EMI CONSULTING

Xcel Energy
Evaporative Cooling Product
2018 Evaluation

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FINAL
REPORT

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Introduction

Xcel Energy contracted with EMI Consulting to evaluate the **2018 Residential Evaporative Cooling Product** in Colorado as part of the Xcel Energy 2018-2019 Demand-Side Management Evaluation Plan. This evaluation included both a process evaluation and impact evaluation. As part of the evaluation research, EMI Consulting assessed product influence on the evolving residential evaporative cooling equipment market, product influence on the decisions of eligible customers, participant experiences with the product, similarity with peer utilities, and opportunities for improving product delivery.

The Xcel Energy Evaporative Cooling Product provides residential customers with downstream financial incentives to encourage the purchase of evaporative cooling equipment in existing or new buildings. The Evaporative Cooling Product offers rebates for three "tiers" of evaporative coolers. Tiers 1 and 2 are based on the saturation efficiency of the unit itself. In order to qualify for Tier 3 (the "Whole House" option), a customer must also connect the unit to at least three ducts within their home.

This summary includes the key findings and recommendations from this evaluation.

Methods

- Historical data analysis
- Interviews:
  - Staff (n=6)
  - Wholesalers (n=6)
  - Contractors (n=14)
- Surveys:
  - Participating customers (n=71)
  - Near-participating customers (n=71)
  - Peer program staff (n=5)

Fielding:
- Apr. 2018 – Oct. 2018

Key Impact Results

There is evidence from this evaluation that **the Evaporative Cooling Product is having a net positive influence on customer decisions** regarding high efficiency residential cooling equipment in the Xcel Energy service territory in Colorado**.** The recommended prospective NTGR is 0.70 for all tiers except Whole House, for which the recommended prospective NTGR is 0.90. These values incorporate estimates of free-ridership, participant spillover, and market effects, and account for planned changes to the product in future years. They also account for **market forces working against the adoption of evaporative coolers**, including a trend in the new construction market toward central AC systems.

Higher NTGRs were associated with:
- First-time installations (compared to replacement with "like" systems)
- Whole house (i.e., multi-ducted premium) systems (compared to single-room standard or premium systems)

Influence can be optimized by:
- Increasing sales through retail channels
- Separating out whole house tier into two tiers: 1st time (i.e., non-replacement) and replacement

Key Process Results

Key barriers to increased adoption of evaporative cooling technologies include:
- **A lack of awareness and familiarity** regarding how evaporative coolers work.
- A perception that evaporative coolers **require substantial maintenance.**
- Negative perceptions of '**swamp coolers'.**

Customers are very likely to replace existing cooling systems with "like" systems, making it difficult to convert customers from central AC to evaporative cooling. Typically, a customer who already has a central AC system is very likely to purchase a new central AC system rather than consider an evaporative cooler. At the same time, customers with evaporative coolers tend to stick with the technology.

There is some indication from wholesalers that not all units sold receive a rebate. Implementing a point-of-sale "instant incentive" system should allow the product to catch more of these units that currently go unrebated.

Trade partners expressed strong support for the product, noting it is very helpful in selling evaporative coolers.

Customers, contractors, and wholesalers were **very satisfied** with the Evaporative Cooling product.

4.8/5

(mean rating given to the Evaporative Cooling Product by participating customers, on a scale of 1-5 where 5 is "very satisfied."

2018 Evaporative Cooling Product (Colorado)

Conclusions & Recommendations

Key Finding 1: Customers are very likely to replace existing cooling systems with "like" systems, making it difficult to convert customers from central AC to evaporative cooling.

Recommendation 1.1: Continue to target customers without any type of existing cooling system, as well as those in areas of lower socioeconomic means.

Recommendation 1.2: Increase the customer rebate amount for first time (e.g., non-replacement) purchase decisions while keeping the customer rebate amounts static for replacement situations. Note: If a customer replaces a cooler with a higher rebate category cooler, the customer would qualify for the first time (non-replacement) rebate and associated NTGR.

Key Finding 2: Simply increasing awareness of what an evaporative cooler is may not be sufficient to increase uptake of this technology among customers. Instead, it appears that a lack of experience with how an evaporative cooler actually operates in a home may also be preventing more customers from seriously considering this type of equipment.

Recommendation 2.1: At some point in the future—after the instant incentives mechanism has been implemented—consider partnering with or providing incentives to retailers and/or third parties to help customers understand first-hand what it is like to have an evaporative cooler in their home. For instance, a live display in a retailer showroom may provide the type of exposure that customers need to feel more comfortable with—and positive about—the technology.

Recommendation 2.2: Find ways to provide information to potential and current evaporative cooling customers related to proper maintenance of evaporative coolers. Such information may emphasize that the maintenance requirements of evaporative coolers are not burdensome.

Key Finding 3: Window and roof-mounted evaporative coolers face heavy competition from other cooling technologies such as central AC systems, mini-split heat pumps, and non-rebated portable evaporative coolers.

Recommendation 3.1: Consider adding portable evaporative coolers as a measure, as some customers choose to purchase portable units rather than window or roof-mounted units.

Key Finding 4: While contractors interviewed by the evaluation team indicated that nearly all eligible evaporative coolers they sell are rebated, there is some indication from wholesalers that not all units sold receive a rebate.

Recommendation 4.1: In the future, consider pursuing a point-of-sale (POS) instant rebate mechanism, as this would allow the product to more effectively capture eligible units that are sold in Xcel Energy service territory. As part of this effort, it would be important to understand timing considerations for implementation (as a hurried implementation may lead to mixed results) as well as the potential impact that such rebates may have on contractor and wholesaler business models. If such a mechanism is implemented, it would also be important to ensure the product can claim attribution—for instance, by requiring contractors to document the rebate on customer invoices, or sending a confirmation email to customers so they are aware that they received a rebate from Xcel Energy.

Key Finding 5: There is evidence from this evaluation that the Evaporative Cooling Product is having a net positive influence on customer decisions regarding high efficiency residential cooling equipment in the Xcel Energy service territory in Colorado.

Recommendation 5.1: The recommended retrospective product-level NTGR is 0.60. Moving forward, the product can optimize influence in the market by (1) prioritizing whole house systems and first time installations, and (2) partnering with retailers to promote evaporative cooling systems through in-store displays in coordination with an instant rebate at the point of sale. These modifications would allow the product to increase its influence in the market, resulting in a recommended prospective product-level NTGR of 0.70.

Recommendation 5.2: Separate the "Whole House" product tier into two separate tiers—a first-time tier and replacement tier—as the current grouping includes both systems that are tied into existing ductwork as well as systems where new ductwork is required. Based on the finding that first-time systems exhibit less free-ridership than replacement systems, and based on benchmarked values for whole house systems from other utilities, the recommended prospective NTGR for a first-time whole house tier is 0.90.

1. INTRODUCTION

Xcel Energy offers a comprehensive array of demand side management (DSM) and other energy services and products to its customers. For the evaluations of its 2017 and 2018 products, Xcel Energy sought to improve the customer experience, understand the role of their products in changing the marketplace, analyze product influence on customer choice, and ensure industry-leading program performance. To accomplish this Xcel Energy contracted with EMI Consulting and its partners: Evergreen Economics, Apex Analytics, and Ridge & Associates (hereafter 'the evaluation team'). This team undertook evaluations of nine products offered in Colorado and Minnesota in 2018, including the Evaporative Cooling Product in Colorado, discussed in this report.[1] This introduction includes an overview of the product and the evaluation approach, and describes the organization of this report.

1.1 Product Overview

The CO Evaporative Cooling Product has offered prescriptive rebates to Xcel Energy residential customers who install qualifying evaporative cooling equipment in existing or new buildings. Rebates have been offered to encourage residential customers to purchase energy-efficient evaporative coolers by lowering the upfront premium costs associated with this equipment. Between January 2017 and June 2018, the Evaporative Cooling Product garnered over 5.5 GWh in energy savings from prescriptive rebates provided in Colorado (Table 1-1).

[1] The programs selected for evaluation in 2017 included: Commercial Refrigeration (CO), Cooling Efficiency (CO), Data Center Efficiency (CO), Insulation/Air Sealing (CO), Residential Heating, (CO), Data Center Efficiency (MN), Evaporative Cooling (MN), and Insulation Rebate (MN). The evaluation team prepared a separate report for each of these evaluations.

Table 1-1. Evaporative Cooling Savings, by Product Channel, January 2017 – June 2018

Measure	Description	Units		Customer kW		Customer kWh	
		Qty	% of total	Qty	% of total	Qty	% of total
Evaporative Cooling Replacing 13 SEER Central A/C (Tier 1) Replacement	3 Ton Evaporative Cooler	1,473	35%	4,124	36%	2,021,972	37%
Evaporative Cooling Replacing 13 SEER Central A/C (Tier 1) 1st Time Install	3 Ton Evaporative Cooler	736	17%	2,052	18%	1,000,731	18%
High Efficiency Evaporative Replacing 13 SEER A/C 3-Ton; (Tier 2) Replacement	High Efficiency Evaporative Cooler 3 Tons	594	14%	1,666	15%	813,991	15%
High Efficiency Evaporative Replacing 13 SEER A/C 3 ton; (Tier 2) 1st Time Install	High Efficiency Evaporative Cooler 3 Tons	204	5%	572	5%	274,994	5%
High Efficiency Evaporative Replacing 13 SEER central A/C 3-Ton; (Tier 3) Replacement	Integrated HVAC with High Efficiency Evaporative System	1,213	29%	2,956	26%	1,415,536	26%
	TOTAL	**4,220**	**100%**	**11,371**	**100%**	**5,527,174**	**100%**

[a] This is the population of participants receiving rebates between January and June 2018.

The Evaporative Cooling Product offers rebates for three "tiers" of evaporative coolers. Tier 1 coolers are based on a minimum airflow of 2500 cubic feet per minute. Tier 2 and 3 coolers qualify by having a minimum media saturation of 85%, and having a purge pump and remote thermostat. In addition, Tier 3 coolers (the "Whole House" option) must be connected to at least three ducts within their home. Tiers 1 and 2 collectively accounted for 66% of the total number of units rebated in 2017 and the first half of 2018.

The Evaporative Cooling 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 a trade relations manager to maintain these relationships.

In 2017, Xcel Energy made several changes to the product.

- Based on numbers from previous years, the Evaporative Cooling Product dialed back its participation goals in recent years to be more realistic, given actual uptake.
- In the late summer and fall of 2017, Xcel Energy piloted an "instant rebates" channel that provided instant rebates to customers purchasing a program-qualified unit at the point-of-purchase. This pilot was conducted on a limited scale with one retailer, and it was considered to be successful.

The product is also considering several possible modifications for future cycles:

- The product may move to a different tier system, for example, based on media type instead of saturation efficiency.
- Depending on retailer cooperation, the product may expand the "instant rebates" pilot to become a more formal delivery channel. The likelihood of this occurring in 2019 is still unclear.

1.2 Evaluation Overview

The evaluation team designed a comprehensive evaluation of the Evaporative Cooling Product to provide information on five key research topics:

- Influence on the evolving residential cooling equipment market
- Influence on the decisions of eligible customers
- Participant experiences with the Evaporative Cooling Product
- Similarity with peer utilities
- Opportunities for improving product delivery

Table 1-2 presents an overview of the research topics and data sources used in this evaluation of the Colorado Evaporative Cooling Product.

Table 1-2. Evaporative Cooling Product Evaluation Framework

Research Objective	Participant Surveys (n=71)	Near-Participant Surveys (n=71)	Trade Partner Interviews (n=20)	Peer Utility Benchmarking (n=5)
Assess customer and trade partner awareness and perceptions of evaporative cooling technologies.	●	●	●	
Assess customer and trade partner awareness and perceptions of the rebate and other Xcel Energy marketing activities.	●	●	●	
Characterize key barriers in the customer decision-making process related to evaporative cooling purchases.	●	●	●	●
Assess customer and trade partner experiences and satisfaction with the Product.	●		●	●
Estimate a NTG ratio documenting the product's influence on customers' decisions.	●		●	
Characterize the role of market actors (manufacturers, manufacturer reps, distributors, retailers, and new home builders) in the evaporative cooling market in Colorado.			●	
Estimate product impacts (net-to-gross analysis).	●		●	●
Identify opportunities to improve Product implementation.	●	●	●	●

1.3 Report Organization

The following chapters organize the evaluation findings into two components: process and impact evaluation results. As illustrated in Table 1-2, each data collection activity may have contributed to multiple evaluation objectives. Further detail on the evaluation approach is presented in the following chapters. Chapter 2 discusses the process evaluation components, which addressed customer and trade partner awareness and perceptions of the product, barriers and motivations to participate, the role of market actors, and opportunities for improvement. Chapter 3 reviews the approach and results of the impact evaluation and the attribution of product impacts using a standard net-to-gross ratio (NTGR) analysis. Conclusions and recommendations are presented in Chapter 4. Detailed, descriptive methodology information, evaluation plans, and survey instruments can be accessed in this report's appendices.

2. IMPACT FINDINGS

A central component of this evaluation was the estimation of the net-to-gross ratio (NTGR) for the CO Evaporative Cooling Product. For demand-side management (DSM) programs, the NTGR is a metric that estimates the influence of a program on the target market. It is used to adjust reported gross energy savings to account for energy efficiency that would have occurred in the absence of a program, and it is also used as a benchmarking indicator of program 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 evaluation team developed the NTGR based on data provided by customers and trade partners. To assess the plausibility of this NTGR, the evaluation team then compared it to the NTGRs of similar programs sponsored by other peer utilities. Note that, while a NTGR of 1.0 is often seen as desirable, it may not be appropriate for all program designs depending on a variety of factors (including the maturity of the program and the technologies it promotes, program intervention strategies, and cross-program coordination strategies). The evaluation team has taken care to present our NTGR results with this context in mind.

This chapter presents:

- The recommended NTGR based on the evaluation team's synthesis of findings from market actors and peer utilities
- An overview of the evaluation team's approach to calculating the recommended NTGR
- Qualitative and quantitative data that support the NTGR calculations

These findings, along with findings from the process evaluation (Chapter 3), inform the conclusions and recommendations presented in the final chapter.

2.1 Key Findings: Net-to-Gross Ratio

The evaluation team recommends a NTGR of 0.60 for the Evaporative Cooling Product based on results from market actor responses and on peer program research.

- The evaluation team first estimated a retrospective overall core NTGR of 0.56.
- The evaluation team adjusted the core NTGR by adding 0.03 to account for market effects and 0.01 to account for participant spillover, bringing the final NTGR to 0.60.
    - Evidence for market effects came primarily from contractor descriptions of product influence and contractors making changes to their business models based on the product.
    - Spillover was based on participants having installed heating systems without a rebate.
- Prospectively, we make several recommendations for how the product can optimize its influence in the market. Contingent on implementing these recommendations, the recommended prospective NTGR is 0.70 for all tiers except the Whole House First Time tier (a new tier), for which the prospective NTGR is 0.90.

In the following sections, we first discuss the general approach taken to estimate the NTGR. We then discuss how specific inputs (e.g., free-ridership) were used to estimate a NTGR.

Approach

The evaluation team developed the NTGR for the CO Evaporative Cooling Product using a self-report approach (SRA) based on participating customer survey results in combination with additional research data inputs. The methodology used in this evaluation was built from the Core Nonresidential Protocol in the *2016 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0*. In *Attachment A of Volume 4: Cross-Cutting Measures and Attachments*. This methodology was supplemented with additional qualitative and quantitative data characterizing the customer decision-making process, as well as trends in the market. An important consideration for this evaluation was the 15-year history of the Evaporative Cooling product availability in Colorado. The product may have significantly impacted sales and stocking practices of HVAC contractors and distributors over this extended period. This evaluation was designed to document this market impact and assess how to design future products to maximize cost-effectiveness.

The data inputs to the NTGR analysis included:[2]

- Participant surveys – focused on project-level effects
- Trade partner interviews – focused on overall market effects
- Historic data – focused on overall market effects
- Product benchmarking data – used as a point of comparison
- Known product changes in upcoming years – used to factor in any known implications for future changes in product design

The evaluation team used self-reported data from participating customers to develop an initial NTGR. Data from the additional sources listed above were then used in constructing a logical narrative of product attribution and in finalizing the NTGR for the product.

The following sections explain how the EMI Consulting team calculated the free-ridership, spillover, and market effects values that were used to estimate the NTGR.

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 1, where 1 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 evaluation team started with the Core Residential Protocol from the Illinois TRM, and wrote specific questions to assess three free-ridership components:

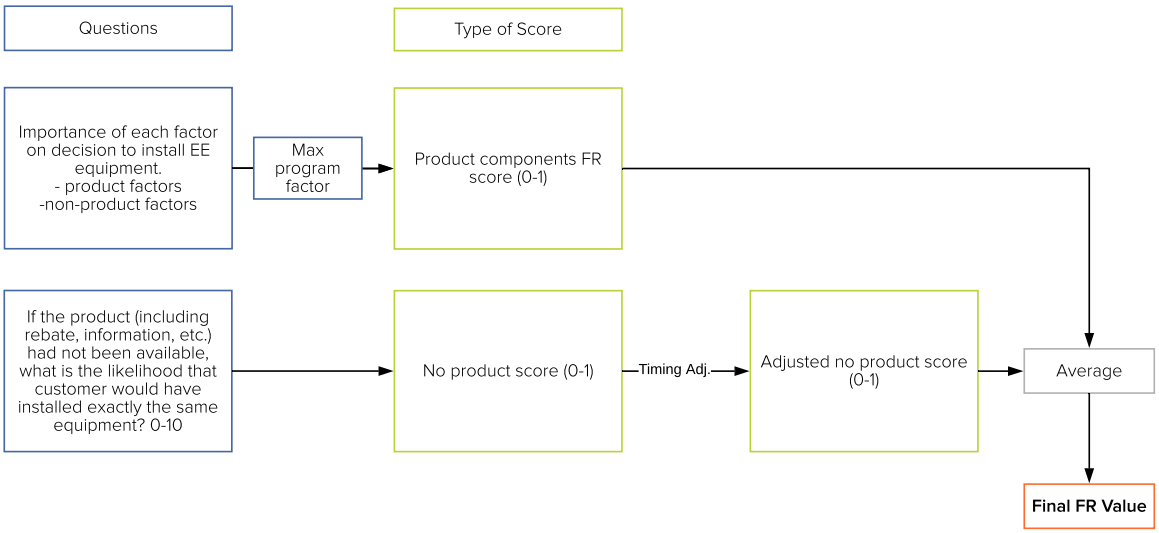
- A **Product Components Score**, based on the participant's perception of the importance of various product components in their decision to carry out the energy-efficient project;

[2] Additional descriptive detail on these research activities appears in Chapter 3 and in the appendices.

- A **No-Product Score**, based on the participant's intention to carry out the energy-efficient project without product funds; and
- A **Timing Adjustment**, based on the participant's perception of when they would have carried out the project in the absence of the product.

When scored, these components assess the likelihood of free-ridership on a scale of 0 to 10, with the two scores averaged and the timing adjustment applied to create a final free-ridership score (Figure 2-1).

Figure 2-1. Core Free-Ridership Calculation Methodology



Additional detail on sensitivity analyses and linkages between survey questions and score development for each free-ridership component can be found in the full NTG methodology description in Appendix A.

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. For this evaluation, we only estimated participant spillover as we did not have access to data that would have allowed us to estimate near-participant spillover effects.

To capture participant spillover, the evaluation team asked participants 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 the Evaporative Cooling Product in participant installation decisions and the likelihood that the measures would have been installed if they had not participated in the product. The evaluation team computed savings estimates for all identified spillover equipment and the product's spillover ratio was calculated by dividing the total spillover savings by the product's total energy savings.

Market Effects

Some product impacts manifest as "market effects," which signify a transformation in the underlying structure and functioning of the market. Market effects can take many forms and may result from product impacts in a market over time. Examples of market effects include trade partners changing their business models based on the influence of the product—for instance, a trade partner may be more likely to promote evaporative coolers knowing that a rebate is available for customers. Over time, the contractor builds this into their general approach to marketing and selling cooling systems.

Determination of Net-to-Gross Ratio

The evaluation team calculated the product's initial NTGR using the following formula:

$$Product\ NTGR = 1 - (Free - ridership\ Ratio) + (Participant\ Spillover\ Ratio)$$

Finally, the evaluation team utilized all the information collected about the product through customer interviews, trade partner interviews, product benchmarking, and known product changes to construct a logical, internally consistent, and coherent narrative of product attribution that attempts to identify all possible pathways of Xcel Energy influence. In addition to free-ridership and participant spillover, the evaluation team also considered whether any adjustment was warranted due to the presence of market effects, recommending a final summative NTGR value consistent with this narrative.

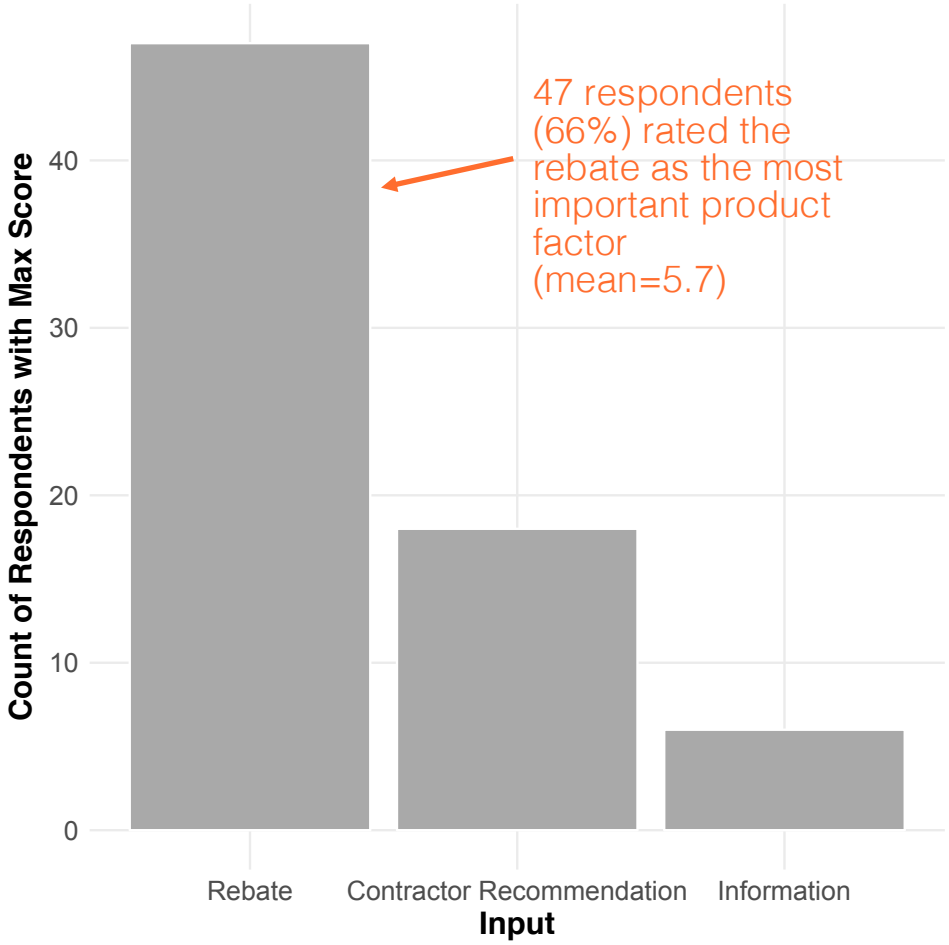
2.2 Net-to-Gross Ratio Inputs

As described in the approach section, the recommended NTGR is based on three primary data inputs: free-ridership, participant spillover, and market effects. The evaluation team additionally considered peer program NTGRs and planned modifications to future product operations when deciding if further adjustments to the NTGR were warranted. This section explores each of these results in more detail, including qualitative data that supports the results.

Free-Ridership Results

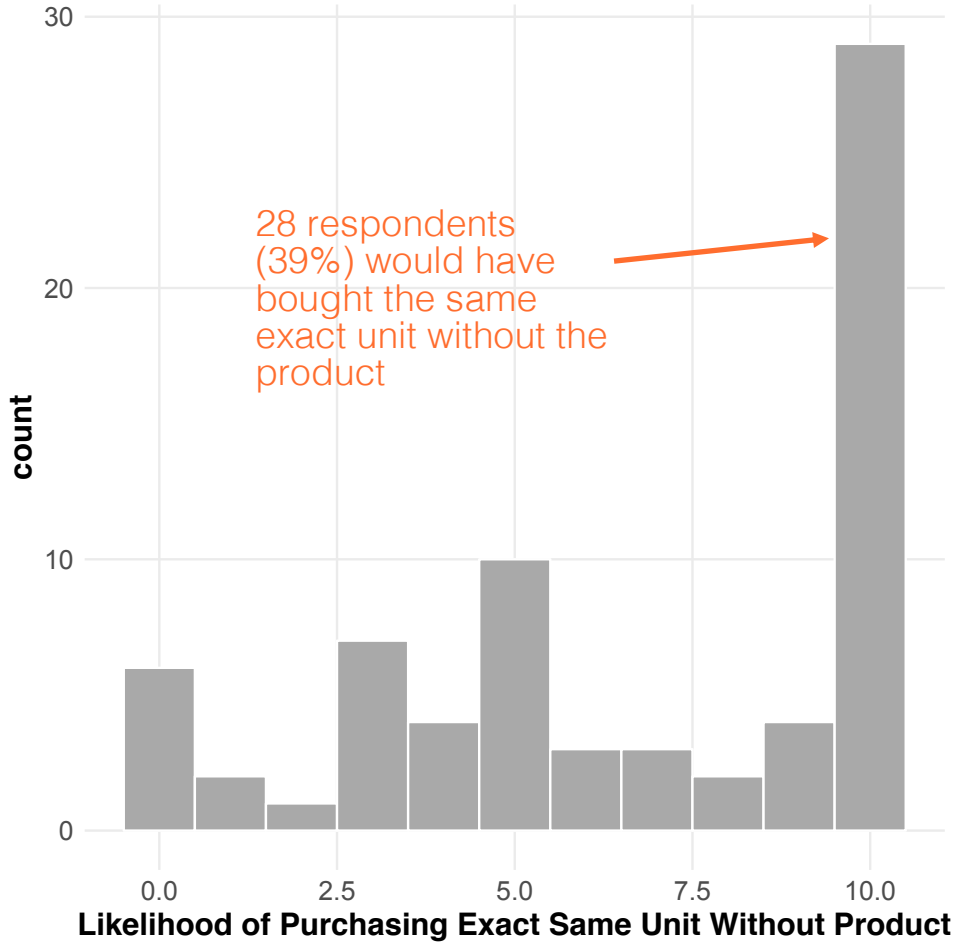
Participating customers surveyed as part of this research most commonly cited the rebate as the most important product factor in their decision to purchase an evaporative cooler (Figure 2-2). A minority of respondents reported that contractor recommendation or information provided by Xcel Energy (via the product) as the most important product factor. Thus, the availability of the rebate was largely responsible for driving down free-ridership in our estimation of the core NTGR.

Figure 2-2. Most Commonly Cited Highest-Rated Product Factors



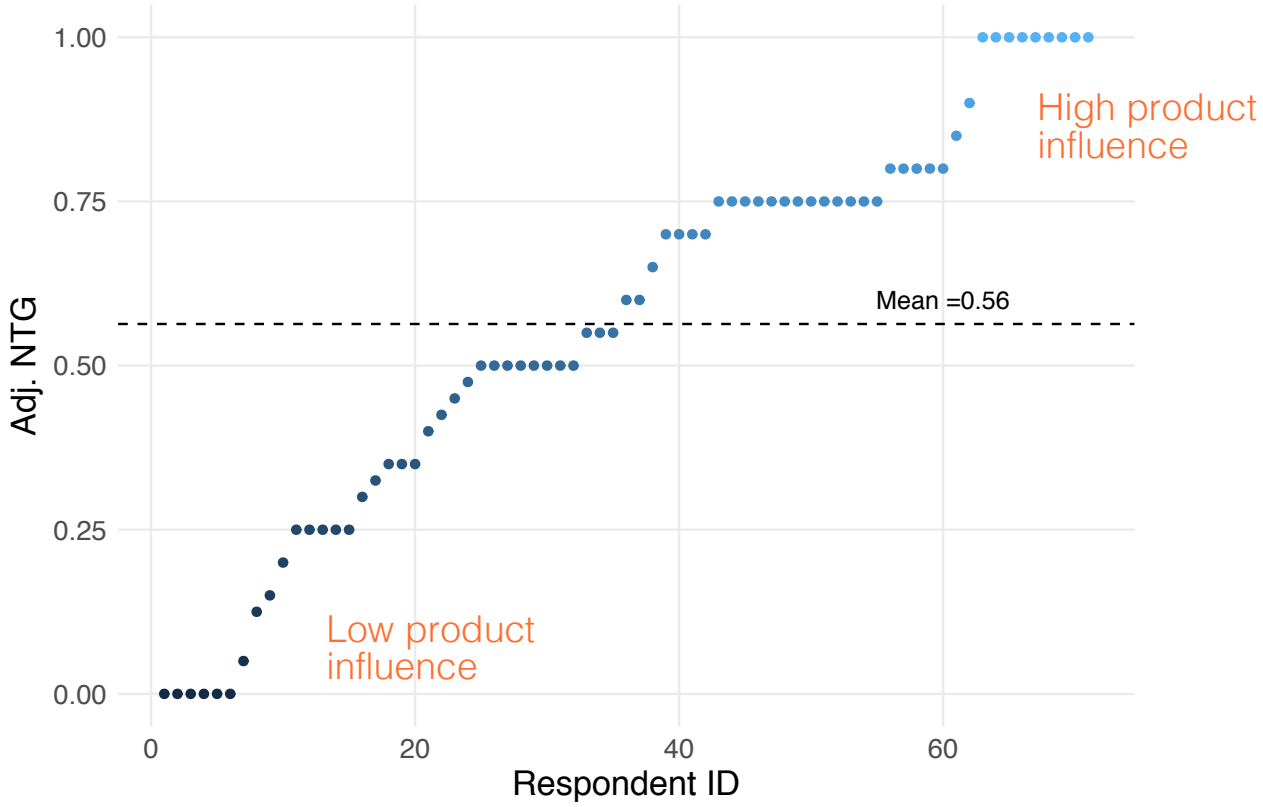
As shown in Figure 2-3, a fairly large number of respondents (28 of 71) indicated they would have bought the same exact unit even if the product had not existed, leading to a large increase in estimated free-ridership for these individuals.

Figure 2-3. Self-reported Likelihood that Participating Customers Would Have Purchased the Same Exact Unit Without the Product



By plugging in the inputs for each individual respondent into the NTGR algorithm, we obtained a NTGR for each individuals respondent as shown below in Figure 2-4. The range of these values was 0 (complete free-ridership) to 1.00 (no free-ridership), with an overall mean value of 0.56.

Figure 2-4. Distribution of Adjusted Core NTGRs



Spillover Results

Participants reported installing several eligible spillover measures after participating in the Evaporative Cooling Product. Four respondents indicated they had purchased high efficiency heating systems for their homes and had not received a utility rebate for doing so. Because there was limited detail regarding the exact type of heating equipment these customers installed, the evaluation team was unable to precisely estimate a savings value, and instead used a conservative adjustment value of +0.01.

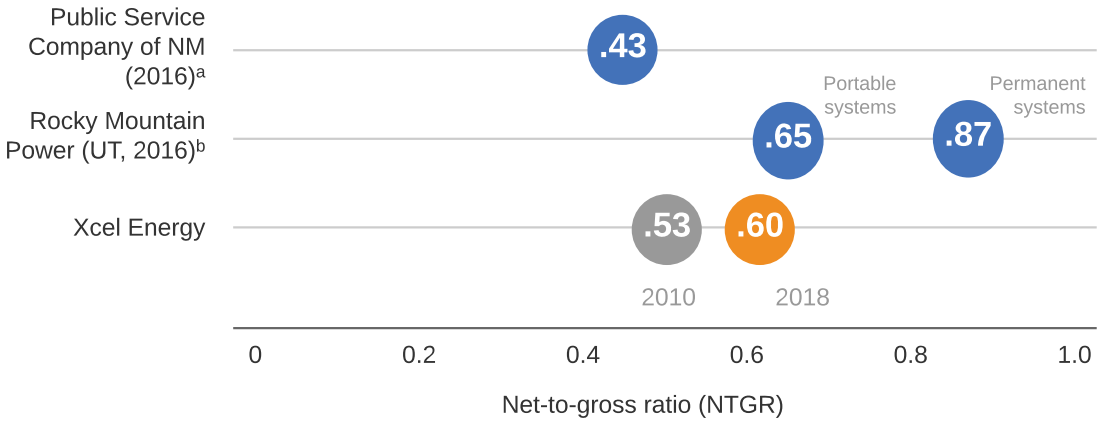
Market Effects

The evaluation detected evidence for several types of market effects attributable to the Xcel Energy Evaporative Cooling Product, leading to a market effects adjustment of +0.03. The main body of evidence comes from interviews with contractors, who reported that the availability of the rebate has enabled them to more easily sell evaporative coolers, and in some cases, has allowed them to modify their business model to focus heavily on sales of evaporative coolers. Several contractors specifically mentioned that even in cases where they would have sold an evaporative cooler to a customer without the help of the product, the rebate allowed them to upsell the customer from a standard unit to a premium unit.

Peer Program Net-to-Gross Ratios

The 2018 Xcel Energy CO Evaporative Cooling Product NTGR is within the range of NTGRs found for similar programs and is slightly higher than the NTGR estimated for this same product in 2010 (Figure 2-5).[3] In this context it is important to note that the Public Service Company of New Mexico operates on a much smaller scale than Xcel Energy and thus the programs should not be directly compared. More generally, because the programs at these other utilities are likely different in some respects compared to the Xcel Energy CO Evaporative Cooling Product, and because limited information was available regarding how these NTGRs were estimated, any comparisons between them should be considered approximate. Because the range of program NTGRs was relatively similar to the estimate for the current evaluation, we did not make any modifications to the current NTGR based on these results.

Figure 2-5. NTGR Comparison with Peer Utility Programs



[a] Report available: https://www.pnm.com/documents/396023/3157050/2016+Independent+Measurement+and+Verification+Report%2C+Part+1%2C+ADM+Associates%2C+Inc.pdf/011b6c03-4358-4396-acf8-73cd8a24009e

[b] Report available: http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/2017/2015-2016_Utah_HES_Evaluation_Report.pdf

Prospective Net-to-Gross Ratios

In the analysis of product influence, we identified several trends in NTGRs between different installation scenarios:

- Product influence was slightly higher among customers who had purchased their evaporative cooler from a retail location (compared to purchasing from a contractor).
- Product influence was slightly higher for first-time installations (compared to replacement systems)
- Product influence was higher for Whole House systems (compared to single-room Standard or Premium systems).

[3] Peer program NTGRs were only available for two programs.

These findings suggest several ways by which the Evaporative Cooling Product can optimize its influence in the market moving forward:

- First, the product can increase market influence by increasing the number of units sold through retail locations. As discussed in the Recommendations section, this may be accomplished by implementing a point-of-sale 'instant rebate' or similar mechanism.
- The current Whole House tier includes both first time and replacement systems (unlike the Standard and Premium tiers). However, a Whole House replacement system does not require new ductwork, and thus is actually much more similar to the current Premium tier (in that a system is simply being replaced). Differentiating between these two types of Whole House installations will allow for a more granular understanding of product influence. Such a distinction would enable the product to further optimize its impact on the market by focusing on first-time Whole House installations (for which product influence is higher), and treating replacement Whole House installations the same as Premium system replacements. The finding that Whole House installations exhibit higher NTGRs is consistent with peer programs, and is a critical focus for the product given that in the future, customers are likely to replace their existing system with a new system of the same type.

The prospective NTGRS for the Evaporative Cooling Product, contingent on implementing product modifications in line with the observations above, are shown below in Table 2-1.

Table 2-1. Existing, Retrospective, and Prospective Recommended NTGRs by Tier [a]

Tier	Existing	Retrospective	Prospective
Standard – Replacement	0.52	0.60	0.70
Standard – First Time	0.70	0.60	0.70
Premium – Replacement	0.59	0.60	0.70
Premium – First Time	0.70	0.60	0.70
Whole House – Replacement [b]	1.00	0.60	0.70
Whole House – First Time [b]	1.00	0.60	0.90

[a] In future years, tiers currently called "First Time" will become "Non-replacement." The "Whole House" tier will become a "Multi-ducted" tier to clarify the eligibility requirements.
[b] The 'Whole House – Replacement' and 'Whole House – First Time' are new tiers, which would be created by breaking the existing 'Whole House' tier into two groups.

3. PROCESS EVALUATION

The evaluation team conducted a process evaluation to determine how Xcel Energy can optimize the design and delivery of the Evaporative Cooling Product to its customers. Specific research objectives of the process evaluation are listed in the bullets below:

- Assess customer and trade partner awareness and perceptions of evaporative cooling technologies.
- Assess customer and trade partner awareness and perceptions of Xcel Energy's Evaporative Cooling Product.
- Characterize key barriers in the customer decision-making process related to evaporative cooling purchases: What are the most common barriers for adoption and how can Xcel Energy overcome them? How are other utilities encouraging the adoption of evaporative cooling technologies?
- Assess trade partners' experiences: How can contractors be motivated to sell more evaporative coolers? How can Xcel Energy make sure all eligible units are being submitted for rebates?
- Characterize the role of manufacturers, manufacturer reps, and distributors in the market for evaporative coolers in Colorado: What barriers to increasing sales of evaporative coolers do these market actors observe?
- Identify opportunities to improve product design and delivery and contextualize using peer utility information.

To accomplish these objectives, the evaluation team elicited feedback from product staff, product participants, product near-participants, market actors in the Xcel Energy Colorado territory (including contractors, distributors, and manufacturer representatives), and program managers of similar programs. The evaluation team also conducted an analysis of historic participation data.

This chapter presents:

- Key findings from the process evaluation
- The evaluation team's approach to conducting the process evaluation
- Specific findings relating to each evaluation objective.

These findings, along with findings from the impact evaluation, inform the conclusions and recommendations presented in the final chapter.

3.1 Key Findings

The evaluation team found that, overall, customers and trade partners are very satisfied with the current product operations, and staff report product processes are running smoothly. But due to a combination of external market forces, the product faces major challenges in trying to expand product participation beyond its current reach.

- **Key Finding 1: Customers are very likely to replace existing cooling systems with "like" systems, making it difficult to convert customers from central AC to evaporative cooling.** Typically, a customer who already has a central AC system is very likely to purchase a new central AC system rather than consider an evaporative cooler. At the same time, customers who did purchase an evaporative cooling system were most likely to either have just replaced an existing evaporative cooler or have had essentially no cooling system at all.

- **Key Finding 2: Simply increasing awareness of *what an evaporative cooler is* may not be sufficient to increase uptake of this technology among customers. Instead, it appears that a lack of experience with how an evaporative cooler actually operates in a home may also be preventing more customers from seriously considering this type of equipment.** More specifically, it appears that performance concerns—particularly those related to maintenance and access—are important overarching barriers for customers who may be thinking about purchasing a cooling system for their homes.

- **Key Finding 3: Window and roof-mounted evaporative coolers face heavy competition from other cooling technologies such as central AC systems, mini-split heat pumps, and non-rebated portable evaporative coolers.** While some contractors are highly motivated to promote and sell evaporative coolers to their customers, other contractors continue to promote options like central AC systems and mini-split heat pumps. In some cases this is because contractors believe that customers are not interested in purchasing an evaporative cooler. In other cases, it is because contractors find it more difficult to achieve the same profit margins on evaporative coolers as they would on more expensive central AC systems. In other cases, customers are forgoing any installation work and purchasing portable evaporative coolers instead of window or roof-mounted units.

- **Key Finding 4: While contractors interviewed by the evaluation team indicated that nearly all eligible evaporative coolers they sell are rebated, there is some indication from wholesalers that not all units sold receive a rebate.** This apparent discrepancy is likely related to self-selection bias by the contractors included in our interviews—these contractors may be more engaged with the Evaporative Cooling Product and thus more likely to offer product rebates to their customers. But not all contractors may be so highly engaged.

In Section 3.2, we describe the overall approach used for the process evaluation research activities, and beginning in Section 3.3, we provide detailed results from each of these activities.

3.2 Approach

To accomplish the evaluation objectives for the Evaporative Cooling product, the evaluation team completed a suite of intersecting and complementary research activities in 2018. Detailed information on the sampling approach used for the research can be accessed in Appendix A. The following discussion highlights the research topics covered by each research activity: the staff

interviews, participant surveys, near-participant surveys, trade partner and wholesaler interviews, and benchmarking interviews.

Staff Interviews

The evaluation team conducted in-depth interviews of Xcel Energy personnel involved with the CO Evaporative Cooling Product early in the course of this evaluation. The six staff interviewed as part of this effort included the following positions:

- Product Manager/Team Lead
- Former Product Manager
- Engineer
- Channel Manager
- Marketing Assistant
- Marketing Research Assistant

The staff interviews covered the following topics:

- The extent to which product design supports product objectives and customer service/satisfaction objectives
- The degree to which product resources are sufficient to conduct product activities with fidelity to the implementation plan
- Staff feedback on implementation successes and challenges
- Themes and issues for possible revisions to the evaluation plan

Appendix B presents the interview guide used for these discussions.

Participant Surveys

The evaluation team conducted telephone surveys with both participants and near-participants using customer records from Xcel Energy for the sample frames. The evaluation plan used for this project can be found in Appendix A. Sample sizes for the participant and near-participant surveys were set at levels adequate to provide a 90% level of confidence with a minimum of +/- 10% relative precision on key questions.[4]

For the purposes of this evaluation, a participating customer was defined as any customer that received an Evaporative Cooling rebate in 2017 or the first half of 2018. The participant sample was stratified and populated proportional to kWh savings to ensure that the sample was representative across several key dimensions, including geography (Western Slope vs. Front Range), equipment tier, and first time purchase vs. replacement. The participant survey was designed to address the following topics:

- Awareness and familiarity with evaporative cooling technologies and the Xcel Energy Evaporative Cooling Product

[4] Key questions include binary (yes/no) variables, bounded rating questions, and percentages.

- Customer motivations and participation barriers
- Product awareness and satisfaction, and influences on satisfaction with Xcel Energy
- Level of free-ridership and product-induced spillover effects (detailed in Chapter 2)

The participant survey guide is presented in Appendix B.

Near-Participant Surveys

The evaluation team also conducted near-participant surveys to collect process evaluation data. For the purposes of this evaluation, the evaluation team defined near-participating customers as residential customers who had received an Xcel Energy rebate for a central AC system in 2017 or the first half of 2018. The near-participant survey addressed the following topics:

- Awareness and familiarity with evaporative cooling technologies and the Xcel Energy Evaporative Cooling Product
- Characteristics of eligible customers
- Decision factors affecting the choice to purchase a central AC system (instead of an evaporative cooler)
- Actions Xcel Energy could take that might increase participation in the Evaporative Cooler Product

Appendix B contains the survey guide used for the near-participating customer research.

Trade Partner Interviews

In addition to the surveys with participants and near-participants, the evaluation team conducted in-depth interviews with trade partners (e.g., contractors and wholesalers). The trade partner research addressed the following topics:

- Satisfaction and awareness; experience with the Evaporative Cooling Product
- Barriers to selling more evaporative coolers
- Perceived trends in the residential cooling market
- Impacts of the Evaporative Cooling Product on their cooling business

Appendix B presents the interview guides used for the trade partner research.

Benchmarking Interviews

The evaluation team examined six peer utilities to benchmark the Xcel Energy product against others in the industry, assessing product design and delivery and key performance indicators (e.g., participation levels, free-ridership). The evaluation team conducted in-depth interviews with five program managers of these utility programs (including implementer staff) to address the following topics:

- Savings impacts estimation methodologies, by measure type

- Savings goals and results by product and for the product portfolio
- Net-to-gross methodology
- Net-to-gross ratios values

To provide important contextual information, additional descriptive program information was collected where possible, including eligible measures and customers, product implementation strategies and engagement practices, and participation levels. Appendix B contains the interview guide used for the benchmarking interviews.

Data on all of the process evaluation topics are presented below. The synthesis of findings places an emphasis on helping Xcel Energy interpret customer and trade partner perspectives and identifying actionable opportunities for improving product operations and marketing.

3.3 Customer and trade partner awareness and perceptions of evaporative cooling technologies

The first objective of the process evaluation was to understand customers' and trade partners' general awareness and perceptions of evaporative cooling technologies. Early on in the research process, this was identified by staff members as a potential barrier to achieving greater participation in the Evaporative Cooling Product. Based on the surveys with participating and near-participating customers, as well as from interviews with trade partners, results show that a lack of customer awareness of evaporative cooling technologies does indeed remain a barrier to greater adoption of this technology; however, it appears that *lack of familiarity* is also an important barrier. This is based on the finding that a surprisingly high percentage of near-participants (91%) indicated awareness of what an evaporative cooler is, yet a third of those near-participants (34%) self-rated their familiarity with evaporative coolers as either 'not at all familiar' or 'slightly familiar.' This suggests that simply knowing what an evaporative cooler *is* may not be sufficient to drive greater adoption. Negative perceptions also remain a significant barrier to adoption of evaporative cooling technologies. Near-participants' most common perceived disadvantage of evaporative coolers centered around performance concerns, particularly around ongoing maintenance needs. This aligned with results from trade partner and wholesaler interviews.

In the following section, we provide more detailed results on customer and trade partner awareness of evaporative cooling. Table 3-1 shows which sources informed the findings related to this research objective.

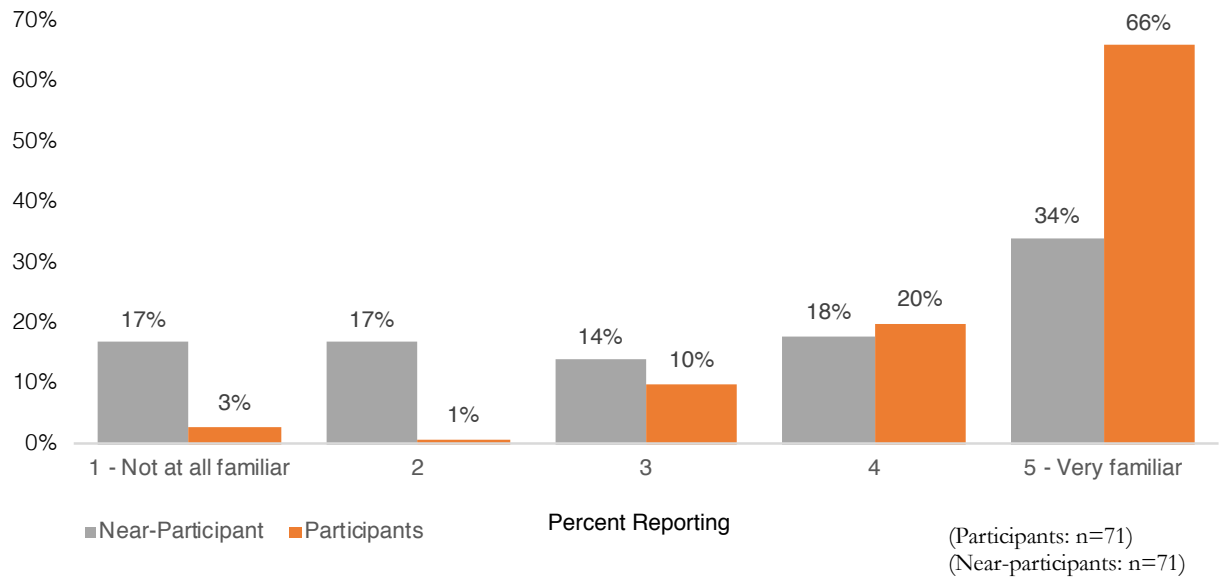
Table 3-1. Data Sources Used to Assess Customer and Trade Partner Awareness and Perceptions of Evaporative Cooling Technologies.

Research Questions	Data Source			
	Participant Survey	Near-participant Survey	Trade Partner Interview	Peer Program Interviews
How much awareness do customers and trade partners have regarding the Xcel Energy Evaporative Cooing Product/rebate? For those that are aware, what are their perceptions?	x	x	x	x

Customer Awareness and Familiarity

In customer surveys, participating and near-participating customers self-rated their familiarity with evaporative cooling technology (Figure 3-1). The majority of participants rated their familiarity as a 5 ("very familiar"). Near-participants' responses were more spread out, and though on the whole near-participants were less familiar than participants, roughly a third of near-participants self-rated themselves as "very familiar."[5]

Figure 3-1. Participant and Near-Participant Familiarity with Evaporative Coolers

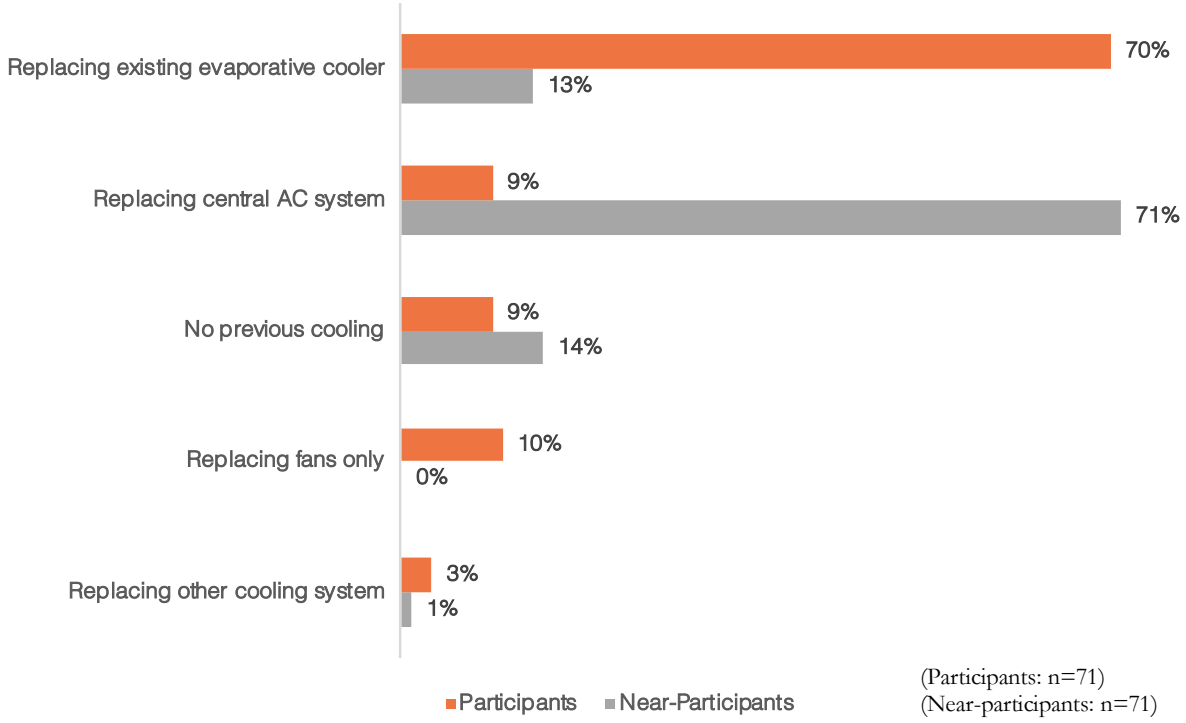


(Participants: n=71)
(Near-participants: n=71)

[5] It is important to note that near-participants who did not know what an evaporative cooler is were screened out from the survey, meaning that this value only applies to a subset of near-participating customers.

Notably, as shown in Figure 3-2, roughly 70% of both participants and near-participants most-recently purchased a unit of the same cooling type as the system they were replacing. This suggests that customers are likely to purchase systems similar to the ones they are replacing.

Figure 3-2. Customers' Prior Cooling Systems (Percent Mentioning)

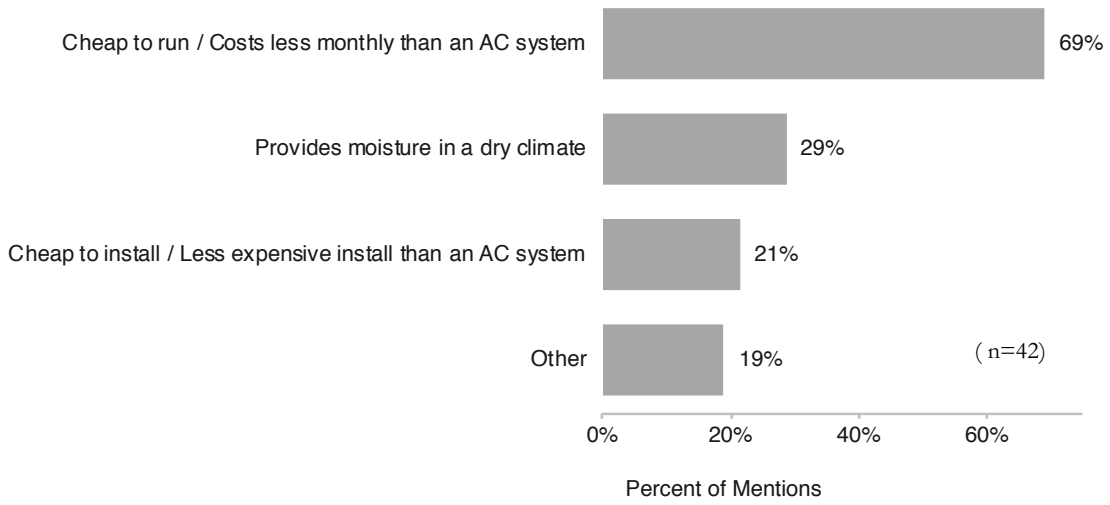


Customer Perceptions of Evaporative Cooling Technology

Customer perceptions of evaporative cooling technology did not appear to vary drastically between participants and near-participants, with both groups recognizing that evaporative coolers may cost less to install, typically cost less to operate on a monthly basis, and are able to provide moisture in dry climates.

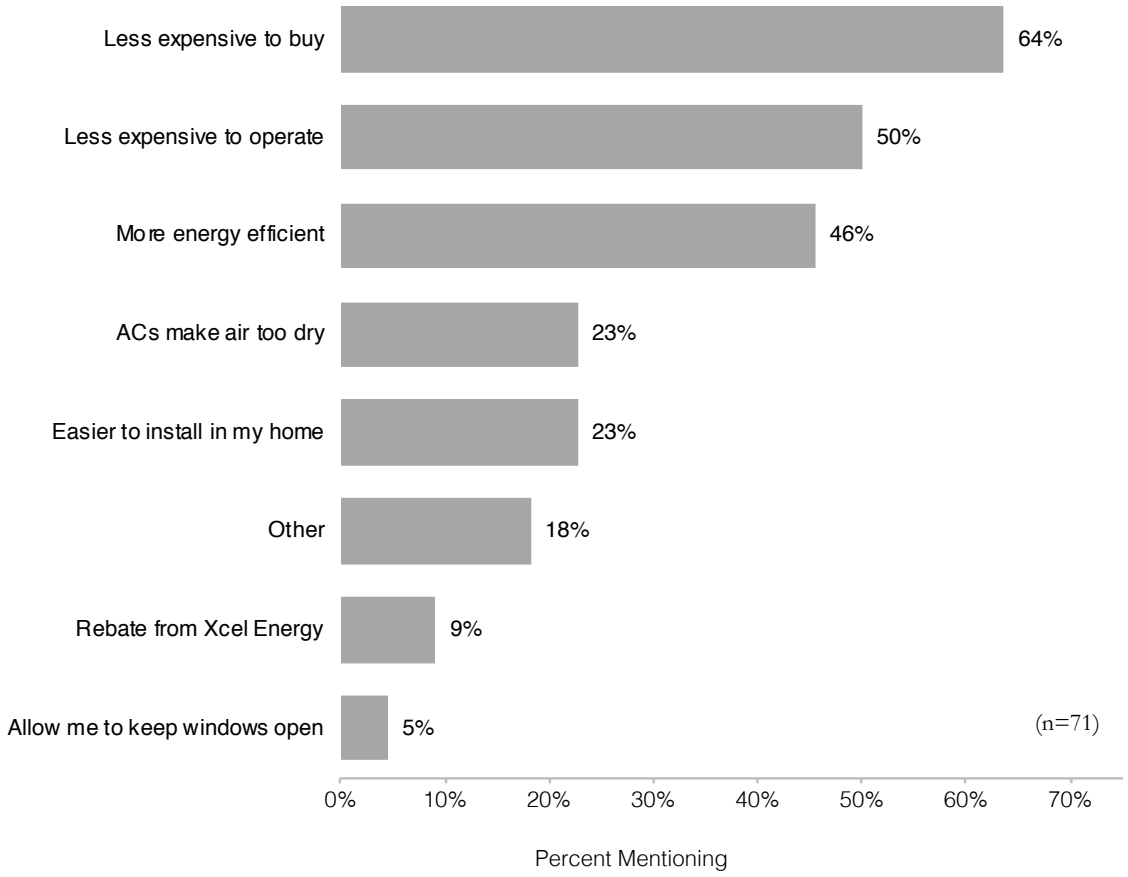
- As shown in Figure 3-3, over two-thirds of near-participants who responded to a question about perceived advantages of evaporative coolers mentioned cheaper operating costs (i.e., lower utility bills) compared to central AC units. Another fifth of near-participants responded that evaporative coolers are cheaper to install than central AC units.
- A little less than a third of near-participant responses (29%) mentioned that one advantage of evaporative coolers is that they provide moisture in dry climates.

Figure 3-3. Near-Participating Customers' Perceived Advantages of Evaporative Coolers



Participants also tended to mention the financial benefits of evaporative coolers (including both upfront and ongoing savings). Roughly two-thirds of participants (64%) cited the upfront cost savings as an advantage, and half (50%) cited their lower monthly operating cost (Figure 3-4).

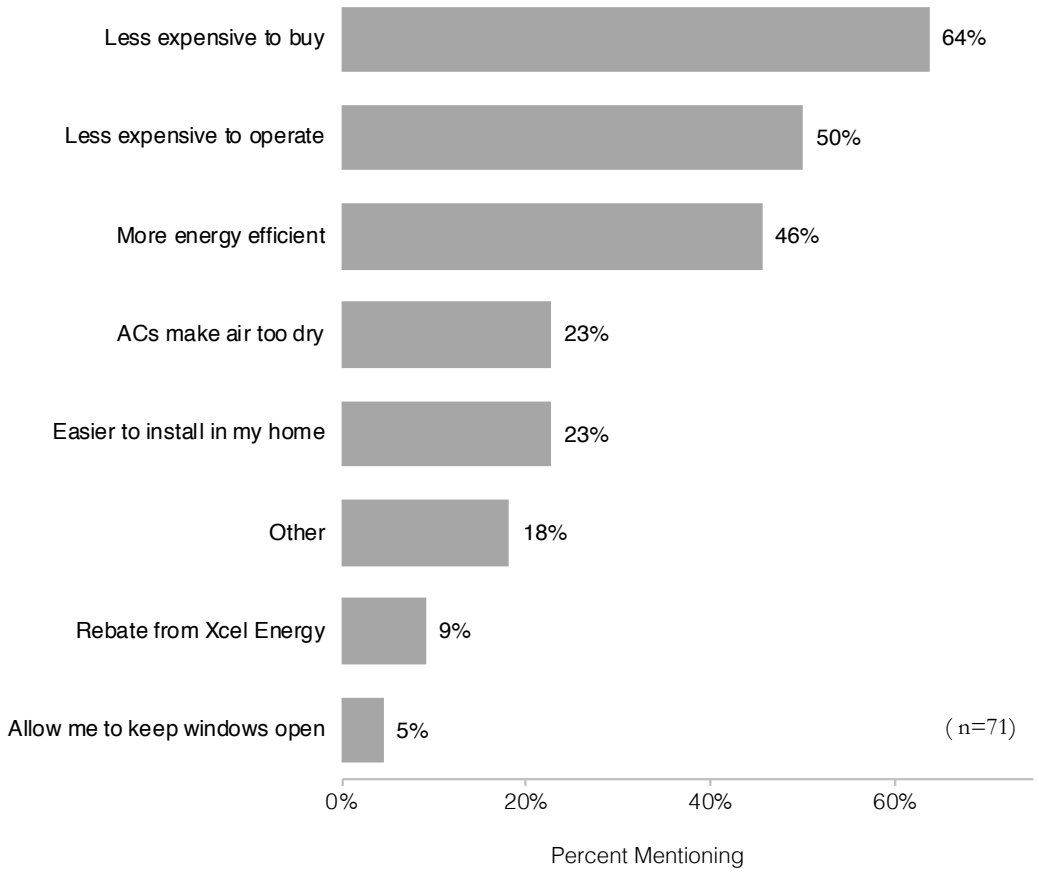
Figure 3-4. Participating Customers' Reasons for Choosing Evaporative Coolers



Participants and near-participants were also similar in their perceptions of the disadvantages of evaporative coolers, with the top concerns focusing on maintenance and access (Figure 3-5 and Figure 3-6).

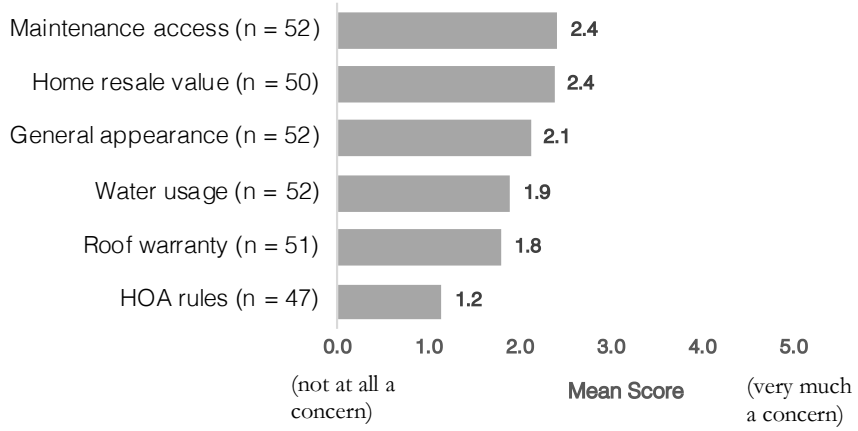
- About a quarter of near-participants (27%) perceive the need for ongoing maintenance as a disadvantage. The same proportion of near-participants believe that evaporative coolers provide too much humidity (i.e., the "swamp cooler" perception).
- Other near-participant perceived disadvantages were that they do not cool effectively in humid climates (22%) and that evaporative coolers do not cool entire homes effectively (18%).

Figure 3-5. Near-Participating Customers' Perceived Disadvantages of Evaporative Coolers



Similar to near-participants, participants cited maintenance as one their top concerns (Figure 3-6). Participants rated on average that "maintenance access" was their top concern, along with "home resale value." Homeowner association (HOA) rules were not commonly cited by participants as a concern; however, this is likely because this was not a barrier for these particular individuals (i.e., those that actually installed an evaporative cooler).

Figure 3-6. Participating Customers' Concerns About Evaporative Coolers



Results from the peer utilities benchmarking interviews generally supported the findings from primary research, indicating that both lack of awareness and negative perceptions are factors preventing greater adoption of evaporative coolers.

2 **Peer utility benchmarking interviewees indicated lack of awareness was the biggest challenge for their program.**

3 **Peer utility benchmarking interviewees indicated negative perceptions were a problem, but not the biggest challenge for their program.**

Trade Partner Perceptions of Evaporative Cooling Technology

Contractors interviewed as part of this research generally had favorable views of evaporative cooling, indicating it is a good option for their customers in Colorado. They commonly cited the major advantages of evaporative cooling as (1) lower cost (both for installation and operation), (2) the ability to bring fresh air into the house, and (3) the ability to add moisture in a dry climate.

Further up the supply chain, wholesalers reported that lack of customer awareness of evaporative coolers was the biggest barrier to more widespread adoption. Wholesalers rated negative perceptions as the second biggest barrier. Wholesalers believed that maintenance concerns were less of a concern than awareness and negative perceptions. This is in contrast to the customer surveys, which placed maintenance at the top of the list for concerns and barriers to adoption.

In the next section we discuss customer and trade partner awareness and perceptions of the Xcel Energy evaporative cooling rebate and other marketing activities.

3.4 Customer and trade partner awareness and perceptions of the rebate and other Xcel Energy marketing activities

In addition to assessing awareness and perceptions of evaporative cooling technologies, the evaluation team also gauged awareness and perceptions of Xcel Energy product rebates and marketing activities. Both customers and upstream actors (i.e., wholesalers and contractors) queried as part of this evaluation reported positive perceptions of the Xcel Energy Evaporative Cooling Product, including the rebate and additional support provided by Xcel Energy product staff. But only a minority of near-participants were aware of Xcel Energy rebates for evaporative coolers at the time they made a decision to purchase a cooling system.

Table 3-2 shows which sources informed the findings related to this research topic. In the following section we provide more detail on awareness and perceptions of the Xcel Energy Evaporative Cooling Product, including rebates and marketing activities, first for customers and then for trade partners.

Table 3-2. Data Sources Used to Assess Customer and Trade Partner Awareness and Perceptions of the Xcel Energy Evaporative Cooling Product

Research Questions	Data Source			
	Participant Survey	Near-Participant Survey	Trade Partner Interview	Peer Program Interview
How much awareness do customers and trade partners have regarding the Xcel Energy Evaporative Cooing Product/rebate? For those that are aware, what are their perceptions?	x	x	x	

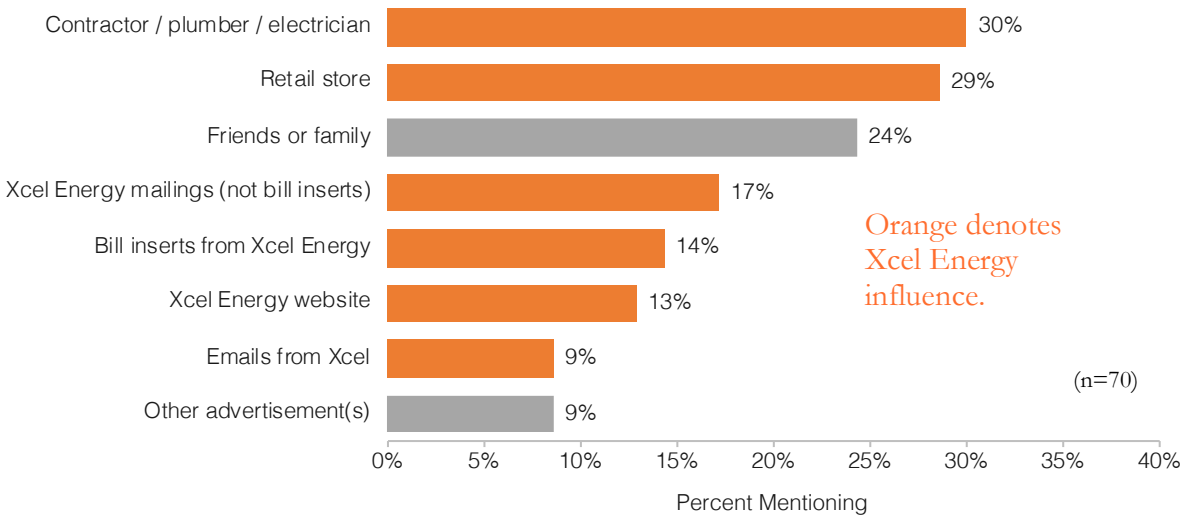
Customer Awareness and Perceptions of Xcel Energy Evaporative Cooling Product

Participating customers tended to have found out about Xcel Energy rebates either through a contractor or retail store, or through one of Xcel Energy's active marketing efforts. However, while most participating customers report being aware of the rebate prior to purchasing an evaporative cooler, only a minority of near-participants were aware of the rebates at the time they purchased a cooling system.

Specific findings include the following:

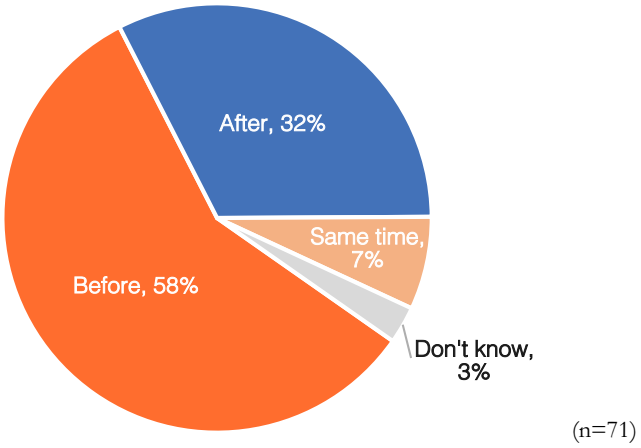
- The two most common ways that participating customers became aware of the Xcel Energy evaporative cooler rebates were through a contractor/plumber/electrician and through a retail store (30% and 29% of mentions respectively). Collectively this suggests that the product has effectively leveraged midstream market actors in helping to spread awareness of the rebates.
- Xcel Energy marketing efforts (via mailings, bill inserts, the website, and emails) collectively accounted for 53% the ways in which near-participants learned about the rebates.

Figure 3-7. How Participating Customers Learned About Xcel Energy Rebates for Evaporative Coolers



Over half of participants learned of the Xcel Energy evaporative cooler rebate *before* making their decision to purchase (Figure 3-8). Only about a third (32%) of participants learned of the rebate *after* deciding to purchase an evaporative cooler.

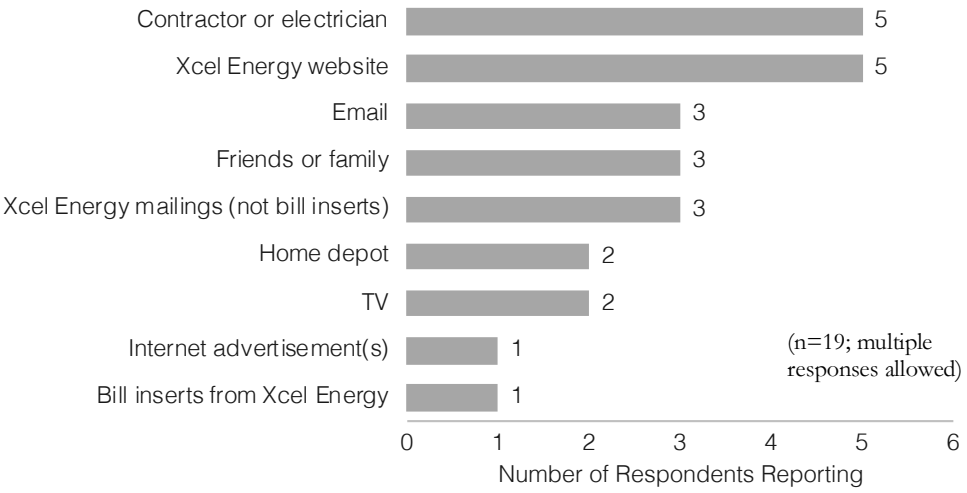
Figure 3-8. When Participating Customers Learned About Xcel Energy Rebates for Evaporative Coolers



Lack of awareness of the Xcel Energy rebates was pronounced for near-participating customers (i.e., those that had purchased a central AC system instead of an evaporative cooler). Just over one-quarter (27%) of near-participants were aware of rebates for evaporative coolers from Xcel Energy at the time they purchased their central AC system. This implies that awareness of the rebates was generally low among all customers considering the purchase of a new cooling system.

Near-participants who were aware of the rebates most commonly learned about them through the Xcel Energy website or through a contractor or electrician (Figure 3-9). Near-participants also cited email, friends or family, and Xcel Energy mailings.

Figure 3-9. How Near-Participating Customers Became Aware of Xcel Energy Rebates for Evaporative Coolers



Trade Partner Awareness and Perceptions of Xcel Energy Evaporative Cooling Product

Trade partners and wholesalers interviewed as part of this research praised Xcel Energy's marketing efforts aimed at customers. Specific findings include the following:

- Half of the 14 contractors we interviewed said that customer awareness of evaporative cooling has increased over time. Of those 7 contractors, 4 credited Xcel Energy product activities for that increase.
- The Xcel Energy website was the most-cited resource that contractors found helpful.
- One manufacturer representative said that Xcel Energy's evaporative cooler rebate marketing is the best he has seen.
    - "I think Xcel actually does the best of any of the utilities from running the TV advertisements as well as the radio advertisements speaking to specifically evaporative cooling. That's probably one of the best campaigns that we've had really ever."
- Other wholesalers also praised Xcel Energy's marketing.
    - One wholesaler said: "I don't see that I would need anything more from them, and I think their materials right now going to the homeowner are great. You know, the only thing with the homeowner focused side of it is you just gotta keep revamping that material every couple years to keep it new and fresh and exciting, if you will. But outside of that, I think they're doing a pretty great job of conveying all the messages within the evaporative cooler segment."
    - Another wholesaler added: "…[Xcel Energy is] helpful to us. We use them all the time. So I think you guys are doing what you can do. I think it's working."

3.5 Key barriers in the customer decision-making process related to evaporative cooling purchases

As outlined above in Section 3.3, many of the barriers to the purchase of evaporative coolers are related to lack of awareness or familiarity, or to the fact that many customers *do not even consider* purchasing an evaporative cooler because they simply want to replace their existing central AC system. Most near-participating customers (i.e., those that chose to purchase a central AC system) reported that they had not even considered purchasing an evaporative cooler, and that an increase in evaporative cooler rebate amounts would not be likely to change this decision. Collectively, this suggests that cost is not the primary barrier affecting greater product participation. Rather, the barriers that affect earlier phases of the customer decision pathway—awareness, familiarity, and the tendency to replace systems with "like" systems—may preclude customers from ever getting to the point of considering evaporative coolers as an option. This barrier is further compounded by trends in new construction that favor central AC systems instead of evaporative coolers—meaning that for some customers, the choice of cooling systems has already been made.

Table 3-3 shows which sources informed the finding related to this research objective.

Table 3-3. Data Sources Used to Assess Key Barriers in Customer Decision-making Process

Research Questions	Data Source			
	Participant Survey	Near-Participant Survey	Trade Partner Interview	Peer Program Interview
What are the most common barriers for adoption and how can Xcel Energy overcome them?	x	x	x	
How are other utilities encouraging the adoption of evaporative cooling technologies?				x

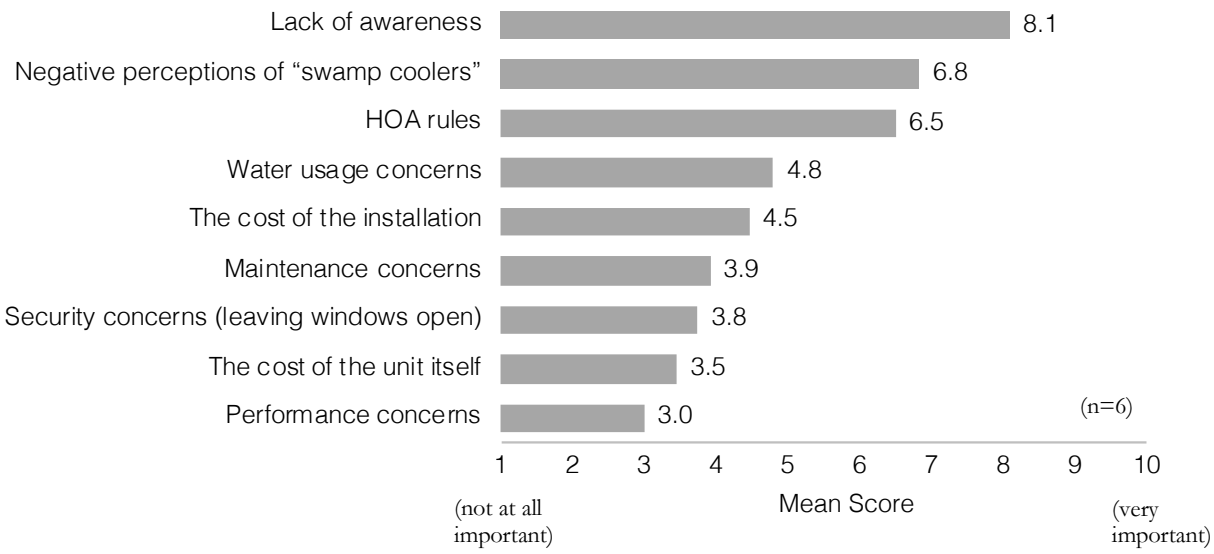
In the following sections we provide more detail on barriers preventing greater adoption of evaporative coolers, focusing first on findings from the trade partner interviews and then from surveys with customers.

Trade Partner Characterization of Customer Barriers

Specific findings from interviews with wholesalers include the following:

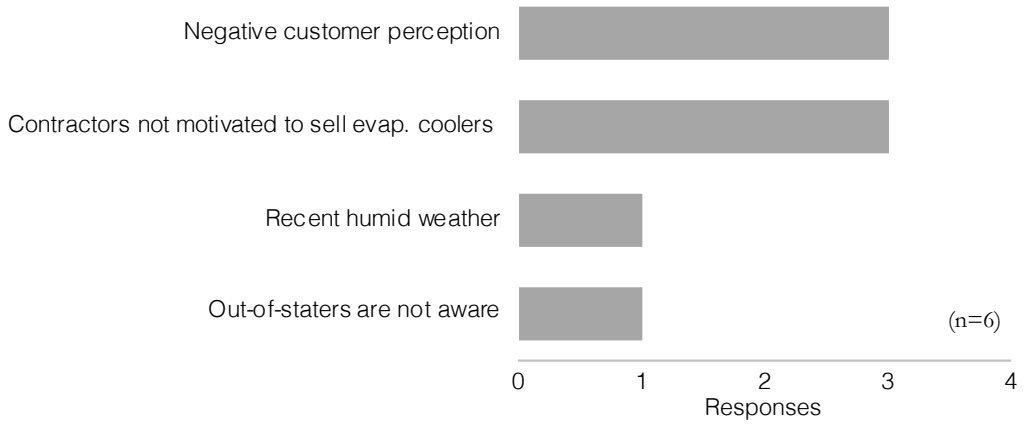
- Wholesalers rated on average that lack of customer awareness of evaporative coolers was the biggest barrier to evaporative cooler adoption (Figure 3-10).
- Wholesalers rated negative perception as the second biggest barrier.
- The importance of maintenance as a barrier was rated only a 3.9/10 by wholesalers. This is in contrast to the customer surveys, which placed maintenance at the top of the list for concerns and barriers to adoption.

Figure 3-10. Wholesaler Ratings of Customer Barriers to Evaporative Cooler Adoption



When the evaluation team asked wholesalers an open-ended question about how they would characterize customer barriers to evaporative cooler adoption, their top two answers were "negative customer perception" and "contractors don't want to sell evaporative coolers" (Figure 3-11). These two barriers go hand-in-hand, since contractors are unlikely to promote products for which their customers have a negative perception. At the same time, it highlights the chicken-and-egg challenge faced by the Evaporative Cooling Product as it attempts to increase uptake of this technology.

Figure 3-11. Wholesaler Open-Ended Responses to Characterize Customer Barriers to Evaporative Cooler Adoption



In addition to these barriers, wholesalers reported that new home builders favor central ACs in their designs rather than evaporative coolers. When asked if he sold evaporative coolers to new home builders, one wholesaler replied: "Not any more. They're not asking for it. It's not being spec'd. You are increasing the value of the house by putting in AC instead. Particularly to people coming in from out of town. [There is] no incentive for them to do it..." Another wholesaler observed that larger

national builders may have partnerships with AC manufacturers: "Well once you get to the large scale, some of [the national building companies] have programs already set up with air conditioning companies, and the air conditioning manufacturers. Just from an economical *(sic)* standpoint, they are significantly larger, so they can throw money around where the evaporative cooler manufacturers aren't able to compete… so it just comes down to a money game, realistically."

In the next section, we provide more detail on customers' self-reported barriers to considering evaporative coolers for their homes.

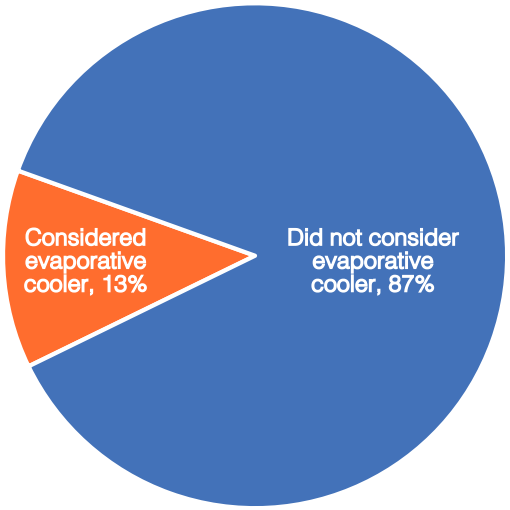
Customer Barriers

A major customer barrier is the fact that many customers don't even consider evaporative coolers as an option when purchasing a new cooling system. At the same time, near-participating customers report that increasing rebate amounts for evaporative coolers would have a limited effect on their likelihood to purchase an evaporative cooler instead of a central AC system. This suggests that there are some customers for whom rebates have a limited effect, which reinforces the need to target customers who (a) are buying a cooling system for the first time, or (b) are cost-conscious.

More details on these results are provided below:

- Results from near-participating customer surveys show that only 13% of them had even considered purchasing an evaporative cooler instead of an AC system (Figure 3-12).

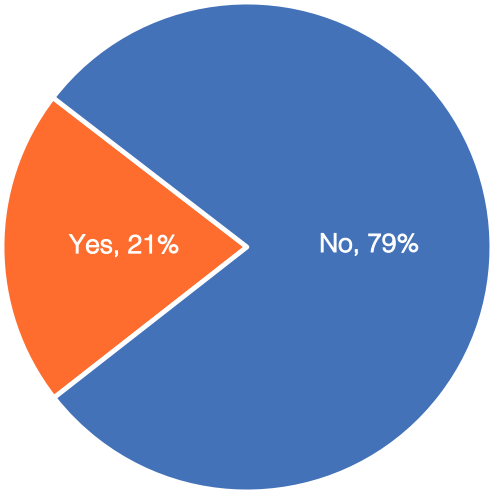
Figure 3-12. Near-Participating Customer Consideration of Evaporative Coolers During Purchase Process



(n=71)

Only 21% of near-participants would have been more likely to purchase an evaporative cooler if the evaporative cooler rebate was twice as much as the rebate they received for an AC system (Figure 3-13).

Figure 3-13. Near-Participating Customer Likelihood to Purchase Evaporative Cooler if the Xcel Energy Rebate were Twice as Large



(n=71)

Responses from participating customers indicate that rebate levels for evaporative coolers are currently within an appropriate range (though as discussed in more detail in the Conclusions and Recommendations, there are ways that the product can optimize influence by selectively increasing rebate amounts for some tiers).

3.6 Customer and trade partner experiences and satisfaction with the Evaporative Cooling Product

Participating customers and trade partners (including both contractors and wholesalers) who are involved with the Evaporative Cooler Product are generally very satisfied. None of the ratings from any of these groups were lower than a four (on a satisfaction scale of one to five) except for wholesalers' ratings of the size of the trade incentive. In addition to the overall product ratings being high, the highest rated aspects of the product were product staff people and the size of the customer rebates.

Table 3-4 shows which sources informed the finding related to this research objective.

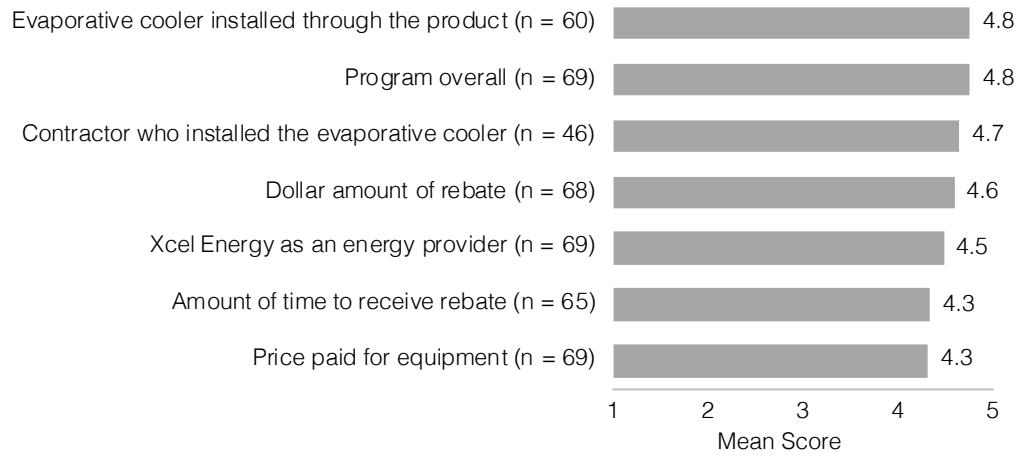
Table 3-4. Data Sources Used to Assess Customer and Trade Partner Experiences and Satisfaction

Research Questions	Data Source			
	Participant Survey	Near-Participant Survey	Trade Partner Interview	Peer Program Interview
How satisfied are customers and trade partners with various aspects of the product?	x		x	

Specific findings from the participating customer surveys include the following:

- Participant satisfaction was on average a 4.3 or above for each product element. On average, participants rated the product overall as a 4.8 (Figure 3-14).
- The highest rated element of the product was the evaporative cooler itself. This suggests that customers are satisfied with the performance of the technology.

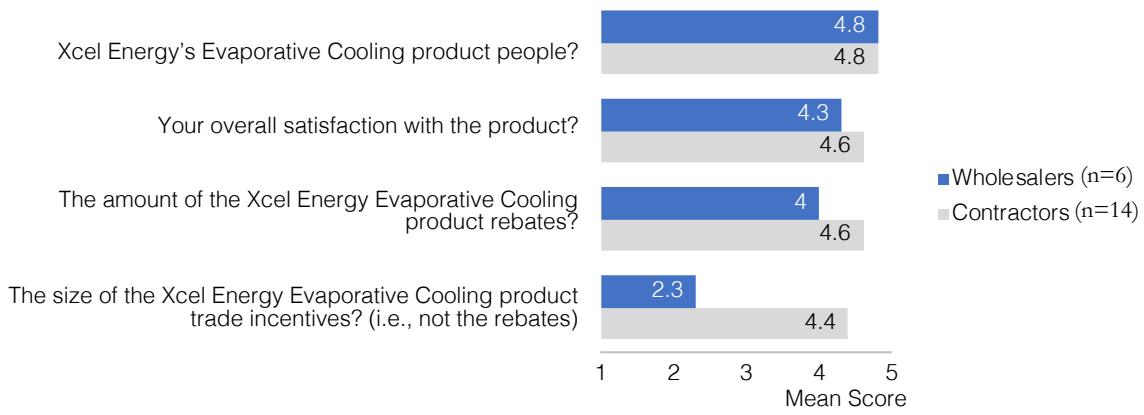
Figure 3-14. Participating Customer Satisfaction with Product Elements



Similarly, specific findings from the contractor and wholesaler interviews mirrored the findings from the customer surveys (Figure 3-15):

- Wholesalers rated product staff the highest of all product elements.
- Wholesalers rated the end user rebate an average 4 out of 5. They rated the size of the trade incentives a 2.3 out of 5.
- Contractors rated all product elements a 4 or higher out of 5, including the size of the trade incentives.
- Like the wholesalers, contractors rated the product staff as the element of the product with which they were the most satisfied.

Figure 3-15. Wholesaler and Contractor Satisfaction with Product Elements



3.7 The role of market actors in the evaporative cooling market in Colorado

The evaluation team queried different market actors (e.g., wholesalers, contractors, and participating customers) to better understand how the product is operating. Comparing results shows that each market actor has a slightly different view: participating customers were generally happy with their contractor, though in most cases this contractor had a limited effect on their decision to purchase an evaporative cooler. At the same time, wholesalers reported that contractors who want to sell evaporative coolers can do so effectively—the issue is that some contractors may not be motivated to promote evaporative coolers to their customers. This may be because contractors believe that customers do not want to buy evaporative coolers. Wholesalers indicated that contractors may be more inclined to promote central AC systems or mini-splits because of higher margins and potentially fewer installation risks (such as those related to working on a customer's roof).

Table 3-5 shows which sources informed the finding related to the role of market actors. The following section provides more details on these results.

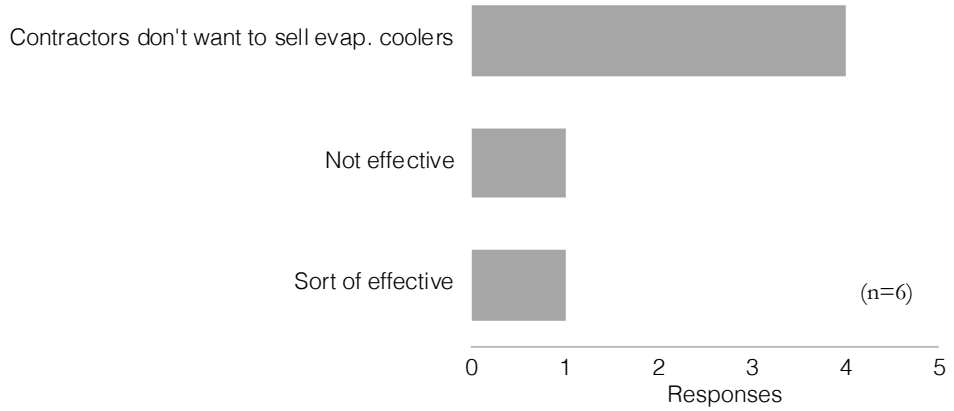
Table 3-5. Data Sources Used to Characterize the Role of Market Actors

Research Questions	Data Source			
	Participant Survey	Near-Participant Survey	Trade Partner Interviews	Peer Program Interviews
What barriers to increased sales of evaporative coolers do these market actors observe?			x	
What opportunities exist to increase their engagement with the product?			x	

Specific findings from contractor interviews include the following:

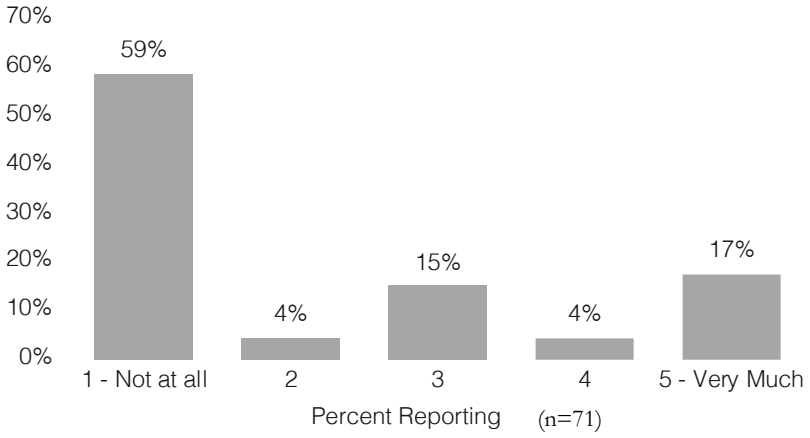
- When the evaluation team asked wholesalers to give open-end responses to describe the effectiveness of contractors at selling evaporative coolers, four of six wholesalers indicated that contractors do not want to sell evaporative coolers (as opposed to other cooling systems like central AC and ductless mini splits) (Figure 3-16).

Figure 3-16. Wholesaler Assessment of Contractor Effectiveness at Selling Evaporative Coolers



Surveys with participating customers corroborate this finding. A substantial percentage of participants (59%) attributed no influence at all to their contractors in their decision to purchase an evaporative cooler (Figure 3-17).

Figure 3-17. Participating Customer Assessment of Contractor Influence in Evaporative Cooler Purchase



Interviews with contractors showed that the customer rebates were an important motivator to sell more evaporative coolers, but that the trade incentives currently have a more limited impact:

- Contractors rated the influence of customer rebates on participation in the product an average 8.1 out of 10, where 0 is not at all influential and 10 is extremely influential.
- Contractors rated the influence of trade incentives on participation in the product an average 5.6 out of 10.
- Collectively this suggests that while customer rebate levels appear appropriate, there may be room for adjustment on the trade partner incentives.

3.8 Opportunities to improve product implementation

While participating customers, contractors, and wholesalers were generally very satisfied with the Evaporative Cooling Product, there were several suggestions for how the product may be improved in the future. Suggestions for improvement focused on: (1) increasing awareness of the rebates, (2) streamlining the rebate submission process, and (3) giving contractors additional motivation to promote and sell evaporative coolers.

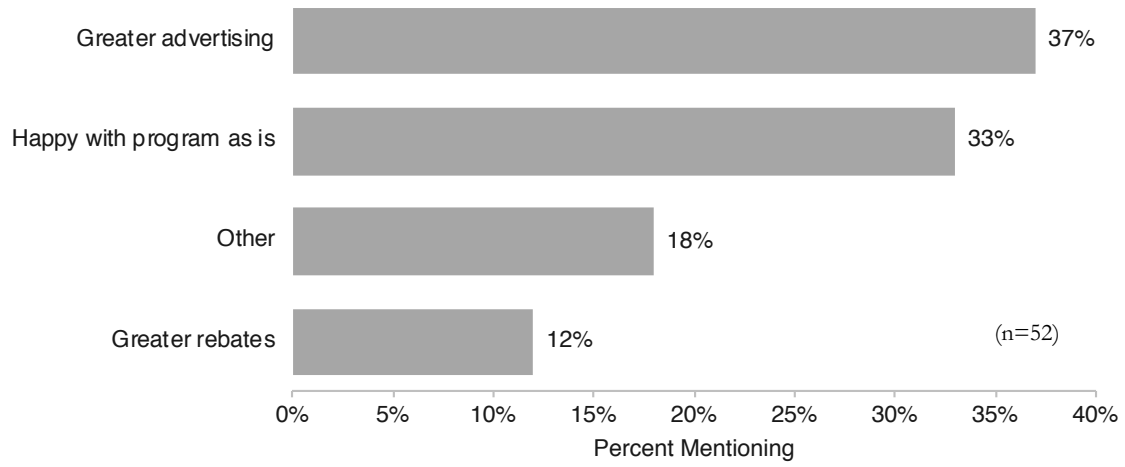
Information from the following sources informed the findings related to product improvement. In the follow section we provide more detail on these findings.

Table 3-2. Data Sources Used to Identify Opportunities to Improve Product Implementation

Research Questions	Data Source			
	Participant Survey	Near-Participant Survey	Trade Partner Interview	Peer Program Interview
How can the product improve? How can it improve the rebate submission process?	x	x	x	x

Participating customers were generally very happy with the Evaporative Cooling Product, and suggestions for improvement were mainly related to increasing awareness of the rebates (Figure 3-18). The most commonly-cited suggestion was to do more advertising (37% of respondents). Only 12% of respondents suggested an increase in rebate amounts. Respondents made suggestions related to other aspects of the product, the most common of which was related to making the rebate application process easier and faster.

Figure 3-18. General Categories of Customer Suggestions for Product Improvement



Like customers, contractors were generally very satisfied with product processes and had only a few suggestions for potential improvements. Specific findings include the following:

- One contractor noted that it was occasionally difficult to determine whether or not a specific model would qualify for the rebate. This contractor indicated that while he knew Xcel Energy provided a list, it was more difficult now than in the past to get in touch directly with someone at Xcel Energy to ask these questions.
- One contractor noted that it was sometimes difficult to submit rebate paperwork in a timely manner when their company got busy. However, there were overall very few mentions of this problem.
- Two contractors noted that sending checks through the mail to customers was a bit of a hassle, and that this process could perhaps be streamlined. Overall, however, this was not mentioned by a majority of contractors interviewed.
- Three of six wholesalers said increasing the contractor trade incentive would be most likely to increase the number of evaporative coolers sold by contractors. One other wholesaler said Xcel Energy should provide contractors pre-made packaged sales options to offer their customers.

4. CONCLUSIONS AND RECOMMENDATIONS

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

Overall, the evaluation team found that the Evaporative Cooling Product is operating smoothly, with high levels of satisfaction among participating customers, trade partners, and wholesalers. There is corresponding evidence from this evaluation that the product has had a positive net impact on energy efficiency within the Xcel Energy Colorado service area. However, there are several market barriers preventing the Evaporative Cooling Product from being able to increase adoption of evaporative cooling technologies. These barriers include:

- A trend in new construction to focus primarily on central AC systems.
- The finding that some contractors may not be motivated to promote evaporative coolers because they believe that customers do not want them or because it is difficult to achieve reasonable profit margins on evaporative cooler installations.
- The fact that customers will typically replace an existing cooling system with a newer system of the same type (meaning it is unlikely that customers will switch from a central AC system to an evaporative cooler).

Despite the challenges presented by these market barriers, there are ways that Xcel Energy can optimize the operations and impact of the Evaporative Cooling Product moving forward. Specific findings and recommendations follow.

- [Process] **Key Finding 1: Customers are very likely to replace existing cooling systems with "like" systems, making it difficult to convert customers from central AC to evaporative cooling.** Typically, a customer who already has a central AC system is very likely to purchase a new central AC system rather than consider an evaporative cooler. At the same time, customers who did purchase an evaporative cooling system were most likely to either have just replaced an existing evaporative cooler or have had essentially no cooling system at all.

    - **Recommendation 1.1:** Continue to target customers without any type of existing cooling system, as well as those in areas of lower socioeconomic means.
    - **Recommendation 1.2:** Increase the customer rebate amount for first time (e.g., non-replacement) purchase decisions while keeping the customer rebate amounts static for replacement situations, as shown in the table below. Further, because the intent is to protect and grow the evaporative cooler customer base, if a customer replaces a cooler with a higher rebate category cooler, the customer would qualify for the first time (non-replacement) rebate and associated NTGR.

Tier [a]	Current	Proposed
Standard – Replacement	$200	$200
Standard – First Time	$300	$400
Premium – Replacement	$600	$600
Premium – First Time	$700	$800
Whole House – Replacement	$1,200	$600
Whole House – First Time	$1,200	$1,200

[a] In future years, tiers currently called "First Time" will become "Non-replacement." The "Whole House" tier will become a "Multi-ducted" tier to clarify the eligibility requirements.

- [Process] **Key Finding 2: Simply increasing awareness of *what an evaporative cooler is* may not be sufficient to increase uptake of this technology among customers. Instead, it appears that a lack of experience with how an evaporative cooler actually operates in a home may also be preventing more customers from seriously considering this type of equipment.** More specifically, it appears that performance concerns—particularly those related to maintenance and access—are important overarching barriers for customers who may be thinking about purchasing a cooling system for their homes.

    - **Recommendation 2.1:** At some point in the future—after the instant rebates mechanism has been implemented—consider partnering with or providing incentives to retailers and/or third parties to help customers understand first-hand what it is like to have an evaporative cooler in their home. For instance, a live display in a retailer showroom may provide the type of exposure that customers need to feel more comfortable with—and positive about—the technology.
    - **Recommendation 2.2:** Find ways to provide information to potential and current evaporative cooling customers related to proper maintenance of evaporative coolers. Such information may emphasize that the maintenance requirements of evaporative coolers do not have to be burdensome to the customer.

- [Process] **Key Finding 3: Window and roof-mounted evaporative coolers face heavy competition from other cooling technologies such as central AC systems, mini-split heat pumps, and non-rebated portable evaporative coolers.** While some contractors are highly motivated to promote and sell evaporative coolers to their customers, other contractors continue to promote options like central AC systems and mini-split heat pumps. In some cases this is because contractors believe that customers are not interested in purchasing an evaporative cooler. In other cases, it is because contractors find it more difficult to achieve the same profit margins on evaporative coolers as they would on more expensive central AC systems. In other cases, customers are forgoing any installation work and purchasing portable evaporative coolers instead of window or roof-mounted units.

    - **Recommendation 3.1:** Consider adding portable evaporative coolers as a measure, as some customers choose to purchase portable units rather than window or roof-mounted units.

- [Process] **Key Finding 4: While contractors interviewed by the evaluation team indicated that nearly all eligible evaporative coolers they sell are rebated, there is some indication from wholesalers that not all units sold receive a rebate.** This apparent discrepancy is likely related to self-selection bias by the contractors included in our interviews—these contractors may be more engaged with the Evaporative Cooling Product and thus more likely to offer product rebates to their customers. But not all contractors may be so highly engaged.

    - **Recommendation 4.1:** In the future, consider pursuing a point-of-sale (POS) instant rebate mechanism, as this would allow the product to more effectively capture eligible units that are sold in Xcel Energy service territory. As part of this effort, it would be important to understand timing considerations for implementation (as a hurried implementation may lead to mixed results) as well as the potential impact that such rebates may have on contractor and wholesaler business models. If such a mechanism is implemented, it would also be important to ensure the product can claim attribution—for instance, by requiring contractors to document the rebate on customer invoices, or sending a confirmation email to customers so they are aware that they received a rebate from Xcel Energy.

- [Impact] **Key Finding 5: There is evidence from this evaluation that the Evaporative Cooling Product is having a net positive influence on customer decisions regarding high efficiency residential cooling equipment in the Xcel Energy service territory in Colorado.** The recommended retrospective NTGR for the product as a whole is 0.60, which incorporates estimates of free-ridership, participant spillover, and market effects. Moving forward, we recommend a prospective NTGR of 0.70, contingent on the product implementing several adjustments as described below.

    - **Recommendation 5.1:** The recommended retrospective product-level NTGR is 0.60. Moving forward, the product can optimize influence in the market by (1) prioritizing whole house systems and first time installations, and (2) partnering with retailers to promote evaporative cooling systems through in-store displays in coordination with an instant rebate at the point of sale. These modifications would allow the product to increase its influence in the market, resulting in a recommended prospective product-level NTGR of 0.70.
    - **Recommendation 5.2:** Separate the "Whole House" product tier into two separate tiers—a first-time tier and replacement tier—as the current grouping includes both systems that are tied into existing ductwork as well as systems where new ductwork is required. Based on the finding that first-time systems exhibit less free-ridership than replacement systems, and based on benchmarked values for whole house systems from other utilities, the recommended prospective NTGR for a first-time whole house tier is 0.90.[6]

[6] As explained in Recommendation 1.2, if a customer replaces a cooler with a higher rebate category cooler, the customer would qualify for the first time (non-replacement) rebate and associated NTGR.

Evaporative Cooling Evaluation

2018 Program Evaluation: Recommendations and Responses

The Xcel Energy Evaporative Cooling product in Colorado provides residential customers with downstream financial incentives to encourage the purchase of evaporative cooling equipment in existing or new homes. Xcel Energy (The Company) engaged a team of researchers led by EMI Consulting to conduct a process and impact evaluation of the Evaporative Cooling product. The evaluation team was asked to assess the following:
The evaluation team designed a comprehensive evaluation of the Evaporative Cooling Product to provide information on five key research topics:

- Influence on the evolving residential cooling equipment market
- Influence on the decisions of eligible customers
- Participant experiences with the Evaporative Cooling Product
- Similarity with peer utilities
- Opportunities for improving product delivery

Based on the results of this research, the evaluation team developed key findings and recommendations for Xcel Energy.

Recommendation	Response
1) Continue to target customers without any type of existing cooling system, as well as those in areas of lower socioeconomic means.	The Company agrees to continue this practice.
2) Increase the customer rebate amount for first time (e.g., non-replacement) purchase decisions while keeping the customer rebate amounts static for replacement situations, as shown in the table below. Further, because the intent is to protect and grow the evaporative cooler customer base, if a customer replaces a cooler with a higher rebate category cooler, the customer would qualify for the first time (non-replacement) rebate and associated NTGR.	The Company is raising the rebates for first time (e.g., non-replacement) evaporative cooler purchase decisions. The Company will follow the evaluator's recommendation for customers who are purchasing a higher tier evaporative cooler than they previously owned as a first time (e.g., non-replacement) rebate and associated NTGR.
3) At some point in the future—after the instant rebates mechanism has been implemented—consider partnering with or providing incentives to retailers and/or third parties to help customers understand first-hand what it is like to have an evaporative cooler in their home. For instance, a live display in a retailer showroom may provide the type of exposure that customers need to feel more comfortable with—and positive about—the technology.	The Company agrees to this recommendation. A handheld "misting fan" will be used to demonstrate the concept of evaporative cooling during the store events in 2019. In 2020, a different demonstration tool may be used.

4) Find ways to provide information to potential and current evaporative cooling customers related to proper maintenance of evaporative coolers. Such information may emphasize that the maintenance requirements of evaporative coolers do not have to be burdensome to the customer.	The Company agrees to this recommendation, and will try to have it ready for the 2019 cooling season as a resource on the product website.
5) Consider adding portable evaporative coolers as a measure, as some customers choose to purchase portable units rather than window or roof-mounted units.	The Company agrees to this recommendation. Product development is planned for 2019, to determine if the measure will be cost effective. If it is, it will be added for use in 2020.
6) In the future, consider pursuing a point-of-sale (POS) instant rebate mechanism, as this would allow the product to more effectively capture eligible units that are sold in Xcel Energy service territory. As part of this effort, it would be important to understand timing considerations for implementation (as a hurried implementation may lead to mixed results) as well as the potential impact that such rebates may have on contractor and wholesaler business models. If such a mechanism is implemented, it would also be important to ensure the product can claim attribution—for instance, by requiring contractors to document the rebate on customer invoices, or sending a confirmation email to customers so they are aware that they received a rebate from Xcel Energy.	The Company agrees to this recommendation. Plans are underway to have an instant rebate mechanism in place for top retail outlets and top distributors in 2019 and 2020. Contractors buying through participating distributors will be trained on the need to document the instant rebate from the Company on their invoice to the customer, for attribution purposes. Further, a letter from the Company to the customer, will reinforce the message that the customer has received a rebate from the Company.
7) The recommended retrospective product-level NTGR is 0.60. Moving forward, the product can optimize influence in the market by (1) prioritizing whole house systems and first time installations, and (2) partnering with retailers to promote evaporative cooling systems through in-store displays in coordination with an instant rebate at the point of sale. These modifications would allow the product to increase its influence in the market, resulting in a recommended prospective product-level NTGR of 0.70.	The Company agrees to this recommendation, and is making the adjustment via a 60-day notice.

8) Separate the "Whole House" product tier into two separate tiers—a first-time tier and replacement tier—as the current grouping includes both systems that are tied into existing ductwork as well as systems where new ductwork is required. Based on the finding that first-time systems exhibit less free-ridership than replacement systems, and based on benchmarked values for whole house systems from other utilities, the recommended prospective NTGR for a first-time whole house tier is 0.90.	The Company agrees to this recommendation, and is making the adjustment via a 60-day notice, to provide a seamless customer rebate experience throughout the 2019 cooling season.