionally differentiated lighting sales shipment reports.
- **The Consortium for Energy Efficiency (CEE):** Works with product administrators to develop strategies to accelerate commercialization of energy efficiency solutions to benefit gas and electric customers, utility systems, and the environment.
- **The Design Lights Consortium (DLC):** This nonprofit organization compiles a Qualifying Product List for high performance lighting.

- **Cadeo:** This consulting firm leads the C&I Lighting Market Characterization efforts for Bonneville Power Administration.
- **Nielsen:** A market research firm that provides lighting bulb counts for residential lighting efforts based on point-of-sale and panel data.
- **IRI:** A market research firm that provides lighting bulb counts for residential lighting efforts based on point-of-sale and panel data.
- **Energy Futures Group:** An energy efficiency evaluation and design consulting firm that provides lighting strategy for utility products.
- **National Association of Electrical Distributors (NAED)**: NAED is a distributor trade association that offers a Market Data Product to collect, aggregate, and share sales data, including sales of commercial lighting products. We also reached out to **D+R International**, who was procured by NAED to lead the Market Data Product.
- **Navigant Consulting:** An energy efficiency research and evaluation consulting firm that prepares solid state lighting data and reports for the Department of Energy.

DATA SEARCH FINDINGS

Because the population of manufacturers is smaller than distributors or contractors, one approach to gathering C&I sales information is to request it directly from manufacturers. Electrofed Canada, in fact, has successfully implemented this approach, with detailed tables that break out dollar and unit sales by lamp type, sector and geography (see Figure 22 for an example). These data are available to non-members for purchase. Manufacturer data collection would be the most straightforward path for collection, but would require a new data collection effort and would not give the needed geographic granularity.

Figure 22: Example of Electrofed Canada Data Report

ELECTRO FEDERATION CANADA EFC

LAMP STATISTICAL REPORT FORM
Commerical & Industrial (C & I) Channel
Units and Dollars Shipments

Group 01

Product Category		01 ATLANTIC		02 QUEBEC		03 ONTARIO		05 MIDWEST		06 ALBERTA		07 BC		GT GRAND TOTAL	
		$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units
A.	**Incandescent**														
02	A - Line														
04	Decorative														
06	Reflectors														
08	Specialty / Other														
$1	**Sub Total (02 - 08)**														
B.	**Halogen (Including Xenon)**														
11	A-Line														
12	Reflectors														
14	Miniature Reflector														
16	Single Ended														
18	Double Ended														
20	Other / Decorative														
$2	**Sub Total (11 - 20)**														
C.	**Fluorescent/Compact Fluorescent**														
24	T5														
26	T8														
28	T12														
30	CFL (u-ballast) - Unenclosed														
31	CFL (w ballast) - Reflector														
33	CFL(w ballast) - Decorative														
32	CFL (without Ballast)														
$3	**Sub Total (24 - 32)**														
D.	**HID**														
36	Mercury														
38	HPS														
40	MH - Probe Start														
41	MH - Pulse Start														
42	Other														
$4	**Sub Total (36 - 42)**														

In the U.S., however, NEMA has no analogous reporting, and based on our conversations, they have no interest or intent to replicate a similar report. Without the support of NEMA it is highly unlikely that manufacturer C&I lighting data collection would be successful in the U.S. Furthermore, even if NEMA were to participate, there are two additional limitations:

1. It is likely that NEMA would not be willing to share detailed data with non-members (particularly entities that are not manufacturers sharing their own data). NEMA has already shown a reluctance to share manufacturer data, as they currently collect data on screw-based lamps, but only share very limited data with the public.

2. Even if NEMA were willing to collect and share the data, it would not have the geographic granularity that is important to product administrator planning and evaluation efforts. The Electrofed data, for example, is a mix of provinces and regions (with multiple provinces), and only includes seven geographies for all of Canada (see Figure 22). Electrofed reported to us that it is difficult to get data more granular than this from manufacturers because they ship to regional distribution centers and report that to Electrofed. A given distribution center may distribute to multiple provinces, but the quantities for each province are not reported to Electrofed. Electrofed also noted that manufacturers must assume which bulbs go to C&I vs. residential in their counts, because they only know bulb type and which distributor they sell to.

Efforts to collect data directly from distributors have had very limited success, and would only reflect a single jurisdiction. In the Northwest, Bonneville Power (BPA) has collected data from distributors directly. After multiple years of effort and $1,000 incentives for each respondent, they estimate that they have captured nearly 50% of the market sales in the Northwest.[22] One consultant actively involved in the research noted that this is probably the "best case scenario" for collecting C&I lighting sales data from distributors.

Another consultant noted that it is challenging to get distributors to participate with data collection efforts as they typically have less precise data and less data management staff than manufacturers. In Wisconsin and Massachusetts, a similar effort to the BPA collection effort was attempted (although focused only on participating distributors), and both those efforts had extremely low response rates of distributors providing actual, full category sales data (including non-qualifying equipment). For example, in 2017 and 2018 Massachusetts tried to replicate the Northwest data collection, with an evaluator reaching out to 10 distributors in Massachusetts during the period of September 2017 through July 2018. Despite letters of introduction to distributors from the implementer, a $1000 incentive, an offer to analyze and categorize raw data from inventory systems and to even meet with distributors in person to assist in gathering the sales data, only two distributors participated.

Midstream products could require full category data from participant distributers, but if not established at the product outset, it would be difficult to collect and could lead to attrition in product participation. One consultant we spoke to provided an example of an HVAC product that has had success collecting full category data, aggregating it up to market level, and sharing data reports back to participants. In general products have only required participating distributors to provide sales of product qualifying units, which minimizes participant burden and concern over data

[22] The reports and data can be found at https://www.bpa.gov/EE/Utility/research-archive/Pages/lighting-market-research.aspx.

confidentiality yet still allows for incentive calculations. Implementation contractors, of course, have a disincentive to request full category data as it would require more paperwork/reporting and risk participant attrition.

A current effort by NAED offers the most promising opportunity to collect C&I lighting sales data. NAED is currently contracting D+R International to lead an effort to collect electrical data, including lighting sales shipments, from distributors across the U.S. as part of the Market Data Product.[23] The Market Data Product asks distributor members of NAED to contribute data in exchange for receiving aggregated reports and analytical tools (e.g., benchmarking) across all distributors (i.e., all contributed data is anonymous). Apex Analytics has held multiple calls with D+R International over the last year to monitor the progress of the effort, but as of fall 2019 the product was struggling to collect sales data and engage distributors. In an effort to work more closely with the product, Apex began reaching out directly to NAED, and has asked a number of product administrators across the U.S. (including Xcel Energy) to write a letter to NAED to encourage them to work more closely with Apex on their behalf.[24]

To date letters have been sent to NAED by ComEd, Efficiency Maine, Xcel Energy, Focus on Energy, and Eversource. In October 2019, Apex Analytics spoke to the president and CEO of NAED. He expressed that NAED continues to struggle getting distributors to provide their data and participate in the product, and that when they do collect data it's intended for use by participating distributors, not (as of now) by third parties. We noted that we can work with our product administrators to encourage distributor participation in the effort, but in return would need access to the data.

NEXT STEPS

Apex will continue to communicate with NAED and see if we can find an acceptable solution to work more closely. In the meantime, Apex is currently pursuing four distributor references, which would allow us to join NAED as an Allied Partner. Allied Partners are invited to participate in conferences, committees, and other industry initiatives, which may provide an opportunity to make additional connections with NAED and build a more formal partnership.

OTHER FINDINGS FROM THE SALES DATA COLLECTION EFFORT

Information obtained during the data search suggests that the traditional C&I lighting supply chain, flowing from manufacturer to distributor to contractor, is being challenged. An expert from DLC suggested that the traditional supply chain is still the large majority, but that bulbs going direct from manufacturer to contractor or direct to customer is becoming more prominent. This is especially true (according to DLC) for Chinese manufacturers, who receive government subsidies

[23] https://www.naed.org/market-data
[24] The Xcel Energy letter is included below.

to sell their bulbs in the U.S. below cost, and often circumvent distributors. The DLC representative expressed the view that they may be trying to "take the industry" with this coordinated tactic.

In addition to direct disintermediation, new options for contractors to purchase lights are also altering the traditional supply chains. The prevalence of online storefronts has made it easier for manufacturers to take direct orders. Large retailers now provide full-service "pro desks", both digitally and physically, that add an additional path to the supply chain and may mix both commercial and residential sales. The "pro desk" is likely a prevalent channel for smaller contractors who wish to bundle smaller purchases, other products that the retailer sells, and equipment rentals from one supplier.

4. CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the research team's key conclusions and associated recommendations regarding the Lighting Efficiency Product in Colorado. All conclusions and recommendations are based on key findings from our research and are designed to reflect the context of future product years, acknowledging expected changes in the market and planned product changes.

Conclusion 1a: Xcel Energy's Lighting Efficiency Product continues to influence the lighting market, accelerating adoption of LED light fixture and retrofit kits. The product motivates participants to undertake lighting upgrades they would not otherwise pursue. Trade partners described incentives as a sales tool that motivates participants to proactively replace inefficient lighting, rather than continuing to maintain inefficient systems. Customer survey responses support trade partners' assessment, with many customers reporting they replaced working light fixtures in order to save energy and money and take advantage of rebates.

Conclusion 1b: The Lighting Efficiency Product has a greater impact on sales volume than market share of LED fixtures and retrofit kits. As a result of the proactive replacements it has brought about, the product has increased the volume of LED fixtures and retrofit kits sold and installed in Xcel Energy service territory, and trade partners anticipate it will continue to do so. Findings suggest the product will have a less pronounced impact on LED market shares going forward. As the market has grown and matured, LEDs have become the predominant technology for light fixtures and retrofit kits installed in commercial applications. As a result, LEDs represent a large majority of fixture and retrofit kit sales and will likely continue to do so. While trade partners anticipated they would still recommend LED fixtures and retrofit kits absent the product, they expected they would sell fewer of them.

- **Recommendation 1a: Xcel Energy should adopt a 2020 NTGR of 73% for downstream measures in the Lighting Efficiency product.** The 73% figure balances findings from participant surveys with findings from trade partner interviews, taking into account the strengths and weaknesses of each and changes in program delivery.
- **Recommendation 1b: Future efforts to assess product attribution should continue to evaluate changes in the volume of LEDs sold with and without the product.** Incorporating a consideration of quantity into both the trade partner NTG approach and the participant-focused, retroactive NTG approach were critical to fully capturing the influence of the product in this research, and quantity increases will be a central element of product influence going forward.

Conclusion 2: Trade partners are responsive to incentive offerings, providing an opportunity for Xcel Energy to target key technologies and applications. Participating trade partners reported Lighting Efficiency Product incentives were more generous for some types of lighting equipment than others,

and the equipment for which incentives were more generous were easier for them to sell. As a result, some trade partners actively target projects involving lighting equipment with more generous incentives. This trade partner responsiveness indicates an opportunity for Xcel Energy to use incentives to promote lighting equipment types that will provide the greatest strategic benefit to the product.

- **Recommendation 2: Xcel Energy should continue to carefully consider which types of lighting equipment will provide the greatest benefit to the product and set incentive levels to encourage installation of those equipment types.** Xcel Energy may opt to focus higher incentives on lighting equipment types with the greatest savings potential or on types that need additional support to accelerate market transformation and increase market share. Future evaluation research could help to prioritize lighting products for targeted incentives.

Conclusion 3: Downstream rebates have limited impact on maintenance installations; Xcel Energy's recent shift to midstream incentives for many measures may cover these installations more effectively. Participating trade partners reported selling a majority of their non-LED lighting products for maintenance installations, replacing individual fixtures or lamps that had failed. Trade partners also cited these smaller installations as among the most common situations in which qualified products do not receive incentives. For these smaller installations, trade partners indicated that the incentive amount their customers would receive for a small number of fixtures would not justify the effort required to submit the application. It may also be more difficult for trade partners to use return-on-investment as a selling point to justify the increased upfront cost of a single fixture than it is to justify a larger-scale lighting upgrade. Xcel Energy's decision to shift many measures from a downstream rebate to a midstream delivery model has the potential to allow the product to better capture these smaller, maintenance installations.

- **Recommendation 3: Xcel Energy should continue to monitor the lighting market and ensure that products frequently installed as maintenance measures are included in the midstream product.** Xcel Energy can leverage its engagement with trade partners to identify which measures are most often purchased for maintenance installations and which are most often purchased for retrofits. Future evaluation research could also assess which measures are used for maintenance and which hare used for retrofits.

XCEL ENERGY

Colorado Lighting Efficiency Net-to-Gross Follow-up Research

APPENDICES

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APPENDIX A: EVALUATION PLANNING DOCUMENTS

A.1 RESEARCH PLAN

To support the research into the attribution of the Xcel Energy efficiency programs, Apex Analytics, part of the EMI Consulting evaluation team, will conduct additional research in 2019 to support the Xcel Energy Lighting Efficiency program. We are conducting this interim-year research to provide a greater understanding of the rapidly evolving lighting market.[1] This memo updates the scope of work described in the team's contract for the 2017-2018 DSM evaluations for the 2019 Xcel Energy Lighting Efficiency evaluation based on staff feedback during the evaluation kick-off meeting[2]. This research plan includes the following sections:

- Product Overview
- Research Overview
- Data Collection Activities and Sampling Plans
- Net-to-Gross Approach

PRODUCT OVERVIEW

The Lighting Efficiency product offers prescriptive and custom rebates to businesses that receive electricity from Xcel Energy and install qualifying energy efficient lighting equipment. The product has three components, targeting existing buildings, new buildings, and custom projects. Rebates encourage commercial and industrial (C&I) customers to purchase energy efficient lighting by lowering the upfront costs associated with this equipment. Between Q3-2018 and Q1-2019, the Lighting Efficiency product claimed over 101 GWh in energy savings from the custom, new construction, and retrofit rebate channels (Table 1).[3] Since the prescriptive retrofit and custom rebates make up the majority of savings in this product, and the product plans to drop eligibility for new buildings, the team will focus efforts on those two channels.

Table 1. Q3-2018 through Q1-2019 Lighting Efficiency Savings, by Product Channel

[1] The evaluation team will conduct a more complete evaluation for this product in 2020.
[2] Held April 15, 2019
[3] The evaluation team is targeting participants from the most recent three quarters to reduce recall bias. The evaluation team relied on application close date to summarize the product totals and planned sampled yet will attempt to sample initially from those participants with the most recent application creation dates first.

Product Channel	Savings (kWh)	% of Total
Retrofit	74,853,675	74%
Custom	16,071,698	16%
New Construction[a]	10,672,726	10%
Total	**101,598,099**	**100%**

[a] note new construction channel excluded from 2019 NTG research

The Lighting Efficiency product offers rebates on a variety of lighting technologies within each channel. Within these, linear LED lighting, troffers, and custom lighting measures contributed most to overall program energy savings (Table 2).

Table 2. Q3-2018 through Q1-2019 Lighting Efficiency Savings, by Measure Category

Measure Category	% of Total Savings (kWh) [a]
LED Linear	28%
LED Troffer	14%
Custom Lighting	14%
LED High Bay	10%
LED Area Lighting	10%
LED Parking Garage Lighting	5%
LED Exterior Lighting	4%
LED Interior Fixture	3%
LED PL/G base	3%
LED Outdoor Canopy or Soffit lighting	2%
LED Lamps - HID Base	1%

[a] Additional measures contributing less than 1% of product savings are LED exit signs, fluorescent high bay, LED lamps with HID base, stairwell occupancy sensor, LED street lighting, LED refrigerator and freezer cases, and pin based CFLs. No network lighting controls were rebated during this timeframe.

The Lighting Efficiency product relies heavily on an active trade partner network. While Xcel Energy does not actively endorse or promote individual trade partners, this group plays an integral part in advancing the product. Internally, Xcel Energy relies on their account managers and the business services center (BSC) to market and facilitate this product. Both key account managers and BSC are incentivized to complete efficiency projects with their customers and will inform and assist customers in the application process.

RESEARCH OVERVIEW

The objective of this research task for the Lighting Efficiency product is to develop a 2020 net-to-gross ratio (NTGR) documenting the extent to which program activities influenced customer lighting purchasing decisions. The evaluation team proposes to triangulate three distinct research estimates from four sources into one cohesive prospective NTG estimate:

- **Source**: Customers.
  - **Estimate**: Projected 2020 NTGR from 2018 and 2019 trendlines
- **Source**: Participating and Non-participating Trade Partners.
  - **Estimate**: Projected 2020 NTGR
- **Source**: Manufacturers/Distributors:
  - **Estimate**: Projected 2020 NTGR

Our research will include perspectives on product influence across the spectrum of market actors, from downstream participants to upstream manufacturer and distributors. To summarize, objectives of the Lighting Efficiency product research include:

- Develop a prospective NTG ratio projecting the program's future influence on the market in 2020.
- Assess the feasibility of collecting full category lighting sales data.
- Provide supplemental insight for product baselines, including:
  - Percentage of early replacement installations[4]
  - Percentage of projects requiring permit (i.e., required code)[5]

DATA COLLECTION ACTIVITIES AND SAMPLING PLANS

To meet the above objectives, the evaluation team will conduct a variety of data collection activities. These are listed in Table 3 and explored more in remaining section. The evaluation team will (1) conduct surveys with participating customers (2) interview participating and non-participating trade partners, and (3) interview manufacturers and/or distributors. These data collection activities will inform both backward and forward looking NTG estimates, as well as research questions around each market actor's decision-making processes. Table 3 outlines each research task and the associated research objectives; details on each data collection activity are provided in the sections that follow.

[4] Identifying differentiated baselines from participant feedback can help refine current impact assumptions regarding early replacement status.
[5] If the lighting retrofit required a building permit, then the baseline would be code, not existing conditions.

Table 3. Lighting Efficiency Research Summary

Research Task	Sample Size	NTG (FR&SO)	Market Effects	Early Replacement
Sales Data Feasibility Assessment	NA		✓	
Participant Surveys	70	✓ (FR, SO)		✓
Participating Trade Partner Surveys	40	✓ (Indirect FR, Non-part SO)	✓	
Non-Participating Trade Partner Surveys	15[a]	✓ (Non-part SO)	✓	
Manufacturer/ Distributor Interviews	5-10[a]	✓	✓	

[a] *The ultimate sample size will depend on the identification of contacts and willingness of actors to participate.*

Sales Data Feasibility Assessment

The objective of this task is to determine the feasibility of collecting comprehensive lighting sales data for commercial/industrial applications in Colorado. This task will enable the evaluation team to explore availability of full category lighting sales, including working with the National Association of Electrical Distributors (NAED), which recently launched a Market Data Program to collect distributor sales data, as well as reviewing and possibly leveraging sales data already collected by Xcel Energy. If successful, the evaluation team will propose a separate analysis task and budget to collect and/or purchase non-residential lighting sales data and, if feasible, utilize the data as input into the NTGR.

Participant Surveys

Participant surveys with customers that recently[6] participated in the Lighting Efficiency product will primarily gather data to inform the NTGR. The evaluation team will limit the sample to those that participated since mid-2018 to minimize recall bias. The NTG battery will largely replicate the 2017 effort, with two key additions to reflect other product influence, including:

- Potential changes in measure quantities resulting from program interventions (e.g., participants that installed more efficient lighting than planned as a result of the product), and

[6] As noted above, the evaluation team will sample from Q3-2018 through Q1-2019 based on close date and focus our initial attempts on those with application creation date from the same period.

- Whether participants replaced existing lighting early as a result of the product (e.g., the existing lighting was fully functional lighting and the participant was not planning on replacing it), or if the customer was planning on doing a lighting upgrade.

The team will ask questions on both free-ridership (the impact the program had on respondents' decision to purchase program incented high efficiency lighting) and spillover (efficient lighting installed because of the Xcel Energy Lighting Efficiency program but not incented).

The targeted sample size (70) will provide results at the product level as a whole, not for individual measures.[7] However, the evaluation team will stratify by the type of measure installed to ensure the survey sample parallels the distribution of expected program savings, and the evaluation team can over- or under-sample specific measures if Xcel Energy expects the 2020 measure mix to differ from the more recent measure mix. The surveys will target each of following four groups: linear LEDs (including troffers), custom lighting, occupancy sensors, and other measures (Table 4). The evaluation team also plans to stratify the custom lighting projects by savings to ensure the sample includes some of the largest sites. While occupancy sensors contributed only 2% of the product savings in the most recent three quarters, the evaluation team plans to over-sample this group (similar to 2018) because of the continued interest in expanding this product adoption.

Table 4. Q3-2018 through Q1-2019 Lighting Efficiency Participant Population, by Survey Strata

Strata	Savings (kWh)	Population	Target Surveys [a]
Linear LEDs and Troffers	41,273,707	1,535	31
Custom Lighting	16,071,698	172	8
Other Measures	33,579,968	1,810	31
Total	**90,925,373**	**3,517[b]**	**70**

[a] Preliminary recommended targets, will be updated upon Xcel Energy review

[b] Because of customer account overlap, we only report the unique total count of accounts, not the additive across each strata

Market Actor Interviews

The evaluation team will conduct in-depth interviews with three related groups of Lighting Efficiency product market actors: participating trade partners, non-participating trade partners, and manufacturers/distributors. The evaluation team

[7] A larger sample size would be necessary to target statistical NTG estimates for specific lighting measures.

has consolidated the data collection and sampling details around the NTG research for these three groups because many of the research objectives overlap.

Participant trade partner interviews will primarily be used to estimate prospective NTGR.[8] The NTG battery will largely replicate the 2018 effort, but with adjustments to assess changes in sales volumes resulting from program interventions. This change is consistent with the participant survey, and the evaluation team expects the inclusion of questions on quantity of measures installed to capture a more comprehensive assessment of the product's influence on market actor decision-making. The planned interviews will be shorter in duration than the 2018 evaluation because this effort excludes a process evaluation; this will help to reduce respondent fatigue and ensure respondents focus on the product attribution-relevant questions.

The team recommends targeting the same number (40) of participant trade partner interviews as completed in the 2018 evaluation. The participating trade partner interviews will be tailored to acknowledge repeat survey participation and, for these participants, will probe regarding changes to their responses from 2018. Similar to the participant surveys, this sample size will provide results at the product level as a whole, not for individual measures.

The evaluation team will stratify the participating trade-partner interviews between higher-and-lower-performers to ensure a representative group. The evaluation team defines higher-performers as trade partners whose projects receive more than 1% of total product rebate dollars, while lower-performers less than 1% of rebate dollars. The trade partner interviews will further prioritize any trade partners that participants highlight as highly influential in the participant surveys.[9] The population of 325 partners should be sufficient to reach the targeted number of surveys (**Error! Reference source not found.**).

Table 5. Q3-2018 through Q1-2019 Lighting Efficiency Market Actor Populations and Target Sample, by Survey Strata

Market Actor	Strata	Population	Percent of Rebate ($)[a]	Target Surveys
Participant Trade Partner	High Performers	24	63%	12[b]
	Mid/low Performers	301	21%	28
Non-Participant Trade Partner	N/A	Unknown	N/A	15

[8] Trade partner interviews will also be used to help identify potentially late adopting customer segments to target for the baseline study.
[9] Note highly-influential trade partners will be flagged for potential inclusion in the trade partner interviews but are not represented as a distinct survey stratum (i.e., they will overlap with high and mid/low performer strata).

Manufacturer/distributors	N/A	Unknown	N/A	5-10

[a] Note that 16% of rebates did not indicate a trade partner.

[b] Given the population of 24 high-performers; the evaluation teak will target 12 but may not achieve this target. Any difference in targets will be added to the mid/low performer strata.

The non-participant trade partner interviews (15), new for the 2019 research, will assess non-participant spillover, inform naturally occurring adoption[10], also assess remaining opportunities for efficient lighting transformation within Xcel Energy's service territory. Non-participants will be identified in two ways:

- Xcel Energy will look at year by year trade partner participation, identifying "drop outs" (i.e., trade partners that participated in prior years but not in 2018 or 2019).
- The evaluation team will classify the NAICs codes of participating trade allies with a business database (e.g., Dun and Bradstreet), and then find businesses with similar NAICs codes that are not listed as participating trade partners.

The evaluation team will also conduct interviews with manufacturers and distributors (10) to help the product gain insight from a more complete market actor perspective. Market actors upstream of direct product interaction offer a different perspective into the lighting market than the trade partners and will also contribute to the prospective NTGR[11] and the concurrent lighting baseline research.

NET-TO-GROSS APPROACH

The NTG assessment aims to estimate the percent of savings achieved that can be attributed to program actions, or a NTG ratio. The evaluation team will rely on participant self-reports, and trade partner and manufacturer/distributor interviews to assess program attribution. Attribution research will include estimating free ridership and spillover while developing evidence reflecting market effects metrics. The team will base its 2019 NTG methodology on the 2018 Xcel Energy Lighting Efficiency product evaluation. The evaluation team plans to leverage the same survey and interview guides used in the 2018 evaluation, which (for participating customers) drew on the Illinois NTG protocols. The evaluation team will supplement these questionnaires with new market elements and key attribution questions that will help strengthen the analysis. We are introducing these enhancements partially in response to questions that arose when analyzing the 2018 NTG results. Details about these additions are reviewed below.

[10] The non-participating trade partners that report no influence from the program may serve as a baseline to compare against participating partners, resulting in a proxy for naturally occurring adoption.

[11] The evaluation team has assumed that Xcel Energy will provide manufacturer and/or distributor contact information, including information for market actors that sell both efficient and inefficient lighting products.

As part of the overall NTG logic, the evaluation team will estimate three distinct prospective 2020 NTG estimates using multiple sources of information, including surveys with participating customers and market actor interviews. The evaluation team will synthesize available data to provide the most accurate and reliable recommended NTG. A summary of the evaluation teams prospective NTG research is shown in **Error! Reference source not found.** below.

Table 6. Prospective Lighting Efficiency Research Summary

Research Task	NTG	Changes to 2018 Algorithm
Projection of Participating Customer 2018-2019 retrospective NTG trends	✓	Addition of quantity factor and timing
Participating Trade Partner Surveys	✓	Addition of quantity factor, edited language to ask "what if program never existed"
Non-Participating Trade Partner Surveys	✓ (indirect and spillover)[a]	New
Manufacturer/Distributor Interviews	✓	New

[a] The non-participating trade partner responses will not result in an independent NTG estimate but help adjust the participating trade partner estimate.

This section presents the evaluation team's method to estimate the NTG ratio and concludes by describing how the evaluation team will synthesize findings to recommend a single overarching prospective NTG ratio for this product.

Participating Customer NTG trends

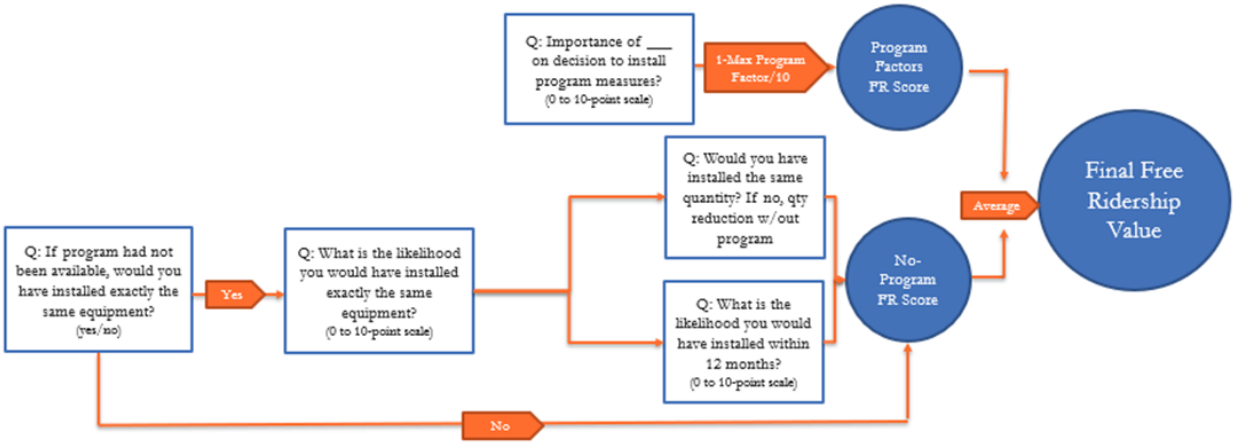
As a first step in estimating the prospective NTG, the evaluation team will collect estimates of retrospective NTG from participating customers. Since the participating customers can only report on their recent purchases, by definition this will be retrospective. A summary of the research task and the inputs for retrospective NTG estimates is shown in **Error! Reference source not found.** below. Note the trade partners inform freeridership indirectly on whether or not they are considered a program influence.

Table 7. Retrospective Lighting Efficiency Research Summary

Research Task	Freeridership	Spillover	Market Effects	Changes to 2018 Algorithm
Participant Surveys	✓	✓ (participant)		Addition of quantity
Participating Trade Partner Surveys	✓ (Indirect)	✓ (non-participant)	✓	Addition of quantity
Non-Participating Trade Partner Surveys		✓ (non-participant)	✓	New

The evaluation team will estimate participating customer freeridership based on an enhanced participant survey battery. The specific freeridership approach, revised to factor in quantity adjustments, is demonstrated in Figure 1 below. As can be seen, we will adjust the no-program freeridership score based on both the timing and quantity elements. Participating trade partners will indirectly inform participating customer freeridership. Similar to the 2018 freeridership logic, the evaluation team will gauge participating trade partner program influence for those partners identified as playing influential roles in participating customers' purchase decisions.

Figure 1. Participant Customer Survey Freeridership Logic



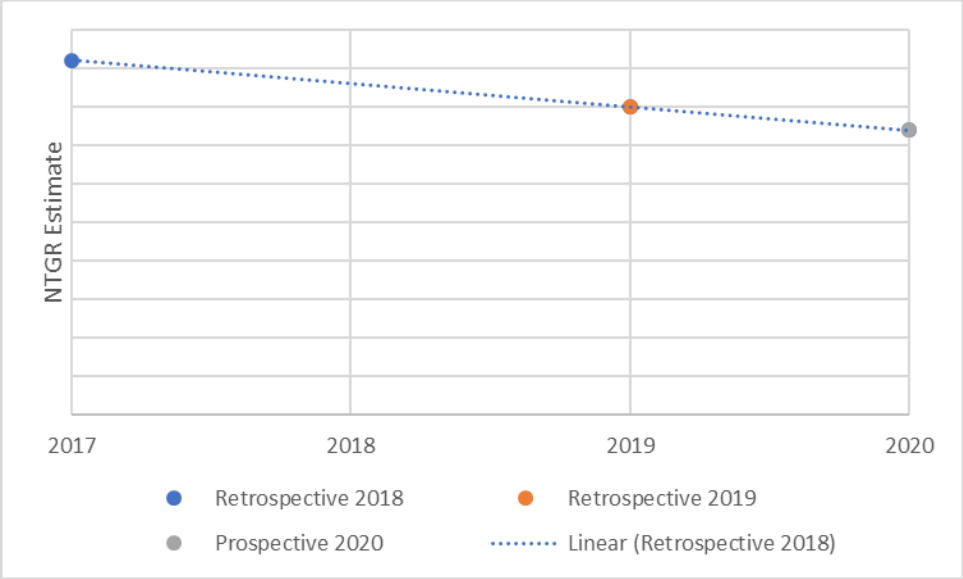
The evaluation team will rely on the same participant customer and trade partner survey batteries as used in the 2018 evaluation to estimate retrospective spillover and inform market effects. The total evaluated spillover will be a function of the participant (customer-centric) spillover estimate and the non-participant spillover estimate provided by participating and non-participating trade partners.

The evaluation team will also assess market effects indicators through the trade partner interviews. Specifically, the evaluation team will ask trade partners about the importance of the product on efficient lighting measure recommendations and

stocking practices and whether they would still have recommended energy efficient measures if Xcel had never offered the product.

The 2018 and 2019 participant end user retrospective NTGR estimates will ultimately be used to predict a 2020 NTGR (Figure 2). Starting with the retrospective estimate from the 2018 evaluation (reflecting PY2017 participants), the evaluation team will plot the updated retrospective estimate (reflecting late 2018 and early 2019 participants) and will forecast the 2020 anticipated customer centric NTGR based on a linear trend line. In general, product attribution is expected to decline based on the rapid transformation of the lighting market. However, given the considerably higher NTG estimate provided by the 2018 customer self-report, the evaluation team anticipates that an extrapolated customer self-report estimate may reflect higher product attribution than the prospective estimates from the other approaches, and not fully capture the rapidly transforming lighting market with increasing measure availability and decreasing prices.[12]

Figure 2. Example Prospective Estimate from Extrapolated Retrospective Estimates



Market Actor NTG

The team will also assess trends provided by participating and non-participating trade partners, as well as manufacturer/distributors. Specifically, the evaluation team will ask trade partners prediction of LED volumes (LED sales volumes will be represented by the quantity of equipment sold) and market shares in 2020 under two scenarios: 1) that the product continues with "business as usual", and 2) that

[12] We also expect that the revised NTG battery, factoring in different timing and inclusion of quantity attributes, may also impact the 2019 retrospective estimate, and the slope of the NTG trend from the prior study to the current study.

the product had never existed.[13] This will provide the evaluation team with product and no-product estimate to inform a prospective NTG value.

The evaluation team will calculate the product's initial prospective NTGR using the following formula:

$$\text{Prospective NTGR} = \frac{\text{LED sales volumes with program} - \text{LED sales volumes without program}}{\text{LED sales volume with program}}$$

Using the LED sales volumes with the program as the denominator, however, provides a conservative NTGR estimate, since not every LED sold through retail channels is submitted for the product.[14] The sales volumes with program metric, therefore, is adjusted to account for products not eligible through the Xcel Energy Lighting Efficiency product.[15]

Gaining insight into non-participant trade partners' behavior and demand for LED measures will add a more comprehensive view to the prospective NTG estimates. Though non-participant trade partners do not directly engage with the product, the evaluation team will investigate several key market dynamics, as described in the research questions below.

- Do non-participating trade partners believe the product has influenced their LED sales?
- Do they believe the overall lighting market has shifted as a result of the product?
- What market share of their current lighting sales are program qualified (LED-based)?

Similar to participating trade-partner NTG questions, we will also ask:

- What are their sales expectations for program qualified LEDs in 2020 with the product in place?
    - What they expect sales would be if the product had never been offered?

The evaluation team will then use the results of the non-participating trade partner interviews to contribute to the prospective NTGR estimates. The team expects the non-participant trade partners to be divided into two groups, those that report their stocking or sales have been influenced by the Lighting Efficiency product (product

[13] This is an important distinction as the change in wording can help capture the impact of past program efforts in future predictions.
[14] Products that are not DLC qualified, for example, were not incentivized for the majority of 2017, plus qualifying lamps do not always receive an incentive due to participant preferences.
[15] This adjustment essentially reduces the denominator by the percent of products ineligible for product incentives. We are interested in products outside of the program sold by the retailers. Specifically, we ask:*"About what percent of the lighting products you sell are eligible for rebates in the Xcel Energy Lighting program?"*

influenced non-participant trade partners), and those that do not (uninfluenced non-participant trade partners). The product influenced non-participant trade partners will provide insight into potential non-participant spillover and market effects, by reporting details on sales or stocking changes as a result of the product, that have not been captured through direct rebates. The uninfluenced non-participant trade partners will add insight into naturally occurring LED adoption through their estimates of LED market shares not impacted by product activities (they will receive the same questions and therefore serve as a naturally occurring baseline relative to influenced group). The evaluation team will scale the adjustments to the prospective NTGR estimate based on the relative stated volumes provided by these market actors.

The evaluation team will also use input from the manufacturer/distributor interviews to inform a separate prospective NTGR estimate. Program influenced manufacturer/distributors will provide insight into potential product impacts, by reporting details on sales or manufacturing changes as a result of the product. The uninfluenced manufacturer/distributors partners will add insight into naturally occurring LED adoption through their estimates of LED market shares not impacted by product activities. The evaluation team will scale the adjustments to the prospective NTGR estimate based on the relative stated volumes (in terms of quantity of equipment sold) provided by these market actors.

Recommended NTG

By design, our final NTG estimate recommendation includes data from mixed methods research, including both quantitative data and qualitative data. The evaluation team anticipates having three estimates of prospective NTG[16]:

- The extrapolated customer self-report (extrapolated from the retrospective trendline)
- The trade partner estimates[17]
- Manufacturers/distributers[18]

For our recommended quantitative estimate, the evaluation team will rely on the retrospective and prospective findings across four distinct yet related data collection activities. This includes multiple data points (participants, participating and non-participating trade partners and manufacturers/distributors) reflecting program influence from different market perspectives to develop a triangulated estimate for the final recommended 2020 prospective NTG. The evaluation team will review each source and its associated uncertainty (i.e., sample size, variance of responses,

[16] There is a fourth potential prospective NTG estimate approach, from sales data, but due to uncertainty regarding data availability and timing we excluded this component from this list.
[17] Note there are also prospective estimates from the trade partners from the 2018 study, however the evaluation team does not recommend using these given they didn't fully capture impacts on sales quantity and market effects.
[18] The use of manufactures and distributors will contingent on the final sample size and the ability of the respondents to speak to the impact of the Xcel Energy product.

response rate, qualitative responses) and whether the estimates are consistent with program theory and consistent across each other, and then consider adjusting the sources contribution (i.e., weighting) to the overall NTG estimate.[19]

The evaluation team's summary of the recommended NTGR inputs, with strengths and potential biases and limitations, are shown in Table 8 below.

[19] As an example, if the non-participating trade partners effort results in lower than anticipated response rates, with high variability among the respondents, we will reduce this sources contribution to the NTG estimate. We understand the importance of early feedback and plan on conducting WIM or separate sessions dedicated to discussions of consistency of results, and will be conducted in advance of any reporting. We will ensure Xcel and evaluation staff are in agreement on 1) what the program does (program theory), 2) how we will be able to maintain a viable lighting efficiency product, and 3) key contextual points that need to be included in any reporting to minimize the chance that results are misinterpreted by stakeholders.

Table 8. Recommended Lighting Efficiency Research Triangulation

Research Task	Changes to 2018 Algorithm	Strengths	Potential Biases / Limitations
Customer Surveys (2018 & 2019)	Addition of equipment quantity and early replacement questions	Factors in historical influence. Based on participating customer perspectives and decision making.	Projected prospectively may overstate future program influence in light of increasing product availability, decreasing price, and general naturally occurring adoption
Participating Trade Partner Surveys	Addition of quantity factor (sales volume), edited language to ask "what if program never existed"	Relies on partners close to product. Provides the market-based perspective of sales (e.g., What the general population is purchasing)	Social desirability bias. Challenge to estimate future program impact. Do not always know when customers fill out rebate forms.
Influenced Non-Participating Trade Partner Surveys	New, Non-participant spillover, will be integrated into trade partner estimate	New perspective on market, can capture other market effects. Provides the market-based perspective of sales (e.g., What the non-participant population is purchasing)	May be difficult to identify non-participants. May understate influence if unaware of product in market and/or influence on customer decisions
Uninfluenced Non-Participating Trade Partner Surveys	New, naturally occurring LED adoption	Serves as baseline LED market share and sales volumes. Provides the market-based perspective of sales (e.g., What the non-participant population is purchasing)	May be difficult to identify non-participants. May understate influence if unaware of product in market and/or influence on customer decisions
Manufacturer/ Distributor Interviews	New, will adjust the trade partner estimates only	New perspective on market, can capture other market effects. Provides the market-based perspective of sales (e.g., What the larger population is purchasing)	Small sample. Potential confusion with midstream program. May not be able to provide information specific to Xcel Energy service territory.

While the evaluation team recommends adopting an overall prospective NTGR value based on quantitative methods, it will be important to leverage qualitative feedback

from the market actors to form a logical and cohesive understanding of the market. The final NTG recommendation is based on the professional judgement of our team after considering all available quantitative and qualitative data. After the initial NTG estimate is calculated, we will then utilize the qualitative insights to construct a logical, internally consistent, and coherent narrative of program attribution that attempts to identify all possible pathways of Xcel Energy influence.

A.2 RESEARCH PLAN ADDENDUM

PRODUCT OVERVIEW

This memo outlines proposed changes to the 2019 Lighting Efficiency Net-to-Gross (NTG) Follow-Up Research Plan finalized on July 1, 2019. The Lighting Efficiency Product staff implemented significant changes to offered measures starting July 1, 2019, potentially impacting the NTGR prospective estimate. Specifically, the Lighting Efficiency Product is no longer incentivizing lamps through the downstream program strategy, and will now only include fixtures, controls, and LED retrofit kits. The evaluation team is adjusting the sample strata for participant end users to exclude those participants that only purchased discontinued Lighting Efficiency rebated products.[20] This change will ensure the researched NTGR will be representative of the 2020 incentivized measures.

Between Q3-2018 and Q1-2019, the Lighting Efficiency product claimed over 90 GWh in energy savings from the custom and retrofit rebate channels (Table 1).[21] However, after excluding discontinued lamps, the overall product savings claims for this time period is reduced by over 30%; the retrofit product component alone decreased by 40%. The evaluation team will sample only from participants that purchase fixtures, controls, or LED retrofit kits in order to exclude discontinued or products that transitioned to the midstream program.

Table 9. Q3-2018 through Q1-2019 Lighting Efficiency Savings, by Product Channel, with and without discontinued products[a]

	All rebated products		Products Continued After 7/1/19	
Product Channel	**Savings (kWh)**	**% of Total**	**Savings (kWh)**	**% of Total**
Retrofit	74,853,675	82%	44,563,419	73%
Custom	16,071,698	18%	16,071,698	27%

[20] The evaluation team will still interview participating trade partners that only sold lamps to probe about the potential product impacts on other lighting measures that these trade partners sell.
[21] The evaluation team is targeting participants from the most recent three quarters to reduce recall bias. The evaluation team relied on application close date to summarize the product totals and planned sampled yet will attempt to sample initially from those participants with the most recent application creation dates first.

Total	**90,925,373**	**100%**	**60,635,117**	**100%**

[a] Note new construction channel excluded from 2019 NTG research

Table 2 shows how the incentivized measure mix changed when the product discontinued lamp incentives. Previously, 28% of the product savings was comprised of linear LEDs. After excluding the discontinued and midstream lamp types from our analysis, the savings contribution of LED area lighting (15%), LED troffers (23%), Custom Lighting (27%), and high bay LED fixtures (19%) increased substantially.

Table 10. Q3-2018 through Q1-2019 Lighting Efficiency Savings, by Measure Category, with and without discontinued products

Measure Category	% of Total Savings (kWh) [a]	
	All rebated products	**Products continued after 7/1/19**
LED Linear[22]	25%	1%
LED Troffer	20%	23%
Custom Lighting	18%	27%
LED High Bay	13%	19%
LED Area Lighting	10%	15%
LED Parking Garage Lighting	3%	5%
LED Exterior Lighting	3%	4%
LED Interior Fixture	3%	4%
Occupancy Sensor	1%	0%
LED PL/G base	1%	0%
LED Outdoor Canopy or Soffit lighting	1%	1%
LED Lamps - HID Base	1%	0%
LED Exit Sign	<1%	1%

[a] Additional measures contributing less than 1% of product savings are LED street lighting and LED refrigerator and freezer cases. No network lighting controls were rebated during this timeframe.

RESEARCH CHANGES

As a result of this program change, the research team is adjusting the participant end user sample strata and survey targets to better represent the 2019 Lighting

[22] Linear LEDs includes LED linear tubes and LED linear ambient fixtures. A full mapping for each of the product measure names to the measure categories is presented in Appendix A.

Efficiency Product offering. Specifically, the research team eliminated the survey strata for linear LED lamps and LED troffers, replacing it with a strata for LED troffers, high bay LED fixtures, and LED area lighting measures. These three measure categories now comprise over 55% of program savings. The target number of surveys, 70, remains the same (Table 4).

Table 11. Q3-2018 through Q1-2019 Lighting Efficiency Participant Population, by Survey Strata

Strata	Savings (kWh)	Population	Target Surveys
LED Troffer, High Bay, Area lighting,	34,284,286	1,200	35
Custom Lighting	16,071,698	172	15
Other Measures	10,279,133	882	20
Total	**60,635,117**	**2,254[a]**	**70**

[a] *Because of customer account overlap, we only report the unique total count of accounts, not the additive across each strata*

Additionally, the research team identified 75 participant trade partners (out of 325 total trade partners) that only sold discontinued or midstream lamp types from Q3-2018 through Q1 - 2019. The research team will include these trade partners as part of the study, but will probe about the potential product impacts on other lighting measures that these trade partners sell (e.g., how the changes in the incentive structure might impact their sales of other lighting measures).

ANALYSIS CHANGES

As noted in the approved research plan, the 2018 and 2019 participant end user retrospective NTGR estimates will ultimately be used to predict a 2020 NTGR via a linear trend line. While a constant measure mix and delivery approach would be ideal for this type of analysis, maintaining that level of consistency is not feasible for a program that must adapt to a changing market. As a result, the retrospective NTGR estimates for 2018 and 2019 will reflect the incented measures for each program year, and the resulting prospective NTGR estimate will recognize that future program years may differ as well. Note the research team conducted sensitivity analysis of limiting the participant measure mix from the 2018 study to the same measures as 2019, and found the impact on the estimated NTG was negligible.

As also noted in the approved research plan, the evaluation team will rely on the findings across participants, participating and non-participating trade partners and manufacturers/distributors reflecting program influence from different market perspectives. We will then develop a triangulated estimate for the final recommended 2020 prospective NTG. The evaluation team will review each source and its associated uncertainty (i.e., sample size, variance of responses, response rate, qualitative responses) and whether the estimates are consistent with program

theory and consistent across each other, and then consider adjusting the sources contribution (i.e., weighting) to the overall NTG estimate.[23]

[23] As an example, if the non-participating trade partners effort results in lower than anticipated response rates, with high variability among the respondents, we will reduce this sources contribution to the NTG estimate. We understand the importance of early feedback and plan on conducting WIM or separate sessions dedicated to discussions of consistency of results, and will be conducted in advance of any reporting. We will ensure Xcel Energy and evaluation staff are in agreement on 1) what the program does (program theory), 2) how to maintain a viable lighting efficiency product, and 3) key contextual points that need to be included in any reporting to minimize the chance that results are misinterpreted by stakeholders.

APPENDIX: MAPPING OF PRODUCT MEASURE NAME TO MEASURE CATEGORY AND SAMPLE STRATA

Measure Name	Measure Category	Sample Strata*	Lamps / Fixtures
LED Linear Ambient <=35W	LED Linear	Other	Fixture
LED Linear Ambient 36-60W	LED Linear	Other	Fixture
LED Linear Ambient 61-100W (T12 Baseline)	LED Linear	Other	Fixture
LED Linear Ambient <=35W (T12 Baseline)	LED Linear	NA (excluded)	Fixture
LED Linear Ambient >=61W (T12 Baseline)	LED Linear	NA (excluded)	Fixture
LED Linear Ambient 36-60W (T12 Baseline)	LED Linear	NA (excluded)	Fixture
LED Linear Tube Type A 4 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type C 2 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type C 4 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type A 2 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type A 4 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type A 4 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type C 2 foot	LED Linear	NA (excluded)	Lamps
LED Linear Tube Type C 4 foot	LED Linear	NA (excluded)	Lamps
LED Linear Type B 4 Foot	LED Linear	NA (excluded)	Lamps
LED Tube Type A 4 foot (T12 Baseline)	LED Linear	NA (excluded)	Lamps
LED Tube Type B 4 foot (T12 Baseline)	LED Linear	NA (excluded)	Lamps
LED Tube Type C 4 foot (T12 Baseline)	LED Linear	NA (excluded)	Lamps
LED Troffer Fixture (T12 Baseline)	LED Troffer	NA (excluded)	Fixture
LED Troffer Retrofit (T12 Baseline)	LED Troffer	NA (excluded)	Retrofit Kits
T12 LED Troffer Fixture	LED Troffer	NA (excluded)	Fixture
LED Troffer Fixture	LED Troffer	LED Troffer, High Bay, Area lighting	Fixture
LED Troffer Fixture 1X4	LED Troffer	LED Troffer, High Bay, Area lighting	Fixture
LED Troffer Fixture 2X2	LED Troffer	LED Troffer, High Bay, Area lighting	Fixture

Measure Name	Measure Category	Sample Strata*	Lamps / Fixtures
LED Troffer Fixture 2X4	LED Troffer	LED Troffer, High Bay, Area lighting	Fixture
LED Troffer Fixtures & Retrofit Kits (T12 Baseline)	LED Troffer	LED Troffer, High Bay, Area lighting	Retrofit Kits
LED Troffer Retrofit Kit 1X4	LED Troffer	LED Troffer, High Bay, Area lighting	Retrofit Kits
LED Troffer Retrofit Kit 2X2	LED Troffer	LED Troffer, High Bay, Area lighting	Retrofit Kits
LED Troffer Retrofit Kit 2X4	LED Troffer	LED Troffer, High Bay, Area lighting	Retrofit Kits
LED Troffers	LED Troffer	LED Troffer, High Bay, Area lighting	Fixture
CO - Custom Efficiency - Electric	Custom Lighting	NA (excluded)	Custom
CO - Custom Efficiency - Small Bus Lighting	Custom Lighting	NA (excluded)	Custom
CO - Custom Efficiency - Lighting	Custom Lighting	Custom	Custom
LED High Bay Fixture - 190-290W	LED High Bay	LED Troffer, High Bay, Area lighting	Fixture
LED High Bay Fixture - 291-464W	LED High Bay	LED Troffer, High Bay, Area lighting	Fixture
LED High Bay Fixture - 465-625W	LED High Bay	LED Troffer, High Bay, Area lighting	Fixture
LED High Bay Fixture - 95-189W	LED High Bay	LED Troffer, High Bay, Area lighting	Fixture
LED High Bay Fixture Kit - 190-290W	LED High Bay	LED Troffer, High Bay, Area lighting	Retrofit Kits
LED High Bay Fixture Kit - 95-189W	LED High Bay	LED Troffer, High Bay, Area lighting	Retrofit Kits
LED Area Lighting - 120-140W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture

Measure Name	Measure Category	Sample Strata*	Lamps / Fixtures
LED Area Lighting - 141-199W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture
LED Area Lighting - 200-550W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture
LED Area Lighting - 45-65W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture
LED Area Lighting - 65-85W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture
LED Area Lighting - 66-89W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture
LED Area Lighting - 90-119W	LED Area Lighting	LED Troffer, High Bay, Area lighting	Fixture
LED Parking Garage lighting 25W - 60W	LED Parking Garage Lighting	Other	Fixture
LED Parking Garage Lighting 25W-60W	LED Parking Garage Lighting	Other	Fixture
LED Parking Garage lighting 61W - 83W	LED Parking Garage Lighting	Other	Fixture
LED Parking Garage Wall Pack <= 25W	LED Parking Garage Lighting	Other	Fixture
LED Parking Garage Wall Pack 26W - 60W	LED Parking Garage Lighting	Other	Fixture
LED Parking Garage Wall Pack 61W - 150W	LED Parking Garage Lighting	Other	Fixture
LED Exterior Wall Pack <= 25W	LED Exterior Lighting	Other	Fixture
LED Exterior Wall Pack 26W - 60W	LED Exterior Lighting	Other	Fixture
LED Exterior Wall Pack 61W - 150W	LED Exterior Lighting	Other	Fixture
LED Interior Fixture <= 25W	LED Interior Fixture	Other	Fixture
LED Interior Fixture <= 25W (CFL Base)	LED Interior Fixture	Other	Fixture
LED Interior Fixture 26W - 50W	LED Interior Fixture	Other	Fixture

Measure Name	Measure Category	Sample Strata*	Lamps / Fixtures
LED Interior Fixture 26W - 50W (CFL Base)	LED Interior Fixture	Other	Fixture
LED Stairwell Fixture	LED Interior Fixture	Other	Fixture
LED Retrofit Kit	LED Interior Fixture	NA (excluded)	Retrofit Kits
Occupancy and Daylighting (Photocell) Sensor	Occupancy Sensor	Other	Controls
Occupancy Sensor	Occupancy Sensor	Other	Controls
Stairwell Fixture with Integral Occupancy Sensor	Occupancy Sensor	Other	Controls
Ceiling mount occupancy sensor - 50 Watts to 300 Watts Controlled Load	Occupancy Sensor	NA (excluded)	Controls
Ceiling mount occupancy sensor - Greater than 300 Watts Controlled Load	Occupancy Sensor	NA (excluded)	Controls
Integral Occupancy & Photo Sensor	Occupancy Sensor	NA (excluded)	Controls
Integral Occupancy Sensor	Occupancy Sensor	NA (excluded)	Controls
Occupancy Sensor - Photocell	Occupancy Sensor	NA (excluded)	Controls
Wall mount occupancy sensor - 50 Watts to 300 Watts Controlled Load	Occupancy Sensor	NA (excluded)	Controls
Wall mount occupancy sensor - Greater than 300 Watts Controlled Load	Occupancy Sensor	NA (excluded)	Controls
LED PL/G based CFL Replacement lamp	LED PL/G base	NA (excluded)	Lamps
LED Outdoor Canopy or Soffit lighting 25W - 60W	LED Outdoor Canopy or Soffit lighting	Other	Fixture
LED Outdoor Canopy or Soffit lighting 61W - 150W	LED Outdoor Canopy or Soffit lighting	Other	Fixture
LED Lamps - 120-144W (HID Base)	LED Lamps - HID Base	NA (excluded)	Lamps
LED Lamps - 145-230W (HID Base)	LED Lamps - HID Base	NA (excluded)	Lamps

Measure Name	Measure Category	Sample Strata*	Lamps / Fixtures
LED Lamps - 40-49W (HID Base)	LED Lamps - HID Base	NA (excluded)	Lamps
LED Lamps - 50-79W (HID Base)	LED Lamps - HID Base	NA (excluded)	Lamps
LED Lamps - 80-119W (HID Base)	LED Lamps - HID Base	NA (excluded)	Lamps
LED/LEC Exit Sign	LED Exit Sign	Other	Fixture
LED Street Lighting - 110-139W	Other	Other	Fixture
LED Street Lighting - 140-209W	Other	Other	Fixture
LED Street Lighting - 80-109W	Other	Other	Fixture
LED Ref and Frz Cases 5' or 6' doors	Other	Other	Fixture
LED Ref and Frz Cases 5' or 6' doors (T12 Baseline)	Other	NA (excluded)	Fixture
LED Interior Lamp - A Lamps	Other	NA (excluded)	Lamps
LED Interior Lamp - Decorative (B, BA, Candle)	Other	NA (excluded)	Lamps
LED Interior Lamp - BR30	Other	NA (excluded)	Lamps
LED Interior Lamp - BR40	Other	NA (excluded)	Lamps
LED Interior Lamp - GU10	Other	NA (excluded)	Lamps
LED Interior Lamp - MR16	Other	NA (excluded)	Lamps
LED Interior Lamp - PAR16	Other	NA (excluded)	Lamps
LED Interior Lamp - PAR20, R20	Other	NA (excluded)	Lamps
LED Interior Lamp - PAR30	Other	NA (excluded)	Lamps
LED Interior Lamp - PAR38	Other	NA (excluded)	Lamps

*Excluded categories reflect measures that were either discontinued or moved to a Midstream incentive structure in 2019.

APPENDIX B: DATA COLLECTION DOCUMENTS

B.1 PARTICIPANT SURVEY INSTRUMENT

To support the ongoing impacts of the 2018/2019 Xcel Energy efficiency products, the EMI Consulting evaluation team will conduct telephone surveys with participants. The evaluation team defined a participating customer as any customer that initiated a project in Q32018-Q12019. The research will primarily quantify attribution, including free-ridership and spillover.

The remainder of the introduction provides the research questions which the participant survey is designed to address, a description of the sample variables to support programming the survey, and fielding instructions for the survey house.

STUDY OBJECTIVES

The objectives for the CO Lighting Efficiency product research are to:

- Develop a prospective NTG ratio projecting the program's future influence on the market in 2020.
- Assess market effects of the Colorado Lighting Efficiency Program
- Determine whether installations occurred as early replacement or new installations
- Understand whether any of the installations occurred primarily as remodeling efforts that may have required permitting

The participant survey does not address every research objective. For reference, the following table provides the research efforts used for each objective.

Research Task	Sample Size	Research Objective(s)
Participant Surveys	70	NTG, Early Replacement
Participating Trade Partner Surveys	40	Prospective NTG, market effects
Non-Participating Trade Partner Surveys	10-15	Prospective NTG, market effects
Manufacturer/Distributor	5-10	Prospective NTG, market effects

Specific research questions which this participant survey is designed to address are the following:

- What level of free ridership exists in the program?
- Does the program influence additional energy savings outside of what is captured through the program (spillover)?
- What proportion of installations represented early replacement?

The following table presents the link between each research objective, research question, and survey question.

Research Objective	Research Question	Survey Question Number(s)
Develop a NTG ratio documenting the program's influence on customer's decisions.	What level of free ridership exists in the program? Does the program influence additional energy savings outside of what is captured through the program (spillover)?	A1-A7; B1-B11
Determine whether installations occurred as early replacement or new installations	Did participants replace old and non-functioning equipment or was the equipment replacing fully functional equipment?	ER1-ER5

Sample Variables

The following table includes the sample variables that will be used to conduct this survey, as well as descriptions of these variables and potential codes.

Sample Variable	Variable Description	Potential Codes
Interviewer Name	Name of interviewer from Ewald and Wasserman	e.g. Donna Whitsett
Program	Name of Program we are evaluating	Lighting Efficiency Program
Organization	Organization name	e.g. Apex Analytics
Contact	Contact at organization	e.g. Katie Cary
Month	Month customer completed project through program	e.g. May
Year	Year customer completed project through program	e.g. 2016
Phone	Phone number for contact at organization	e.g. 555-555-5555
Measure1	Measure installed through program; first to be asked about for free-ridership battery	e.g. "TLED"
Measure1_Stratum	The stratum for measure 1 (in some cases collapsed across different types of measures)	e.g. "Linear LEDs and Troffers"
QTY	The number of units of Measure 1 the respondent installed.	E.g. 40
Type	Measure type, based on whether the lighting product was a bulb or fixture	E.g. "Bulb" or "Fixture"
Location	Name of premise where lighting product was installed	E.g. "Baden Street"
Address	Address where lighting product was Installed	E.g. "1234 High Street"
Number_of_Sites	The total number of sites for which a contact is responsible for an identical set of measures	e.g. "4"

Sample Variable	Variable Description	Potential Codes
Dollar Amount	The incentive amount the contact received from the Xcel Energy Lighting Efficiency Program	e.g. $1,000

Fielding Instructions

- Attempt each record six times on different days of the week and at different times.
- Leave messages on the first and fourth attempt. The survey is considered complete when CLOSE1 is answered.
- After completing 5 interviews, hold calling and output a preliminary SPSS dataset and recordings of the pretest interviews. Resume calling after Apex Analytics checks the data (usually with 1-2 working days).
- Monitor at least 10 percent of the interviews to ensure proper interview protocols (e.g., reading questions verbatim, proper probing, accurate data entry).
- Calling hours are 9 AM to 5 PM MDT.

Stratification and Target Completes

Stratum	Target # Sites	Minimum # Contacts Interviewed
Linear LEDs and Troffers	35	35
Custom Lighting	5	5
Other Measures	30	30
TOTAL	**70**	**70**

Note that the "Target # Sites" is based on the variable "Number_of_Sites" for each interviewee. If an interviewee is responsible for three sites and indicates that the decision was identical for all three sites, this single interview will count toward a total of three sites for the appropriate measure strata.
Each interview only counts as one interview in the "Minimum # Contacts Interviewed" quota. Where a contact/site includes two measures, that interview may be counted toward the quotas in both strata.

While every effort should be made to achieve the target number of sites for each stratum, it is expected that at a minimum, 70 interviews will be conducted, with the allocation as close as possible the quotas provided above by stratum.

SURVEY SECTIONS

- **Intro.** Introduction and Screening
- **Gen.** Operations, Participation

- **A.** Free-ridership and market effects
- **B.** Spillover
- **ER.** Early replacement
- **Firm.** Firmographics

SURVEY

SECTION INTRO: INTRODUCTION AND SCREENING

Intro1. Hello, this is **<INTERVIEWER NAME>** calling from Ewald and Wasserman, a national research firm working with Xcel Energy. May I speak with **<CONTACT>?**

1. Yes, that would be me.
2. Yes, let me transfer you to the correct person **[IF NAME GIVEN, ENTER AS <CONTACT>; REPEAT QUESTION INTRO1 WITH NEW RESPONDENT]**
3. No, they are not available right now.[Skip to Intro6]
4. No, they are no longer employed by this organization.
5. No, other reason (SPECIFY).

REF **[TERMINATE]**

[ASK IF Intro1=1 OR 4]
Intro2. We are working to help Xcel Energy improve their lighting efficiency program. Our records show that you received a rebate from that program for **<MEASURE1>** you installed at **<LOCATION>** in **<MONTH> <YEAR>**. Are you the person at **<ORGANIZATION>** who is most familiar with your participation in the Xcel Energy Lighting Efficiency program, or at least as familiar as anyone else there?

1. Yes. [Skip to Intro8]
2. No, they are not available right now. [Skip to Intro4]
3. No, that's someone else.[Skip to Intro4]
4. No, that person no longer works here.
5. Not applicable – this organization did not participate in any such program. **[TERMINATE]**

DK **[TERMINATE]**
REF **[TERMINATE]**

[ASK IF Intro2=4]
Intro3. Is there someone else that is knowledgeable about your participation in the Lighting Efficiency program?

1. Yes.
2. No **[TERMINATE]**

DK **[TERMINATE]**
REF **[TERMINATE]**

[ASK IF Intro2=2-3 OR Intro3=1]
Intro4. What is this person's name?

1. [RECORD CORRECT PERSON'S NAME AS **<CONTACT>**]

DK **[TERMINATE]**
REF **[TERMINATE]**

[ASK IF Intro4=1]
Intro5. Would I reach that person by dialing the same number I used to connect with you: **<PHONE>**?

1. Yes
2. No, use a different number (RECORD HERE AS **<PHONE>**) **[THANK AND TERMINATE; REDIAL NEW SAMPLE CASE]**

DK **[TERMINATE]**
REF **[TERMINATE]**

PROGRAMMER NOTE: Only those for whom Intro1=1 or Intro2=1 should get to this screen; the rest would end at Intro5 as they will need to be made into new sample cases and called back at a later time.

[ASK IF Intro2=1]
Intro6. Great! (IF NEEDED: Again, we're Ewald and Wasserman, a national research firm calling on behalf of Xcel Energy). I would like to invite you to participate in a short survey that will help Xcel Energy improve the Lighting Efficiency program to best suit the needs of businesses like yours. The survey takes about 15 minutes on average, and as a small token of appreciation, we are offering a $25 Amazon gift card that you will receive after completing the survey. Your responses will remain confidential, meaning that your name and company name will not be attributed to your answers.

Is now a good time or should we call you back?

1. No objection – fine to continue
2. Objection **[RESOLVE, RESCHEDULE A MORE CONVENIENT TIME, AND RESCREEN AS NECESSARY]**

REF **[TERMINATE]**

SECTION GEN: OPERATIONS, PARTICIPATION

[ASK ALL]
Gen1. Did an outside contractor install the lighting equipment you had rebated as part of the Xcel Energy Lighting Efficiency program, or did you install the equipment with in-house staff?

1. Used a contractor
2. Installed equipment with in-house staff [Skip to Gen4]

DK [Skip to Gen4]
REF [Skip to Gen4]

[ASK IF Gen1 = 1]
Gen2. What was the name of the contractor/company that installed the lighting equipment?

1. **Name**

DK

[ASK IF Gen1 = 1]
Gen3. Who was your primary contact at the contractor/company?
1. **Name**
DK

Gen4. Has your organization previously participated in this or any other Xcel Energy efficiency program for your business? [Clarify: program may have provided information or rebates to install energy efficient equipment or take other actions to save energy]
1. Yes
2. No
DK
REF

SECTION A: FREE-RIDERSHIP

[ASK IF Number_of_Sites>1], ELSE SKIP TO A1
A0. I understand you received rebates from Xcel Energy for lighting products at several locations in the past year. Our database shows [**Number_of_Sites**] locations receiving Xcel Energy rebated lighting products. Was there a single decision maker for all [**Number_of_Sites**] locations or were there multiple decision makers in the process of purchasing these lighting products?
1. Single decision maker
2. Multiple decision makers [SET [**LOCATION**] TO [**ADDRESS**] FOR THIS SECTION] [SKIP TO A1]

DK [SET [**LOCATION**] TO [**ADDRESS**] FOR THIS SECTION] [SKIP TO A1]
REF [SET [LOCATION] TO [ADDRESS] FOR THIS SECTION [SKIP TO A1]

[ASK IF A0=1]
A0a. Did the decision making process differ between the sites or was it the same for all locations? [IF NEEDED: STATED ANOTHER WAY, DID YOU MAKE ONE DECISION THAT APPLIED TO ALL SITES, OR DID EACH SITE REQUIRE INDIVIDUAL ASSESSMENT?]
1. Decision process was the same for all sites
[REFERENCE ALL LOCATIONs FOR THIS CONTACT FOR THIS SECTION: SET [LOCATION] to "these [number of sites] locations"]
2. Decision process varied from site to site
[REFERENCE ONLY [ADDRESS] FOR THIS SECTION]: SET [LOCATION] to "[ADDRESS]"]

DK [REFERENCE ONLY [ADDRESS] FOR THIS SECTION:]: SET [LOCATION] to [ADDRESS]
REF [REFERENCE ONLY [ADDRESS] FOR THIS SECTION:]: SET [LOCATION] to [ADDRESS]

A1. Making decisions can sometimes be relatively simple involving one major factor, like price. Or, they can be relatively complex involving multiple factors.

As part of the project at [**LOCATION**], Xcel Energy offered you:
1. An incentive of <**DOLLAR_AMOUNT**>
2. Information through marketing materials
3. An endorsement or recommendation by Xcel Energy staff
4. Engineering or other technical assistance

There might be other things, not related to the program that might also have influenced your decision to install <**MEASURE_1**> at [**LOCATION**]. For example, maybe high electric bills, previous experience with energy efficient equipment, or a scheduled remodel.

Please rate the importance of each of the following factors on your decision to install **<MEASURE _1>** using a scale from 0 to 10, where 0 means "not at all important" and 10 means "extremely important". The bigger the number, the greater the influence; if a particular factor is not applicable for this project, just say "not applicable". If you don't know, just say "I don't know". Now, how important was…

(REPEAT SCALE AS NECESSARY; RANDOMIZE ORDER OF FACTORS A1a-A1m BELOW)
1. [NUMERIC OPEN END, 0 - 10]
DK
REF
NA

A1a. <ASK IF Gen1=1> Contractor recommendation
A1b. The dollar amount of the rebate
A1c. Endorsement or recommendation by your Xcel Energy account manager or other Xcel Energy staff to install energy efficient lighting
A1d. Information from Xcel Energy marketing or informational materials
A1e. Simple payback period, which is the amount of time until equipment has paid for itself

A1e1. <ASK IF A1e> 5 and < 76> Before we move on, I'd like to probe on that a little. Did the Xcel Energy rebate impact your calculations on the payback period?
1. Yes
2. No (Skip to A1e3)
DK (Skip to A1e3)
REF (Skip to A1e3)

A1e2. <ASK IF A1e1= YES> By how much did the Xcel Energy rebate shorten the payback period ?
1.[**ENTER**]
DK

REF

A1e3. <ASK IF A1e> 5 and < 76> Typically, what is the simple payback threshold that your company uses for such capital investments?
[OPEN END]

A1f. The total amount of money saved over lifetime of the equipment, otherwise known as the return on investment or "ROI"

A1f1. <ASK IF A1f> 5 and <76> And just to follow-up on that: Did the Xcel Energy rebate increase the return on investment?
1. Yes, by how much?
2. No
DK
REF

[ASK A1g IF GEN4 =1, YES]
A1g. Your previous participation in an Xcel Energy program
A1g1. [IF A1g <> NA, 88, 99]: How long ago in years did you participate in the Xcel Energy program? _____ years]

A1h. The age or condition of the old equipment
A1i. Previous experience with this type of equipment
A1j. Corporate policy or guidelines
A1j1 <ASK IF A1j>5 and < 76>Does your company have any corporate policies related to energy efficiency standards that you need to consider when purchasing new equipment or making improvements to this facility?
1. Yes, what is that policy?:
2. No (Skip to A1k)
DK (Skip to A1k)
REF (Skip to A1k)

IF (A1j1=2 or DK/refused) skip to A1k
A1j2. Does the corporate policy specifically cover lighting?
1. Yes
2. No
DK
REF
A1j3. <ASK IF A1j2 =1 > How did this corporate policy influence your decision to install the **<MEASURE _1>**?
[OPEN END]

A1j4 <ASK IF A1j2 =1 > Did Xcel Energy influence your decision to develop this corporate policy?
1. Yes, how did it influence your decision?:
2. No
DK

REF

A1k. Minimizing operating cost
A1l. Predetermined timeline or schedule for replacing equipment
A1m. State or Federal efficiency standards
A1n. Are there any other factors that were important in your decision to install **<Measure_1>**?

1. Yes, please specify:
2. No
88. Don't know
99. Refused

[ASK IF A1n = 1]
A1n1. How would you rate the importance of that factor on your decision to install MEASURE_1

A3a. If the Xcel Energy Lighting Efficiency Program was not available, would you have installed the *exact same type, model, and efficiency* of the <MEASURE_1> at [LOCATION] you installed through the lighting efficiency program**?**

1. Yes
2. Maybe / not sure
3. No / Would not have installed <MEASURE_1> at all [Skip to A6]

REF [Skip to A6]

[ASK IF A3a = 1 or 2]
A3b. Using a scale from 0 to 10, where 0 means "not at all likely" and 10 means "extremely likely", please rate the likelihood that you would have installed the *exact same* **<MEASURE_1 > at [LOCATION]** <u>if the Xcel Energy Lighting efficiency program incentive was not available</u>.

When I say "the exact same <MEASURE_1>", I mean the *exact same model, and efficiency* of the lighting products you installed through the Lighting Efficiency Program.

[NUMERIC OPEN END, 0 - 10]
DK
REF

[**IF A3a = 1 or 2**]
A4. In the absence of the Xcel Energy rebate program, when would you have installed the *exact same type, model, and efficiency* of the lights you installed at [LOCATION] through the Lighting Efficiency Program? Would it have been… [READ CODES 1-77]

1. Within one year of installation?

2. Between 1 and 2 years later
3. Between 2 years and 3 years later
4. Between 3 years and 4 years later
5. Greater than 4 years later
77. Or would you not have installed the equipment at all
DK
REF

[IF A3a = 1 or 2]
A5. Asking this same question in a different way -- using a scale from 0 to 10, where 0 means "not at all likely" and 10 means "extremely likely", what is the likelihood that you would have installed the *exact same model and efficiency* of the <MEASURE_1> you installed through the Lighting Efficiency Program within 12 months of <MONTH> <YEAR> if the Xcel Energy Lighting Efficiency Program was not available.

[NUMERIC OPEN END, 0 - 10]
DK
REF

[ASK IF A3b > 7 and A5>7 and Maximum of (A1a to A1g > 7]
[ONLY ASK MAXIMUM OF ONE TIME]
A3c. You just indicated you would still have installed **<MEASURE_1>** at roughly the same time without any support from the Lighting Efficiency Program, suggesting that the program was not very important. Earlier, when I asked you to rate the importance of each program factor on your decision, the highest rating you gave was a **<RESTORE HIGHEST RATING FROM A1a to A1g>** out of 10, suggesting that the program was very important. Should I go back and change one of your answers?

1. Change the answer to installing **<MEASURE_1>** without the program **[RETURN TO A3a]**
2. Change the influence of the program factors **[Skip to A1FactorUpdate]**3. No, leave answer as is
DK
REF [SKIP TO A4]

[If A3c = "NO" or "DK", then ASK]
A3d. Can you tell me more about how the program was influential in your decision to install this lighting equipment, yet you would have done so without program support?

1[**RECORD RESPONSE**]

[ASK IF A3b < 3 and Maximum of (A1a to A1g < 3]
[ONLY ASK MAXIMUM OF ONE TIME]
A3e. You just rated your likelihood to install **<MEASURE_ 1>** without any incentive from the Lighting Efficiency Program as a(n) **<RESTORE RESPONSE**

FROM A3b> out of 10, suggesting that the program was very important. Earlier, when I asked you to rate the importance of each program factor on your decision, the highest rating you gave was a **<RESTORE HIGHEST RATING AND THE FACTOR FROM A1a to A1g>** out of 10, suggesting that the program was not very important. Should I go back and change one of your answers?

1. Change the likelihood of installing **<MEASURE _1>** without the program **[RETURN TO A3a]**
2. Change the influence of the program factors [Skip to A1FactorUpdate]
3. No, leave answer as is
DK
REF [SKIP TO A4]

[If **A3e** = "NO" or "DK", then ASK]
A3f. Can you tell me more about how the program was NOT influential In your decision to install this lighting equipment yet you would have not Installed this equipment without program support?
1[**RECORD RESPONSE**]

[ASK IF A3c = 2 OR A3e = 2]
A1Factor Update. You said you would like to change the influence of program factors. Which factors would you like to change and what would you like to change them to? (Lower # = Lower importance, Higher # = Higher importance)

1. The dollar amount of the rebate (Your rating: %A1b%/10)
2. Endorsement or recommendation by your Xcel Energy account manager or other Xcel Energy staff (Your rating: %A1c%/10)
3. Information from Xcel Energy marketing or informational materials (Your rating: %A1d%/10)
4. Your previous participation in an Xcel Energy program (Your rating: %A1g%/10)

A6. As part of the Xcel Energy rebate program, you installed [**QTY**] <MEASURE_1> at [**LOCATION**]. If the rebates and program had not been available, would you have installed… [READ CODES 1-77]

1. The exact same quantity [Skip to A9]
2. Less
77. Or would you not have installed the equipment at all [Skip to A9]
DK [Skip to A9]
REF [Skip to A9]

[IF **A6** = 2]

A7. If the rebates and program had not been available, by how much would you have reduced the quantity of your project <MEASURE_1> installations? You can

provide this as an absolute quantity or a relative percentage reduction, whichever you are surer of.

1. [If they can provide exact quantity, enter here]_[**Reduced QTY**]___
2. [If they can only provide an approximate percent decline, enter here] [**Reduced PCT]** ____
NA
DK
REF

[IF A7=1 or 2]
A8. To confirm, if Xcel Energy's Lighting Efficiency program was not available, rather than installing [**QTY**] <MEASURE_1> as part of the program, you would have instead installed (if **A7** = 1 then [**QTY** - **Reduced QTY**], if **A7** = 2 then [**QTY*(1-Reduced_PCT)**].

1. Correct
2. No [HAVE RESPONDENT CLARIFY QTY ADJUSTMENT HERE]
DK
REF

A9. In your own words, how would you describe the influence that the Xcel Energy Lighting Efficiency Program had on your decision to purchase/install this <MEASURE_1> at [LOCATION].

[RECORD VERBATIM]

EARLY REPLACEMENT

[ASK ALL]
ER1. For your <**MEASURE_1**> lighting project we have discussed, was the original/removed equipment …. (READ LIST)
1. fully functional and the lights were operating
2. fully functional but the lights were burned out
3. Functional, but needed repairs
4. Not functional?
5. Some were functional, some were not
NA - No equipment was removed
DK
REF

[ASK ER1a if QTY > 1]
ER1a. And can you confirm what percent of the original equipment removed was fully operational, functional, but the lights were burned out, required repairs, or not functional? As an example, you may have found that 50% of your lighting equipment was still fully functional while the other 50% were not functional.
1. % FULLY FUNCTIONAL

2. % FUNCTIONAL BUT LIGHTS BURNED OUT
3. % REQUIRED REPAIRS
4. % NOT FUNCTIONAL

[ASK IF ER1≠4]
ER2. How long do you think your old lighting equipment would have lasted if you had not replaced it?

1. OPEN END
DK
REF

[IF ER1 = 1]
ER3. If your existing lighting equipment was fully functional, why did you replace it with <**MEASURE1**>?
(READ LIST. SELECT ALL THAT APPLY.)

1. Was it due to a remodel project?
2. Was it part of scheduled upgrades?
3. Was it due to the Xcel Energy Lighting Efficiency Rebate?
4. Capital funds became available for extra projects
5. Were you seeking to increase your energy efficiency and/or save money?
5. Other [**ENTER HERE**]

ER4. Did the Xcel rebate influence the attractiveness of this project compared to other projects that could have been completed with the available funds?

1. Yes
2. No
DK
REF

Section B: Spillover

[NOTE: Questions B1 through B6 measure 'like' spillover. Questions B7 through B12 measure 'unlike' spillover.]

B1. Since your participation in the Lighting Efficiency program in <MONTH> of YEAR >, has your company installed any efficient lighting products at this facility <u>without</u> a rebate from Xcel Energy? When I say "efficient lighting products", the most common products are LEDs, retrofit kits, T5s, and lighting controls.

1. Yes
2. No [SKIP TO B7]
DK [SKIP TO B7]
REF [SKIP TO B7]

B1a. Why did you not apply for an Xcel Energy rebate for purchasing these efficient lighting products?

1. OPEN END

DK
REF

B2. Did your experience with the efficient lighting products you installed through the Xcel Energy Lighting Efficiency Program influence your decision to install the additional efficient lighting products on your own?

1. Yes
2. No [SKIP TO B7]
DK [SKIP TO B7]
REF [SKIP TO B7]

B3. What type of lighting was it? For example, screw in LEDs, Linear LEDs, lighting controls. (LIST ALL TYPES)

1. Lighting type 1:
2. Lighting type 2:
3. Lighting type 3:
4. Lighting type 4:
DK [SKIP TO B7]
REF [SKIP TO B7]

B4. Approximately how many of each type did you install? (READ TYPES LISTED IN B3 For controls, ask for approximate number of lamps or fixtures controlled)

1. Lighting type 1:
2. Lighting type 2:
3. Lighting type 3:
4. Lighting type 4:

B5. How important was your experience in the Lighting Efficiency program and products in your decision to install these lighting products on your own, using a scale from 0 to 10, where 0 is "not at all important" and 10 is "extremely important"?

1. Lighting type 1:
2. Lighting type 2:
3. Lighting type 3:
4. Lighting type 4:

B6. Using a 0 to 10 scale, where 0 means you definitely WOULD NOT have installed these products and 10 means you definitely WOULD have installed these lighting products, if you had not participated in the Lighting Efficiency program, how likely is it that your organization would have installed these additional efficient lighting products?

1. Lighting type 1:
2. Lighting type 2:

3. Lighting type 3:
4. Lighting type 4:

B7. Since your participation in the Lighting Efficiency program, have you installed any additional energy efficient equipment, other than lighting, at this or other facilities in Xcel Energy's territory?

1. Yes
2. No [Skip to Firm1]
DK [Skip to Firm1]
REF [Skip to Firm1]

[ASK IF B7=1]
B8. Did your experience with the Xcel Energy rebated lighting influence your decision to install some or all of these efficient products?

1. Yes
2. No [Skip to Firm1]
DK [Skip to Firm1]
REF [Skip to Firm1]

B9. What equipment did you install? Please provide as much detail as you can. **(PROBE FOR NUMBER INSTALLED, EQUIPMENT TYPE, EFFICIENCY, SIZE)**

1. Equipment 1: [NUMBER INSTALLED; TYPE OF EQUIPMENT; SIZE; EFFICIENCY]
2. Equipment 2: [NUMBER INSTALLED; TYPE OF EQUIPMENT; SIZE; EFFICIENCY]
3. Equipment 3: [NUMBER INSTALLED; TYPE OF EQUIPMENT; SIZE; EFFICIENCY]
4. Equipment 4: [NUMBER INSTALLED; TYPE OF EQUIPMENT; SIZE; EFFICIENCY]
5. Equipment 5: [NUMBER INSTALLED; TYPE OF EQUIPMENT; SIZE; EFFICIENCY]
DK [Skip to Firm1]
REF [Skip to Firm1]

[PROGRAMMING NOTE: CREATE LOOP B10-B12 FOR EACH MEMBER OF B9, MAX 5 LOOPS]

[ASK B10-B12 FOR INDIVIDUALLY FOR EACH EQUIPMENT METIONED IN B9]

B10. Did you receive a rebate for [EQUIPMENT X] through Xcel Energy or any other energy efficiency program?

1. Yes [Skip to Firm1]

2. No
DK [Skip to Firm1]
REF [Skip to Firm1]

[ASK IF B10=2]
B11. How important was your experience in the Lighting Efficiency program in your decision to install this [EQUIPMENTX], using a scale from 0 to 10, where 0 is "not at all important" and 10 is "extremely important"?

1. [NUMERIC OPEN END, 0 – 10]
DK
REF

[ASK IF B10=2]
B12. If you had not participated in the Lighting Efficiency program, how likely is it that your organization would still have installed [EQUIPMENTX], using a 0 to 10 scale, where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

1. [NUMERIC OPEN END, 0 – 10]
DK
REF

SECTION GEN: FIRMOGRAPHICS

Finally, I'd like to gather some information about your involvement with the Xcel Energy Lighting Efficiency program and your role at your organization.

Firm1. How would you describe the primary business activity at this location? **(IF RESPONDENT IS A PROPERTY MANAGER, PROBE FOR BUSINESS ACTIVITY OF MOST TENANTS)**

1. Administrative and Support Services
2. Ambulatory Health Care
3. Educational Services
4. Fabricated Metal Product Manufacturing
5. Food and Beverage Stores
6. Food Services and Drinking Places
7. Merchant Wholesalers, Durable Goods
8. Professional, Scientific, and Technical Services
9. Real Estate
10. Religious, Grantmaking, Civic, Professional, and Similar Organizations
11. Other (Specify: _____)

Firm2. How many buildings are at this address?

Firm3. What is the approximate total square footage of all the occupied space for all buildings at this address?

Firm4. What is your occupational title within your company? **(ASK OPEN END, PROBE FOR SPECIFICS / VERIFY SELECTION AS NEEDED)**

1. President / CEO
2. Proprietor / Owner
3. Chief Financial Officer
4. Vice President / Director / Assistant Director / Department Head
5. Other financial / administrative position
6. Facilities Manager
7. Energy Manager
8. Other facilities management / maintenance position
9. Other Manager / assistant manager
10. Other _____

88.DK
99.REF

Firm5. Approximately how many full-time equivalent (FTE) employees does your organization currently have in the state of Colorado?

1. < 20
2. 20 - 49
3. 50 - 99
4. 100 - 249
5. 250 - 499
6. 500 - 999
7. 1,000 - 2,500
8. > 2,500

DK
REF / Prefer not to say

Firm6. Does your organization own, lease, or rent your facility?

1. Own
2. Lease / Rent
3. Other _____

DK
REF

[ASK IF Firm6 <> 1]
Firm7. Do you pay your Xcel Energy bill, or does someone else (e.g., a landlord or building manager)?

1. Our organization pays the bill
2. Someone else pays the bill

DK
REF

Firm8. Aside from your rebate for **<Measure1 >** through the Lighting Efficiency program, have you ever received any other rebates from a utility other than Xcel Energy for installing energy efficient Lighting equipment, having equipment optimized, or performing maintenance?

1. Yes
2. No
DK
REF

[ASK IF Firm8=1]
Firm9. Which utility did you receive rebates from?
1. [OPEN END]
DK
REF
Closing

CLOSE1. These are all the questions I have. As a thank you for your input, we'd like to send you $25 Amazon gift card. Let me ask the information we need to mail your gift card to the intended recipient—this could be you, personally, or anyone else of your choosing:
[COLLECT CONTACT INFORMATION]

B.2 PARTICIPATING TRADE PARTNER INTERVIEW GUIDE

INTRODUCTION

To support the 2018-2019 Xcel Energy Lighting Efficiency Product, members of the EMI Consulting evaluation team are conducting in-depth telephone interviews with Trade Partners. This guide presents the questions to be covered in the in-depth interviews with Trade Partners who participated in the Xcel Energy Colorado Lighting Efficiency program. The participating sample for these interviews may include a mix of both high and low performing trade partners. The remainder of the introduction provides the research questions this guide is designed to address and fielding instructions for the interviewers.

Research Objectives

The objectives for the CO Lighting Efficiency product research are to:

- Develop a NTG ratio documenting the program's influence on customer's decisions.
- Assess market effects of the Colorado Lighting Efficiency Program

The following table summarizes the trade partner survey objectives.

Research Task	Sample Size	Research Objective(s)
Participant Surveys	70	Prospective NTG, Early Replacement
Participating Trade Partner Interviews	40	Prospective NTG, market effects
Non-Participating Trade Partner Interviews	10-15	Prospective NTG, market effects

Manufacturer/Distributor Interviews	5-10	Prospective NTG, market effects

Specific research questions which this participant survey is designed to address are the following:

- Does the program influence additional energy savings outside of what is captured through the program (spillover)?

The following table presents the link between each research objective, research question, and survey question.

Research Objective	Research Question	Survey Question Number(s)
Develop a NTG ratio documenting the program's influence on customer's decisions.	Does the program influence additional energy savings outside of what is captured through the program (spillover)? Should the trade ally be considered a "program factor" in the participant NTG battery?	B5-B22

Sample Variables

The following table include the sample variables that will be used to conduct this survey, as well as descriptions of these variables and potential codes.

Sample Variable	Variable Description	Potential Codes
Interviewer Name	Name of interviewer Apex	e.g. Katie Parkinson
Organization	Organization name	e.g. Apex Analytics
Contact	Contact at organization	e.g. Katie Cary
Phone	Phone number for contact at organization	e.g. 555-555-5555

Fielding Instructions

We will attempt to schedule interviews via email if email addresses are available; we will offer sales volume questions through email if requested. We will supplement email recruiting efforts with telephone calls as needed. The following fielding guidelines should be used for trade partner/contractor recruiting and interviews:

- Attempt to reach each trade partner/contractor six times on different days of the week and at different times.
- Leave messages on the first and fourth attempt.

- Calling hours are 7 AM to 5 PM MT.
- Record interviews
- Definitions:
  COMPANY NAME = Update COMPANY NAME with Trade Partner's/Contractor's company name

Telephone Recruiting Dialog/Message Script

[INTRO:] Hi, this is **NAME** from Apex Analytics, calling on behalf of Xcel Energy. We're working with Xcel to find ways to improve their Lighting Efficiency Program. Contractors like you are really important to the success of that program, and your perspective would be very valuable to us. May I please speak with <CONTACT> or the person most familiar with your company's participation in Xcel's Lighting Efficiency Program?

[ONCE CONTACT IS ON THE PHONE, REPEAT INTRO AS NEEDED:] Apex Analytics is an independent third-party contractor hired by Xcel Energy to evaluate their Lighting Efficiency Program. I'd appreciate the opportunity to schedule a quick half-hour interview with you to discuss your experience. We are offering a $50 incentive as a thank you for your time.

[MESSAGE SCRIPT:] Please give me a call back to schedule a time to talk. My name is **NAME** and my phone number is **PHONE NUMBER**. If I don't hear back in a few days, I will give you a try back. Thank you! Goodbye.

Email Recruiting Text

Hello _____,
My company, Apex Analytics, is an independent, third-party, research firm hired by Xcel Energy to find ways to improve their Lighting Efficiency Program. **[If contractor participated in PY2018 Interview, then state: We recognize that you participated In last years efforts by speaking with a colleague about your experiences with the program. Since the lighting market is evolving so rapidly, Xcel is interested in hearing from you again to gain insight into the lighting market.]** Contractors like you play a key role in the program, and your feedback would be very valuable as we consider ways Xcel Energy can improve the program. **<If contractor in tier 1, 2, then state>**: "As one of the most active contractors in the program, your perspective would be particularly helpful." <**If contractor > tier 2 then state**>: "As a contractor that completes projects both in- and outside the program, it would be very helpful to hear your perspective on the program and the lighting market." – Please let me know when you are available for a quick, half-hour, conversation to discuss your experience. We are offering a $50 incentive as a thank you for your time.

I look forward to speaking with you, and I'm happy to answer any questions you have about our research.

SURVEY/INTERVIEW

Section A: Introduction/Background Information [ASK ALL]
Thank you for agreeing to talk with me today. I expect this conversation to take about half an hour. To help me capture your responses accurately, is it okay if I record this call? The recording will be used for my note-taking purposes only. It won't be shared with Xcel Energy.

Do you have any questions before I start?

First, I want to take 5 minutes to better understand your role and set the stage for the rest of the questions.

A1. What is your title or role at COMPANY NAME [**PROBE:** Owner, Engineer, Contractor, Field Technician, Project Manager, etc.]

A2. What are your primary responsibilities at COMPANY NAME?

A3. Please briefly describe your company's work? [**PROBE ON THE FOLLOWING: ROLE**: DISTRIBUTOR, MANUFACTURER, CONTRACTOR, RETAILER? **SPECIALTIES**: DO THEY ONLY SELL TO PARTICULAR BUSINESS TYPES? **MARKETS:** COMMERCIAL, RESIDENTIAL, MULTIFAMILY.] IF APPROPRIATE, SWITCH TO MANUFACTURER/DISTRIBUTER GUIDE

A3. Has your company's participation in the Lighting Efficiency program influenced any changes in the services you deliver, products you provide, or the customers you serve? How so?
A4. Which of the following types of lighting products does your company sell in Colorado?

Approximately what percent of your lighting equipment sales are each of these types? [IF NEEDED: WE ARE LOOKING FOR APPROXIMATE PERCENT OF UNIT SALES, NOT SALES IN DOLLARS]

Type	***A4.1 Sell? (Y/N)***	***A4.2 % of equipment***
a) Linear LEDs [t-LEDs]		
b) T-12 lamps		
c) T-8 lamps		
d) T-5 lamps		
e) T-12, T-8, or T-5 fixtures		
f) LED retrofit kits		
g) T-8 to T-5 retrofit kits		
h) High bay lighting - non-LED technologies		
i) High bay lighting - LED		

j) HID lighting		
k) Troffers - non-LED technologies		
l) Troffers - LED		
m) Lighting controls		
Screw based lightbulbs		
n) CFLs?		
o) LEDs?		
p) Incandescent / Halogens		
q) Other [specify]		
SUM TO 100%		*100%*

Section B: Trade Partner Marketing, Freeridership, & Spillover

[ASK IF RESPONDENT RECEIVED INCENTIVES FOR MEASURES REMAINING DOWNSTREAM]

B1. Do Xcel Energy rebates/incentives ever come up in sales discussions with customers?

[**IF YES**:]

1. When in the conversation are rebates/incentives typically mentioned [**PROBE:** introduction, discussion of costs, etc.]?
    a. Who typically brings up rebates/incentives [**PROBE:** customer or contractor]?
2. On a scale of 0-10 where 0 is not at all influential, 5 is somewhat influential, and 10 is extremely influential, how influential are the Lighting Efficiency program rebates when customers are choosing their lighting fixtures and retrofit kits?
    a. To what extent does discussing rebates/incentives help sales?
3. [ASK FOR TRADE PARTNERS THAT SELL LED DIRECT LINEAR AMBIENT FIXTURES] In July of this year, Xcel Energy changed the incentives for LED direct linear ambient fixtures. Were you aware of this change?
    a. If yes: Has this change in incentive levels impacted your sales of this product?
        i. how? [PROBES: Are your customers buying fewer of these products overall? Are they buying the same quantity but a different type of fixture? What fixtures have they switched to?]

b. By what percent has your sales of LED direct linear ambient fixtures increased/decreased since Xcel Energy changed their incentive?

B2. What other aspects of the Lighting Efficiency program do you discuss with customers?

1. What do you tell them about the program?

2. What do you think motivates customers to participate?

B3. About what percent of the lighting fixtures and retrofit kits you sell/install are LED?

B4. In the past year, did you sell any LED fixtures or LED retrofit kits that you or your customer did not submit for an Xcel Energy rebate?

a. Approximately what percent of Xcel Energy LED fixtures and retrofit kits products you sell do not receive rebates?

   1. To confirm, of all the LED lighting fixtures and retrofit kits you sold in the past year, [1- ANSWER FROM B4a] received a rebate and [ANSWER FROM B4a] were not rebated. Does that sound about right?

b. Why did you or your customer not apply for a rebate?

c. How, if at all, did the Xcel Energy Lighting efficiency program influence the sales/installation of these LED fixtures and retrofit kits that did not receive rebates?

d. Thinking about these LED fixtures and retrofit kits that did not receive a rebate, on a scale of 0 to 10 where 0 is not at all important and 10 is extremely important, how important was the Xcel Energy Lighting Efficiency program in influencing the sales of these products? [INTERVIEWER NOTE: PLEASE FLAG ANY INCONSISTENCIES WITH THIS ANSWER AND ASK FOR CLARIFICATION]

[GREAT, THANKS. NOW I WOULD LIKE TO MOVE ON TO DISCUSS YOUR EXPERIENCE WITH PRODUCTS SOLD THAT WERE ELIGIBLE FOR XCELS LIGHTING EFFICIENCY PROGRAM.]

B5. On a scale of 0 to 10 where 0 is not at all important and 10 is extremely important, how important was the Xcel Energy Lighting Efficiency program, including rebates and program information, in:

A. Your decision to recommend LED lighting fixtures and LED retrofit kits to your customers?

B. Deciding which lighting products you stock as a whole?

B6. On the same scale, how important was your firm's past participation in the Xcel Energy Lighting Efficiency program in influencing your decision to recommend LED fixtures and LED retrofit kits?

B7. And using a 0 to 10 likelihood scale, where 0 is not at all likely and 10 is extremely likely, if the Lighting Efficiency program, including rebates and program information, had not been available, what is the likelihood you would have recommended the same energy efficient lighting products to your customers? When we say "the same efficient lighting products", we mean products of the same quality and efficiency level.

B7a. We are interested in how influential the Lighting Efficiency rebates are on your LED fixture and retrofit kit sales. What percent of fixture and retrofit sales result from recommendations without rebates? For example, when you recommend a fixture or retrofit kit that does not qualify for a Lighting efficiency rebate, X% of them result in sales.

B7b. What percent of sales result from recommendations with rebates? For example, when you recommend a fixture or retrofit kit that qualifies for a Lighting efficiency rebate, X% of them result in sales.

[CONSISTENCY CHECK: ASK B8 IF B5a or b > 5 AND B6 > 5 AND B7 > 5 OR IF B5a or b < 5 AND B6 < 5 AND B7 < 5]

B8. I want to make sure I understand how the program may have influenced your companies' decisions for stocking, selling, and recommending efficient lighting. You just indicated that the incentives and program support were:

A. [IF B5a or b > 5 AND B6 > 5 AND B7 > 5] influential, yet also indicated that had the program not been available you would have still recommended lighting products to your customers. Should I change your responses to these questions?

B. [IF B5a or b < 5 AND B6 < 5 AND B7 < 5] NOT influential, yet also indicated that had the program not been available you would NOT have recommended lighting products to your customers. Should I change your responses to these questions?

1. If yes, change response, revisit B5-B7, else record why response may have been inconsistent.

B9. Do you sell lighting products outside of the Xcel Energy Colorado service territory?

1. YES
   NO [SKIP TO B12]

DK [SKIP TO B12]
REFUSED/PREFER NOT TO STATE [SKIP TO B12]

B10. Does the PROPORTION of LED and non-LED lighting fixtures and retrofit kits YOU SELL/INSTALL differ in Xcel Energy's service territory compared with outside of it?

1. YES
   What percent of your lighting fixtures and retrofit kits are LEDs within Xcel Energy's territory?
   What percent of your lighting fixtures and retrofit kits are LEDs outside of Xcel Energy's territory?
2. NO
   DK
   REFUSED/PREFER NOT TO STATE

B11. Did Xcel Energy's Lighting Efficiency program influence the LED fixtures and retrofit kits sales outside of Xcel Energy's Colorado territory?

[**IF EARLIER EMAIL RECRUITMENT WAS ABLE TO PROVIDE SALES VOLUMES, HAVE THEM AVAILABLE HERE FOR CONFIRMATION**]

B12. In the past 12 months, what is your company's **approximate LED fixture and LED retrofit kit SALES IN UNITS SOLD in Colorado?** We are asking about the quantity of fixtures sold, not dollars.

B13. Similarly, what is the **approximate PERCENTAGE** of lighting fixtures sold in the past 12 months that are LEDs (in Colorado)? We are asking about the percent of lighting fixtures, not dollars.

[**I WANT TO SHIFT THIS DISCUSSION ABOUT CURRENT SALES TRENDS AND LOOK TO WHAT SALES MAY LOOK LIKE NEXT YEAR, IN 2020**.]

B14. According to your response above, you sold [enter B12 units sold] LED fixtures and LED retrofit kits In the past 12 months in Colorado. Assuming continued Xcel Energy incentives and program support, do you expect your LED fixtures and retrofit **SALES** in 2020 to be higher, lower, or the same? We are asking about the quantity sold, not dollars.

[**If B14 If higher or lower, then ask**]
B14a. What do you expect your 2020 LED fixture and retrofit unit sales to be?

[**ASK ALL**]
B14b. Why do you believe your 2020 sales will be [response from B14, higher/lower/same]?

B15. Similarly, according to your response above, [enter B13 LED percent of units sold] of your fixtures sold in the past 12 months were LEDs in Colorado. Assuming continued Xcel Energy incentives and program support, do you expect that **LED percent** to be higher, lower, or the same in 2020?

[**If B15 If higher or lower, then ask**]
B15a. What do you expect your LED percentage of 2020 sales to be?

[**ASK ALL**]
B15b. Why do you believe your 2020 LED percentage will be [higher/lower/same]?

[NOW PLEASE ASSUME THAT XCEL ENERGY HAD NEVER OFFERED THEIR LIGHTING EFFICIENCY PROGRAM, AND WILL NOT OFFER IT IN 2020.]

B16. According to your response above, you sold [enter B12 units sold] LED fixtures and retrofit kits in the past 12 months. If Xcel had never offered and will not offer the lighting efficiency program in 2020, would you expect your **SALES** of LED fixtures and retrofit kits in Colorado in 2020 to be higher, lower, or the same? We are asking about the quantity of LED fixtures and retrofit kits, not dollars.

[**If B16 If higher or lower, then ask**]
B16a. What do you expect your 2020 LED fixture and retrofit kit unit sales to be?

[**ASK ALL**]
B16b. Why do you believe your 2020 sales will be [response from B16, higher/lower/same]?

B17. Similarly, according to your response above, [enter B13 LED percent of units sold] of your fixtures sold in the past 12 months were LEDs. If Xcel had never offered and will not offer the lighting efficiency program in 2020, would you expect that **LED percent** to be higher, lower, or the same in 2020?

[**If B17 If higher or lower, then ask**]
B17a. What do you expect your LED percentage of 2020 sales to be?

[**ASK ALL**]
B17b. Why do you believe your 2020 LED percentage will be different?

B18. Lots of factors may have contributed to the growth in energy efficient lighting over the past ten years in Colorado. I'd like to hear your perspective on what has been most important. What do you believe are the most important drivers that have resulted in market adoption of LED lighting?

1. Now I'd like you to rate, on a scale from 0 to 10, with 0 being not at all influential and 10 being very influential, how influential you think each of the following factors have been in increasing uptake of energy efficient lighting:
    a. Reductions in cost due to Xcel Energy rebates
    b. Reductions in cost due to market forces not related to Xcel Energy rebates
    c. Increased customer awareness of LED benefits due to Xcel Energy marketing and program efforts
    d. Increased customer awareness of LED benefits due to contractor, distributor, and manufacturer marketing and educational efforts
        i. [IF d>5] What contractor, distributor, or manufacturer efforts do you think were influential?
    e. Utility program training, workshops, and other support provided to contractors and distributors
    f. Factors mentioned above from B18 that are outside of incentives and awareness

B19. How, if at all, do you think the Colorado market share of LED fixtures would be different had Xcel Energy and other utilities never offered lighting rebates? Why do you say that?

B20. How, if at all, do you think the size of the LED fixture and retrofit kit market (market volume) in Colorado would be different had Xcel Energy and other utilities never offered lighting rebates? Why do you say that?

Section C: Evolving Market Place [ASK ALL]

C1. What do you see as new/emerging energy efficiency opportunities for Lighting Efficiency program customers?

C2. Do you see any sectors or business types that are slower to adopt LED technologies? Which ones?

Section D: Effects of Shift to Midstream

[ASK if RESPONDENT ONLY RECEIVED INCENTIVES FOR DISCONTINUED OR MIDSTREAM LAMPS AND IF A4.1f=Yes or A4.1i=yes or A4.1l=yes or A4.1m=yes (Respondent sells/installs measures currently in the program BUT ONLY RECEIVED INCENTIVES FOR MEASURES NO LONGER OFFERED DOWNSTREAM)]

D1. Our records show that your company only received incentives from the Xcel Energy lighting efficiency program for lamps from July of 2018 through March of 2019. You did not receive incentives for LED fixtures and retrofit kits during that period. Is that correct? *Interviewer: prompt with responses for each, do not read 96-99*

[if D1=No]

D2. What types of fixtures and retrofit kits did you receive Xcel Energy Lighting Efficiency Program incentives for between July 2018 and March 2019, and about how many did you receive incentives on? *Interviewer: prompt with responses for each, do not read 97-99*

[Matrix Question]

Measures receiving incentives	Quantity installed through program
Measure1:	
Measure 2:	
Measure 3:	
Measure 4:	

[IF D1=1]

D3. Why didn't you submit the LED fixtures and retrofit kits you sold or installed between July 2018 and March 2019 for Xcel Energy Lighting Efficiency Program incentives?

[ask all]

D4. Were you aware that in July of 2019, Xcel Energy expanded distributor-focused incentives and discontinued traditional incentives to contractors and end-users for many lamp measures?

[if **Error! Reference source not found.**=Yes]

D5. How, if at all, has (or might) this change influenced what lighting products you sell or install?

[*Probe if not addressed:*] How might it affect your likelihood to sell and install the LED fixtures and retrofit kits that the program still covers? How might it affect your likelihood to sell and install the types of LED lamps you sold through the program in the past?

Section Gen: Firmographics [ASK ALL]

Finally, I'd like to gather some information about your involvement with the Xcel Energy Lighting Efficiency program and your role at your organization.

Firm1. Approximately how many full-time equivalent (FTE) employees does your organization currently have in the state of Colorado?

1. < 20
2. 20 - 49
3. 50 - 99
4. 100 - 249
5. 250 - 499
6. 500 - 999
7. 1,000 - 2,500
8. > 2,500

DK

REF / Prefer not to say

Firm2. Approximately what was your gross lighting sales in 2018 (in dollars)?
1. [OPEN END]
DK
REF / Prefer not to say

Section H: Closing [ASK ALL]

Close1. Is there anything we didn't cover that you'd like to mention or discuss about your experiences participating in the Lighting Efficiency program?

Close2. Thank you. Those are all the questions I have today.
[THANK AND TERMINATE]

B.3 NON-PARTICIPATING TRADE PARTNER INTERVIEW GUIDE

INTRODUCTION

To support the 2018-2019 Xcel Energy Lighting Efficiency Product, members of the EMI Consulting evaluation team are conducting in-depth telephone interviews with Non-Participating Trade Partners. This guide presents the questions to be covered in the in-depth interviews for the Xcel Energy Colorado Lighting Efficiency program. The remainder of the introduction provides the research questions this guide is designed to address and fielding instructions for the interviewers.

Research Objectives

The objectives for the CO Lighting Efficiency product research are to:

- Develop a NTG ratio documenting the program's influence on customer's decisions.
- Assess market effects of the Colorado Lighting Efficiency Program among non-participants

The following table summarizes the trade partner survey objectives.

Research Task	Sample Size	Research Objective(s)
Participant Surveys	70	Prospective NTG, Early Replacement
Participating Trade Partner Interviews	40	Prospective NTG, market effects
Non-Participating Trade Partner Interviews	10-15	Prospective NTG, market effects
Manufacturer/Distributor Interviews	5-10	Prospective NTG, market effects

Specific research questions which this non-participant survey is designed to address are the following:

- Do non-participating trade partners believe the product has influenced their LED sales?
- Do they believe the overall lighting market has shifted as a result of the product?
- What market share of their current lighting sales are program qualified (LED-based)?

The following table presents the link between each research objective, research question, and survey question.

Research Objective	Research Question	Survey Question Number(s)
Develop a NTG ratio documenting the program's influence on customer's decisions.	Does the program influence additional energy savings outside of what is captured through the program (spillover)? Should the trade ally be considered a "program factor" in the participant NTG battery?	B5-B20

Sample Variables

The following table include the sample variables that will be used to conduct this survey, as well as descriptions of these variables and potential codes.

Sample Variable	Variable Description	Potential Codes
Interviewer Name	Name of interviewer Apex	e.g. Katie Parkinson
Organization	Organization name	e.g. Apex Analytics
Contact	Contact at organization	e.g. Katie Cary
Phone	Phone number for contact at organization	e.g. 555-555-5555

Fielding Instructions

We will attempt to schedule interviews via email if email addresses are available; we will offer sales volume questions through email if requested. We will supplement email recruiting efforts with telephone calls as needed. The following fielding guidelines should be used for trade partner/contractor recruiting and interviews:

- Attempt to reach each non-participating trade partner/contractor six times on different days of the week and at different times.
- Leave messages on the first and fourth attempt.
- Calling hours are 7 AM to 5 PM MT.
- Record interviews
- Definitions:

  COMPANY NAME = Update COMPANY NAME with Non-Participating Trade Partner's/Contractor's company name

Telephone Recruiting Dialog/Message Script

[INTRO:] Hi, this is **NAME** from Apex Analytics, calling on behalf of Xcel Energy. We're working with Xcel to find ways to improve their Lighting Efficiency Program. Contractors like you are really important to the success of that program, and your perspective would be very valuable to us. May I please speak with <CONTACT> or the person most familiar with your company's lighting stocking and sales activities for commercial and industrial customers?

[ONCE CONTACT IS ON THE PHONE, REPEAT INTRO AS NEEDED:] Apex Analytics is an independent third-party contractor hired by Xcel Energy to evaluate their Lighting Efficiency Program. I'd appreciate the opportunity to schedule a quick 15 minute interview with you to discuss your experience. If you qualify for they survey, we are offering a $50 incentive as a thank you for your time.

[MESSAGE SCRIPT:] Please give me a call back to schedule a time to talk. My name is **NAME** and my phone number is **PHONE NUMBER**. If I don't hear back in a few days, I will give you a try back. Thank you! Goodbye.

Email Recruiting Text

Hello _____,

My company, Apex Analytics, is an independent, third-party, research firm hired by Xcel Energy to find ways to improve their Lighting Efficiency Program. As a contractor that completes lighting projects both in- and outside the program, it would be very helpful to hear your perspective on the program and the lighting market. Please let me know when you are available for a quick, 15 minute conversation to discuss your experience. If you qualify for the study, we are offering a $50 incentive as a thank you for your time.

I look forward to speaking with you, and I'm happy to answer any questions you have about our research.

SURVEY/INTERVIEW

Section A: Introduction/Background Information

Thank you for agreeing to talk with me today. I expect this conversation to take about half an hour. To help me capture your responses accurately, is it okay if I record this call? The recording will be used for my note-taking purposes only. It won't be shared with Xcel Energy.

Do you have any questions before I start?

First, I want to take 5 minutes to better understand your role and set the stage for the rest of the questions.

A1. What is your title or role at COMPANY NAME [**PROBE:** Owner, Engineer, Contractor, Field Technician, Project Manager, etc.]

A2. What are your primary responsibilities at COMPANY NAME?

A3. Please briefly describe your company's work? [**PROBE ON THE FOLLOWING: ROLE**: DISTRIBUTOR, MANUFACTURER, CONTRACTOR, RETAILER? **SPECIALTIES**: DO THEY ONLY SELL TO PARTICULAR BUSINESS TYPES? **MARKETS:** COMMERCIAL, RESIDENTIAL, MULTIFAMILY.] IF APPROPRIATE, SWITCH TO MANUFACTURER/DISTRIBUTER GUIDE

A4. Which of the following types of lighting products does your company sell in Colorado?

Approximately what percent of your lighting equipment sales are each of these types? (If necessary, clarify product sales, not dollar volume)

Type	***Sell? (Y/N)***	***% of equipment***
Linear LEDs [t-LEDs]		
T-12 lamps		
T-8 lamps		
T-5 lamps		
T-12, T-8, or T-5 fixtures		

Linear LED retrofit kits		
T-8 to T-5 retrofit kits		
High bay lighting - non-LED		
High bay lighting - LED		
HID lighting		
Non-LED Troffers		
LED Troffers -		
Lighting controls		
Screw based lightbulbs		
CFLs?		
LEDs?		
Incandescent / Halogens		
Other [specify]		
SUM TO 100%		*100%*

IF TRADE PARTNER DOES NOT SELL LIGHTING FIXTURES or LED RETROFIT KITSCONTROLS TO COMMERCIAL OR INDUSTRIAL CUSTOMERS, SAY "Based on your responses, you do not qualify for this survey. Thank you for your time today." END CALL

A5. Xcel Energy's Lighting Efficiency program offers rebates on high efficiency lighting fixtures, controls, and LED retrofit kits for commercial and industrial customers. Before today, have you heard of Xcel Energy's lighting efficiency program?

IF YES: How have you heard of this program? Have you had any interaction with the program? (if yes) What was it?

A6. Has the Lighting Efficiency program influenced any changes in your lighting sales, the services you deliver, products you provide, or the customers you serve? How so?

A7. About what percent of the lighting fixtures you currently sell/install are LED fixtures?

A8. About what percent of retrofit kits you sell are for LEDs?

Section B: Non-Participating Trade Partner Marketing, Freeridership, & Spillover

[**IF RESPONDENT UNFAMILIAR WITH XCEL ENERGY LIGHTING EFFICIENCY PROGRAM (A4=NO), SKIP TO B8]**

B1. Do Xcel Energy rebates/incentives LED fixtures, retrofit kits, or controls ever come up in sales discussions with customers?

[**IF YES**:]

1. When in the conversation are rebates/incentives typically mentioned [**PROBE:** introduction, discussion of costs, etc.]?

a. Who typically brings up rebates/incentives [**PROBE:** customer or contractor]?

2. On a scale of 0-10 where 0 is not at all influential, 5 is somewhat influential, and 10 is extremely influential, how influential are the Lighting Efficiency program rebates when customers are choosing their lighting fixtures and retrofit kits?

    a. To what extent does discussing rebates/incentives help sales?

B2. What other aspects of the Lighting Efficiency program do you discuss with customers?

1. What do you tell them about the program?
2.
3. What do you think motivates customers to participate?

[GREAT, THANKS. NOW I WOULD LIKE TO MOVE ON TO DISCUSS YOUR EXPERIENCE WITH PRODUCTS SOLD THAT WERE ELIGIBLE FOR XCEL ENERGY'S LIGHTING EFFICIENCY PROGRAM.]

B4. On a scale of 0 to 10 where 0 is not at all important and 10 is extremely important, how important was the Xcel Energy Lighting Efficiency program, including rebates and program information, in:

A. Your decision to recommend LED lighting fixtures and LED retrofit kits to your customers?

B. Deciding which lighting fixtures and retrofit kits you stock as a whole?

[IF TRADE PARTNER PREVIOUS PARTICIPATION = YES, THEN ASK B5]

B5. Based on program documentation, we understand your company has been associated with Xcel Energy's Lighting Efficiency program in the past. On the same scale, how important was your firm's past participation in the Xcel Energy Lighting Efficiency program in influencing your decision to recommend LED lighting equipment?

B6. And using a 0 to 10 likelihood scale, where 0 is not at all likely and 10 is extremely likely, if the Lighting Efficiency program had not been available, what is the likelihood you would have recommended LED lighting fixtures and retrofit kits to your customers?

[CONSISTENCY CHECK: ASK B7 IF B4a or b > 5 AND B5 > 5 AND B6 > 5 OR IF B4a or b < 5 AND B5 < 5 AND B6 < 5]

B7. I want to make sure I understand how the program may have influenced your companies' decisions for stocking, selling, and recommending efficient LED lighting. You just indicated that the incentives and program support were:

A. [IF B4a or b > 5 AND B5 > 5 AND B6 > 5] influential, yet also indicated that had the program not been available you would have still recommended efficient LED lighting fixtures and retrofit kits to your customers. Should I change your responses to these questions?

C. [IF B4a or b < 5 AND B5 < 5 AND B6 < 5] NOT influential, yet also indicated that had the program not been available you would NOT have recommended efficient LED lighting fixtures and retrofit kits to your customers. Should I change your responses to these questions?

1. If yes, change response, revisit B4-B6, else record why response may have been inconsistent.

B8. Do you sell lighting fixtures and retrofit kits outside of the Xcel Energy Colorado service territory?

1. YES
   NO [SKIP TO B11]
   DK [SKIP TO B11]
   REFUSED/PREFER NOT TO STATE [SKIP TO B11]

B9. Does the PROPORTION of LED and non-LED lighting fixtures and retrofit kits YOU SELL/INSTALL differ in Xcel Energy's Colorado service territory compared with outside of it?

1. YES

What percent of your lighting fixtures and retrofit kits are LEDs within Xcel Energy's territory?
What percent of your lighting fixtures and retrofit kits are LEDs outside of Xcel Energy's territory?

2. NO
   DK
   REFUSED/PREFER NOT TO STATE

B10. Does Xcel Energy's Lighting Efficiency program influence the sales of efficiency lighting products, including lighting fixtures and retrofit kits outside of Xcel Energy's Colorado territory? If so, how?

[**IF EARLIER EMAIL RECRUITMENT WAS ABLE TO PROVIDE SALES VOLUMES, HAVE THEM AVAILABLE HERE FOR CONFIRMATION**]

B11. In the past 12 months, what is your company's **approximate LED fixture and LED retrofit kit SALES IN UNITS SOLD** in Colorado? We are asking about the quantity sold, not dollars.

B12. Similarly, what is the **approximate PERCENTAGE** of lighting fixtures sold in Colorado in the past 12 months that are LEDs? We are asking about the percent of lighting fixtures, not dollars.

[**I WANT TO SHIFT THIS DISCUSSION ABOUT CURRENT SALES TRENDS AND LOOK TO WHAT SALES MAY LOOK LIKE NEXT YEAR, IN 2020**.]

B13. According to your response above, you sold [enter B11 units sold] LED fixtures and retrofit kits in the past 12 months in Colorado. For those aware of product: [Assuming continued Xcel Energy incentives and program support] Do you expect your LED fixtures and LED retrofit kits **SALES IN UNITS SOLD** in 2020 to be higher, lower, or the same? We are asking about the quantity of LED fixtures and retrofit kits, not dollars.

[**If B13 If higher or lower, then ask**]
B13a. What do you expect your 2020 LED fixtures and retrofit kits unit sales to be in Colorado?

[**ASK ALL**]
B13b. Why do you believe your 2020 sales will be [response from B13 higher/lower/same]?

B14. Similarly, according to your response above, [enter B12 LED percent of units sold] of your fixtures sold in Colorado in the past 12 months were LEDs. [For those aware of program: Assuming continued Xcel Energy incentives and program support], do you expect that **LED percent** to be higher, lower, or the same in 2020?

[**If B14 If higher or lower, then ask**]
B15. What do you expect your LED percentage of 2020 sales to be?

[**ASK ALL**]
B15a. Why do you believe your 2020 LED percentage will be different?

[IF TRADE PARTNER IS UNAWARE OF PROGRAM (A5=NO), SKIP TO B18]

NOW PLEASE ASSUME THAT XCEL HAD NEVER OFFERED THEIR LIGHTING EFFICIENCY PROGRAM, AND WILL NOT OFFER IT IN 2020.

B16. According to your response above, you sold [enter B11 units sold] LED fixtures and retrofit kits in the past 12 months in Colorado. If Xcel Energy had never offered and will not offer the lighting efficiency program in 2020, would you expect your **SALES IN UNITS SOLD** of LED lighting fixtures and LED retrofit kits in 2020 to be higher, lower, or the same? We are asking about the quantity of LED lighting fixtures and LED retrofit kits, not dollars.

[**If B16 If higher or lower, then ask**]
B16a. What do you expect your 2020 LED fixtures and retrofit kits unit sales to be in Colorado?

[**ASK ALL**]
B16b. Why do you believe your 2020 sales will be [response from B16, higher/lower/same]?

B17. Similarly, according to your response above, [enter B12 LED percent of units sold] of your fixtures sold in Colorado in the past 12 months were LEDs. If Xcel had never offered and will not offer the lighting efficiency program in 2020, would you expect that **LED percent** to be higher, lower, or the same in 2020?

[**If B17 If higher or lower, then ask**]
B17a. What do you expect your LED percentage of 2020 sales to be in Colorado?

[**ASK ALL**]
B17b. Why do you believe your 2020 LED percentage will be different?

B18. Lots of factors may have contributed to the growth in energy efficient lighting over the past ten years. I'd like to hear your perspective on what has been most important. What do you believe are the most important drivers that have resulted in market adoption of LED lighting in Colorado?

2. Now I'd like you to rate, on a scale from 0 to 10, with 0 being not at all influential and 10 being extremely influential, how influential you think each of the following factors have been in increasing uptake of energy efficient lighting:
    a. Reductions in cost due to Xcel Energy rebates
    b. Reductions in cost due to market forces not related to Xcel Energy rebates
    c. Increased customer awareness of LED benefits due to Xcel Energy marketing and program efforts
    d. Increased customer awareness of LED benefits due to contractor, distributor, and manufacturer marketing and educational efforts
        i. [IF d>5] What contractor, distributor, or manufacturer efforts do you think were influential?
    e. Utility program training, workshops, and other support provided to contractors and distributors
    f. Factors mentioned above from [B18] that are outside of incentives and awareness

B19. How, if at all, do you think the Colorado market share of LED fixtures and retrofit kits would be different had Xcel Energy and other utilities never offered lighting rebates? Do you think the market share of LED fixtures in Colorado would be higher, lower, or the same? Why do you say that?

B20. How, if at all, do you think the size of the LED fixture and retrofit kit market (market volume) in Colorado would be different had Xcel Energy and other utilities never offered lighting rebates? Do you think the market volume would be larger, smaller, or the same? Why do you say that?

Section C: Evolving Market Place

C1. What do you see as new/emerging energy efficiency opportunities within the commercial lighting market?

C2. Do you see any sectors or business types that are slower to adopt LED technologies? Which ones?

Section Gen: Firmographics

Finally, I'd like to gather some information about your organization.

Firm1. Approximately how many full-time equivalent (FTE) employees does your organization currently have in the state of Colorado?

1. < 20
2. 20 - 49
3. 50 - 99
4. 100 - 249
5. 250 - 499
6. 500 - 999
7. 1,000 - 2,500
8. > 2,500

DK
REF / Prefer not to say

Firm2. Approximately what was your gross lighting sales in 2018 (in dollars)?

1. [OPEN END]

DK
REF / Prefer not to say

Section H: Closing

Close1. Is there anything we didn't cover that you'd like to mention or discuss about your experiences with the Lighting Efficiency program?

Close2. Thank you. Those are all the questions I have today.
[THANK AND TERMINATE]

B.4 MANUFACTURER/DISTRIBUTOR INTERVIEW GUIDE

INTRODUCTION

To support the 2018-2019 Xcel Energy Lighting Efficiency Product, members of the EMI Consulting evaluation team are conducting in-depth telephone interviews with lighting manufacturers and distributors. This guide presents the questions to be covered in the in-depth interviews for the Xcel Energy Colorado Lighting Efficiency program. The sample for these interviews may include both manufacturers and distributors. The remainder of the introduction provides the research questions this guide is designed to address and fielding instructions for the interviewers.

RESEARCH OBJECTIVES

The objectives for the CO Lighting Efficiency product research are to:

- Develop a NTG ratio documenting the program's influence on customer's decisions.
- Assess market effects of the Colorado Lighting Efficiency Program

The following table summarizes the trade partner survey objectives.

Research Task	Sample Size	Research Objective(s)
Participant Surveys	70	Prospective NTG, Early Replacement
Participating Trade Partner Interviews	40	Prospective NTG, market effects
Non-Participating Trade Partner Interviews	10-15	Prospective NTG, market effects
Manufacturer/Distributor Interviews	5-10	Prospective NTG, market effects

Specific research questions which this participant survey is designed to address are the following:

- Does the program influence additional energy savings outside of what is captured through the program (spillover)?
- Has the program influenced product decisions at the manufacturer / distributer level?

The following table presents the link between each research objective, research question, and survey question.

Research Objective	Research Question	Survey Question Number(s)
Develop a NTG ratio documenting the program's influence on customer's decisions.	Does the program influence additional energy savings outside of what is captured through the program (spillover)? Has the Lighting Efficiency product influenced what lighting products are sold / stocked in Colorado?	B5-B22

Sample Variables

The following table include the sample variables that will be used to conduct this survey, as well as descriptions of these variables and potential codes.

Sample Variable	Variable Description	Potential Codes
Interviewer Name	Name of interviewer Apex	e.g. Katie Parkinson
Organization	Organization name	e.g. Apex Analytics
Contact	Contact at organization	e.g. Katie Cary
Phone	Phone number for contact at organization	e.g. 555-555-5555

Fielding Instructions

We will attempt to schedule interviews via email if email addresses are available; we will offer sales volume questions through email if requested. We will supplement email recruiting efforts with telephone calls as needed. The following fielding guidelines should be used for manufacturer/distributor recruiting and interviews:

- Attempt to reach each trade manufacturer/distributor six times on different days of the week and at different times.
- Leave messages on the first and fourth attempt.
- Calling hours are 7 AM to 5 PM MT.
- Record interviews
- Definitions:

  COMPANY NAME = Update COMPANY NAME with manufacturer/distributor company name

Telephone Recruiting Dialog/Message Script

[INTRO:] Hi, this is **NAME** from Apex Analytics, calling on behalf of Xcel Energy. We're working with Xcel to find ways to improve their Lighting Efficiency Program. Your company is very important to the success of that program, and your perspective would be very valuable to us. May I please speak with <CONTACT> or the person most familiar with Xcel Energy's Lighting Efficiency Program?

[ONCE CONTACT IS ON THE PHONE, REPEAT INTRO AS NEEDED:] Apex Analytics is an independent third-party contractor hired by Xcel Energy to evaluate their Lighting Efficiency Program. I'd appreciate the opportunity to schedule a quick half-hour interview with you to discuss your experience. If you qualify for the study, we are offering a $50 incentive as a thank you for your time.

[MESSAGE SCRIPT:] Please give me a call back to schedule a time to talk. My name is **NAME** and my phone number is **PHONE NUMBER**. If I don't hear back in a few days, I will give you a try back. Thank you! Goodbye.

Email Recruiting Text

Hello _____,
My company, Apex Analytics, is an independent, third-party, research firm hired by Xcel Energy to find ways to improve their Lighting Efficiency Program. Your feedback would be very valuable as we consider ways Xcel Energy can improve the program. As a company which sells lighting fixtures and retrofit kits both in- and outside the program, it would be very helpful to hear your perspective on the program and the lighting market. Please let me know when you are available for a quick, half-hour, conversation to discuss your experience. If you qualify for the study, we are offering a $50 incentive as a thank you for your time.

I look forward to speaking with you, and I'm happy to answer any questions you have about our research.

SURVEY/INTERVIEW

SECTION A: INTRODUCTION/BACKGROUND INFORMATION

Thank you for agreeing to talk with me today. I expect this conversation to take about half an hour. To help me capture your responses accurately, is it okay if I record this call? The recording will be used for my note-taking purposes only. It won't be shared with Xcel Energy.

Do you have any questions before I start?

First, I want to take 5 minutes to better understand your role and set the stage for the rest of the questions.

A3. What is your title or role at COMPANY NAME [**PROBE:** Owner, Director, Sales Associate, Technician, Project Manager, etc.]

A4. What are your primary responsibilities at COMPANY NAME?

A3. Please briefly describe your company's work? [**PROBE ON THE FOLLOWING: ROLE**: DISTRIBUTOR / MANUFACTURER? **MARKETS:** COMMERCIAL, RESIDENTIAL]

A5. Has the Xcel Energy Lighting Efficiency program influenced any changes in the products you distribute/manufacture? How so?

A6. Which of the following types of lighting products does your company sell in Colorado?

Approximately what percent of your lighting equipment sales are each of these types?

Type	***Sell? (Y/N)***	***% of equipment***
Linear LEDs [t-LEDs]		
T-12 lamps		
T-8 lamps		
T-5 lamps		
T-12, T-8, or T-5 fixtures		
Linear LED retrofit kits		
T-12, T-8, or T-5 fixtures		
High bay lighting - LED		
High bay lighting - non-LED		
HID lighting		
LED Troffers		
Non-LED Troffers		
Lighting controls		
Screw based lightbulbs		
CFLs?		
LEDs?		
Incandescent / Halogens		
Other [specify]		
SUM TO 100%		*100%*

IF TRADE PARTNER DOES NOT SELL LIGHTING FIXTURES or LED RETROFIT KITS to COMMERCIAL OR INDUSTRIAL CUSTOMERS, SAY "Based on your responses, you do not qualify for this survey. Thank you for your time today." END CALL

A7. Xcel Energy's Lighting Efficiency program offers rebates on high efficiency lighting fixtures, controls, and LED retrofit kits for commercial and industrial customers. Before today, have you heard of Xcel Energy's lighting efficiency program?

a. IF YES: How have you heard of this program? what interaction have you had with the program?

A8. Has the Lighting Efficiency program influenced any changes in your lighting sales the services you deliver, products you provide, or the customers you serve? How so?

A9. About what percent of the lighting fixtures you currently sell/install in Colorado are LED fixtures?

A10. About what percent of retrofit kits you sell are LEDs?

Section B: Marketing, Freeridership, & Spillover

[**IF RESPONDENT UNFAMILIAR WITH XCEL ENERGY LIGHTING EFFICIENCY PROGRAM (A4=NO), SKIP TO B9]**

B1. Do Xcel Energy rebates/incentives on LED fixtures, retrofit kits, or controls ever come up in sales discussions with [contractors/distributors]?

B1a [IF YES] On a scale of 0-10 where 0 is not at all influential, 5 is somewhat influential, and 10 is extremely influential, how influential are the Lighting Efficiency program rebates when [contractors/distributors] are choosing which lighting fixtures and retrofit kits to purchase?

b. To what extent does discussing rebates/incentives help sales?

[GREAT, THANKS. NOW I WOULD LIKE TO MOVE ON TO DISCUSS YOUR EXPERIENCE WITH PRODUCTS SOLD THAT WERE ELIGIBLE FOR XCEL ENERGY'S LIGHTING EFFICIENCY PROGRAM. THE PROGRAM CURRENTLY INCENTIVIZES LED FIXTURES, RETROFIT KITS, AND CONTROLS.]

B5. On a scale of 0 to 10 where 0 is not at all important and 10 is extremely important, how important was the Xcel Energy Lighting Efficiency program, including rebates and program information, in:

A. Your decision to recommend LED lighting fixtures and LED retrofit kits to your Colorado customers?

B. Deciding which lighting fixtures you stock or manufacture?

B6. On the same scale, how important was your firm's past participation in the Xcel Energy Lighting Efficiency program in influencing your decision to recommend
LED fixtures, LED retrofit kits, and controls?

B7. And using a 0 to 10 likelihood scale, where 0 is not at all likely and 10 is extremely likely, if the Lighting Efficiency program had never been available, what is the likelihood you would have recommended LED lighting fixtures and retrofit kits to your Colorado customers?

[CONSISTENCY CHECK: ASK B8 IF B5a or b > 5 AND B6 > 5 AND B7 > 5 OR IF B5a or b < 5 AND B6 < 5 AND B7 < 5]

B8. I want to make sure I understand how the program may have influenced your companies' decisions for stocking, selling, and recommending efficient lighting in Colorado. You just indicated that the incentives and program support were:

A. [IF B5a or b > 5 AND B6 > 5 AND B7 > 5] influential, yet also indicated that had the program not been available you would have still recommended LED lighting fixtures and retrofit kits to your customers. Should I change your responses to these questions?

B. [IF B5a or b < 5 AND B6 < 5 AND B7 < 5] NOT influential, yet also indicated that had the program not been available you would NOT have recommended LED lighting fixtures and retrofit kits to your customers. Should I change your responses to these questions?

1. If yes, change response, revisit B5-B7, else record why response may have been inconsistent.

B9. Do you sell lighting fixtures and retrofit kits outside of the Xcel Energy Colorado service territory?

2. YES
   NO [SKIP TO B12]
   DK [SKIP TO B12]
   REFUSED/PREFER NOT TO STATE [SKIP TO B12]

B10. Does the PROPORTION of LED and non-LED lighting fixtures and retrofit kits YOU INSTALL/SELL differ in Xcel Energy's service territory compared with outside of it?

3. YES

   What percent of your lighting fixtures and retrofit kits are LEDs within Xcel Energy's territory?

   What percent of your lighting fixtures and retrofit kits are LEDs technologies outside of Xcel Energy's territory?

4. NO
DK
REFUSED/PREFER NOT TO STATE

B11. Did Xcel Energy's Lighting Efficiency program influence the energy efficient lighting sales for fixtures and retrofit kits outside of Xcel Energy's Colorado territory? How so?

[**IF EARLIER EMAIL RECRUITMENT WAS ABLE TO PROVIDE SALES VOLUMES, HAVE THEM AVAILABLE HERE FOR CONFIRMATION**]

B12. In the past 12 months, what is the **approximate SALES IN UNITS SOLD** of LED lighting fixtures and LED retrofit kits in Colorado? We are asking about the quantity sold, not dollars.

B13. Similarly, what is the **approximate PERCENTAGE** of all your lighting fixtures sold in Colorado in the past 12 months that are LEDs? We are asking about the percent of lighting fixtures, not dollars.

[**I WANT TO SHIFT THIS DISCUSSION ABOUT CURRENT SALES TRENDS AND LOOK TO WHAT SALES MAY LOOK LIKE NEXT YEAR, IN 2020**.]

B14. According to your response above, you sold [enter B12 units sold] LED fixtures and LED retrofit kits in the past 12 months in Colorado. [IF FAMILIAR WITH PROGRAM: Assuming continued Xcel Energy incentives and program support,] do you expect your LED fixtures and LED retrofit kits **SALES IN UNITS SOLD** in Colorado in 2020 to be higher, lower, or the same? We are asking about the quantity of LED lighting fixtures and retrofit kits.

[**If B14 If higher or lower, then ask**]
B14a. What do you expect your 2020 LED fixtures and retrofit kits unit sales to be in Colorado?

[**ASK ALL**]
B14b. Why do you believe your 2020 sales will be [response from B12, higher/lower/same]?

B15. Similarly, according to your response above, [enter B13 LED percent of units sold] of your fixtures in the past 12 months were LEDs in Colorado. Assuming continued Xcel Energy incentives and program support, do you expect that **LED percent** to be higher, lower, or the same in 2020?

[**If B15 If higher or lower, then ask**]
B15a. What do you expect your LED percentage of 2020 sales to be in Colorado?

[**ASK ALL**]
B15b. Why do you believe your 2020 LED percentage will be different?

[IF TRADE PARTNER DOES NOT BELIEVE PROGRAM IMPACTED SALES/PRODUCTS (A5=NO), SKIP TO B18]

[NOW PLEASE ASSUME THAT XCEL HAD NEVER OFFERED THEIR LIGHTING EFFICIENCY PROGRAM, AND WILL NOT OFFER IT IN 2020.]

B16. According to your response above, you sold [enter B12 units sold] LED fixtures and retrofit kits in the past 12 months in Colorado. If Xcel Energy had never offered and will not offer the lighting efficiency program in 2020, would you expect your **SALES IN UNITS SOLD** of LED lighting fixtures and retrofit kits in 2020 to be higher, lower, or the same? We are asking about the quantity sold, not dollars.

[**If B16 If higher or lower, then ask**]
B16a. What do you expect your 2020 LED fixtures and LED retrofit kits unit sales in Colorado to be?

[**ASK ALL**]
B16b. Why do you believe your 2020 sales will be [response from B16, higher/lower/same]?

B17. Similarly, according to your response above, [enter B13 LED percent of units sold] of your fixtures sold in the past 12 months were LEDs in Colorado. If Xcel had never offered and will not offer the lighting efficiency program in 2020, would you expect that **LED percent** to be higher, lower, or the same in 2020?

[**If B17 If higher or lower, then ask**]
B17a. What do you expect your LED percentage of 2020 sales to be in Colorado?

[**ASK ALL**]
B17b. Why do you believe your 2020 LED percentage will be different?

B18. Lots of factors may have contributed to the growth in energy efficient lighting over the past ten years. I'd like to hear your perspective on what has been most important. What do you believe are the most important drivers that have resulted in market adoption of LED lighting?

3. Now I'd like you to rate, on a scale from 0 to 10, with 0 being not at all influential and 10 being very influential, how influential you think each of the following factors have been in increasing uptake of energy efficient lighting:
    a. Reductions in cost due to Xcel Energy rebates
    b. Reductions in cost due to market forces not related to Xcel Energy rebates
    c. Increased customer awareness of LED benefits due to Xcel Energy marketing and program efforts

d. Increased customer awareness of LED benefits due to contractor, distributor, and manufacturer marketing and educational efforts
    i. [IF d>5] What contractor, distributor, or manufacturer efforts do you think were influential?
e. Utility program training, workshops, and other support provided to contractors and distributors
f. Factors mentioned above from B18 that are outside of incentives and awareness

B19. How, if at all, do you think the market share of LED fixtures in Colorado would be different had Xcel Energy and other utilities never offered lighting rebates? Why do you say that?

B20. How, if at all, do you think the size of the LED fixture and retrofit kit market (market volume) in Colorado would be different had Xcel Energy and other utilities never offered lighting rebates? Why do you say that?

Section C: Evolving Market Place

C1. What do you see as new/emerging energy efficiency opportunities for Lighting Efficiency program customers?

C2. Do you see any sectors or business types that are slower to adopt LED technologies? Which ones?

Section Gen: Firmographics

Finally, I'd like to gather some information about your involvement with the Xcel Energy Lighting Efficiency program and your role at your organization.

Firm1. Approximately how many full-time equivalent (FTE) employees does your organization currently have in the state of Colorado?

1. < 20
2. 20 - 49
3. 50 - 99
4. 100 - 249
5. 250 - 499
6. 500 - 999
7. 1,000 - 2,500
8. > 2,500

DK
REF / Prefer not to say

Firm2. Approximately what was your gross lighting sales in 2018 (in dollars)?

1. [OPEN END]

DK
REF / Prefer not to say

SECTION H: CLOSING

Close1. Is there anything we didn't cover that you'd like to mention or discuss about Xcel Energy's Lighting Efficiency program or the lighting market in general?

Close2. Thank you. Those are all the questions I have today.

[THANK AND TERMINATE]

APPENDIX C: PARTICIPANT SURVEY RESULTS

To support the process and impact evaluation of the 2018 Xcel Energy efficiency programs, the EMI Consulting evaluation team conducted telephone interview with participants of the CO Lighting Efficiency program. The evaluation team defined a participating customer as any customer that initiated a project in Q32018-Q12019, limiting the sample to only those who have participated since mid-2019 to minimize recall bias. The interview objectives were to collect participant feedback related to early replacement, free-ridership, and spillover.

The following sections contain our summary of the key takeaways, a look into participants' general operations and participation, an overview of the free-ridership analysis, early replacement analysis, and spillover analysis, including "like" and "not-like" spillover.

KEY TAKEAWAYS

Below are key takeaways from participant experiences with the CO Lighting Efficiency program. These key takeaways provide a summary of the program context and feedback received during the phone interviews.

- The three most important factors participants cited as influencing measure installation are 1) minimizing operating cost, 2) return on investment, and 3) age or condition of old equipment.
- About half of the participants (51%) reported that they would have installed the exact same type, model, and efficiency of the measure installed through the program in absence of the program.
- About 36% of participants indicated that they would have installed the same measures in absence of the program within 12 months of the original installation.
- On average, of participants who stated that absent the program, they would have reduced the quantity of their installation, participants would have reduced their quantities by 40%.
- Over half (55%) of participants reported that their original equipment that was replaced was fully functional and all lights were operating.
- When asked whether participants' companies had installed any efficient lighting products without a rebate since their original participation in the program, 23% indicated that they had, and 73% indicated that they had not.
- When asked whether participants would have installed any additional energy efficient equipment other than lighting since their participation in the Lighting Efficiency Program, 41% responded that they had, 56% responded that they had not.

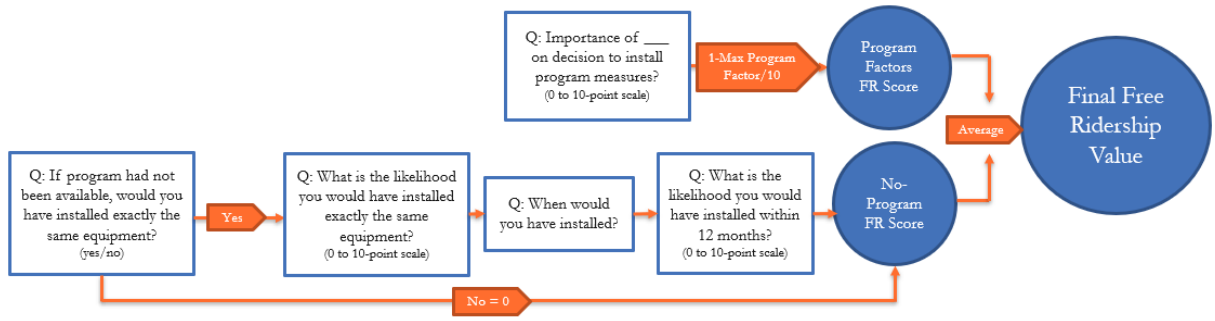
GENERAL OPERATIONS AND PARTICIPATION

The majority (77%) of participants sampled used an outside contractor to install the lighting equipment that was rebated as part of the Xcel Energy Lighting Efficiency Program, and 23% installed the equipment with in-house staff. Additionally, 67% of participants had previously participated in this or any other Xcel Energy efficiency program for this business. Only 28% indicated that they had not previously participated in an Xcel efficiency program, and 5% were unsure.

FREE-RIDERSHIP

Figure 3 below illustrates the evaluation team's approach to evaluating free-ridership, and the paragraphs to follow summarize the findings used to conduct the free-ridership analysis.

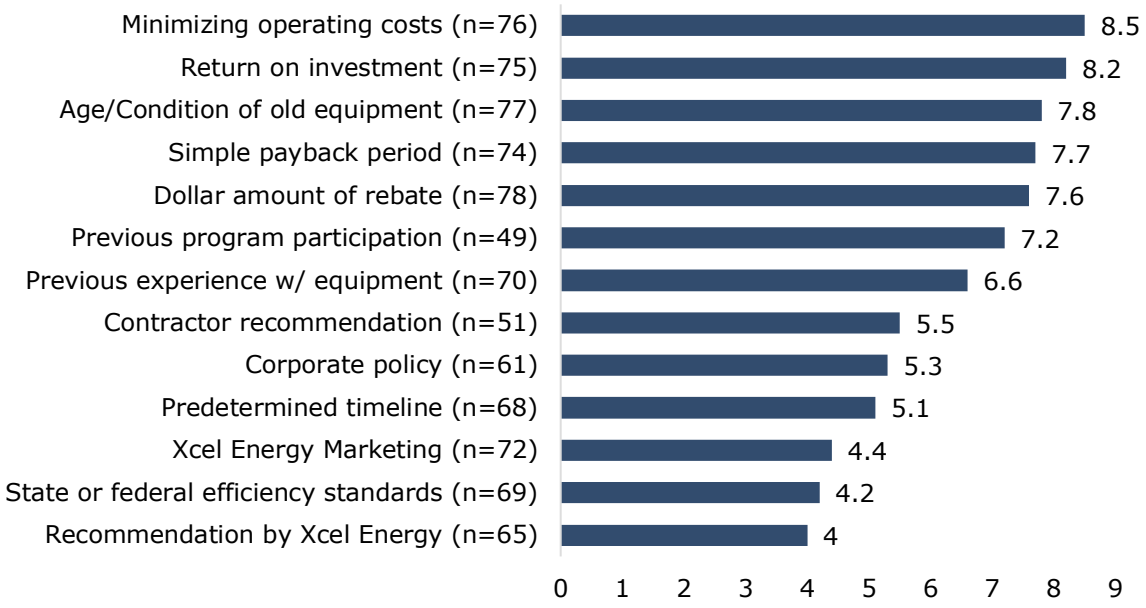
Figure 3. Flowchart Showing the Calculation of the NTG Score



The three most important program factors that influenced a participant's decision to install a measure were 1) the return on investment, 2) the simple payback period, and 3) the dollar amount of the rebate. Note that the return on investment and payback period were only considered a program factor if the respondent reported that the program either increased the return on investment or shorted the payback period.

The three most important non-program factors that influenced a participant's decision to install a measure were 1) minimizing operating cost, 2) the age or condition of their old equipment, and 3) previous experience with the equipment. The average importance score of all factors which may have influenced a participant's decision to install a measure are displayed below in Figure 4.

Figure 4. Average Importance Scores of Factors Influencing Measure Installation

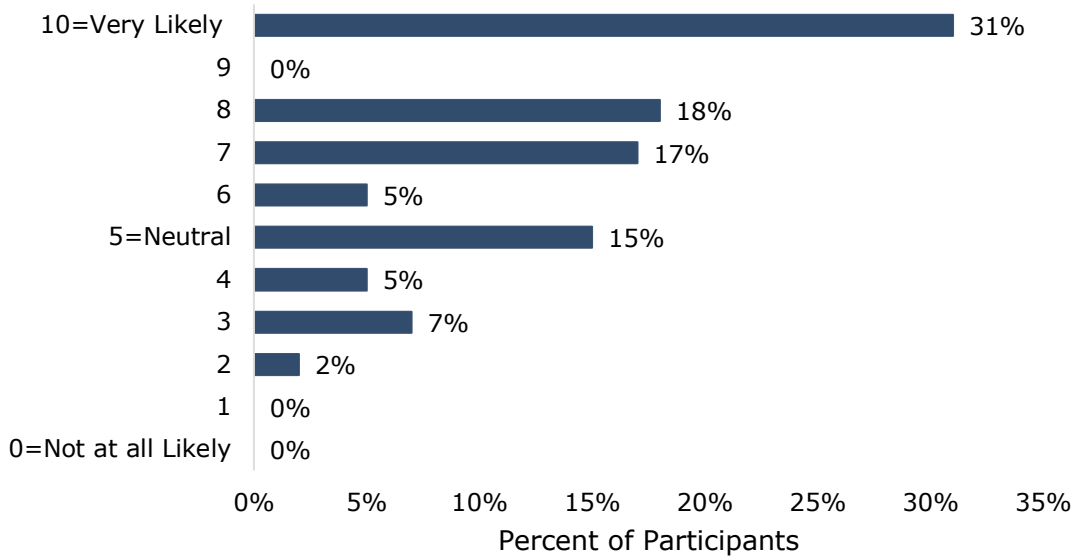


Among participants who reported previously participating in an Xcel Energy program, the average years prior that this participation occurred was 4 years. Among the participants who reported that their companies have corporate polices related to energy efficiency standards, 65% indicated that their corporate policies specifically cover lighting. The evaluation team asked customers if there were any other factors that guided their decisions to install measures, and the following bullets summarize their responses.

- Desires to adopt more sustainable lighting equipment not due to a corporate policy
- Quality and aesthetics of the lighting measures installed
- Increased safety of more efficient lighting measures

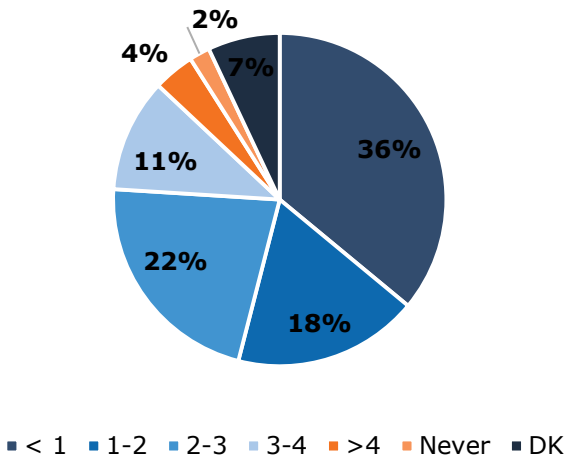
About half of the participants (51%) reported that they would have installed the exact same type, model, and efficiency of the measure installed through the program in absence of the program. A little under a third (28%) said they would not have installed the measures they had under the program if it had not been available, and 21% were unsure. Figure 5 below exhibits participants' likelihood of installing the exact same equipment they installed under the program if the program had not been available.

Figure 5. Participants' Likelihood of Installing the Exact Same Equipment without the Program. (n=55)



About 36% of participants indicated that they would have installed the same measures in absence of the program within 12 months of the original installation. Figure 6 below displays the number of years from the original installation that participants would have installed the same measures absent the program.

Figure 6. Number of Years Participants Would Have Waited to Install the Exact Same Equipment. (n=55)



Further, without the program, about half (49%) of participants indicated they would have installed the exact same quantity of measures they installed under the program. About 18% of participants indicated that they would have installed fewer measures without the program, 26% stated they would not have installed the

equipment at all, and 6% were not sure. Of those who stated that absent the program, they would have reduced the quantity of their project installations, participants estimated an average 40% percent reduction.

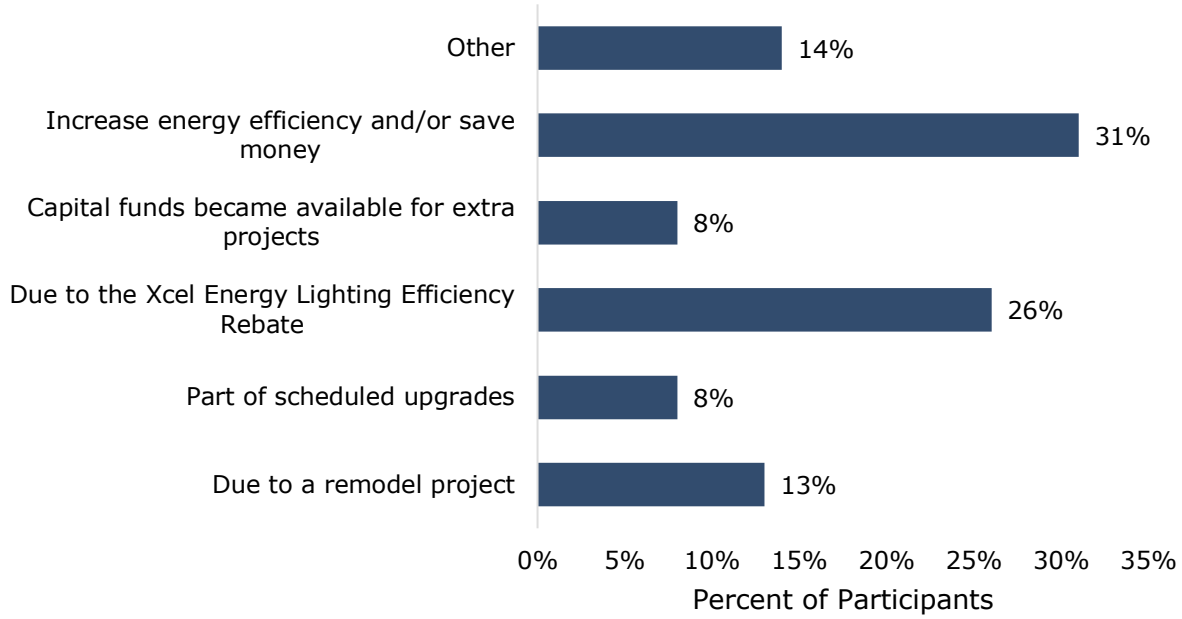
The evaluation team asked participants to describe the influence that the Xcel Energy Lighting Efficiency Program had on their decision to purchase/install measures at their locations. Select responses are included below.

- "It allowed me to get a better quality product. Without the rebate, I would have installed a lower quality, cheaper option."
- "It didn't have much influence. It was more like a bonus. Would have upgraded and installed the same lighting fixtures anyway."
- "The rebate was a major factor in the decision to do the installation."
- "The lights would have had to be replaced and because of the rebate I decided to go with LED. Or else I might have gone with T8 Fluorescent."
- "The program was instrumental, with the payback it made it possible. We could not have done it without the payback."

EARLY REPLACEMENT

Over half (55%) of participants reported that their original equipment that was replaced was fully functional and all lights were operating. About 10% indicated that their original equipment was fully functional, but that lights were burned out, 18% indicated that their original equipment was functional but needed repairs, and 13% indicated that only some of their original equipment was functional. Figure 7 below displays the primary reasons participants with fully functional lighting equipment decided to upgrade to more efficient measures.

Figure 7. Factors Influencing Installations for Participants with Fully Functional Original Equipment. (n=91)



Other factors participants listed as factors influencing their decision to upgrade their already fully functional lighting equipment include:

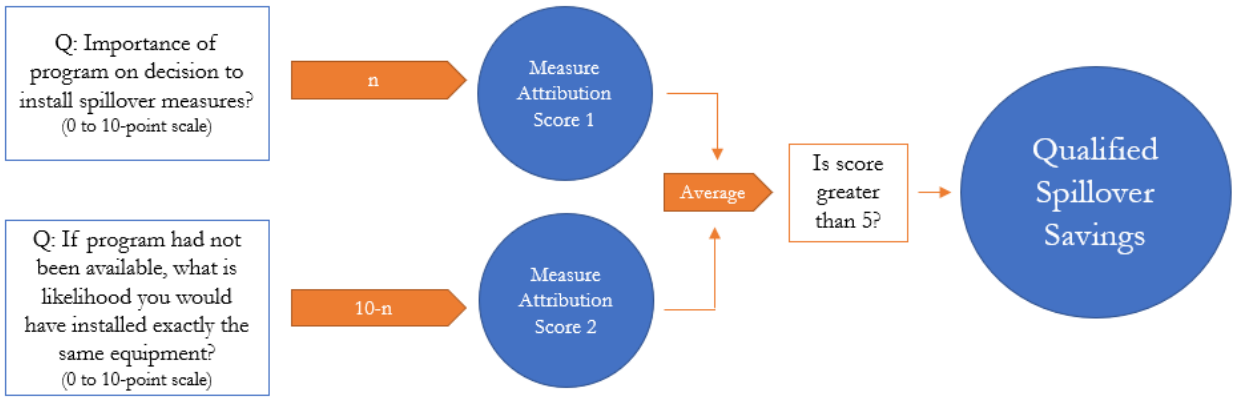
- Aesthetics
- Wished to upgrade to high quality lights
- Safety concerns

Three-fourths (76%) of participants agreed that the Xcel Energy rebate influenced the attractiveness of their installation projects compared to other projects that could have been completed with the available funds.

SPILLOVER

Figure 8 shows the approach used for evaluation spillover and the following paragraphs summarize the findings that were used to evaluate spillover. Note that spillover is broken down into sections: "like" spillover, meaning lighting spillover the program caused, and "not-like" spillover, meaning other efficiency installation spillover that the program caused.

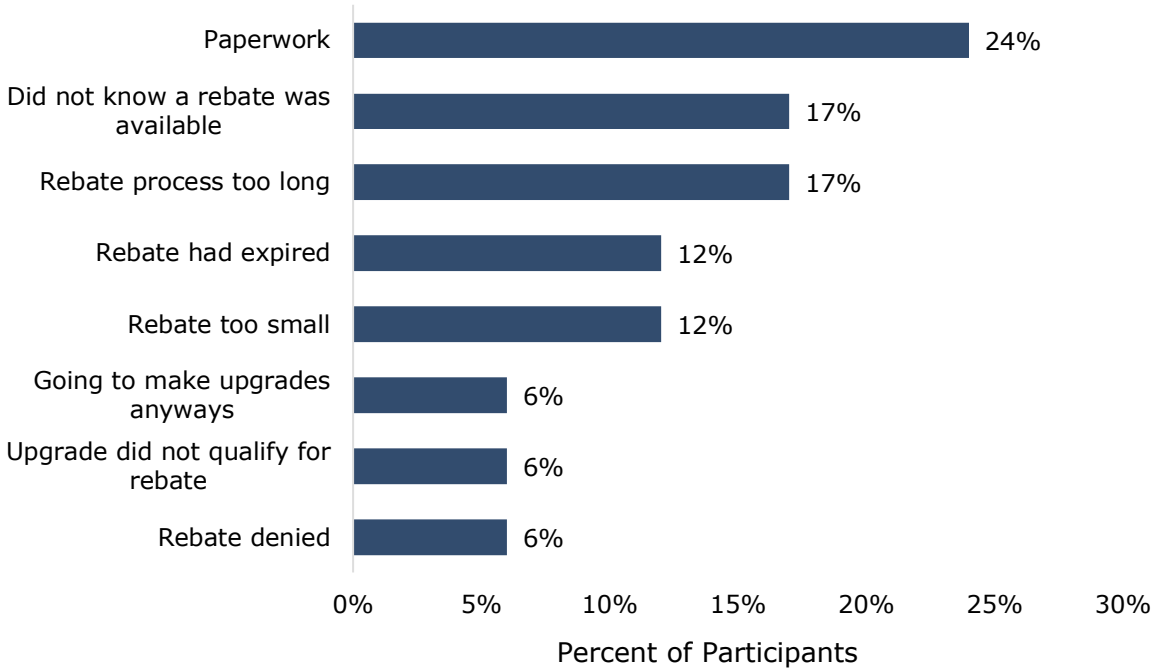
Figure 8. Flowchart Showing the Calculation of Spillover



"LIKE" SPILLOVER:

When asked whether participants' companies had installed any efficient lighting products without a rebate since their original participation in the program, 23% indicated that they had, and 73% indicated that they had not, and that all efficient lighting products installed had been rebated. Open-ended responses to "Why did you not apply for an Xcel Energy rebate for purchasing these efficient lighting products" are summarized in Figure 9.

Figure 9. Reasons Participants Cited for Not Applying for a Rebate. (n=17)



Among participants who installed additional efficient lighting products using in-house staff, 39% stated that their experience with the efficient lighting products installed through the Xcel Lighting Efficiency Program influenced those additional installation. Those who installed additional efficient lighting products on their own reported installing the following types of lighting equipment, and the average number of these additional fixtures that participants installed was 52:

- Linear LEDs
- Troffers
- Screw-in LEDs
- CAN retrofits

The average level of importance participants stated their experience in the Lighting Efficiency Program was in their decision to install these additional products on their own was an 8, on a scale of 0 (not at all important) to 10 (very important). The average likelihood that participants would have installed these additional efficient lighting products if they had not participated in the Lighting Efficiency Program was 6, on a scale of 0 (would not have installed) to 10 (definitely would have installed).

"NOT-LIKE" SPILLOVER:

When asked whether participants would have installed any additional energy efficient equipment other than lighting since their participation in the Lighting Efficiency Program, 41% responded that they had, 56% responded that they had not, and 2% were unsure. Additionally, 60% of participants stated that their experience with the Xcel Energy rebate influenced their decision to install some or all of these additional efficient products that were installed. Those who installed additional efficient non-lighting equipment installed the following types of equipment:

- Solar panels
- Boilers
- HVAC equipment
- VFDs
- Building controls systems

A little less than half (47%) of participants who installed non-lighting additional efficient equipment stated they received rebates for these products from Xcel or any other energy efficiency company. 37% did receive a rebate, and 16% were not sure. When asked how important their experience in the Lighting Efficiency Program was in their decision to install non-lighting additional efficient equipment, participants reported an average of 4 on a scale from 0 (not at all important) to 10 (extremely important). When asked how likely it is that participants' organizations would still have installed the non-lighting efficient equipment if they had not participated in the Lighting Efficiency Program, participants responded an average of 7, on a scale of 0 (would not have installed) to 10 (definitely would have installed).

APPENDIX D: TRADE PARTNER INTERVIEW RESULTS

KEY TAKEAWAYS

- The lighting type that trade partners most commonly reported their businesses stocking and selling is LED troffers (96%) and the least common lighting type that trade partners reported stocking and selling is T-8 to T-5 retrofit kits (16%).
- Almost all respondents (92%) reported that Xcel Energy rebates come up in sales discussion with their customers.
- When asked on a scale of 0-10 where 0 is not at all influential and 10 is extremely influential, how influential the Lighting Efficiency Program rebates are when customers are choosing their lighting fixtures and retrofit kits, respondents reported an average influence of 7.0.
- Each trade partner who was interviewed that sells LED direct linear ambient fixtures was aware of the incentive change for these fixtures which was implemented in July of 2019, and over half (52%) reported that the incentive change has impacted their sales of these fixtures.
- Over half of respondents (57%) indicated that they had sold LED fixtures or retrofit kits over the last year that did not receive an Xcel Energy rebate, and 30% of these respondents indicated this was the reason because of the paperwork and the length of the process involved in obtaining a rebate.
- Though respondents largely stated that the program is important in their decision to recommend LEDs (average of 7.06 out of 10), many respondents also stated they would recommend the same products without the program.
- The majority of respondents (69%) claim that the Lighting Efficiency Program does not influence LED fixture and retrofit kit sales out of the Xcel service territory.
- Respondents reported a wide range of LED fixture and retrofit kit unit sales in Colorado over the last year. On average, respondents reported that 91% of their sales were LEDs.
- Assuming continued Xcel Energy incentives and program support, 59% of respondents expect their LED fixture and retrofit sales to be higher in 2020.
- Considering the scenario where Xcel had never offered and will not offer the Lighting Efficiency Program in 2020, 33% of respondents said they would expect their 2020 sales to be lower and 67% expect their 2020 sales would be the same.
- When asked about which factors have been the most important in contributing to the growth of energy efficient lighting in Colorado, respondents rated "reductions in cost due to Xcel Energy rebates" as the most important factor (average 7.96 on a 0-10 importance scale).
- Had Xcel never offered efficient lighting incentives, 81.6% of respondents said they thought market adoption of LED lighting would have been slower, and 84% of respondents additionally stated that they thought the market volume of LED fixtures and retrofit kits in Colorado would be considerably smaller than it is now.

- Respondents primarily see lighting controls, LEDs, and OLEDs as new or emerging energy efficiency opportunities for Lighting Efficiency program customers (Figure 19). Many respondents, however, do not see any emerging energy efficiency opportunities for lighting (12.9%) or do not know (14.8%).

APPROACH

The EMI Consulting evaluation team conducted in-depth interviews with 54 Xcel Energy trade partners to learn about their experiences with both Xcel's Commercial Lighting Efficiency Program as well as the larger commercial lighting market. The objective of the trade partner interviews was to gain trade partner perspectives on:

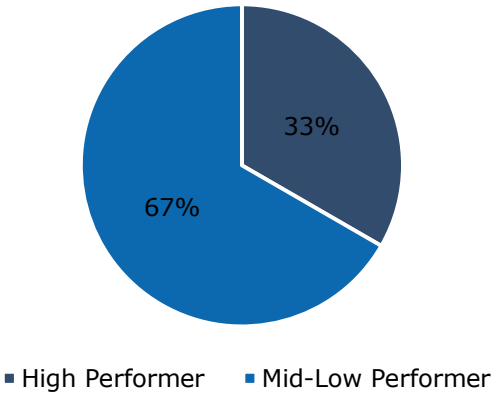
- **Trade partner lighting sales**, including what percent of trade partners' sales are LED;
- **Sales practices**, including how the Lighting Efficiency Program influences customers' buying decisions and the role of rebates in making efficient lighting sales;
- **Qualifying LED sales that were not rebated**, including why these sales were not rebated and whether the program had any influence on these sales;
- **LED sales**, both for this past year and projected into 2020. Trade partners were asked to estimate sales under two scenarios: 1) assuming Xcel Energy continues to offer rebates on LEDs and 2) assuming Xcel Energy does not continue to offer rebates on LEDs;
- **The Colorado LED market**, including which sectors are slowest to adopt efficient lighting.

In the following sections, we provide a description of our Trade Partner sample, followed by a summary of interview findings.

DESCRIPTIONS OF INTERVIEWED TRADE PARTNERS

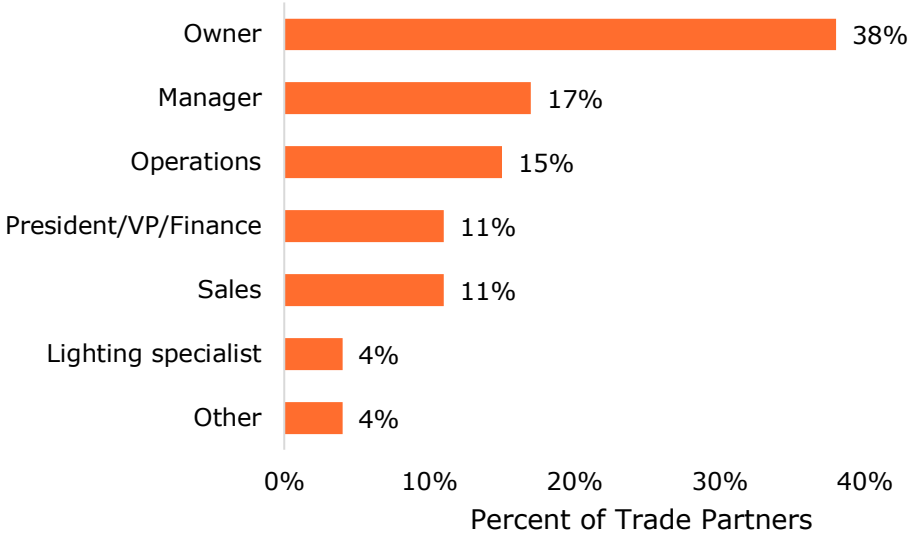
We interviewed 54 of Xcel Energy's registered trade partners, including 18 (33%) "high performers" and 36 (67%) "mid-low performers." The 54 trade partner interviews completed include 13 interviews with distributors/manufacturers. The breakdown of interview respondents by program performance is shown in Figure 10. The evaluation team defines high performers as trade partners that return more than 1% of total product rebate dollars, whereas mid-low performers return less than 1% of rebate dollars.

Figure 10. Breakdown of Interview Respondents by Program Performance (n=54)



The majority of respondents (66%) were in senior positions as either owners, presidents, or managers at their companies (Figure 11). Numerous respondents who work in operations said they work almost exclusively with rebates. In a minority of cases, respondents' primary responsibility was installation; some of these technicians were not able to comment on every topic we asked about. For each topic discussed, the number of respondents is noted.

Figure 11. Role of Interviewed Trade Partners (n=53)

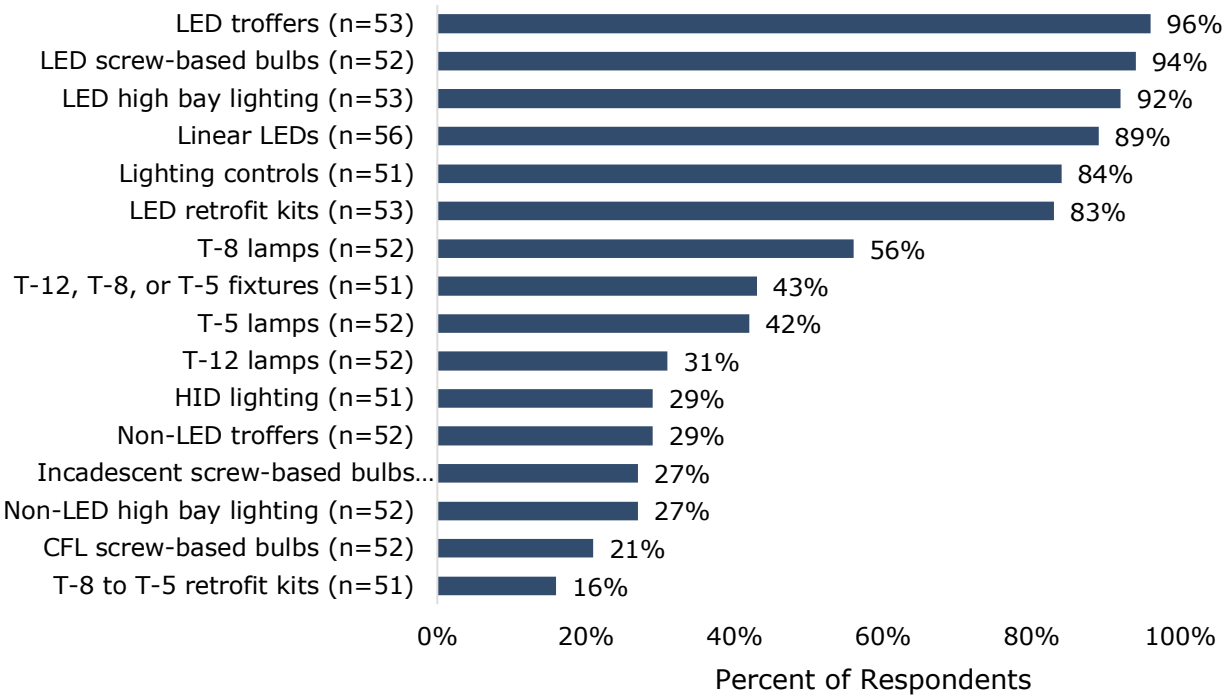


Over half (60%) of respondents agreed that their companies' participation in the Lighting Efficiency program has influenced changes in the services they deliver, products they provide, or the customers they serve, and 40% said that their participation has influenced no changes.

Nearly all respondents sell and install LED lighting products, with several respondents indicating that their companies sell and install exclusively LED lighting

products. Figure 12 below outlines the percent of respondents who indicated that they sell or install the lighting products listed along the y-axis. Many of the respondents who indicated selling traditional lighting products (T-5, T-12, HID, etc.) said they sell these lighting types very infrequently and only upon request.

Figure 12. Percent of Respondents Who Sell Various Lighting Products



Trade partners were also asked to quantify each lighting type' spercent of their overall sales. Table 12 below outlines the average percentages respondents reported for each lighting type; note that these percentages were only calculated for trade partners who reported to selling each types of lighting. Five of the top six lighting types which comprise trade partners' highest percent sales are LEDs, and incandescent/halogen bulbs represent the lowest average percent of trade partners' sales.

Table 12. Average Percent of Total Lighting Sales by Lighting Type

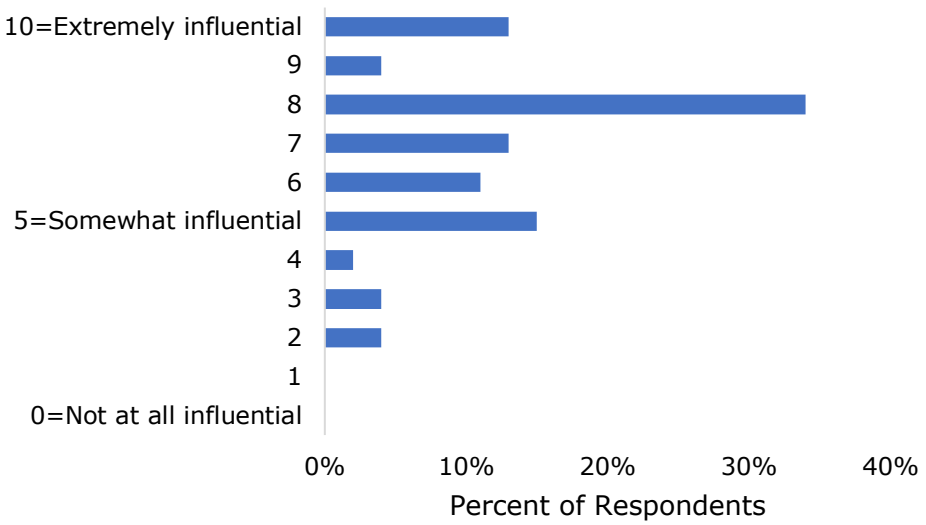
Lighting Type	Average Percent of Lighting Sales
LED Troffers (n=41)	72%
LED Screw-Based (n=36)	36%
T-5 Lamps (n=18)	30%
Linear LEDs (n=37)	26%
LED High Bay Lighting (n=37)	23%
LED Retrofit Kits (n=35)	19%
Lighting Controls (n=26)	15%
HID Lighting (n=11)	9%
T-8 Lamps (n=24)	7%
CFL Screw-Based Bulbs (n=7)	7%
Non-LED High Bay Lighting (n=7)	6%
T-12, T-5, or T-8 Lamps (n=18)	5%
Non-LED Troffers (n=9)	4%
T-8 to T-5 Retrofit Kits (n=2)	3%
T-12 Lamps (n=11)	2%
Incandescent/Halogen (n=8)	2%

TRADE PARTNER MARKETING, FREERIDERSHIP, AND SPILLOVER

Nearly all (92%, n=51) respondents said that Xcel Energy rebates and incentives come up in sales discussions with customers. Of those who said that rebates and incentives come up in sales discussions with customers, the majority indicated that the rebates are brought up in conversation right away, either because their electricians and contractors lead conversations with them, or because the rebates are customers' primary motivation for installing qualifying light products. Some respondents indicated that the rebates only come up in the proposal and bidding part of their conversations with customers.

When asked on a scale of 0-10 where 0 is not at all influential and 10 is extremely influential, how influential the Lighting Efficiency Program rebates are when customers are choosing their lighting fixtures and retrofit kits, respondents reported an average influence of 7.0 (Figure 13).

Figure 13. Influence of Lighting Efficiency Program Rebates on Customer Choices (n=34)



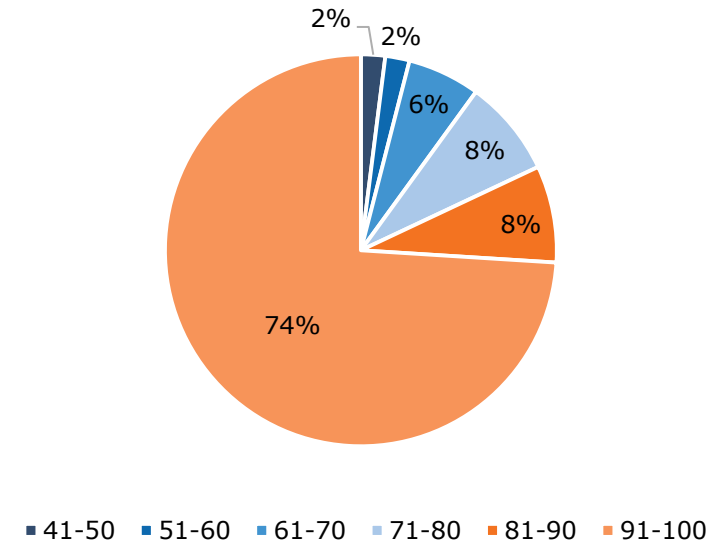
Trade partners that sell LED direct linear ambient fixtures were asked whether they were aware of the incentive change for these fixtures which was implemented in July of 2019. Each of these respondents (100%, n=11) indicated that they were aware of this incentive change. Over half (56%) indicated that this change in incentive levels has impacted their sales of these fixtures, mostly because customers are no longer installing these products due to the incentive change. Those who quantified the percent their sales of LED direct linear ambient fixtures have decreased since the incentive change reported an average decrease of 32% (n=3).

We then asked trade partners what other aspects of the program they discuss with their customers. Respondents most commonly stated they discuss almost exclusively the cost savings associated with participating in the program, but other aspects of the program that respondents reported discussing with their customers include energy savings from upgrading to efficient lighting and the low-maintenance associated with efficient lighting. Trade partners then indicated the following as what ultimately motivates their customers to participate in the program:

- Energy savings/return on investment
- Rebate (cost savings)
- Desire to "go green"
- Fear of rebates being discontinued

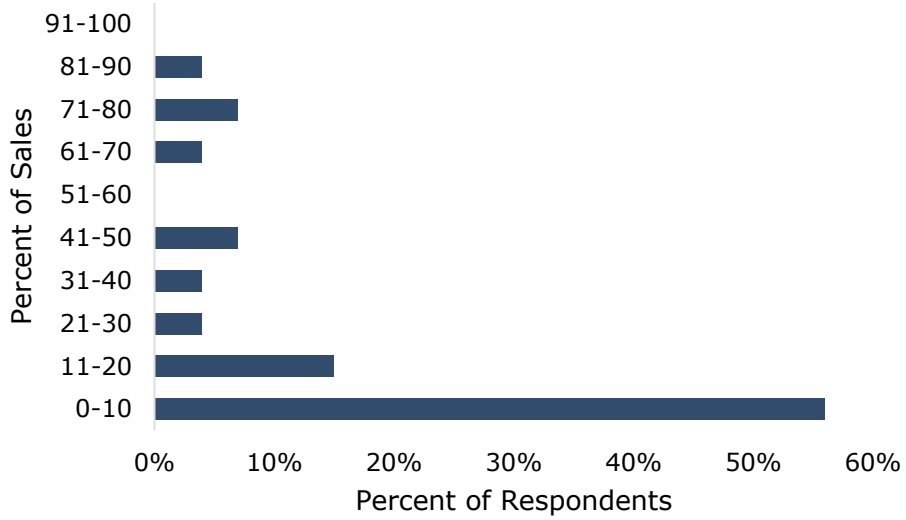
As an extension to the results presented in Figure 12, 74% of respondents indicated that their companies' lighting sales are 91-100% LED, and the average for all respondents was 92.6%. Zero respondents reported their companies' LED lighting sales being below 40%, so percentages below 40% are not reported in Figure 14 below.

Figure 14. Trade Partners' LED Sales as a Percent of Total Sales (n=50)



Over half (57%, n=51) of respondents said that they have sold LED fixtures or retrofit kits over the last year that were not submitted for an Xcel Energy rebate. Roughly a third (37%) of respondents said that all LED fixtures and retrofit kits sold over the last year were submitted for an Xcel Energy rebate, and 6% were unsure. Of the 57% who reported selling an LED fixture or retrofit kit that did not receive a rebate, the average percent of Xcel Energy LED fixtures and retrofit kits that respondents reported did not receive rebates was 23% (Figure 15).

Figure 15. Percent of Trade Partners' LED Fixture and Retrofit Kit Sales that were not Rebated (n=27)



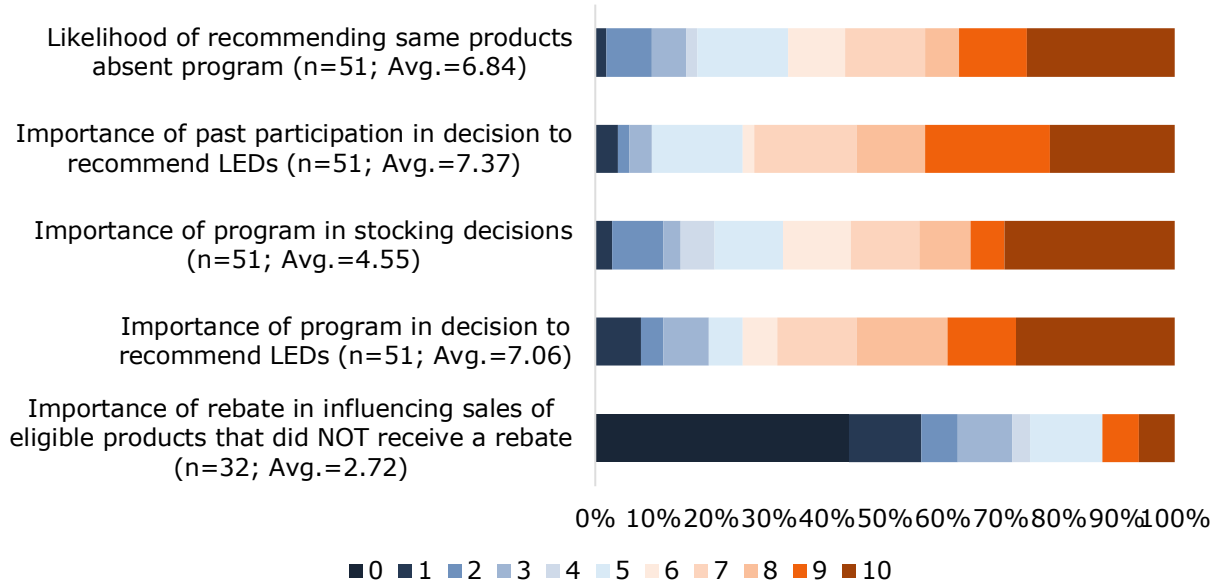
The most common reason respondents stated that they or their customer did not apply for a rebate was due to paperwork and the length of the process (30%, n=27). Other reasons respondents listed for not applying for a rebate include: the

product did not qualify (26%), a logistical issue (15%), the project was too small (18%), the customer did not want to bother obtaining a rebate (7%), and that they and their customers did not know that a rebate was available at the time of the sale (4%). Over half of these respondents additionally stated that the Xcel Energy Lighting Efficiency Program did not influence the sales or installation of these LED fixtures and retrofit kits that did not receive rebates. On a scale of 0-10 where 0 is not at all important and 10 is extremely important, these respondents rated the Lighting Efficiency Program having an average of 2.6 importance in influencing the sales of these products that were not rebated.

Respondents were then asked, on a 0-10 scale, the importance the Xcel Energy Lighting Efficiency Program has had on their decision to recommend LED lighting fixtures and retrofit kits to their customers, the lighting products they stock as a whole, their sales of eligible products that did not receive a rebate, and how important their past participation in the program has been on their decision to recommend LEDs. Respondents were also asked how likely they would be to recommend the same efficient lighting products to their customers absent Xcel Energy's rebate program.

Though respondents largely stated that the program is important in their decision to recommend LEDs (average of 7.06), many respondents also stated they would recommend the same products without the program, as can be seen in Figure 16 (average 6.85 on a 0-10 likelihood scale). Participants justified this apparent discrepancy by reiterating that their company only sells and installs LED fixtures or that they would still recommend LED fixtures because they are superior to older lighting products.

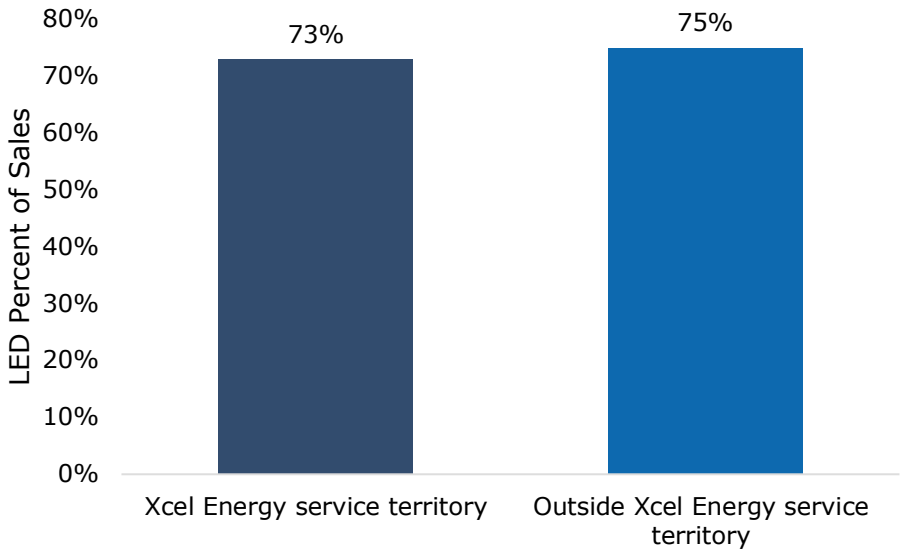
Figure 16. Importance of Lighting Efficiency Program on Business Decisions



Asking respondents further about how influential the Lighting Efficiency rebates are on their LED fixture and retrofit kit sales, respondents reported that 40%, on average, of recommendations they make that do not qualify for a rebate still result in sales. Conversely, respondents reported that 67%, on average, of recommendations they make that do qualify for rebates result in sales.

Over three quarters (82%, n=50) of respondents stated that their company sells lighting products outside of the Xcel Energy Colorado service territory. Of the trade partners who sell lighting products outside of the Xcel service territory, 78% said that the proportion of LED and non-LED lighting fixtures and retrofit kits that they sell and install in Xcel's service territory is no different than outside of it. Respondents were asked the percent of their lighting fixture and retrofit kits that are LEDs within Xcel's territory and outside of it, and the average percentages reported were nearly identical (Figure 17).

Figure 17. Trade Partners' Percent of Sales which are LED in Xcel's Territory and Outside of Xcel's Territory (n=7)



The majority of (69%, n=39) respondents additionally claim that Xcel Energy's Lighting Efficiency Program does not influence the LED fixture and retrofit kit sales outside of the Xcel territory. Roughly a quarter (23%) of respondents said that the program does influence LED sales outside of the Xcel territory, and 8% did not know.

TRADE PARTNER SALES

Respondents reported a wide range of LED fixture and retrofit kit unit sales in Colorado over the last year (see Table 13). On average, respondents reported that 91% of their sales were LEDs. Assuming continued Xcel Energy incentives and program support, 59% of respondents expect their LED fixture and retrofit sales to be higher in 2020, 12% expect them to be lower and 29% expect them to be the same as in 2019. Table 13 displays respondents' projected unit sales in 2020 under this scenario.

Table 13. Trade Partners' 2019 LED Sales and Projected 2020 Sales with Program

	2019	Projected 2020 sales with Program
Low	100	250
25th Percentile	1,200	1,500
Mean	25,692	32,302
75th Percentile	30,000	38,833
High	200,000	280,000

The reasons respondents expect their 2020 unit sales to be higher include:

- Natural market growth of LED lighting
- New construction
- Grow lights

The reasons respondents expect their 2020 unit sales to be lower include:

- Lower Xcel Energy incentives
- Slow sales in 2019
- Customer base already operating on LED lighting

Respondents were then asked to assume that Xcel had never offered and will not offer the Lighting Efficiency program in 2020. Under this scenario, 33% of respondents said they would expect their 2020 sales to be lower, 67% said they expect their 2020 sales would be the same, and 0% said they would expect their 2020 sales to increase. Table 14 displays respondents' projected unit sales in 2020 without the Lighting Efficiency Program.

Table 14. Trade Partners' Projected 2020 Sales without Program

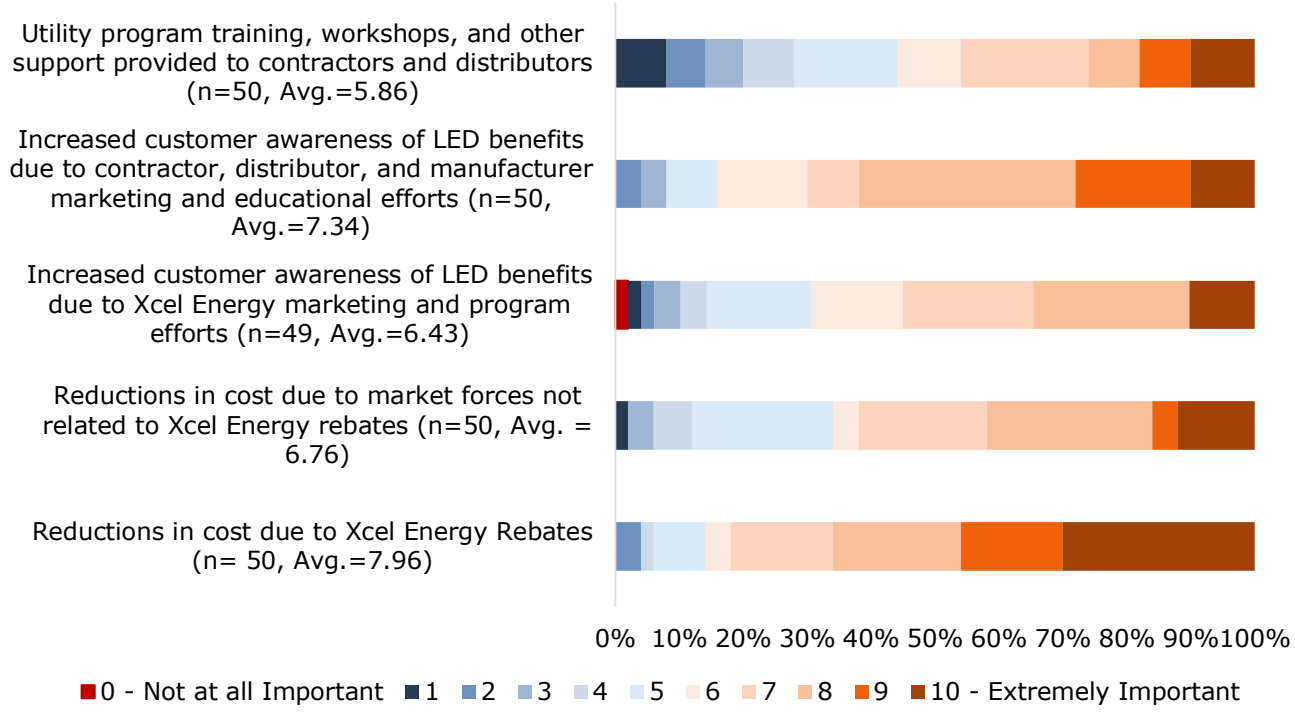
	Projected 2020 sales without Program
Low	60
25th Percentile	618
Mean	18,332
75th Percentile	22,500
High	150,000

The primary reason respondents stated their 2020 unit sales would be lower without the program is because rebates incentivize customers to install LED lighting who otherwise would not.

PROGRAM INFLUENCE ON LED MARKET

When asked about which factors have been the most important in contributing to the growth of energy efficient lighting in Colorado, respondents rated "reductions in cost due to Xcel Energy rebates" as the most important factor (average 7.96 on a 0-10 importance scale). Figure 18 displays the results from each of the factors respondents rated.

Figure 18. Trade Partners' Ratings of which Factors have been most Important in Driving Growth of Energy Efficient Lighting in Colorado

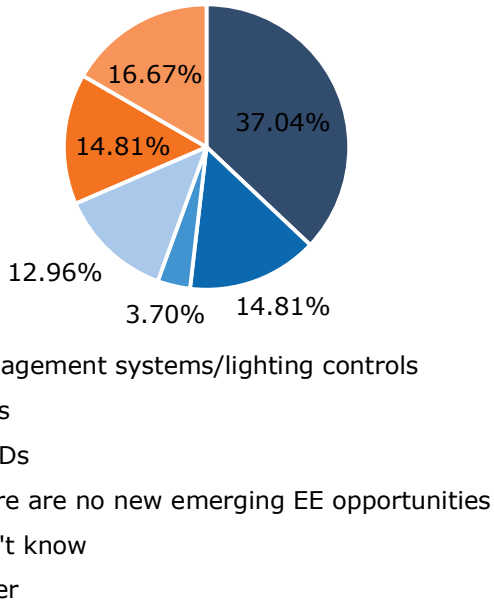


Respondents were then asked how they thought the Colorado market share of LED fixtures would differ today had Xcel Energy and other utilities never offered lighting rebates. Most respondents (81.6%) said they thought adoption of LED lighting would have been slower, 10.2% said they did not think market adoption would have been any different, and 8.2% were unsure. When asked how they thought the size of the size of the LED fixture and retrofit kit market would differ had utilities never offered lighting rebates, the overwhelming majority of respondents expressed belief that the LED fixture and retrofit market in Colorado would be considerably smaller than it is now (84%, n=49). Only 7% of respondents did not think the market would be any different, and 4% were unsure.

EVOLVING MARKETPLACE

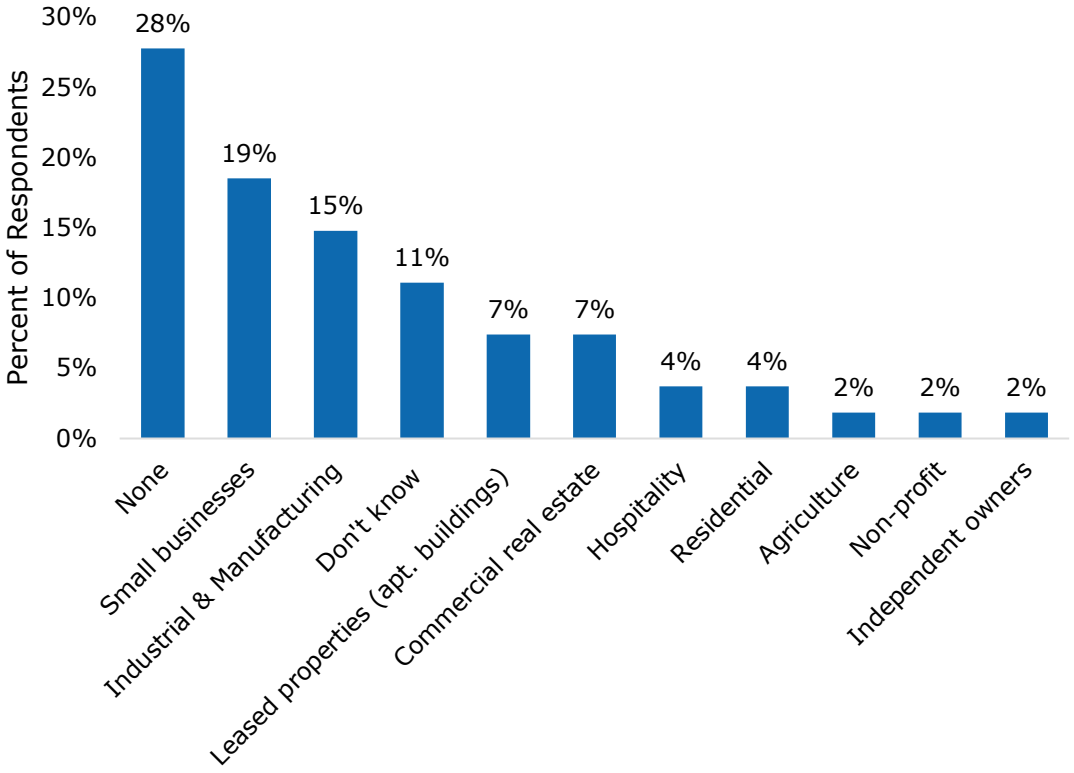
Respondents primarily see lighting controls, LEDs, and OLEDs as new or emerging energy efficiency opportunities for Lighting Efficiency program customers (Figure 19). Many respondents, however, do not see any emerging energy efficiency opportunities for lighting (12.9%) or do not know (14.8%).

Figure 19. New or emerging energy efficiency opportunities for lighting efficiency program customers



Additionally, many respondents do not see any sectors or business types that are slower to adopt LED technologies (28%), and most of these respondents cited this as this case because their customers are all already adopting LED technologies. As shown in Figure 20, respondents who do see sectors or business types that are slower to adopt LED technologies most commonly reported small businesses (19%), industrial/manufacturing (15%), leased properties (7%), and commercial real estate (7%).

Figure 20. Sectors and business types slowest to adopt led technologies



APPENDIX E: NON-PARTICIPATING TRADE PARTNER INTERVIEW RESULTS

KEY TAKEAWAYS

- Non-participating trade partners reported an average 90% of their sales consisting of LED lighting
- Each of the four non-participating trade partners were aware of the Lighting Efficiency Program and claimed that the program's rebates and incentives come up in sales discussions with customers.
- The program is somewhat important in guiding non-participating trade partners' business decisions:
    - Respondents rated the program's average importance in their decision to recommend LED fixture and retrofit kits to their customers a 7.2.
    - Respondents rated the program's average importance in deciding which lighting products they stock as a whole a 5.0.
- Non-participating trade partners would have been somewhat unlikely to recommend LED lighting fixtures and retrofit kits to their customers if the program had never bene available: on a scale of 0-10, respondents reported an average likelihood of 3.5.
- Assuming continued Xcel Energy incentives and program support, non-participating trade partners anticipate their 2020 sales of LED fixtures and retrofit kits to be the same as they were in 2019. Under the scenario where Xcel Energy had never offered, and will not offer, the program in 2020, all non-participating trade partners anticipate their 2020 sales of LED fixtures and retrofit kits to drop.
- Non-participating trade partners rated "increased customer awareness of LED benefits due to contractor, distributor, and manufacturer marketing and educational efforts" as the most influential factor that has driven the uptake of efficient lighting.
- Each of the four non-participating respondents anticipate that the market share and the market volume of LED fixtures and retrofit kits would be lower if Xcel Energy and other utilities had never offered lighting rebates.

APPROACH

The EMI Consulting evaluation team administered telephone surveys to non-participating Xcel Energy trade partners to learn about their experiences with both Xcel's Commercial Lighting Efficiency Program as well as the larger commercial lighting market. Similar to participating trade partners, the objectives of the non-participating trade partner interviews was to gain trade partner perspectives on:

- **Trade partner lighting sales**, including what percent of trade partners' sales are LED;

- **Sales practices**, including if the Lighting Efficiency Program influences customers' buying decisions and the role of rebates in making efficient lighting sales;
- **Qualifying LED sales that were not rebated**, including why these sales were not rebated and whether the program had any influence on these sales;
- **LED sales**, both for this past year and projected into 2020. Trade partners were asked to estimate sales under two scenarios: 1) assuming Xcel Energy continues to offer rebates on LEDs and 2) assuming Xcel Energy does not continue to offer rebates on LEDs;
- **The Colorado LED market**, including which sectors are slowest to adopt efficient lighting.

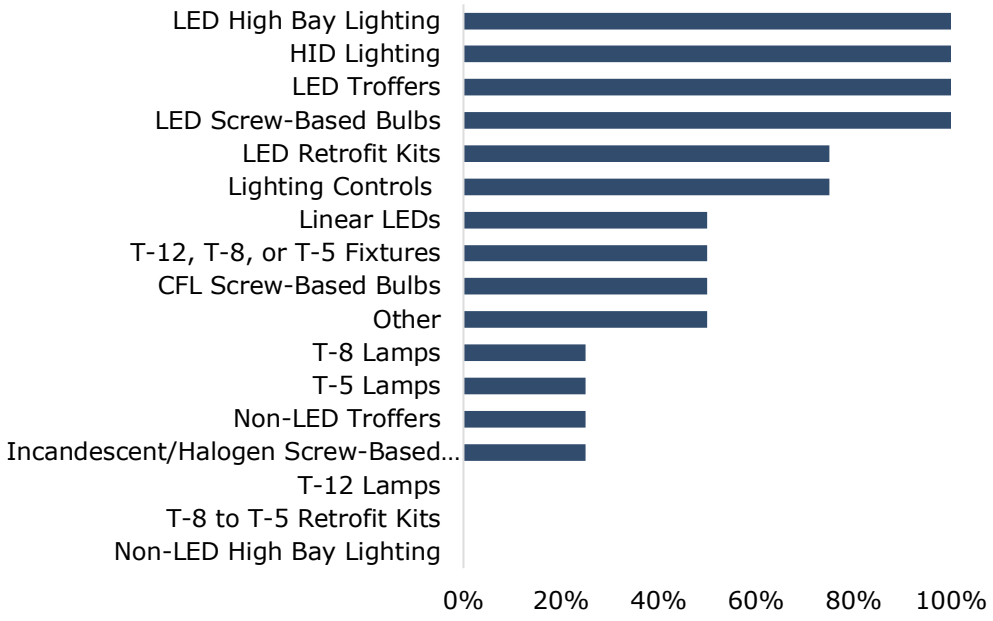
In the following sections, we provide a description of our Trade Partner sample, followed by a summary of interview findings.

DESCRIPTIONS OF INTERVIEWED NON-PARTICIPATING TRADE PARTNERS

The evaluation team received survey responses from 4 of Xcel Energy's registered trade partners who do not participate in the Lighting Efficiency Program. Each of these 4 respondents indicated that they are the owner or president of their company; one of these respondents identified that their company is a distribution company, and the other three respondents classified their companies as electrical contractors.

LED lighting dominates among non-participant trade partners' sales. Each of the 4 respondents indicated that their company sells LED high bay lighting, HID lighting, LED troffers, and LED screw-in lightbulbs, and 0 of the 4 respondents indicated that their company sells T-12 lamps, T-8 to T-5 retrofit kits, or non-LED high bay lighting (Figure 15). Other types of lighting that respondents indicated selling which we did not include on our list of lighting types include induction and wall packs (pole lighting).

Figure 21. Percent of Respondents Who Sell Various Lighting Products (n=4)



Non-participating trade partners were also asked to quantify each lighting types' percent of their overall sales. Table 15 below outlines the average percentages respondents reported for each lighting type. Note that there are very small sample sizes for each of the lighting types listed and the average percent of lighting sales that these trade partners reported may not be reflective of other non-participating trade partners in Colorado.

Table 15. Average Percent of Total Lighting Sales by Lighting Type

Lighting Type	Average Percent of Lighting Sales
T-8 Lamps (n=1)	40%
LED Retrofit Kits (n=3)	29%
HID Lighting (n=4)	28%
LED High Bay Lighting (n=4)	26%
LED Troffers (n=4)	25%
Other (n=1)	25%
Lighting Controls (n=3)	15%
T-5 Lamps (n=1)	10%
LED Screw-Based (n=3)	1.5%
Linear LEDs (n=2)	5%
Non-LED Troffers (n=1)	5%
T-12, T-5, or T-8 Fixtures (n=2)	3%
CFL Screw-Based Bulbs (n=1)	2%

The evaluation team asked non-participating trade partners whether they had been previously aware of Xcel Energy's Lighting Efficiency Program. Each of the four respondents (100%) answered "yes," that they had been previously aware of the program, and each of the respondents also agreed that the program has influenced changes in any or each of the following: the services they deliver, the products they provide, or the customers they serve.

As an extension to the results presented in Figure 21. Percent of Respondents Who Sell Various Lighting Products (n=4), the non-participating trade partners reported an average 90% (n=3) of their sales consisting of LED lighting. Additionally, these trade partners reported an average 82% (n=3) of their retrofit kit sales are for LEDs lighting types.

NON-PARTICIPATING TRADE PARTNER MARKETING, FREERIDERSHIP, & SPILLOVER

Each of the four non-participating trade partners claimed that Xcel Energy rebates and incentives come up in sales discussions with customers. Additionally, each of the respondents reported that the rebates are brought up at the beginning of conversations with customers, and that they are usually brought up by themselves, but sometimes brought up by their customers. When asked on a scale of 0-10 where 0 is not at all influential and 10 is extremely influential, how influential the Lighting Efficiency Program rebates are when customers are choosing their lighting fixtures and retrofit kids, respondents reported an average influence of 9.3 (n=3).

The evaluation team further asked non-participating trade partners what other aspects of the Lighting Efficiency Program they discuss with their customers. The following bullets display their responses:

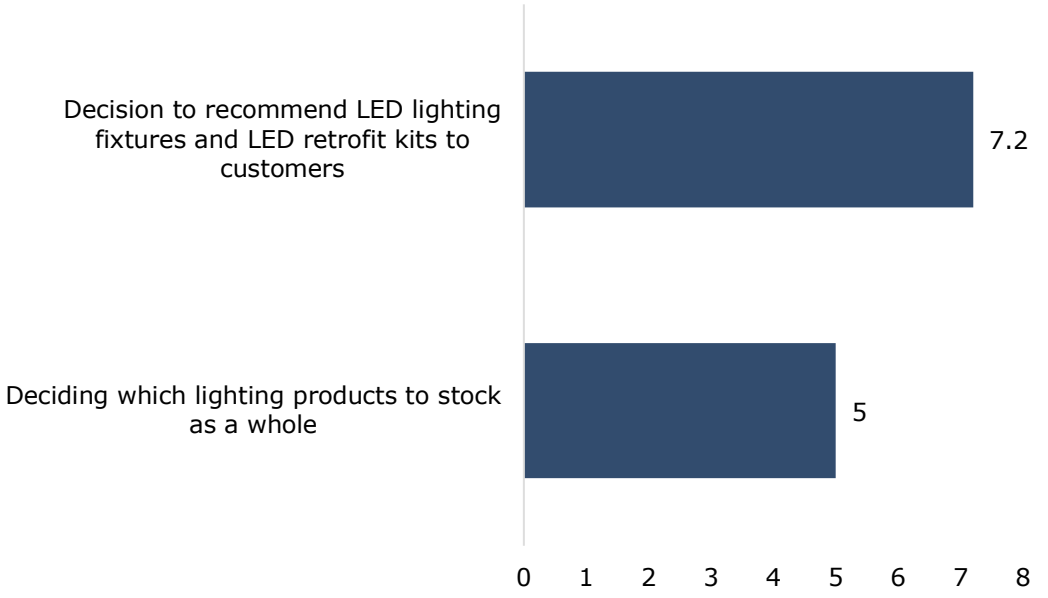
- "No, because they're not involved in all the paperwork, we sell Xcel projects based on the savings and maintenance costs. The rebates just accelerates the ROI on it."
- Obviously we discuss the energy savings, but as far as Xcel goes, they're mainly involved with the rebate."
- "That's it. That's really all the customer cares about, what's the bottom line, what is it going to cost for them to get these fixtures installed. Usually they're not, they don't understand the savings that they get in the long term as far as the usage."

Respondents then provided the following responses after asked what they think motivates customers to participate:

- "The ROI. I guess the rebate, which brings down the ROI"
- "The rebate."

Non-participating trade partners were then asked about their experience with products sold that are eligible for Xcel's Lighting Efficiency Program, including how important the program is in their decision to recommend LED lighting fixtures and LED retrofit kits to their customers and in deciding which lighting products they stock as a whole. Figure 22 below shows the average responses received for these questions.

Figure 22. Importance of Lighting Efficiency Program on Non-Participating Trade Partners' Business Decisions (n=3)



Each of the four non-participating trade partners interviewed had been associated with the Lighting Efficiency program in the past. Given this, trade partners were asked how important their firms' past participation in the program was in influencing their decision to recommend LED equipment. Respondents reported an average importance of 5.7. Trade partners were also asked how likely they would have been to recommend LED lighting fixtures and retrofit kits to their customers if the program had never been available. Trade partners responded an average likelihood of 3.5 out of 10 (n=4).

Three of the four non-participating trade partners surveyed indicated that they sell lighting fixtures and retrofit kits outside of the Xcel Colorado service territory. Of the three trade partners who sell outside of Xcel Colorado's service territory, two reported that the proportion of LED and non-LED lighting fixtures and retrofit kits that they sell does not differ in Xcel Colorado's service territory compared to outside of it; one respondent indicated that there is a difference in sales between the two territories. These three respondents were then asked if the Lighting Efficiency program influences the sales of efficient lighting products outside of Xcel's Colorado territory. The following bullets outline their responses.

- "I do energy projects, that's what we do now, that's all we do, so they're all LED."
- "In other areas, they are not as likely to go with the LEDs b/c they are more expensive and it's hard to get them to change their mind b/c the cost of a T12 or a T8, I mean, and the cost of an LED are so different, at least they can get a little bit of a break on the fixture, b/c a lot of times, it's bottom line."

- "No, probably more of an adverse way. United Power requirements aren't as strict, so type of fixture I was able to supply was a little cheaper. It was the DLC requirement of Xcel, which is a little limiting. Most fixtures are rated that."

NON-PARTICIPATING TRADE PARTNER SALES

Respondents were asked to report their unit sales of LED fixture and retrofit kits over the last 12 months in Colorado. The first column in Table 16 displays their responses, and the second column reports respondents' percent of sales that were LED.

Respondents were then asked to project their 2020 unit sales of LED fixtures and retrofit kits under the scenario that Xcel Energy continues their incentives and program support, as well as what percent of these sales they anticipate will be LED. One respondent indicated they anticipate their 2020 unit sales to be higher than they were in 2019, one respondent indicated they anticipate their 2020 unit sales to be lower, and two respondents indicated that they think their 2020 unit sales will be the same as their 2019 unit sales under this scenario (see Table 16).

Alternatively, respondents were asked to project their 2020 unit sales of LED fixtures and retrofit kits under the scenario that Xcel Energy had never offered, and will not offer, the Lighting Efficiency Program in 2020. Each of the four respondents indicated that they would anticipate their 2020 unit sales of LED fixtures and retrofit kits to be lower under this scenario, though they thought their LED percent of sales would remain the same (see Table 16).

Table 16. Non-Participating Trade Partners' 2019 LED Sales and Percent of Sales and Projected 2020 Sales with and without the Program

		Assuming continued Xcel Energy incentives and program support		**If Xcel Energy had never and will not continue program**	
2019 LED Fixture and Retrofit Kit Sales	2019 LED Percent of Sales	Projected 2020 LED Fixture and Retrofit Kit Sales	Projected 2020 LED Percent of Sales	Projected 2020 LED Fixture and Retrofit Kit Sales	Projected 2020 LED Percent of Sales
400	100%	0	-	0	-
7,000	92.5%	7,525	92.5%	4,900	92.5%
740	95%	750	95%	187.5	95%
100	80%	100	92.5%	75	80%

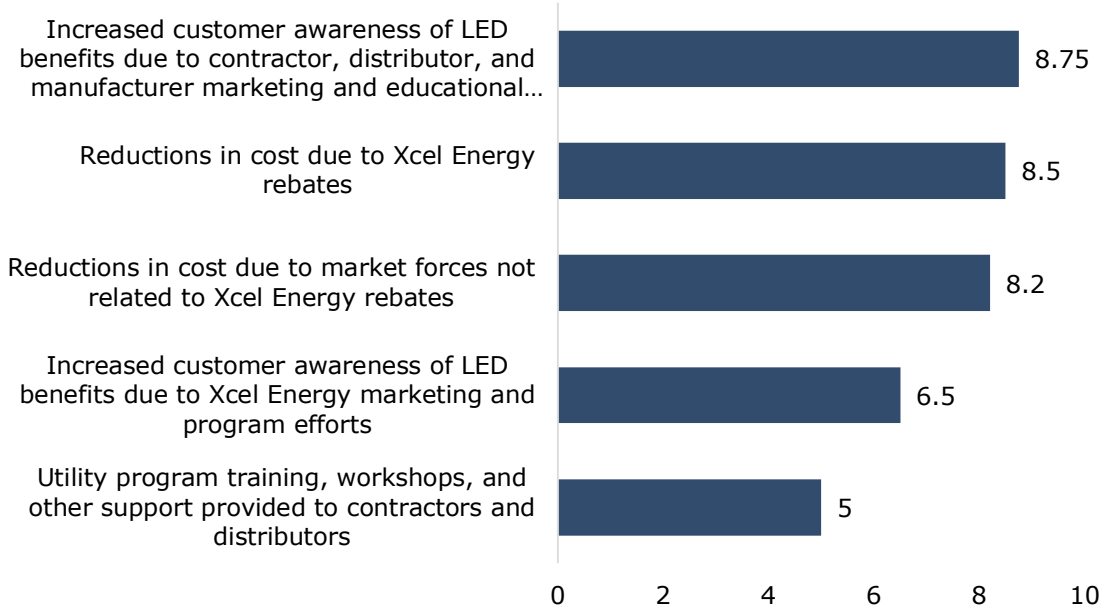
The evaluation team then asked respondents what they thought have been the most important drivers that have resulted in market adoption of LED lighting in

Colorado over the last ten years. Respondents most commonly cited energy savings as the primary driver, and individual responses are reported below.

- "Number one is the efficiency of LEDs, if I went from HID to induction to LED, I'm at 150 lm of efficiency up there, that's the biggest thing."
- "Definitely energy savings, at the top, quality of lighting, and then rebates"
- "Number one would be the availability of them, two would be they've gotten better as they've experimented and come out, and three, they were, you just couldn't get them b/c they were so expensive, cost inhibitive, they have come down a ways so Xcel has helped with rebates, so those factors have led to us putting in more and more."
- "Probably the energy efficiency of it, that's really kind of the only thing I can see that would make it a huge draw. The disadvantages in my opinion are kind of up there."

Similar to participating trade partners, the evaluation team asked how influential, on a scale from 0 to 10, various factors have been in increasing the uptake of efficient lighting. On average, respondents rated "increased customer awareness of LED benefits due to contractor, distributor, and manufacturer marketing and educational efforts" as the most influential factor, and "utility program training, workshops, and other support provided to contractors and distributors" as the least influential factor (Figure 23).

Figure 23. Average Influence of Various Factors in Increasing Uptake of Energy Efficient Lighting (n=4)



Respondents reported the following as what contractor, distributor, and manufacturer efforts they thought have been the most influential:

- "I think the big vendors of LED have been the biggest educators out there, we all know who Cree is, and I not only think it's through the vendors, it's come in through the public, home depots, lowes, hardware stores."
- "re just the ones out there every day trying to sell projects, coming in contact with more end users"
- "Customers really aren't aware of rebates and stuff until you talk to them and tell them, not that many know. I was surprised at how many people don't realize the energy savings until I explain to them one of these light panels, one of their troffer fixtures uses more power than three of those LED flat panels I use. Once you tell them the cost to run the same amount one of your old fixtures compared to three new ones and they still draw less power, then they realize."
- "Probably direct contact with Xcel. I think there was a, it wasn't Xcel themselves, it was an agency, just having somebody to answer questions."

When asked how respondents thought the Colorado market share of LED fixtures and retrofit kits would be different had Xcel Energy and other utilities never offered lighting rebates, each of the four respondents indicated that the market share today would be lower under this scenario because rebates and incentives cause customers to change their lighting. When asked how respondents thought the size of the LED fixture and retrofit kit market (market volume) in Colorado would be different had Xcel and other utilities never offered lighting rebates, again, each of the four respondents indicated they thought the market volume would be lower.

Evolving Market Place

Two of the four non-participating trade partners see lighting controls as new/emerging energy efficiency opportunities within the commercial lighting market, and two are unaware of any new/emerging opportunities. Respondents were also asked if they see any sectors or business types that are slower to adopt LED technologies. One respondent reported coal mines, one respondent reported industrial businesses, and one respondent reported agriculture as industries which are slower to adopt.

Lighting Efficiency Evaluation

2019 Program Evaluation: Recommendations and Responses

The Xcel Energy Lighting Efficiency product in Colorado offers prescriptive and custom rebates to Xcel Energy electric business customers who install qualifying energy efficient lighting equipment in existing or new buildings. Rebates are offered to encourage commercial and industrial (C&I) customers to purchase energy efficient lighting by lowering the upfront premium costs associated with this equipment.

Xcel Energy (The Company) engaged a team of researchers led by EMI Consulting to conduct an impact evaluation of the Lighting Efficiency product. The evaluation team was asked to assess the following:

- **Estimate the Net-To-Gross Ratio (NTGR):** Estimate the retrospective and prospective NTGR for 2020 program year;
- Assess the feasibility of **collecting full category C&I lighting sales data**; and
- Provide supplement insight for **product baselines**, including the percent of functional fixture replacements and proportion of lighting replaced as part of remodel projects.

Based on the results of this research, the evaluation team developed key findings and recommendations for Xcel Energy.

Recommendation	Response
1) **Xcel Energy should adopt a 2020 NTGR of 73% for downstream measures in the Lighting Efficiency Product.** The 73% figure balances findings from participant surveys with findings from trade partner interviews, taking into account the strengths and weaknesses of each, as well as changes in the program delivery.	The Company will apply a NTGR of 73% to the program starting January 1, 2020 and will be implementing all recommendations contained in the report.
2) **Future efforts to assess product attribution should continue to evaluate changes in the volume of LEDs sold with and without the product.** Incorporating a consideration of quantity into both the trade partner NTG approach and the participant- focused, retroactive NTG approach were critical to fully capturing the influence of the product in this research, and quantity increases will be a central element of product influence going forward.	The Company will continue to assess the product attribution and evaluate changes in the volume of LEDs sold with and without the product.
3) **Xcel Energy should continue to carefully consider which types of lighting equipment will provide the greatest benefit to the product and should set incentive levels to encourage installation of those equipment types.** Xcel Energy may opt to focus higher incentives on lighting equipment types with the greatest savings potential or on types that need	The Company will continue to analyze which types of lighting equipment will provide the greatest benefit to the product and set rebate levels to encourage customers to install those equipment types.

additional support to accelerate market transformation and increase market share. Future evaluation research could help to prioritize lighting products for targeted incentives.	
4) Xcel Energy should continue to monitor the lighting market and ensure that products frequently installed as maintenance measures are included in the midstream product. Xcel Energy can leverage its engagement with trade partners to identify which measures are most often purchased for maintenance installations and which are most often purchased for maintenance installations and which are most often purchased for retrofits. Future evaluation research could also assess which measures are used for maintenance and which are used for retrofits.	The Company will continue to monitor the lighting market and ensure products frequently installed as maintenance measure are included in the midstream product.