

Xcel Energy

Comprehensive Process and Impact Evaluation of the Business Heating Efficiency Program—Colorado

FINAL

December 14, 2011



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EXECUTIVE SUMMARY

Xcel Energy is looking for meaningful ways to improve the elements of its demand side management (DSM) business programs, its customer-reach capabilities, and the operation efficiency of their programs so that they can successfully meet program goals and objectives. To assist Xcel Energy in this aim, Xcel Energy selected through a competitive Request for Proposals (RFP) process a third party vendor (comprised of Tetra Tech, Evergreen Economics and Michaels Energy—hereafter the “Tetra Tech team”) to conduct objective evaluations of their demand side management (DSM) business programs in Minnesota and Colorado. Furthermore, the RFP process selected a DSM business programs evaluation provider for a three-year period (2010–2012) in order to provide research continuity, comprehensive portfolio-level results, and best practices evaluation services.

The Colorado Business Heating Efficiency program was evaluated in 2011. This Executive Summary provides an overview of the 2011 process and impact evaluation of the Commercial Heating Efficiency program in Colorado.

I. PROGRAM OVERVIEW

Xcel Energy, the fourth-largest combination electricity and natural gas company in the United States, offers a comprehensive portfolio of energy-related products and services to 3.4 million electricity and 1.9 million natural gas customers. In Colorado, Xcel Energy has 195,169 commercial customers and 4,415 industrial customers. These include electric only, gas only, and electric and gas customers.

The Colorado Business Heating Efficiency program (formerly the Boiler Efficiency and Furnace Efficiency programs) is designed to encourage business customers to install new high efficiency gas-fired hot-water boilers and furnaces, improve existing boilers or hot water heaters with efficiency enhancements, or conduct boiler tune-ups to maintain peak operating efficiency. The program provides prescriptive rebates to natural gas customers in Colorado for installing qualifying high efficiency systems used exclusively for space or domestic water heating. As the rebates are prescriptive, no pre-approval is required.

II. EVALUATION METHODOLOGY

The Tetra Tech team conducted a comprehensive evaluation of the program. The process evaluation provides Xcel Energy with a thorough understanding of participating and nonparticipating commercial customer and trade ally awareness, attitudes and behaviors as well as benchmarked information for similar programs offered throughout the country. The impact evaluation assesses that the program’s gross energy and demand savings are sound and defensible. In addition, the impact evaluation’s net-to-gross calculations to estimate net energy savings employ triangulation methods for best estimates of program attribution.

The evaluation research included: 12 Xcel Energy staff internal review interviews (30 total covering all four programs), 115 participant surveys, 53 nonparticipant surveys, 10 qualitative trade ally interviews, three surveys with influential vendors representing 15 projects, a benchmarking study of 13 other utility programs including four program manager interviews and an engineering review of the program’s baseline and technical assumptions.



III. SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

The Colorado Business Heating Efficiency program (formally the Boiler Efficiency and Furnace Efficiency programs) is designed to encourage business customers to install new high efficiency gas-fired hot-water boilers and furnaces, improve existing boilers or hot water heaters with efficiency enhancements, or conduct boiler tune-ups to maintain peak operating efficiency. The program provides prescriptive rebates to Xcel Energy natural gas customers in Colorado for installing qualifying high efficiency systems used exclusively for space or domestic water heating. As the rebates are prescriptive, no pre-approval is required. The program should be on track to meet its 2011 goal of 44,102 Dth, with 23,044 Dth committed as of September 15, 2011 before what is normally a busy fall for participation.

Based on extensive primary research with Xcel Energy program staff, heating efficiency program staff in other territories, program participants, Colorado HVAC contractors and suppliers, and nonparticipating Xcel Energy customers, the program is operating effectively considering its limited exposure to the market. However, the evaluation research did identify some areas where improvements could be implemented as well as areas that would benefit from continued program support.

The program's operational success is due to many components that are working well in conjunction with proactive efforts to address challenges facing a young program. These components include efficient working relationships among the Xcel Energy DSM staff; adoption of proven program design practices; effective outreach to trade allies' unique incentive structures that drive customer interest; and few "bottlenecks" in the program participation process.

At the same time, the program faces several challenges. The low natural gas prices in Colorado have decreased the number of cost-effective measures available for the program. Program staff also report that internally electric savings programs generally receive higher priority than natural gas savings programs among sales staff. This focus may be due to a greater incentive for reaching electric savings goals than for annual natural gas savings goals because of the higher avoided costs for electricity. In addition, a high percentage of Colorado Xcel Energy customers, especially the largest, are gas transport-only customers and therefore ineligible for the program. Therefore, the program must rely more heavily on small business customers, which can be administratively harder to reach and serve. The evaluation research did identify some strategies to help Xcel Energy with those challenges. Recommendations for consideration discussed below include implementing a trade ally incentive for contractors new to the program; continuing the Plan B boiler incentive; creating targeted educational materials regarding the cost-effectiveness of boiler retrofits and tune-ups; and developing simple Xcel Energy-branded return-on-investment or energy savings calculators for use by HVAC contractors.

Key findings and recommendations for both the impact and process components of the evaluation are below.

IV. IMPACT EVALUATION FINDINGS

The evaluation included research to inform both gross savings and net savings estimates, discussed next.



a. Program Gross Savings

The participant surveys found that measure persistence is high and the baseline and technical assumption review found that the program's baseline and technical assumptions to calculate gross savings are reasonable, well-researched and documented, and generally consistent with other programs. Below are key findings as well as recommendations for Xcel Energy's consideration.

Measure persistence is high.

All customers reported the heating equipment they rebated through the program was still installed and operating as intended.

Recommendation #1: There is no recommendation for improving measure persistence.

The baseline efficiencies for new boiler projects, water heaters and furnaces are all reasonable and consistent with other programs, as well as compliant with current Colorado building and energy codes.

The baseline efficiency for new boiler projects is based on the minimum efficiency requirements found in 2006 International Energy Conservation Code (IECC), ASHRAE 90.1, and the Federal Energy Management Program. The proposed boiler efficiencies are also the qualifying efficiencies and are reasonable when compared to the required efficiencies of other programs. The proposed boiler efficiency is collected and input into the savings calculation, but is not used to calculate the savings. Instead, an average efficiency is used to account for operating under non ideal test conditions. The average efficiency is reasonable, but the value used for condensing boilers is slightly higher at 96.2 percent than other sources found in the literature review as detailed in Section 10, which cluster around 94 percent such as found in the Prescriptive Condensing Boiler Impact Evaluation of the Massachusetts Energy Efficiency Programs (93.9 percent). The furnace and water heater baseline efficiency is consistent with other programs reviewed.

Recommendation #2: While no changes are recommended to the baseline efficiencies for new boiler projects, water heaters and furnaces; Xcel Energy may want to consider revising the assumed efficiency for condensing space heating and water heating boilers to 94 percent to be slightly more conservative and consistent with the literature.

The assumed increases in efficiency for modulating burners, tune-ups, outdoor air temperature resets, and stack dampers are all reasonable and consistent with other programs.

While the efficiency for all these measures are reasonable, the evaluation team believes the outdoor air temperature reset measure can currently be claimed for all types of boilers. Since the water temperature for domestic hot water is fixed, domestic hot water only boilers cannot modulate temperature with outdoor air temperature.

Recommendation #3: Consider making outdoor air temperature reset ineligible for domestic hot water only boilers.

Savings assumptions for pipe insulation are consistent with best practice while the literature review shows that savings for steam traps vary considerably.



Xcel Energy uses a quasi-custom analysis to determine the savings for pipe insulation. This allows greater flexibility than fixed values when determining the energy savings for a given project. Additionally the savings algorithms were developed using a highly used and well regarded insulation calculation software package. The literature review found that steam trap savings vary significantly based on the orifice size of the steam trap being replaced. However, primary research on steam traps is very expensive and should only be conducted if steam traps are a substantial percentage of overall program savings. Xcel Energy staff report that very few to no steam trap replacements are anticipated in the Colorado market.

Recommendation #4: Consider further research for the steam trap measure to ensure that the most representative information is used for participants in the Colorado territory only if or when steam trap savings meet or exceed 30 percent of the total Colorado Heating Prescriptive program savings.

The expected useful life for high efficiency boilers used in saving calculations is reasonable but adjustments may be needed for stack dampers and pipe insulation.

The savings for high efficiency boiler projects are based on an expected useful life of 20 years. Based on the results of the literature review, this is reasonable and consistent with other programs. The expected useful life used for stack dampers is also 20 years and this is greater than what is used in other programs, which tend to cluster around 12 years such as for the NYSERDA program. Conversely, the expected useful life for pipe insulation appears to be less than what is used in other programs. The EUL for pipe insulation is currently set at seven years. A review of the literature shows several reports and jurisdictions use between ten and 15 years for an EUL.

Recommendation #5: Consider reducing the effective useful life for stack dampers from 20 years to 12 years to be more consistent with other programs.

Recommendation #6: Consider increasing the effective useful life for pipe insulation from seven years to ten to 15 years to be more consistent with other programs.

Effective full load hour assumptions are reasonable.

The space heating only effective full load hours (EFLH) are assumed to be 659 hours. This value is reasonable based on the Colorado climate. The EFLH used in water heating only applications is 2,190 hours per year, and the EFLH used in water heating and space heating applications is 1,443 hours per year. These numbers also appear to be reasonable as do the assumptions for pipe insulation.

Recommendation #7: No changes are recommended to the effective full load hour assumptions.

b. Program Net Savings

To estimate program net savings, the evaluation team employed a triangulation, or preponderance of evidence, approach—an identified best practice in the industry for net savings—to recommend a net-to-gross (NTG) ratio for the program. The recommended NTG ratio is based on a review of program files and interviews with: 1) recent (within the last 12 months of the program) participating customers and influential vendors (vendors identified by participating customers as



being influential in their decision-making process), 2) in-depth interviews with trade allies, 3) a literature review and benchmarking interviews with program managers of similar programs in the US, and 4) results from surveys with eligible nonparticipants. Key findings and recommendations for this research are below.

The net-to-gross research shows the program has been influential in the participant decision making process.

The NTG ratio for the Colorado Business Heating Colorado Business Heating Efficiency program based on the Calculated NTG ratio using the California self report approach, adjusted for participant-reported previous program participation and spillover results, is a .85 NTG ratio. While this is a conservative estimate of net-to-gross as it does not include nonparticipant spillover and is limited to participant-reported like spillover, it does show the program is highly influential in the customer decision making process across the majority of program savings. However, this NTG is based on research with participants during the first program cycle. We normally see NTG increases as programs gain more maturity in a market and able to more effectively influence customers. The benchmarked research shows NTG with spillover for business heating programs typically range from .80 to .89 for prescriptive measures¹. Xcel Energy falls within this range. However, we recommend a slight adjustment upward in the recommended NTG factor for the next program cycle to recognize the program will have gained some momentum to be more influential in the customer decision-making process. For the next program year, we recommend a one percent increase in the NTG factor.

Recommendation #8: We recommend a NTG ratio for the next program year of 0.86.

V. PROCESS EVALUATION

The process evaluation findings and recommendations synthesize results across program staff interviews, participant and nonparticipant surveys, in-depth interviews with trade allies and benchmarking of similar programs across the U.S. Below we summarize key findings and recommendations in the following areas: program design, program delivery and customer satisfaction.

c. Program Design

The program is following best practice for heating programs by offering two tiers of rebates: an aggressive high efficiency level and a less aggressive high efficiency level.

Aggressive high efficiency rebates range from \$1000 - \$5000/MMBTUH with less aggressive high efficiency level rebates ranging from \$500 - \$2000/MMBTUH. The benchmarking research indicates this structure is best practice across the country. It allows for programs to cost-effectively capture a wide variety of boiler installations and accommodates changes in technology without radical shifts in incentive structures.

¹ Tetra Tech, Massachusetts Program Administrators and the Energy Efficiency Advisory Council Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential and Multi-Family HEHE Gas Programs, and Commercial and Industrial Gas Programs, July 8, 2011



Recommendation #9: Continue tiered rebate structure based on efficiency levels.

Trade ally incentives could be effective, especially in markets with a large population of small HVAC contractors and nonparticipating contractors.

The benchmarking research identified three programs that offered incentives to trade allies that install equipment through the program. The incentives ranged from \$25 to \$175 per qualifying new equipment installed. In addition, one program offered incentives for boiler enhancements and steam traps: \$15 to \$25 per enhancement and \$3 per repaired or replaced steam trap. Program managers reported that these incentives were well received, particularly by smaller HVAC contractors that used the money to compensate staff or invest in their business. Program managers reported that larger firms usually used the incentive to buy-down the cost to the customer.

However, interviews with participating trade allies indicate that the incentive, while viewed positively, would have little influence on their sales practices. This suggests an incentive would be most effective with HVAC contractors that are new to the program. It was discussed with program staff that one main benefit of a trade incentive would be the possibility of streamlining the cost of program administration by encouraging trade allies to submit completed and accurate program paperwork for customers. A drawback of trade incentives also discussed is once an incentive is introduced, it is difficult to discontinue or stop the benefit even when it is no longer needed. It was also discussed that because the Colorado program has a limited program budget, it is most likely not feasible to offer trade ally incentives.

Recommendation #10: Consider offering trade ally incentives. If possible, limiting this incentive to nonparticipating or “first-time” vendors would maximize its influence. Another possibility is to only provide incentives upon the submission of complete program paperwork. This could reduce the program’s overall administrative burden.

The Plan B boiler component of the Colorado program is effective.

Program staff reported that the program’s Plan B boiler option has been very effective at driving interest in the program due to the large rebate amount. This finding is corroborated by participant results which identified a high level of program influence on these projects. Program staff and all but one interviewed vendor reported that, given the appropriate project, the program’s incentive enables efficient retrofits to go forward when customers otherwise would have kept the less efficient boiler until failure. Vendors also reported the Plan B rebate creates a unique marketing tool for early retirement of inefficient boilers.

Recommendation #11: Continue to offer enhanced rebates for early replacement boilers.

Boiler tune-ups may be most effective as a way to educate customers about high-efficiency equipment for upgrades or replacements.

While some HVAC contractors reported that the tune-up incentive does encourage people to conduct tune-ups when they otherwise might not have, others reported that the tune-ups are something that their customers are doing regardless of financial incentives as part of routine maintenance. In addition, analysis of the participant surveys indicates a lower level of program influence for this service as evidenced through the NTG ratio calculated at the measure level. In



addition, some participants reported lower satisfaction with the rebate amount and were unsure of what savings were realized as a result of the tune-up. As those participants that received a boiler tune-up frequently mentioned energy savings as the motivation for conducting the tune-up, it is possible that they may not be aware of the potential cost savings realized from conducting tune-ups. These costs savings can come not only from reduced fuel consumption but also from a reduction in emergency service calls when equipment fails during the heating season.

When asked about future plans for heating system upgrades, 39 percent of participants reported that they had plans to upgrade or replace part of their system. Most of these were participants who had received a boiler tune-up (43 participants, 31 of which received a boiler tune-up). Most often, these planned projects included the installation of new boilers (86 percent of those participants with plans to upgrade/replace). This finding suggests potential for future program participants specifically as those conducting boiler tune-ups start to replace their aging systems and turn to Xcel Energy for technical and financial assistance.

Recommendation #12: Continue the boiler tune-up component as an important entrée into efficient equipment projects, but also continue to educate customers regarding the cost savings benefits of boiler tune-ups.

Recommendation #13: Investigate the feasibility of an enhanced boiler tune-up option in Colorado after the Minnesota Commercial Heating Efficiency program pilots this enhanced option in 2012.

There is savings potential in the Colorado market for the Heating Efficiency program, but this is limited by ineligible customers.

In addition, to the 39 percent of participants reporting planned equipment upgrade or replacement projects as discussed in the above key finding, about one-quarter of eligible nonparticipants plan to install new heating equipment in the near future, and a majority would appreciate help from Xcel Energy in doing so.

The nonparticipant survey screened out customers that were not eligible for the program because they did not have eligible equipment or their boiler was used for process purposes. These ineligible customers represented three percent of the nonparticipant sample, which had already been screened for customers ineligible for other reasons. For example, as mentioned previously, gas transport-only customers are also not eligible for the program. Gas-transport only customer represent some of Xcel Energy's largest customers. Therefore the program has to primarily reach smaller and medium-sized customers, which are administratively harder and more costly to reach than larger customers with established account management relationships.

Recommendation #14: Continue to consider the savings potential of the somewhat limited eligible population when setting program goals.

Program nonparticipants face significant barriers when deciding whether or not to install energy-efficient equipment.

Most nonparticipants gave at least one example of a barrier their business faces when looking to install energy-using equipment at their facility. Most often, nonparticipants mentioned financial barriers, either initial cost or a lack of capital, as their main barrier to implementing projects. Capital investment and budget availability were also rated the highest of a list of important factors



nonparticipants consider when deciding whether or not to install new energy-using equipment of processes at their facility.

Recommendation #15: Continue to offer program rebates that are important in addressing the initial cost barrier of energy efficient projects.

Over half of boiler tune-up participants reported future heating improvement system plans.

Approximately half (53 percent) of tune-up participants reported having plans to implement energy efficiency improvements in the future, about twice as many as non-participants (27 percent). This indicates that tune-ups may be an important first-step to future heating improvements that will realize larger savings.

Recommendation #16: Continue to offer tune-ups as an important awareness builder for larger energy efficiency projects.

d. Program Delivery

Xcel Energy has effective trade ally outreach in Colorado.

Program staff report that the program has engaged trades early and often to make sure they were “on board” and worked closely with distributors to funnel information down to smaller providers and that these efforts have succeeded in generating interest among the HVAC contractors in their area. In addition to those efforts, the program is creating a heating advisory board with 14 different HVAC trade ally firms across the state. This board will meet twice a year to ensure the program is meeting the needs of both Colorado natural gas customers and the contractors that serve those customers.

In addition, all but one of the interviewed trade allies reported that they were first made aware of the commercial rebates available from the program by Xcel Energy staff.

Recommendation #17: Continue to support a heating advisory board in Colorado, including actively recruiting new members to the board and scheduling regular meetings (semiannually or prior to major program design changes). Program staff have already begun this process and are scheduling semi-annual meetings.

Some HVAC contractors question the savings and reliability of high efficiency boilers.

While a majority of contractors and all of the manufacturers’ representatives interviewed reported that the incentives offered by the program for high efficiency boilers were effective, two contractors claimed that installing high efficiency boilers is not always a “no-brainer”. One contractor believed the increased maintenance costs of a high efficiency boiler offset any savings from reduced energy. Another contractor believed that retrofitted boilers do not often run at maximum efficiency as the system is still using old heating peripherals that reduce efficiency. Xcel Energy reports that, in their experience, customers do not install high efficiency boilers in these situations because of the price differential, which would not be justified without realizing the energy savings, and therefore this is not an issue for the program.

Several interviews also suggested that a program calculator would provide “hard numbers” for customers, encouraging them to see the long term savings available by upgrading to high



efficiency boiler systems. This calculator could also serve as an educational tool, encouraging contractors to see the cost savings potential of high efficiency boilers and helping to address some of the misconceptions discussed above.

Recommendation #18: Pursue developing simple Xcel Energy-branded return-on-investment or energy savings calculators for use by HVAC contractors. This idea could first be vetted to the Heating Advisory Board for their input.

Contractors expressed interest in cooperative marketing activities with Xcel Energy.

When asked about cooperative marketing opportunities, contractors responded positively. Contractors believed that Xcel Energy branding would lend credibility to the contractors' presentations and bids. These campaigns could include allowing contractors to use Xcel Energy logos in their bid presentations or presenting customers with Xcel Energy-sponsored savings figures based on the previously suggested calculators. Program staff reported they did work with two different trade allies to review collateral materials the trade allies developed. Program staff said they are open to continue to do so in the future.

Recommendation #19: Investigate allowing HVAC contractors to enter into cooperative advertising campaigns with Xcel Energy.

HVAC contractors are the most effective ways to educate potential participants about the program.

When asked how they first became aware of Xcel Energy's Heating Efficiency program, participants most frequently reported that their equipment or service contractor informed them that they were eligible for the program. In addition, of the managed account participants, account managers were the most frequently reported source of program information instead of the equipment vendors. Nonparticipants also reported relying on vendors or contractors for information about and implementation of energy-using equipment. These findings suggest that these two channels are effective sources of program information for potential participants.

Recommendation #20: Continue proactive HVAC vendor outreach and expand opportunities to engage vendors as feasible and relevant to the program.

There is evidence that both the application process and understanding of rebates could be barriers to increased participation.

About three-quarters of participants reported they filled out the program application themselves, with about one-quarter being completed by vendors². Of those customers completing the applications themselves, the majority did report they needed to request assistance from Xcel Energy to complete the application. However, relatively few ($n = 8$) reported having an application denied (for any Xcel Energy program). One contractor of the ten interviewed reported that the application process and amount of information needed was burdensome.

When asked about rebate information, participants most frequently reported that they were informed of the rebate amount through communication with Xcel Energy staff (39 percent); either

² This differs significantly from the Minnesota Heating Efficiency program where the majority of participants reported that the vendor completes the program application.



program staff, their account manager, or Business Services Center staff. Participants that received boilers reported that Xcel Energy staff informed them of the rebate amount more often than those that received tune-ups (65 percent and 22 percent). This difference may indicate that the dollars per MMBTU method for calculating boiler rebates may be difficult for potential participants and may be another barrier to participation.

Recommendation #21: Continue developing materials to effectively convey rebate amounts and how rebates are determined.

Recommendation #22: Continue to streamline the application process.

Program awareness is strong.

While most nonparticipants (81 percent overall) were aware that Xcel Energy offers rebate and technical assistance programs, 45 percent were specifically aware of the Heating Efficiency program. Those who had heard of the program most frequently indicated that Xcel Energy informed them of the program in some way. This is a high level of both Xcel Energy programs in general, and the Heating Efficiency program specifically. This becomes especially prevalent when compared to percentages found in the recent Colorado Business DSM Attitudes, Awareness and Usage Study (Xcel Energy, November 2010).

Recommendation #23: Continue the effective marketing of Xcel Energy programs.

e. Program Satisfaction

Both contractors and participants are generally satisfied with the Xcel Energy Heating Efficiency program.

Nine of the ten contractors reported that they were satisfied with the program.

Across all types of projects, participants in the Heating Efficiency program reported consistent levels of satisfaction with the program overall. When asked to rate their satisfaction with the program on a zero to ten scale, 93 percent of participants rated their satisfaction positively. Participants' reasons for the high satisfaction (listed in descending order of satisfaction) included the rebate from the program, the results of the program-funded project, a smooth application process, and their interaction with Xcel Energy staff. These results are corroborated by the relatively few program changes requested by participants; 66 percent stated they would not recommend any changes to the program.

Recommendation #24: There are no recommendations specific to improving participant and contractor satisfaction.



The Heating Efficiency program may be increasing overall satisfaction with Xcel Energy.

There is evidence that the program has positively affected overall satisfaction with Xcel Energy among Colorado gas customers. Ninety-three percent of all program participants rated their satisfaction with Xcel Energy as their utility positively compared to 75 percent of nonparticipants.

Recommendation #25: There are no recommendations to address overall satisfaction with Xcel Energy among program participants.



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1. GLOSSARY OF IMPACT EVALUATION TERMS

Attribution	Estimation of what would have happened absent a program. Isolating the effects of program factors and other influences in the decision to adopt energy efficiency measures is often referred to as “attribution.” Program attribution refers to energy impacts that can be attributed with some level of confidence to program efforts.
Confidence interval	The confidence interval (which would differ for each sample) encompasses the true population parameter 90 percent of the time if this procedure was repeated on multiple samples ³ .
Baseline and technical assumptions	Baseline and technical assumptions are used to determine deemed savings for prescriptive projects. Deemed savings are an estimate of an energy savings and/or demand savings outcome on a “per-unit” basis for installed energy efficiency measures (i.e., a steam trap or motor). The gross savings impact evaluation included a review of the baseline and technical assumptions used in the program calculated deemed savings.
Free-drivers or nonparticipant spillover	<i>Free-drivers</i> , or nonparticipant spillover, refers to any energy efficient measures adopted by program nonparticipants due to the program's influence. The program can have an influence on design professionals and vendors as well as an influence on product availability or practices, product or practice acceptance, customer expectations, and other market effects. All of these may induce nonparticipants to implement energy efficiency measures on their own.
Free-riders	A <i>free-rider</i> refers to a program participant who received an incentive or other assistance through an energy efficiency program who would have adopted the same high-efficiency measure ⁴ on their own at that same time in the absence of the program. For free-riders, the program is assumed to have had no influence or only a slight influence on their decision to install or implement the energy efficiency measure. Partial free-riders are those customers who would have adopted some measure on their own, but of a lesser efficiency or a lesser quantity, or they would not have adopted the efficient measures until a later time. Thus, the program had some impact on their decision.
Freeridership rate	A program's <i>freeridership rate</i> is the percentage of program savings attributed to free-riders.
Net program effect	The net program effect is the observed effect, less the estimate of what would have happened absent the program.

³ Cox D.R., Hinkley D.V. (1974) Theoretical Statistics, Chapman & Hall, p49, 209

⁴ For purposes of this discussion, an “energy efficiency measure” includes high efficiency equipment or appliances, an efficiency measure such as insulation, or an energy efficient practice such as boiler tune-ups.



Net-to-gross (NTG) ratio	<p>The ratio of net program-attributable savings over program gross savings. The ratio calculated includes estimates of program free-riders and program-induced spillover.</p> <p>NTG ratio= (1 – free rider rate) + spillover rate.</p> <p>The recommended NTG ratio for a program is based on a preponderance of evidence approach and therefore may differ from the calculated NTG ratio.</p>
Net-to-gross attribution factors	Net-to-gross factors include freeridership and spillover that are typically applied to program gross savings to estimate the net energy and demand savings attributed to the program's activities.
Nonparticipant “like” spillover	<i>Nonparticipant “like” spillover</i> refers to additional measures of the same type as offered through the program that are adopted due to the program's influence. For this study, we attempted to quantify nonparticipant “like” spillover through vendor surveys.
Participant “like” spillover	Participant “like” spillover is when the customer adds more of the same technology incented through the program due to program influences but without any financial or technical assistance from the program. Participant “like” spillover in this study is quantified through participant surveys, but is limited to locations within Xcel Energy's territory.
Previous Program Participation	The quantitative participant surveys capture the level of influence that prior participation in Xcel Energy's demand side management programs has had on the customer decision making process for evaluated projects. This is quantified in the net-to-gross factor by reducing freeridership rates based on the level of reported influence of prior program participation, consistent with the Massachusetts standardized net-to-gross methodology ⁵ .
Self report approach (SRA)	Participant and trade ally self-reports of what they would have done in the absence of the program.
Spillover	<i>Spillover</i> refers to additional energy efficiency measures adopted by a customer due to program influences, but without any financial or technical assistance from the program. As this study only quantifies “like” spillover, it is a conservative estimate of spillover resulting from Xcel Energy's programs.

⁵ Massachusetts Program Administrators Cross-Cutting C&I Freeridership and Spillover Methodology Study Final Report, May 20, 2011, prepared by Tetra Tech, KEMA, and NMR.



2. INTRODUCTION

Xcel Energy is looking for meaningful ways to improve the elements of its demand side management (DSM) business programs, its customer-reach capabilities, and the operation efficiency of their programs so that they can successfully meet program goals and objectives. To assist Xcel Energy in this aim, Xcel Energy selected through a competitive Request for Proposals (RFP) process a third party vendor (comprised of Tetra Tech, Evergreen Economics and Michaels Energy—hereafter the “Tetra Tech team”) to conduct objective evaluations of their demand side management (DSM) business programs in Minnesota and Colorado. Furthermore, the RFP process selected a DSM business programs evaluation provider for a three-year period (2010–2012) in order to provide research continuity, comprehensive portfolio-level results, and best practices evaluation services.

The Colorado Business Heating Colorado Business Heating Efficiency program was evaluated in 2011. This report presents the process and impact evaluation of the Heating Efficiency Program in Colorado.

2.1 PROGRAM OVERVIEW

Xcel Energy, the fourth-largest combination electricity and natural gas company in the United States, offers a comprehensive portfolio of energy-related products and services to 3.4 million electricity and 1.9 million natural gas customers. In Colorado, Xcel Energy has 195,169 commercial customers and 4,415 industrial customers. These include electric only, gas only, and electric and gas customers.

The Colorado Business Heating Colorado Business Heating Efficiency program (formally the Boiler Efficiency and Furnace Efficiency programs) is designed to encourage business customers to install new high efficiency gas-fired hot-water boilers and furnaces, improve existing boilers or hot water heaters with efficiency enhancements, or conduct boiler tune-ups to maintain peak operating efficiency. The program provides prescriptive rebates to natural gas customers in Colorado for installing qualifying high efficiency systems used exclusively for space or domestic water heating. As the rebates are prescriptive, no pre-approval is required.

2.2 PROGRAM LOGIC MODEL

A program logic model documents the activities a program undertakes and the intended consequences of those activities. In addition, it lists the inputs and resources (e.g., available staff, budget) needed to complete those activities. Evaluators drafted a program logic model in February and March of 2011 based on a review of program documentation and interviews with program staff. The logic model presented in Figure 2-1 includes edits based on product manager feedback.

Figure 2-1. Colorado Business Heating Efficiency Logic Model

2. Introduction



Inputs/ Resources	Sufficient budget is allocated	Marketing collateral and rebate forms	Non-targeted marketing materials including website, brochure, and savings guidebook	Program infrastructure
	Technical assumptions	Xcel Energy trade relations manager	Targeted marketing materials	Rebate applications
	Product manager, energy efficiency engineer and other key staff	Heating Efficiency trade website	Xcel Energy Account Managers & BSC	Rebate funds

Activities	Develop Program Infrastructure	Outreach to Heating Contractors	Customer Communications	Rebate Measures
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Outputs	The Colorado Business Heating Efficiency program is implemented.	Provide training, information and marketing support to contractors that sell or install boilers, hot water heaters, and furnaces or that provide routine HVAC maintenance	Target direct communications to commercial customers and other outreach such as newsletters, energy efficiency fairs, bill inserts, contacts from Account Managers	Customers participate in the program
	Program measures defined, forms, rebates and marketing strategy developed, refined and documented.	Meetings with heating equipment distributors and key trade associations	Incoming customers calls to Account Managers and BSC regarding Heating Efficiency program	Customer and contractor data entered into program tracking database
	Appropriate data fields created in the Xcel Energy customer tracking database.	Heating contractors and distributors join Xcel Energy's Trade Network	Visits to Xcel Energy Heating Efficiency website	Possible verification site visit by Xcel Energy staff

Short to medium term outcomes	Administrative functions can handle expected application numbers.	Heating contractors are knowledgeable about various available rebates and program requirements.	Customers submit applications	44,102 Dth savings in 2011.
	Xcel Energy account managers and Business Solutions Center (BSC) are knowledgeable about the program.	Heating contractors regularly talk to customers about the program and leverage rebates in sales efforts	Program offerings, requirements, benefits are clear to customers.	Rebate reduces payback period for customers

Long term outcomes	Annual energy savings goals are achieved within budgetary constraints and the program is cost-effective.	A network of well informed and educated heating equipment professionals with increased sales of high efficiency equipment.	The demand for energy-efficient heating equipment and system improvements increases. The demand for energy-efficient HVAC tune-up services increases	Increased penetration of energy efficiency equipment among Xcel Energy's commercial customers Increased customers satisfaction with Xcel Energy
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2.3 EVALUATION METHODOLOGY

The Tetra Tech team conducted a comprehensive evaluation of the program. The process evaluation provides Xcel Energy with a thorough understanding of participating and nonparticipating commercial customer and trade ally awareness, attitudes and behaviors as well as benchmarked information for similar programs offered throughout the country. The impact evaluation assesses that the program's gross energy and demand savings are sound and defensible. In addition, the impact evaluation's net-to-gross calculations to estimate net energy savings employ triangulation methods for best estimates of program attribution.

The evaluation scope of work consisted of the following evaluation tasks:

- Task 1: Start-up meeting and evaluation plan
- Task 2: Internal review/development of logic model (included interviews with 12 Xcel Energy staff – the overall DSM state manager, the product manager, two account managers, two BSC reps, a rebate specialist, a marketing manager, DSM Regulatory staff, a marketing consultant, an energy efficiency engineer, and a channel manager)
- Task 3: Customer surveys (included 115 participant surveys and 53 nonparticipant surveys)
- Task 4: Trade ally interviews (included 10 qualitative trade ally interviews and three influential vendor surveys representing 15 projects)
- Task 5b: Net-to-gross recommendations
- Task 5c: Verify technical and baseline assumptions
- Task 6: Peer utility benchmarking (included secondary research on 13 other utility programs and in-depth interviews with four program managers)
- Task 7: Progress reporting
- Task 8: Reporting and results presentation.

The evaluation activities that directly address the process evaluation objectives are the internal review, participant and nonparticipant surveys, trade ally interviews, and peer utility benchmarking. The tasks that directly support the impact evaluation are: 1) developing net-to-gross ratios through a triangulation method (participant surveys, nonparticipant surveys, trade ally surveys and interviews, and benchmarking study results) and 2) verifying baseline and technical assumptions through engineering. These impact evaluation tasks resulted in the development of net savings recommendations.

2.4 REPORT ORGANIZATION

Section 3 of the report synthesizes overall key findings and recommendations across all of the evaluation activities. Sections 4 through 10 detail results from each of the evaluation activities as follows: internal review, participant surveys, nonparticipant surveys, trade ally interviews, peer utility benchmarking, net-to-gross analysis and verification of technical and baseline assumptions.



A detailed appendix contains all data collection instruments used for the evaluation as well as survey response rates.



3. SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

3.1 OVERVIEW OF PROGRAM SUCCESSES AND CHALLENGES

The Colorado Business Heating Efficiency program (formerly the Boiler Efficiency and Furnace Efficiency programs) is designed to encourage business customers to install new high efficiency gas-fired hot-water boilers and furnaces, improve existing boilers or hot water heaters with efficiency enhancements, or conduct boiler tune-ups to maintain peak operating efficiency. The program provides prescriptive rebates to Xcel Energy natural gas customers in Colorado for installing qualifying high efficiency systems used exclusively for space or domestic water heating. As the rebates are prescriptive, no pre-approval is required. The program should be on track to meet its 2011 goal of 44,102 Dth, with 23,044 Dth committed as of September 15, 2011 before what is normally a busy fall for participation.

Based on extensive primary research with Xcel Energy program staff, heating efficiency program staff in other territories, program participants, Colorado HVAC contractors and suppliers, and nonparticipating Xcel Energy customers, the program is operating effectively considering its limited exposure to the market. However, the evaluation research did identify some areas where improvements could be implemented as well as areas that would benefit from continued program support.

The program's operational success is due to many components that are working well in conjunction with proactive efforts to address challenges facing a young program. These components include efficient working relationships among the Xcel Energy DSM staff; adoption of proven program design practices; effective outreach to trade allies' unique incentive structures that drive customer interest; and few "bottlenecks" in the program participation process.

At the same time, the program faces several challenges. The low natural gas prices in Colorado have decreased the number of cost-effective measures available for the program. Program staff also report that internally electric savings programs generally receive higher priority than natural gas savings programs among sales staff. This focus may be due to a greater incentive for reaching electric savings goals than for annual natural gas savings goals because of the higher avoided costs for electricity. In addition, a high percentage of Colorado Xcel Energy customers, especially the largest, are gas transport-only customers and therefore ineligible for the program. Therefore, the program must rely more heavily on small business customers, which can be administratively harder to reach and serve. The evaluation research did identify some strategies to help Xcel Energy with those challenges. Recommendations for consideration discussed below include implementing a trade ally incentive for contractors new to the program; continuing the Plan B boiler incentive; creating targeted educational materials regarding the cost-effectiveness of boiler retrofits and tune-ups; and developing simple Xcel Energy-branded return-on-investment or energy savings calculators for use by HVAC contractors.

Key findings and recommendations for both the impact and process components of the evaluation are below.

3.2 IMPACT EVALUATION FINDINGS

The evaluation included research to inform both gross savings and net savings estimates, discussed next.



3.2.1 Program Gross Savings

The participant surveys found that measure persistence is high and the baseline and technical assumption review found that the program's baseline and technical assumptions to calculate gross savings are reasonable, well-researched and documented, and generally consistent with other programs. Below are key findings as well as recommendations for Xcel Energy's consideration.

Measure persistence is high.

All customers reported the heating equipment they rebated through the program was still installed and operating as intended.

Recommendation #1: There is no recommendation for improving measure persistence.

The baseline efficiencies for new boiler projects, water heaters and furnaces are all reasonable and consistent with other programs, as well as compliant with current Colorado building and energy codes.

The baseline efficiency for new boiler projects is based on the minimum efficiency requirements found in 2006 International Energy Conservation Code (IECC), ASHRAE 90.1, and the Federal Energy Management Program. The proposed boiler efficiencies are also the qualifying efficiencies and are reasonable when compared to the required efficiencies of other programs. The proposed boiler efficiency is collected and input into the savings calculation, but is not used to calculate the savings. Instead, an average efficiency is used to account for operating under non ideal test conditions. The average efficiency is reasonable, but the value used for condensing boilers is slightly higher at 96.2 percent than other sources found in the literature review as detailed in Section 10, which cluster around 94 percent such as found in the Prescriptive Condensing Boiler Impact Evaluation of the Massachusetts Energy Efficiency Programs (93.9 percent). The furnace and water heater baseline efficiency is consistent with other programs reviewed.

Recommendation #2: While no changes are recommended to the baseline efficiencies for new boiler projects, water heaters and furnaces; Xcel Energy may want to consider revising the assumed efficiency for condensing space heating and water heating boilers to 94 percent to be slightly more conservative and consistent with the literature.

The assumed increases in efficiency for modulating burners, tune-ups, outdoor air temperature resets, and stack dampers are all reasonable and consistent with other programs.

While the efficiency for all these measures are reasonable, the evaluation team believes the outdoor air temperature reset measure can currently be claimed for all types of boilers. Since the water temperature for domestic hot water is fixed, domestic hot water only boilers cannot modulate temperature with outdoor air temperature.

Recommendation #3: Consider making outdoor air temperature reset ineligible for domestic hot water only boilers.

Savings assumptions for pipe insulation are consistent with best practice while the literature review shows that savings for steam traps vary considerably.



Xcel Energy uses a quasi-custom analysis to determine the savings for pipe insulation. This allows greater flexibility than fixed values when determining the energy savings for a given project. Additionally the savings algorithms were developed using a highly used and well regarded insulation calculation software package. The literature review found that steam trap savings vary significantly based on the orifice size of the steam trap being replaced. However, primary research on steam traps is very expensive and should only be conducted if steam traps are a substantial percentage of overall program savings. Xcel Energy staff report that very few to no steam trap replacements are anticipated in the Colorado market.

Recommendation #4: Consider further research for the steam trap measure to ensure that the most representative information is used for participants in the Colorado territory only if or when steam trap savings meet or exceed 30 percent of the total Colorado Heating Prescriptive program savings.

The expected useful life for high efficiency boilers used in saving calculations is reasonable but adjustments may be needed for stack dampers and pipe insulation.

The savings for high efficiency boiler projects are based on an expected useful life of 20 years. Based on the results of the literature review, this is reasonable and consistent with other programs. The expected useful life used for stack dampers is also 20 years and this is greater than what is used in other programs, which tend to cluster around 12 years such as for the NYSEDA program. Conversely, the expected useful life for pipe insulation appears to be less than what is used in other programs. The EUL for pipe insulation is currently set at seven years. A review of the literature shows several reports and jurisdictions use between ten and 15 years for an EUL.

Recommendation #5: Consider reducing the effective useful life for stack dampers from 20 years to 12 years to be more consistent with other programs.

Recommendation #6: Consider increasing the effective useful life for pipe insulation from seven years to ten to 15 years to be more consistent with other programs.

Effective full load hour assumptions are reasonable.

The space heating only effective full load hours (EFLH) are assumed to be 659 hours. This value is reasonable based on the Colorado climate. The EFLH used in water heating only applications is 2,190 hours per year, and the EFLH used in water heating and space heating applications is 1,443 hours per year. These numbers also appear to be reasonable as do the assumptions for pipe insulation.

Recommendation #7: No changes are recommended to the effective full load hour assumptions.

3.2.2 Program Net Savings

To estimate program net savings, the evaluation team employed a triangulation, or preponderance of evidence, approach—an identified best practice in the industry for net savings—to recommend a net-to-gross (NTG) ratio for the program. The recommended NTG ratio is based on a review of program files and interviews with: 1) recent (within the last 12 months of the program) participating customers and influential vendors (vendors identified by participating customers as being influential in their decision-making process), 2) in-depth interviews with trade allies, 3) a literature review and benchmarking interviews with program managers of similar programs in the US, and 4) results from surveys with eligible nonparticipants. Key findings and recommendations for this research are below.



The net-to-gross research shows the program has been influential in the participant decision making process.

The NTG ratio for the Colorado Business Heating Colorado Business Heating Efficiency program based on the Calculated NTG ratio using the California self report approach, adjusted for participant-reported previous program participation and spillover results, is a .85 NTG ratio. While this is a conservative estimate of net-to-gross as it does not include nonparticipant spillover and is limited to participant-reported like spillover, it does show the program is highly influential in the customer decision making process across the majority of program savings. However, this NTG is based on research with participants during the first program cycle. We normally see NTG increases as programs gain more maturity in a market and able to more effectively influence customers. The benchmarked research shows NTG with spillover for business heating programs typically range from .80 to .89 for prescriptive measures⁶. Xcel Energy falls within this range. However, we recommend a slight adjustment upward in the recommended NTG factor for the next program cycle to recognize the program will have gained some momentum to be more influential in the customer decision-making process. For the next program year, we recommend a one percent increase in the NTG factor.

Recommendation #8: We recommend a NTG ratio for the next program year of 0.86..

3.3 PROCESS EVALUATION

The process evaluation findings and recommendations synthesize results across program staff interviews, participant and nonparticipant surveys, in-depth interviews with trade allies and benchmarking of similar programs across the U.S. Below we summarize key findings and recommendations in the following areas: program design, program delivery and customer satisfaction.

3.3.1 Program Design

The program is following best practice for heating programs by offering two tiers of rebates: an aggressive high efficiency level and a less aggressive high efficiency level.

Aggressive high efficiency rebates range from \$1000 - \$5000/MMBTUH with less aggressive high efficiency level rebates ranging from \$500 - \$2000/MMBTUH. The benchmarking research indicates this structure is best practice across the country. It allows for programs to cost-effectively capture a wide variety of boiler installations and accommodates changes in technology without radical shifts in incentive structures.

Recommendation #9: Continue tiered rebate structure based on efficiency levels.

Trade ally incentives could be effective, especially in markets with a large population of small HVAC contractors and nonparticipating contractors.

⁶ Tetra Tech, Massachusetts Program Administrators and the Energy Efficiency Advisory Council Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential and Multi-Family HEHE Gas Programs, and Commercial and Industrial Gas Programs, July 8, 2011



The benchmarking research identified three programs that offered incentives to trade allies that install equipment through the program. The incentives ranged from \$25 to \$175 per qualifying new equipment installed. In addition, one program offered incentives for boiler enhancements and steam traps: \$15 to \$25 per enhancement and \$3 per repaired or replaced steam trap. Program managers reported that these incentives were well received, particularly by smaller HVAC contractors that used the money to compensate staff or invest in their business. Program managers reported that larger firms usually used the incentive to buy-down the cost to the customer.

However, interviews with participating trade allies indicate that the incentive, while viewed positively, would have little influence on their sales practices. This suggests an incentive would be most effective with HVAC contractors that are new to the program. It was discussed with program staff that one main benefit of a trade incentive would be the possibility of streamlining the cost of program administration by encouraging trade allies to submit completed and accurate program paperwork for customers. A drawback of trade incentives also discussed is once an incentive is introduced, it is difficult to discontinue or stop the benefit even when it is no longer needed. It was also discussed that because the Colorado program has a limited program budget, it is most likely not feasible to offer trade ally incentives.

Recommendation #10: Consider offering trade ally incentives. If possible, limiting this incentive to nonparticipating or “first-time” vendors would maximize its influence. Another possibility is to only provide incentives upon the submission of complete program paperwork. This could reduce the program’s overall administrative burden.

The Plan B boiler component of the Colorado program is effective.

Program staff reported that the program’s Plan B boiler option has been very effective at driving interest in the program due to the large rebate amount. This finding is corroborated by participant results which identified a high level of program influence on these projects. Program staff and all but one interviewed vendor reported that, given the appropriate project, the program’s incentive enables efficient retrofits to go forward when customers otherwise would have kept the less efficient boiler until failure. Vendors also reported the Plan B rebate creates a unique marketing tool for early retirement of inefficient boilers.

Recommendation #11: Continue to offer enhanced rebates for early replacement boilers.

Boiler tune-ups may be most effective as a way to educate customers about high-efficiency equipment for upgrades or replacements.

While some HVAC contractors reported that the tune-up incentive does encourage people to conduct tune-ups when they otherwise might not have, others reported that the tune-ups are something that their customers are doing regardless of financial incentives as part of routine maintenance. In addition, analysis of the participant surveys indicates a lower level of program influence for this service as evidenced through the NTG ratio calculated at the measure level. In addition, some participants reported lower satisfaction with the rebate amount and were unsure of what savings were realized as a result of the tune-up. As those participants that received a boiler tune-up frequently mentioned energy savings as the motivation for conducting the tune-up, it is possible that they may not be aware of the potential cost savings realized from conducting tune-ups. These costs savings can come not only from reduced fuel consumption but also from a reduction in emergency service calls when equipment fails during the heating season.



When asked about future plans for heating system upgrades, 39 percent of participants reported that they had plans to upgrade or replace part of their system. Most of these were participants who had received a boiler tune-up (43 participants, 31 of which received a boiler tune-up). Most often, these planned projects included the installation of new boilers (86 percent of those participants with plans to upgrade/replace). This finding suggests potential for future program participants specifically as those conducting boiler tune-ups start to replace their aging systems and turn to Xcel Energy for technical and financial assistance.

Recommendation #12: Continue the boiler tune-up component as an important entrée into efficient equipment projects, but also continue to educate customers regarding the cost savings benefits of boiler tune-ups.

Recommendation #13: Investigate the feasibility of an enhanced boiler tune-up option in Colorado after the Minnesota Commercial Heating Efficiency program pilots this enhanced option in 2012.

There is savings potential in the Colorado market for the Heating Efficiency program, but this is limited by ineligible customers.

In addition, to the 39 percent of participants reporting planned equipment upgrade or replacement projects as discussed in the above key finding, about one-quarter of eligible nonparticipants plan to install new heating equipment in the near future, and a majority would appreciate help from Xcel Energy in doing so.

The nonparticipant survey screened out customers that were not eligible for the program because they did not have eligible equipment or their boiler was used for process purposes. These ineligible customers represented three percent of the nonparticipant sample, which had already been screened for customers ineligible for other reasons. For example, as mentioned previously, gas transport-only customers are also not eligible for the program. Gas-transport only customer represent some of Xcel Energy's largest customers. Therefore the program has to primarily reach smaller and medium-sized customers, which are administratively harder and more costly to reach than larger customers with established account management relationships.

Recommendation #14: Continue to consider the savings potential of the somewhat limited eligible population when setting program goals.

Program nonparticipants face significant barriers when deciding whether or not to install energy-efficient equipment.

Most nonparticipants gave at least one example of a barrier their business faces when looking to install energy-using equipment at their facility. Most often, nonparticipants mentioned financial barriers, either initial cost or a lack of capital, as their main barrier to implementing projects. Capital investment and budget availability were also rated the highest of a list of important factors nonparticipants consider when deciding whether or not to install new energy-using equipment of processes at their facility.

Recommendation #15: Continue to offer program rebates that are important in addressing the initial cost barrier of energy efficient projects.

Over half of boiler tune-up participants reported future heating improvement system plans.



Approximately half (53 percent) of tune-up participants reported having plans to implement energy efficiency improvements in the future, about twice as many as non-participants (27 percent). This indicates that tune-ups may be an important first-step to future heating improvements that will realize larger savings.

Recommendation #16: Continue to offer tune-ups as an important awareness builder for larger energy efficiency projects.

3.3.2 Program Delivery

Xcel Energy has effective trade ally outreach in Colorado.

Program staff report that the program has engaged trades early and often to make sure they were “on board” and worked closely with distributors to funnel information down to smaller providers and that these efforts have succeeded in generating interest among the HVAC contractors in their area. In addition to those efforts, the program is creating a heating advisory board with 14 different HVAC trade ally firms across the state. This board will meet twice a year to ensure the program is meeting the needs of both Colorado natural gas customers and the contractors that serve those customers.

In addition, all but one of the interviewed trade allies reported that they were first made aware of the commercial rebates available from the program by Xcel Energy staff.

Recommendation #17: Continue to support a heating advisory board in Colorado, including actively recruiting new members to the board and scheduling regular meetings (semiannually or prior to major program design changes). Program staff have already begun this process and are scheduling semi-annual meetings.

Some HVAC contractors question the savings and reliability of high efficiency boilers.

While a majority of contractors and all of the manufacturers’ representatives interviewed reported that the incentives offered by the program for high efficiency boilers were effective, two contractors claimed that installing high efficiency boilers is not always a “no-brainer”. One contractor believed the increased maintenance costs of a high efficiency boiler offset any savings from reduced energy. Another contractor believed that retrofitted boilers do not often run at maximum efficiency as the system is still using old heating peripherals that reduce efficiency. Xcel Energy reports that, in their experience, customers do not install high efficiency boilers in these situations because of the price differential, which would not be justified without realizing the energy savings, and therefore this is not an issue for the program.

Several interviews also suggested that a program calculator would provide “hard numbers” for customers, encouraging them to see the long term savings available by upgrading to high efficiency boiler systems. This calculator could also serve as an educational tool, encouraging contractors to see the cost savings potential of high efficiency boilers and helping to address some of the misconceptions discussed above.

Recommendation #18: Pursue developing simple Xcel Energy-branded return-on-investment or energy savings calculators for use by HVAC contractors. This idea could first be vetted to the Heating Advisory Board for their input.

Contractors expressed interest in cooperative marketing activities with Xcel Energy.



When asked about cooperative marketing opportunities, contractors responded positively. Contractors believed that Xcel Energy branding would lend credibility to the contractors' presentations and bids. These campaigns could include allowing contractors to use Xcel Energy logos in their bid presentations or presenting customers with Xcel Energy-sponsored savings figures based on the previously suggested calculators. Program staff reported they did work with two different trade allies to review collateral materials the trade allies developed. Program staff said they are open to continue to do so in the future.

Recommendation #19: Investigate allowing HVAC contractors to enter into cooperative advertising campaigns with Xcel Energy.

HVAC contractors are the most effective ways to educate potential participants about the program.

When asked how they first became aware of Xcel Energy's Heating Efficiency program, participants most frequently reported that their equipment or service contractor informed them that they were eligible for the program. In addition, of the managed account participants, account managers were the most frequently reported source of program information instead of the equipment vendors. Nonparticipants also reported relying on vendors or contractors for information about and implementation of energy-using equipment. These findings suggest that these two channels are effective sources of program information for potential participants.

Recommendation #20: Continue proactive HVAC vendor outreach and expand opportunities to engage vendors as feasible and relevant to the program.

There is evidence that both the application process and understanding of rebates could be barriers to increased participation.

About three-quarters of participants reported they filled out the program application themselves, with about one-quarter being completed by vendors⁷. Of those customers completing the applications themselves, the majority did report they needed to request assistance from Xcel Energy to complete the application. However, relatively few (n = 8) reported having an application denied (for any Xcel Energy program). One contractor of the ten interviewed reported that the application process and amount of information needed was burdensome.

When asked about rebate information, participants most frequently reported that they were informed of the rebate amount through communication with Xcel Energy staff (39 percent); either program staff, their account manager, or Business Services Center staff. Participants that received boilers reported that Xcel Energy staff informed them of the rebate amount more often than those that received tune-ups (65 percent and 22 percent). This difference may indicate that the dollars per MMBTU method for calculating boiler rebates may be difficult for potential participants and may be another barrier to participation.

Recommendation #21: Continue developing materials to effectively convey rebate amounts and how rebates are determined.

Recommendation #22: Continue to streamline the application process.

⁷ This differs significantly from the Minnesota Heating Efficiency program where the majority of participants reported that the vendor completes the program application.



Program awareness is strong.

While most nonparticipants (81 percent overall) were aware that Xcel Energy offers rebate and technical assistance programs, 45 percent were specifically aware of the Heating Efficiency program. Those who had heard of the program most frequently indicated that Xcel Energy informed them of the program in some way. This is a high level of both Xcel Energy programs in general, and the Heating Efficiency program specifically. This becomes especially prevalent when compared to percentages found in the recent Colorado Business DSM Attitudes, Awareness and Usage Study (Xcel Energy, November 2010).

Recommendation #23: Continue the effective marketing of Xcel Energy programs.

3.3.3 Program Satisfaction

Both contractors and participants are generally satisfied with the Xcel Energy Heating Efficiency program.

Nine of the ten contractors reported that they were satisfied with the program.

Across all types of projects, participants in the Heating Efficiency program reported consistent levels of satisfaction with the program overall. When asked to rate their satisfaction with the program on a zero to ten scale, 93 percent of participants rated their satisfaction positively. Participants' reasons for the high satisfaction (listed in descending order of satisfaction) included the rebate from the program, the results of the program-funded project, a smooth application process, and their interaction with Xcel Energy staff. These results are corroborated by the relatively few program changes requested by participants; 66 percent stated they would not recommend any changes to the program.

Recommendation #24: There are no recommendations specific to improving participant and contractor satisfaction.

The Heating Efficiency program may be increasing overall satisfaction with Xcel Energy.

There is evidence that the program has positively affected overall satisfaction with Xcel Energy among Colorado gas customers. Ninety-three percent of all program participants rated their satisfaction with Xcel Energy as their utility positively compared to 75 percent of nonparticipants.

Recommendation #25: There are no recommendations to address overall satisfaction with Xcel Energy among program participants.



4. EVALUATION RESULTS—INTERNAL REVIEW

4.1 INTRODUCTION

This section provides high-level key findings resulting from internal interviews with 12 Xcel Energy staff that work directly with the Heating Efficiency Program (a total of 30 staff were interviewed across all Business DSM Programs).

For the internal interviews, evaluators interviewed a range of staff; those who work directly with the program included the product managers (one), marketing consultants (one), rebate specialists (one), Business Solutions Center (BSC) energy-efficiency specialists (two), channel managers (one), account managers (two), energy efficiency engineers (one), regulatory affairs (one), the state marketing manager (one), and the overall DSM state manager (one).

Evaluators conducted these interviews over a four week period in February and March of 2011. The interviews covered a variety of issues, including:

- Roles and responsibilities of the staff
- Communication and interaction with others in the program
- Program design
- Resources to support the program
- Program marketing efforts
- Issues unique to the groups they interact with (e.g., customers and trade allies)
- Program operations
- Customer and trade ally satisfaction with the program
- Areas where the programs are working well
- Past, current, and future challenges of the program(s)
- Issues they would like the evaluation to research further.

The interviews provided a considerable amount of rich and detailed information that helped to form and shape the additional evaluation activities. This section highlights key findings for Xcel Energy's consideration at the overarching and program-level.

4.2 SUMMARY OF FINDINGS

Multiple internal staff support Xcel Energy's DSM programs: product managers, marketing managers, regulatory affairs staff, marketing assistants, energy efficiency engineers, channel managers, account managers, energy efficiency specialists, and rebate processors. Product managers oversee each program ("product") and are ultimately responsible for the program design and goals, monitoring goals, developing contingency plans, pursuing effective marketing and communication strategies, and reporting to the marketing managers in each state. Marketing managers monitor overall program performance and make adjustments as needed to ensure the



overall DSM portfolio meets its goals by state. Marketing managers also work with two directors on strategy and policy directions for the DSM programs. There are two marketing managers, one for Colorado and one for Minnesota. Marketing managers also interact with regulatory affairs staff. Regulatory affairs staff interface with the states' Public Utility Commissions and related stakeholders to ensure that the programs are in compliance with the regulatory framework in Colorado and Minnesota.

Marketing assistants support product managers, and interact with engineers, account managers and the BSC, and customers during the project pre-approval and approval processes. Energy efficiency engineers are responsible for technical reviews, pre-approvals of custom measures, and program energy savings calculations. Account Managers are the first point of contact for managed accounts, as well as a conduit between managed customers and the marketing and product teams. Channel managers oversee the relationships between the DSM products and trade allies or vendors. Channel managers identify and train new trade allies as well as work with established vendors and distributors to market Xcel Energy's DSM products. Channel managers also engage trade allies in Advisory Councils that meet periodically to provide advice and input on Xcel Energy's DSM products. Rebate processors complete program documentation to ensure the customer receives their rebate.

In 2010, Xcel Energy reorganized their Business Solutions Center (BSC) to include energy-efficiency specialists, whose main focus is to promote energy-efficiency programs to non-managed customers. They were trained specifically on energy-efficiency and Xcel Energy's program offerings. These energy-efficiency specialists conduct direct marketing to customers, as well as field questions and assist customers in filling out their applications. Additionally, customer-service centered BSC representatives handle a wide variety of customer service tasks and are an additional point to which customers can be funneled into Xcel Energy programs. In general, BSC staff reported a high level of satisfaction with their new roles and responsibilities. Staff indicated that trainings so far had been effective, and one staff member felt that the trainings should continue well into the future, as Xcel Energy has a broad variety of program offerings and the energy-efficiency market is constantly shifting.

Lastly, there are established tracking systems that assist in the effective tracking and monitoring of the programs. The Siebel system tracks all programs from project leads to completions. There are also project specific tracking systems. At the beginning of the process, leads are tracked in Siebel, which carries them all the way through the programs to the rebate processors.

The remainder of this overarching Key Findings section is organized around areas that are working well and opportunities for improvement.

4.2.1 Areas that are Working Well

- Staff report high levels of satisfaction with their interactions with other program-related staff. Staff generally felt that their colleagues were responsive, cooperative, and approachable.
- Most staff in program-specific functions (engineers, product managers, marketing staff) felt that they had sufficient resources to meet the needs of their program(s).
- Dedicated channel managers are an important part of Xcel Energy's DSM programs and their inclusion in staffing plans recognizes this. These positions greatly facilitate trade ally engagement in the programs.



- Staff who interact with trade allies generally felt positive about those relationships.
- Account managers are an extremely effective vehicle to promote program participation for larger customers. In many cases, they not only promote the program but provide “handholding” throughout the application process.
- The BSC’s re-organization in 2010 to include dedicated energy efficiency specialists has generally been viewed as very successful, both from within and outside of the BSC. Their focus on advocating energy-efficiency to smaller, nonmanaged customers is an important role for the program, which has a higher number of smaller businesses due to a relatively high percentage of transport gas customers.
- Current marketing efforts to both trade allies and customers have been viewed as effective.

4.2.2 Opportunities for Improvement/Research

- While most staff felt they had sufficient resources, staff in several departments reported the need for additional resources, specifically additional staff members to facilitate their delivery of the programs. One staff member expressed frustration about staff being spread too thin across several responsibilities; another reported a heavy workload which left them needing “more hours in the day.”
- While the new role of energy-efficiency specialists within the BSC has been successful in helping to increase uptake of the programs within the small business market, several program staff still reported challenges to engaging smaller, nonmanaged customers. For example, a high volume of smaller customers is needed to produce the same savings achieved by projects conducted by only one or two large C&I customers, which adds to the internal administrative costs of the program.
- Staff mentioned the comparatively lower importance placed on natural gas goals and sales as a challenge to effectively implementing their programs. Customer-facing staff do not need to report on natural gas goals as often as electric goals (yearly vs. quarterly), leading to an unbalanced focus on electric and natural gas measures throughout the year. For Colorado, the presence of transport gas customers adds an additional hurdle to increasing participation numbers.

4.3 DETAILED FINDINGS

The Colorado Business Heating Efficiency program (formally the Boiler Efficiency and Furnace Efficiency programs) is designed to encourage business customers to install new high efficiency natural gas-fired hot-water boilers and furnaces, improve existing boilers or hot water heaters with efficiency enhancements, or conduct boiler tune-ups to maintain peak operating efficiency. The program provides prescriptive rebates to natural gas customers in Colorado for installing qualifying high efficiency systems used exclusively for space or domestic water heating. As the rebates are prescriptive, no pre-approval is required.

The program also provides custom rebates for heating projects that do not qualify for prescriptive rebates (new steam boilers, new boilers larger than ten MMBTUH, and process boilers). Custom rebates require pre-approval before installation. The Colorado program is relatively new – it



launched in 2009 and is working on creating a base of informed trade allies and potential participants.

Interviews with program staff indicated that many aspects of the program are operating effectively including communication, marketing, and trade ally engagement. All program staff reported that communications and working relationships among those involved with the program (product managers, marketing assistants, trade relations managers, energy efficiency engineers, BSC staff, account managers, and rebate processing staff) are smooth and do not pose any threat to the program meeting its goals.

Given that the program has only launched in the past two years, staff feel it has been successful at raising awareness with potential trade allies and ensuring that when they meet with customers, energy efficiency is part of the conversation. The program has engaged them early and often to make sure they were “on board” and worked closely with distributors to funnel information down to smaller providers. Program staff report that those efforts have succeeded in generating interest among the HVAC contractors in their area. In addition to those efforts, the program is creating a heating advisory board with 14 different HVAC trade ally firms across the state. This board will meet twice a year to ensure the program is meeting the needs of both Colorado natural gas customers and the contractors that serve those customers.

Program staff also feel they have effectively raised awareness among potential participants through several marketing efforts. Staff ensure that both BSC staff and account managers are trained and up-to-date on the program. The program also conducts direct mailings and outbound calling to customers with recent boiler inspections, attends trades shows and expos, creates feature sheets and coupon books that are posted to the program website and handed out at in-person meetings, and distributes branded promotional material like temperature magnets used to identify hot spots in commercial buildings.

As stated before, in 2010 Xcel Energy expanded the role of the BSC to include energy efficiency specialists (discussed under Overarching Key Findings), who focus on promoting energy-efficiency programs to nonmanaged customers through direct marketing outreach (e.g., emails, phone calls). One staff member reported that Xcel Energy utilizes an energy-efficiency specialist who also meets with customers face-to-face to educate them about how they can benefit from the DSM programs. In essence, this role is a quasi-account manager that can efficiently bring high priority nonmanaged accounts into the program.

Program staff also reported that their Plan B boiler option has been very effective. This option allows for customers to replace working, inefficient boilers that were installed less than 25 years ago. As these boilers often have many useful years left to operate, the program offers enhanced incentives to encourage the early replacement. While there were only eight participants in this offering in 2010, staff are optimistic about its potential for natural gas savings.

Though successful on many fronts, there are barriers to participation for the Colorado program. Program staff report that the Colorado market has low natural gas prices. While natural gas prices are currently low nation-wide, they are even more pronounced in Colorado than other areas of the US. These prices contribute to longer payback periods when customers calculate the costs and benefits of installing high efficiency boilers despite high rebate amounts. These low natural gas prices caused the program to remove several measures as they were no longer cost-effective (e.g., steam traps, oxygen trim controls), further limiting opportunities for savings. The product offerings do still include some measures that are not currently passing cost-effectiveness tests in order to



maintain consistency in the program offerings. Program staff report that they did not want to remove these measures just to add them back in if/when gas prices increase making them cost-effective again.

Likewise, the Colorado market has a relatively large percentage of transport gas customers (customers that use Xcel Energy pipelines but purchase natural gas from a third-party supplier) which increase the administrative costs of reaching program savings goals. Program staff report that there are about 5,000 transport gas customers in their territory and that these customers tend to be the largest natural gas users. As these customers do not contribute to the Demand Side Management Cost Adjustment (DSMCA) rider, they cannot participate in DSM programs and, to meet its target, the program must rely more heavily on smaller customers with limited energy saving potential. Given the limited savings and the paperwork involved, these smaller customers require more administrative time per therm saved, raising the overall cost to participate in the program. With heightened customer costs, the overall program costs are increased due to the need for additional resources for motivating these smaller customers.

Program staff also expressed concern that natural gas savings do not benefit Xcel Energy in the same way as electric savings. This is because avoided costs (such as for increased generation capacity and improved infrastructure) are greater on the electric side, resulting in larger net benefits for electric savings. Therefore, Xcel Energy's incentive for reaching electric goals is greater than for reaching natural gas goals. This disparity means that priority is given to other programs when distributing resources (be it staff time, funds, or technical assistance). Program staff believe that some of these resources are critical to create a support system for the customers that are considering participating in the program.

Program staff were also concerned that the rebates offered for the boiler tune-ups and high efficiency furnaces were not high enough to encourage participation. Staff felt that customers may think the rebate amounts for the tune-ups are not worth the extra paperwork required to be eligible. While some staff reported that everything on the boiler tune-up checklist are things that are conducted as part of standard annual service calls, other staff reported that the program's combustion tests, piping inspections are other checks are not included in a standard tune-up. It was further reported that if contractors do conduct combustion tests conducted outside of the program, it is unlikely that contractors would provide a written report.. Staff also felt that the rebate amount provided for furnaces (between \$80 and \$120 depending on AFUE rating) are not enough to convince customers to upgrade from standard efficiency equipment.



5. EVALUATION RESULTS—PARTICIPANT FINDINGS

This section presents the results of 115 quantitative telephone surveys of participants in the Colorado Business Heating Efficiency Program conducted for the Xcel Energy Demand Side Management Business Programs evaluation. Tetra Tech conducted this research between June 13 and July 29, 2011.

5.1 INTRODUCTION

These surveys, conducted with 71 unique respondents, represent 115 locations/premises that participated in the Heating Efficiency Program (“participants”) from May 2010 to May 2011⁸. Collectively, respondents installed 43 boilers, six efficiency measures (which included equipment such as outdoor air resets and steam traps), seven furnaces, two water heaters, and 59 boiler tune-ups. Several participating businesses installed multiple measures (i.e., a boiler and an efficiency measure, etc). Table 5-1 below shows the breakdown of managed and nonmanaged cases among completed surveys. Table 5-2 compares the measure information found in the population with the projects include in the participant survey.

Table 5-1. Managed Status

	Count	Percent
Managed	14	12%
Nonmanaged	101	87%

Table 5-2. Population and Surveyed Project Information

Measure	Population		Survey	
	Average Therm Savings per Projects	Number of Projects	Average Therm Savings per Projects	Number of Projects
Boiler	3,769	79	2,894	43
Efficiency Enhancements	1,405	38	579	6
Furnace	257	20	289	7
Water Heaters	744	4	1,049	2
Boiler Tune-ups	420	186	279	59
Total	1,337	327	1,269	117

5.1.1 Detailed Sampling and Weighting

a. Sampling

Sample was received from Xcel Energy in several different files. Most sample information was gathered from the file “BUS DSM EVAL.xls” which included information on program participation, measures installed, savings (kWh and therms), and preliminary customer contact and address information. More detailed contact and end-use information was merged in from several other sample files.

The sampling frame for this survey effort included prescriptive projects conducted between May 2010 and May 2011 for the Minnesota Motors and Drives, Minnesota Heating Efficiency, and Colorado Business

⁸ Some businesses participated in the program at multiple locations.



Heating Colorado Business Heating Efficiency programs. Per Xcel Energy’s request, custom projects and projects conducted outside of the timeframe were removed from the sample.

In the initial sample files, data were “stacked” by measure type, meaning that each line in the data represented one measure (boiler, VFD, steam trap, etc) installed at a premise or location. In order to prepare the sample for fielding, the data were aggregated so all measure information was combined and attached to one premise number. Once aggregated and ineligible cases were removed, the sample was reviewed to determine whether random sampling within measure types was possible or a census of all available sample points should be taken. For all measures except boiler tune-ups, the available pool of sample points was not large enough to support a random sampling of cases. Therefore, all eligible participants that installed a boiler, a furnace, a water heater, or an efficiency measure at their facility were selected to be interviewed. As the pool of eligible boiler tune-up participants was larger, these cases were randomly sampled.

Finally, the sample was reviewed for cases flagged as “Do Not Call” or “Do Not Contact” by Xcel Energy. These cases were removed from the sample.

Once final sample was prepared for fielding, this data was carefully reviewed for “multiples.” A “multiple” is defined as a participating business with multiple locations; for example, a property management company may conduct boiler tune-ups through the program at several apartment complexes. Often, one person is the main decision-maker for all locations within a multiple. To reduce customer burden, we do not conduct multiple callbacks to customers; instead, we speak with the decision-maker once and probe for any differences in the decision-making process between the different locations on file. In the sample, these cases are manually identified by identical debtor numbers and/or customer contact information.

b. Weighting

Weighting is the adjustment of data to account for intervening factors during sampling or fielding which would negatively affect the representativeness of the final survey data. Depending on which factors may be intervening in the survey, some data are given more “weight,” or contribute more to the analysis, than others.

For the Colorado Business Heating Colorado Business Heating Efficiency program, boiler tune-ups were randomly sampled while a census was taken of all other measure types. In order to more accurately report survey analysis at the overall program level, weights were determined to make sure boiler tune-ups were accurately represented in the overall mix of measures.

Table 5-3 below details the population sizes and number of completes for each stratum, as well as the weights determined for each. All counts reported in this section are unweighted, while all percentages are weighted. Additionally, because of the small sample sizes for some measure types (water heaters, furnaces, and heating efficiency measures) this section includes only unweighted counts for those strata, and not percentages.

Table 5-3. Weighting Scheme

	Population, after aggregation	Completed Surveys	Applied Weight
Only Tune-up	182	59	3.084746
No Tune-up	135	56	2.410714



c. Survey Design

The participant surveys collected information to inform program design, program administration, program implementation and delivery, market response, and program attribution. Program attribution impact results are reported in Section 9.

The participant surveys included questions regarding participant characteristics and profile, decision-making processes, sources of program information, satisfaction with key aspects of the program and the application process, barriers to participation, the effect of the program on their decision to install qualifying equipment, and suggestions for program improvements. While a majority of the analysis summarizes the program overall, we examined the results for differences between participants that received different types of equipment or services. However, as we completed few interviews with participants that installed furnaces, hot water heaters, or boiler efficiency improvements, most comparisons are only between participants that received boiler upgrades and boiler tune-ups.

First, we highlight key findings from the participant surveys. Then we present detailed findings in the following categories: Program Awareness, Program Design and Procedures, Participation Barriers, Program Satisfaction, and Customer Profile.

5.2 SUMMARY OF FINDINGS

The 115 Colorado participants interviewed included maintenance managers, organization directors, building owners, property managers, and plant managers at apartment buildings, office buildings, lodging facilities, and places of worship. Table 5-4 below compares the type of business included in our survey with those business included in the population (based on SIC code). With small exceptions, our sampled participants are relatively representative of the program population.

Table 5-4. Population versus Survey Business Types

Sector	Population	Survey
Housing/Rental/Real estate	32%	38%
Office	20%	14%
Unspecified	11%	N/A
Service	9%	6%
Religious	8%	7%
Education	7%	5%
Health Care	5%	1%
Other ⁹	3%	10%
Retail	2%	1%
Food/Restaurants	2%	2%
Manufacturing	2%	3%

Source: Participant data file, SIC Description, Participant Survey, questions F1

Key findings from the participant survey include:

- **Colorado participants in the Heating Efficiency program are generally satisfied with Xcel Energy and the program overall.** Across all types of projects, participants in the Heating Efficiency

⁹ “Other” contains recreational facilities, fraternal associations, and recording studios.



program reported consistent levels of satisfaction with the program overall. When asked to rate their satisfaction with the program on a zero to ten scale, 93 percent of participants rated their satisfaction positively. Likewise, 90 percent of all program participants rated their satisfaction with Xcel Energy as their utility positively. Participants' reasons for the high satisfaction (listed in descending order of satisfaction) included the rebate from the program, the results of the program-funded project, a smooth application process, and their interaction with Xcel Energy staff. These results are corroborated by the relatively few program changes requested by participants; 66 percent stated they would not recommend any changes to the program.

- **HVAC contractors and account managers are the most effective ways to educate potential participants about the program.** When asked how they first became aware of Xcel Energy's Heating Efficiency program, participants most frequently reported that their equipment or service contractor informed them that they were eligible for the program. In addition, of the managed account participants, account managers were the most frequently reported source of program information instead of the equipment vendors. These findings suggest that these two channels are effective sources of program information for potential participants.
- **Participants that only receive rebates for conducting a boiler tune-up perceive limited value from the program.** Participants that received boiler tune-up rebates were least satisfied with the amount of the rebate provided by the program. In addition, a significant percentage of those participants stated that they conducted the service as part of routine maintenance at their property (no service agreements were reported by participants) and they were unsure of what energy savings they have realized as part of the program. These findings in combination suggest that these participants may not see the full value of the program participation.
- **The high efficiency HVAC market in Colorado is not yet saturated.** When asked about future plans for heating system upgrades, 39 percent of participants (43 participants, 31 of which received a boiler tune-up) reported that they had plans to upgrade or replace part of their system. Most often, these planned projects included the installation of new boilers (86 percent of those participants with plans). This finding suggests potential for future program participants specifically as those conducting boiler tune-ups start to replace their aging systems and turn to Xcel Energy for technical and financial assistance.
- **Potential participants may have difficulty calculating boiler rebates without the assistance of Xcel Energy staff.** Participants most frequently reported that they were informed of the rebate amount through communication with Xcel Energy staff (39 percent); either program staff, their account manager, or BSC staff. Participants that received boilers reported that Xcel Energy staff informed them of the rebate amount more often than those that received tune-ups (65 percent and 22 percent). This difference may indicate that the dollars per MMBTU method for calculating boiler rebates may be difficult for potential participants and may be another barrier to participation.

5.3 DETAILED FINDINGS

Detailed findings are presented in the following topic areas: Program Awareness, Program Design and Procedures, Participation Barriers, Program Satisfaction, and Customer Profile.

5.3.1 Program Awareness

A key step in the Colorado Business Heating Efficiency program design is to conduct coordinated outreach with HVAC contractors. This outreach is intended to create a network of educated HVAC contractors that regularly talk to customers about the program and leverage the program in their sales efforts. Results from



the participant survey indicate that Xcel Energy has been successful at this task and is effectively using their trade ally network in Colorado as a strong sales force for the program.

When asked how they first became aware of Xcel Energy’s Heating Efficiency program, a highest percentage of participants overall reported that their equipment or service contractor informed them that they were eligible of the program (24 percent). Participants also frequently reported that they became aware of the program as a result of Xcel Energy’s general marketing campaigns including bill inserts and newsletters (14 percent), online research including visiting Xcel Energy’s website and vendor emails (eight percent), and their account manager (seven percent). However, of the managed account participants (n = 14), their account manager was the most frequently reported source of program information (n = 7) instead of the equipment vendors (n = 5). In addition, one participant that received program funds for boiler tune-ups at 20 locations reported that they became aware of the program as part of a HUD property assessment required in order to receive federal funding (34 percent of the boiler tune-up projects).

Other sources included communication with an Xcel Energy staff member (other than their account manager), a recommendation by a co-worker, previous experience with Xcel Energy’s DSM programs, a BSC representative, and an Xcel Energy information seminar. In addition, 16 percent of the participants could not recall how they heard about the program.

Table 5-5 below details the frequency of the reported channel from which the participant heard about the program by which type of measure they received through the program as well as by managed status.



Table 5-5. How Respondent First Heard of Program

By Measure Type	Received boiler tune-up (n = 59)		Installed boiler (n = 43)		Installed furnace (n = 7)	Installed heating efficiency measures (n = 6)	Installed hot water heater (n = 2)	Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Responses	Responses	Responses	Weighted Percent
Equipment vendor/contractor	15	25%	8	19%	2	3	0	27	24%
HUD assessment	20	34%	0	0%	0	0	0	20	19%
General knowledge of rebate programs	0	0%	20	47%	0	1	0	21	16%
General information from Xcel Energy	10	17%	2	5%	1	0	0	13	12%
Online resource	4	7%	4	9%	1	1	0	9	8%
Account manager	2	3%	6	14%	0	0	0	8	7%
Xcel Energy staff member	3	5%	1	2%	1	0	0	5	4%
Colleague/coworker	1	2%	2	5%	0	0	1	4	3%
Previous Xcel Energy program experience	1	2%	0	0%	0	0	1	2	2%
Mass advertising campaign	1	2%	1	2%	0	0	0	2	2%
BSC representative	1	2%	0	0%	0	0	0	1	1%
Xcel Energy event	0	0%	1	2%	0	0	0	1	1%
Other	3	5%	3	7%	1	0	0	7	6%
Don't Know/Don't Recall	1	2%	0	0%	1	1	0	3	2%
By Managed Status	Nonmanaged (n = 101)		Managed (n = 14)					Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent				Responses	Weighted Percent
Equipment vendor/contractor	22	22%	5	N/A				27	24%
HUD assessment	20	22%	0					20	19%
General knowledge of rebate programs	21	18%	0					21	16%
General information from Xcel Energy	12	13%	1					13	12%
Online resource	6	6%	3					9	8%
Account manager	1	1%	7					8	7%
Xcel Energy staff member	4	4%	1					5	4%
Colleague/coworker	4	4%	0					4	3%
Previous Xcel Energy program experience	1	1%	1					2	2%
Mass advertising campaign	2	2%	0					2	2%
BSC representative	1	1%	0					1	1%
Xcel Energy event	0	0%	1					1	1%
Other	6	6%	1					7	6%
Don't Know/Don't Recall	3	3%	0					3	2%
Total	101	100%	14					115	100%

Source: Participant Survey, questions PA1 to PA1E



5.3.2 Program Design and Procedures

Onerous program applications and documentation requirements can be a significant barrier for potential participants as they struggle to replace equipment on tight timelines and with limited resources. However, results from the participant survey indicate that this is not a significant barrier in Colorado's program as a majority of participants reported that they completed the rebate application form internally; either themselves or with the assistance of other in-house staff (78 percent). Only 26 percent¹⁰ of the participants reported that their contractor completed the application for them. This finding conflicts with the finding from our trade ally surveys in which contractors reported that they completed the program paperwork for their customers and only provided it to them for a signature. It is possible that participants defined providing a final signature as "completing" the application, when, in fact, contractors entered a majority of the required technical information.

Regardless, 57 percent of the participants that stated they completed the rebate application by themselves reported they required assistance from Xcel Energy staff or their contractor (29 percent of the participants overall). Specifically, they often required additional help on providing the technical specifications of the equipment installed. This assistance was most frequently requested by those participants that installed boilers and boiler efficiency improvements through the program. Table 5-6 below contains detailed information about who completed the rebate application form by measure type and managed status.

¹⁰ Respondents can select more than one source of assistance. Therefore, reported percentages sum to more than 100 percent.

Table 5-6. Who Completed Rebate Application Form

By Measure Type	Received boiler tune-up (n = 59)		Installed boiler (n = 43)		Installed furnace (n = 7)	Installed heating efficiency measures (n = 6)	Installed hot water heater (n = 2)	Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Responses	Responses	Responses	Weighted Percent
Either respondent or coworker	43	73%	36	84%	6	4	2	90	78%
Equipment vendor	17	29%	10	23%	1	2	0	29	26%
Other Xcel Energy program staff	1	2%	3	7%	0	0	0	4	3%
Account manager	0	0%	1	2%	0	0	0	1	1%
Other	1	2%	2	5%	0	0	0	3	2%
Don't Know/Don't Recall	1	2%	0	0%	0	0	0	1	1%
By Managed Status	Nonmanaged (n = 101)		Managed (n = 14)					Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent				Responses	Weighted Percent
Either respondent or coworker	80	79%	10	N/A				90	78%
Equipment vendor	22	22%	7					29	26%
Other Xcel Energy program staff	2	2%	2					4	3%
Account manager	0	0%	1					1	1%
Other	2	2%	1					3	2%
Don't Know/Don't Recall	1	1%	0					1	1%

Source: Participant Survey, question SA1c

In addition, a majority of participants reported that, overall, the actual rebate amount they received was the same as the amount initially estimated when the project was planned (80 percent). Only seven percent of the participants reported that the amount was less than initially estimated. Participants most frequently reported that they were informed of the rebate amount through communication with Xcel Energy staff (39 percent); either program staff, their account manager, or BSC staff. Participants that received boilers reported that Xcel Energy staff informed them of the rebate amount more often than those that received tune-ups (65 percent and 22 percent). This difference is likely a result of the way rebates are calculated for boilers - the amount is based on boiler size and efficiency instead of the prescriptive “per boiler” amount offered for tune-ups.

Only 19 percent of all participants reported that their contractor provided them with an estimated rebate amount. The remaining participants calculated the rebate amount internally using either existing knowledge of the program, information provided on the rebate application, or information provided on the program website.

Although a significant proportion of respondents need help from Xcel Energy when completing the rebate application, participants did not report that many of their past applications have been rejected. When asked about rejected rebate applications for purchased equipment or services, only eight percent (n = 9) of the participants reported that, at some point in the past, Xcel Energy had denied a submitted application as the equipment did not qualify. Of these nine participants, four reported that someone at Xcel Energy stated the equipment would qualify while one reported that their vendor selected the incorrect equipment. The remaining four participants stated they had selected the incorrect equipment themselves. Table 5-7 details the frequency of rejected applications by measure type and managed status.



Table 5-7. Rejected Applications by Measure Type

By Measure Type	Received boiler tune-up (n = 59)		Installed boiler (n = 43)		Installed furnace (n = 7)	Installed heating efficiency measures (n = 6)	Installed hot water heater (n = 2)	Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Responses	Responses	Responses	Weighted Percent
No	55	93%	39	91%	6	6	2	106	92%
Yes	4	7%	4	9%	1	0	0	9	8%
Don't Know/Don't Recall	0	0%	0	0%	0	0	0	0	0%
By Managed Status	Nonmanaged (n = 101)		Managed (n = 14)					Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent				Responses	Weighted Percent
No	95	94%	11	N/A				106	92%
Yes	6	6%	3					9	8%
Don't Know/Don't Recall	0	0%	0					0	0%

Source: Participant Survey, question SA3c

5.3.3 Participation Barriers

There are many potential obstacles that customers must overcome when deciding whether to install high efficiency equipment instead of standard efficiency equipment, or whether to conduct a boiler tune-up this year or delay it for another heating season. These potential obstacles include lack of funds, split incentives (between building owners and tenants), uncertainty regarding equipment performance, and difficulty in coordinating approval among various stakeholders. When asked about what, if any, barriers they faced when deciding whether to install the new equipment or conduct the boiler tune-up, a majority of participants across all measure types reported that there were no significant barriers (84 percent). Barriers included lack of available funds or financing, lease agreements, lack of information regarding savings potential, limited time to oversee the implementation, and a difficult rebate application process. Those receiving boiler tune-ups were least likely to mention any barriers. Table 5-8 below lists the frequency of the reported barriers by measure type and managed status.



Table 5-8. Reported Barriers to Implementation

By Measure Type	Received boiler tune-up (n = 59)		Installed boiler (n = 43)		Installed furnace (n = 7)	Installed heating efficiency measures (n = 6)	Installed hot water heater (n = 2)	Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Responses	Responses	Responses	Weighted Percent
No barriers	53	90%	32	74%	4	6	2	95	84%
Lack of financing	0	0%	3	7%	1	0	0	4	3%
Lack of funds available for investment	1	2%	2	5%	0	0	0	3	2%
Unsure of energy savings potential	2	3%	0	0%	0	0	0	2	2%
Upper management doesn't see benefit	1	2%	1	2%	0	0	0	2	2%
Economy	0	0%	2	5%	0	0	0	2	2%
Amount of management time to oversee projects	0	0%	2	5%	0	0	0	2	2%
Internal staff lacked expertise about measures	0	0%	2	5%	0	0	0	2	2%
Other priorities for capital spending	0	0%	1	2%	0	0	0	1	1%
Business hesitant to replace existing working equipment	0	0%	1	2%	0	0	0	1	1%
Payback on investment	0	0%	0	0%	1	0	0	1	1%
Other	1	2%	3	7%	1	0	0	5	4%
Don't Know/Don't Recall	1	2%	0	0%	0	0	0	1	1%
By Managed Status	Nonmanaged (n = 101)		Managed (n = 14)					Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent				Responses	Weighted Percent
No barriers	86	86%	9	N/A				95	84%
Lack of financing	3	3%	1					4	3%
Lack of funds available for investment	2	2%	1					3	2%
Unsure of energy savings potential	2	2%	0					2	2%
Upper management doesn't see benefit	2	2%	0					2	2%
Economy	2	2%	0					2	2%
Amount of management time to oversee projects	0	0%	2					2	2%
Internal staff lacked expertise about measures	2	2%	0					2	2%
Other priorities for capital spending	0	0%	1					1	1%
Business hesitant to replace existing working equipment	1	1%	0					1	1%
Payback on investment	1	1%	0					1	1%
Other	4	4%	1					5	4%
Don't Know/Don't Recall	1	1%	0					1	1%

Source: Participant Survey, question SA7b



Although lack of capital was mentioned as a barrier by several participants, none of the participants reported the incremental cost of the higher efficiency equipment as a barrier. In addition, 67 percent of the participants reported that they did not include the rebate amount in the budget proposal when seeking approval for the project. While these findings are typical of low cost services such as boiler tune-ups, they are unusual for larger cost projects such as boilers. These findings may suggest several trends. First, the incremental cost of high efficiency boilers is low enough to make the benefits of high efficiency equipment self-evident to program participants and it is no longer a barrier. Likewise, it may suggest that the program and its trade allies are effective at educating customers about the benefits of high efficiency equipment despite the increased cost, therefore reducing the perceived barrier of incremental cost.

When asked why they installed the program-eligible equipment over standard efficiency equipment, conducted the boiler tune-up, or upgraded the efficiency of their existing boilers with efficiency enhancements, a majority of participants stated that they wanted to save energy (48 percent) or reduce costs (31 percent). In addition, 53 percent of those that received a boiler tune-up (30 percent overall) stated that they conducted the service as part of routine maintenance at their property. Other frequently stated motivations included funding from an outside source (sources were not specified), existing renovation plans, the availability of the program incentive, and recommendations from contractors.

Participants that conducted a boiler tune-up more frequently reported a desire to save energy as a motivation for conducting the service than those that installed new boilers (58 percent vs. 30 percent respectively). Likewise, those that installed new boilers more frequently reported a desire to reduce costs than those that conducted tune-ups (61 percent vs. ten percent respectively). This difference between the two measure types suggests that customers may not be expecting any significant cost savings from conducting boiler tune-ups. It is possible they understand the tune-up will make their boilers more efficient but they may not be translating that efficiency gain into a reduction in the energy costs. Table 5-9 and Table 5-10 below list the frequency of the stated motivations for installing new equipment or conducting the boiler tune-up by measure type and managed status.



Table 5-9. Motivations for Program Participation (By Measure Type)

By Measure Type	Received boiler tune-up (n = 59)		Installed boiler (n = 43)		Installed furnace (n = 7)	Installed heating efficiency measures (n = 6)	Installed hot water heater (n = 2)	Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Responses	Responses	Responses	Weighted Percent
Wanted to save energy	34	58%	13	30%	5	0	2	54	48%
Wanted to reduce costs	6	10%	26	60%	4	3	1	39	31%
Routine maintenance/upkeep	31	53%	0	0%	0	0	0	31	30%
Funding from outside source	0	0%	18	42%	1	1	0	20	15%
Renovation plans	0	0%	18	42%	0	1	0	19	14%
Program incentive	7	12%	4	9%	2	0	0	13	11%
Recommendation of third party contractor/engineer	7	12%	2	5%	0	0	0	9	8%
Age/efficiency of previous equipment	0	0%	6	14%	1	1	0	8	6%
Tune-up had never been performed	6	10%	0	0%	0	0	0	6	6%
Ensure equipment reliability	3	5%	0	0%	1	0	0	4	4%
Program-subsidized boiler tune-up	3	5%	0	0%	0	0	0	3	3%
Equipment needed to be replaced	0	0%	1	2%	0	2	1	3	2%
Increase efficiency	0	0%	2	5%	0	0	0	2	2%
LEED qualified	0	0%	2	5%	0	0	0	2	2%
Program-subsidized study	1	2%	0	0%	0	0	0	1	1%
Past experience with Xcel Energy program	1	2%	0	0%	0	0	0	1	1%
Other	5	8%	3	7%	0	0	0	8	7%
Don't Know/Don't Recall	0	0%	0	0%	0	0	0	0	0%

Source: Participant Survey, question N1a

Table 5-10. Motivations for Program Participation (By Managed Status)

By Managed Status	Nonmanaged (n = 101)		Managed (n = 14)		Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Weighted Percent
Wanted to save energy	46	48%	8	53%	54	48%
Wanted to reduce costs	36	33%	3	19%	39	31%
Routine maintenance/upkeep	29	32%	2	16%	31	30%
Funding from outside source	20	17%	0	0%	20	15%
Renovation plans	19	16%	0	0%	19	14%
Program incentive	10	10%	3	19%	13	11%
Recommendation of third party contractor/engineer	7	7%	2	15%	9	8%
Age/efficiency of previous equipment	7	6%	1	6%	8	6%
Tune-up had never been performed	4	4%	2	16%	6	6%
Ensure equipment reliability	3	3%	1	8%	4	4%
Program-subsidized boiler tune-up	3	3%	0	0%	3	3%
Equipment needed to be replaced	3	3%	0	0%	3	2%
Increase efficiency	2	2%	0	0%	2	2%
LEED qualified	1	1%	1	6%	2	2%
Program-subsidized study	1	1%	0	0%	1	1%
Past experience with Xcel Energy program	1	1%	0	0%	1	1%
Other	5	5%	3	21%	8	7%
Don't Know/Don't Recall	0	0%	0	0%	0	0%

Source: Participant Survey, question N1a

When asked about future plans for heating system upgrades, 41 percent of participants reported that they had plans to upgrade or replace part of their system. Most often, this planned project included the installation of new boilers (86 percent of those participants with plans). Other additions included new heating system enhancements (e.g., pipe insulation, O2 trim controls) and new furnaces. When asked how Xcel Energy could assist with these future plans, 62 percent of participants stated that rebates would be most beneficial while 29 percent reported that they did not need any additional assistance at this time. Other forms of requested assistance included technical assistance and contractor recommendations.

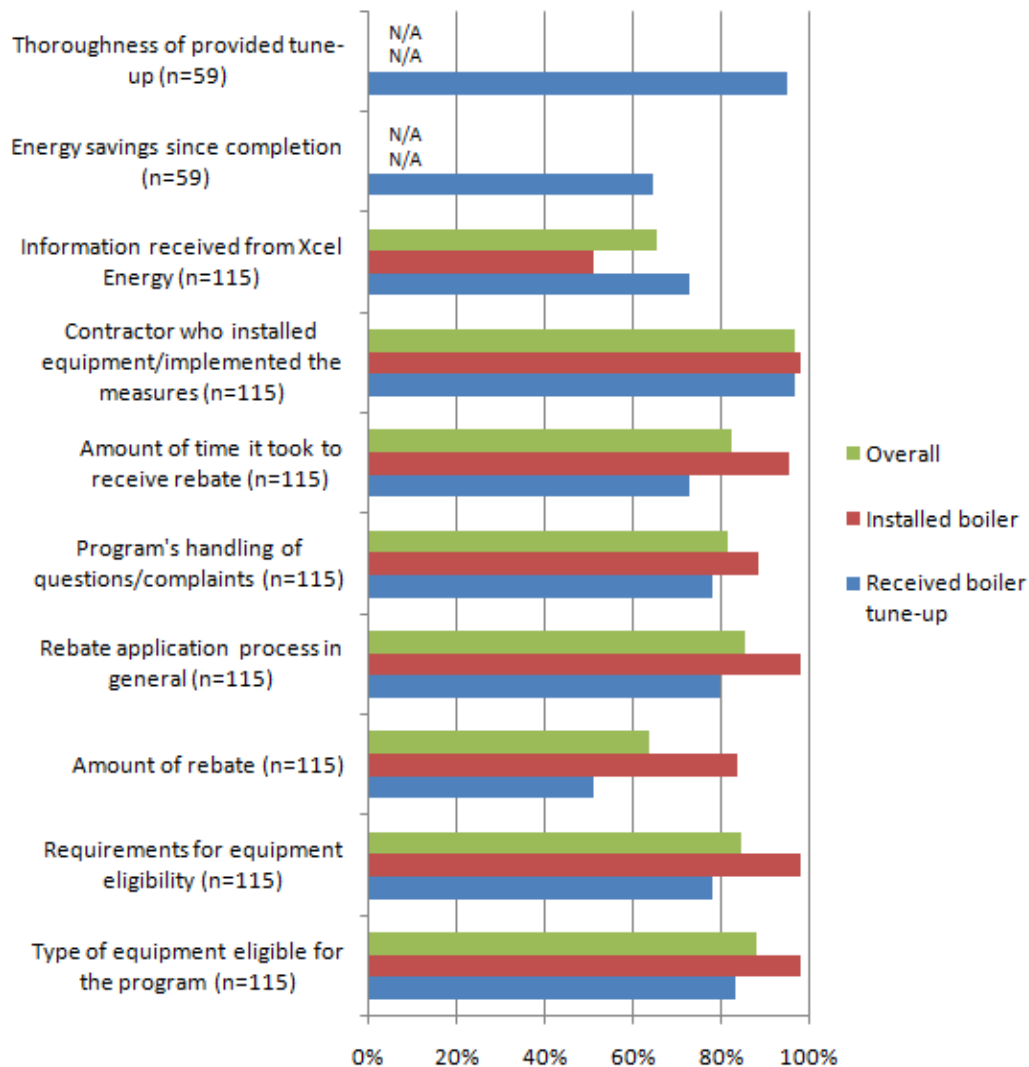
5.4 PROGRAM SATISFACTION

Across all types of projects, participants in the Heating Efficiency program report consistent levels of satisfaction with the program overall. When asked to rate their satisfaction with the program on a zero to ten scale, where zero is not at all satisfied and ten is very satisfied, 93 percent of participants rated their satisfaction positively (a six or higher on a ten point scale). All of the



participants that installed water heaters and heating system improvements rated the program positively. In addition, 95 percent of those participants that installed boilers or conducted tune-ups through the program also rated the program positively. Those that installed furnaces had the lowest levels of overall satisfaction: two of the seven participants that installed furnaces rated their satisfaction with the program negatively. Participants gave various reasons for why they reported high levels of satisfaction: the rebate from the program (51 percent), the results of the program-funded project (26 percent), a smooth application process (12 percent), and their interaction with Xcel Energy staff (12 percent). Those few participants that rated their satisfaction with the program negatively reported that the program should improve the rebate process, deliver rebate checks faster, and increase the rebate amount. Likewise, 90 percent of all program participants rated their satisfaction with Xcel Energy as their utility positively.

Participants also report high levels of satisfaction when asked about specific program components. Specifically, at least 80 percent of all participants provided positive ratings for their satisfaction with the program-eligible equipment, the program's requirements, the rebate process, the program's handling of questions from participants, the amount of time it took to receive the rebate, and the contractors that completed the project. In addition, of those participants that received boiler tune-ups, 95 percent of the participants reported that they were satisfied with the thoroughness of the tune-up conducted. Table 5-11 below lists the percentage of participants that were satisfied with each individual program component by measure type. Table 5-12 details the weighted mean satisfaction for each program component, by managed status.

Table 5-11. Percentage of Participants Satisfied by Program Component¹¹

Source: Participant Survey, question SA6a – SA7j

¹¹ Due to a skip error, only those who conducted boiler tune-ups were asked about their satisfaction with their energy savings (question Sa6j). Callbacks were attempted.

**Table 5-12. Mean (Weighted Average) Satisfaction with Program Components**

	Nonmanaged		Managed		Total	
	Mean	Responses	Mean	Responses	Weighted Mean	Responses
Contractor who installed equipment/implemented the measures	9.3	99	9.7	14	9.4	113
Program's handling of questions/complaints	8.8	89	9.8	13	9.0	102
Type of equipment eligible for the program	8.7	94	9.1	14	8.7	108
Amount of time it took to receive rebate	8.5	97	9.5	13	8.6	110
Rebate application process in general	8.4	96	9.7	13	8.5	109
Thoroughness of provided tune-up	8.2	51	10.0	6	8.4	57
Information received from Xcel Energy	7.9	75	9.4	13	8.1	88
Requirements for equipment eligibility	7.9	93	9.4	13	8.1	106
Amount of rebate	7.4	98	8.4	13	7.5	111
Amount of energy savings since project completion	7.1	36	7.3	3	7.1	39

Source: Participant Survey, question SA6a – SA7j

However, there were two program components where participants overall rated their satisfaction significantly lower than others. First, only 63 percent of all participants rated their satisfaction with the amount of the program rebate as positive (a common response during participant evaluation). Across all measure types, satisfaction with the rebate amount was lowest among those that received boiler tune-ups through the program (51 percent). Second, only 64 percent of all participants rated their satisfaction with the energy savings they have realized since completion of the boiler tune-up as positive. However, only one participant reported that they were not satisfied with the energy savings from the tune-up; the remainder of the participants reported that they could not provide a rating as it was too early to see what benefit, if any, would be provided by the tune-up.

Participants also had few requested changes to the program. When asked what changes, if any, they would suggest Xcel Energy make to the Heating Efficiency program, 66 percent stated they would not make any change to the program. This finding corroborates the high satisfaction levels reported above. For those participants that did request changes, higher rebate levels and an improved application process or rebate form (e.g., online forms, less information required) were frequently requested.

5.5 CUSTOMER PROFILE

As mentioned in the Key Findings, participating properties included apartment buildings, office buildings, lodging facilities, places of worship, education facilities, and manufacturing facilities. A

majority of the participants owned their facility (88 percent) while the others either managed the property (nine percent), leased the location (two percent), or both managed and leased properties (one percent). Many of these participants had taken additional actions within the past five years to improve the energy efficiency and reduce their energy consumption at these facilities. The most frequent improvements made by program participants were to make improvements to the building envelope (32 percent) and install high efficiency lighting equipment (25 percent). Other improvements included installing new energy efficient systems including appliances, lighting controls, HVAC system controls, HVAC systems (for those that did not install one through the program), and solar-powered equipment. In addition, other facilities made improvements to industrial processes, reduced operating hours, and conducting facility-wide energy efficiency awareness campaigns. Table 5-13 below lists the frequency of the improvements made in the past five years by managed status.

Table 5-13. Other Energy Efficient Actions at this Location

	Nonmanaged (n = 101)		Managed (n = 14)		Total (n = 115)	
	Responses	Weighted Percent	Responses	Weighted Percent	Responses	Weighted Percent
Made changes to building envelope	34	31%	6	N/A	40	32%
Installed high efficiency lighting equipment	20	20%	9		29	25%
Installed energy efficient appliances	20	17%	0		20	15%
Added lighting controls	7	7%	5		12	11%
Added controls to HVAC system to reduce use	10	10%	2		12	11%
Made changes to HVAC maintenance schedule	8	8%	2		10	9%
Installed high efficiency heating equipment	6	6%	1		7	7%
Installed solar equipment	4	4%	3		7	6%
Process improvements	4	4%	2		6	5%
Tuned up existing equipment	4	4%	1		5	5%
Installed high efficiency cooling equipment	3	3%	2		5	4%
Changed operating hours/Minimized demand	4	4%	0		4	4%
Facility-wide energy awareness training	4	4%	0		4	3%
Recommissioning/retrocommissioning	0	0%	3		3	3%
Participated in other Xcel Energy on-site assessment/study	2	2%	0		2	2%
Installed high efficiency ventilation equipment	1	1%	0		1	1%
Installed high efficiency refrigeration equipment	1	1%	0		1	1%
Installed heating equipment - unspecified efficiency	1	1%	0		1	1%
Energy assessment/audit - unspecified provider	1	1%	0		1	1%
Installed high efficiency motors/drives	0	0%	1		1	1%
Other	2	2%	3		5	4%
None	27	29%	1		28	26%

Source: Participant Survey, question F4

While 26 percent of the participants reported that they have not completed any changes to their facility that were intended to reduce energy consumption, a majority of those participants stated



that they were in the process of making improvements. Other reasons participants gave for not having completed energy efficiency projects include lack of need, budget constraints, and lack of knowledge about how to reduce energy in their facility.

5.5.1 Other Measures

A majority of the participants in the Colorado Business Heating Efficiency program either installed a new boiler or conducted a tune-up on an existing boiler. However, the program also offers incentives for water heaters, furnaces, and efficiency enhancements. As we only completed surveys with a small number of these projects, the results are only qualitative. However, there are several findings applicable to these measures identified in this survey. These findings suggest that these components are useful parts of the program design and fill a necessary, albeit small, market need.

First, participants that install furnaces or efficiency enhancements were most likely to hear about the program from their vendor or contractor. Those that installed water heaters did not mention contractors instead relying on co-workers or previous experience with Xcel Energy. In addition, none of the participants that installed furnaces, water heaters, or enhancements reported any previously rejected applications.

Participants that installed enhancements or water heaters reported no barriers to implementing those measures. However, participants that installed furnaces reported financial barriers included a lack of financing available and the payback on the investment. However, a majority of all three types of participants reported that a desire to save energy and reduce costs were main motivations behind their installation of the program-eligible equipment. In addition, only two furnaces participants reported the program incentive as a main motivation behind installing the furnace.

As the barriers to installing furnaces were primarily financial and the incentive was reported as a main motivation, the program may be having a significant effect on those projects when compared with enhancements and water heaters. However, this finding is contradicted by the NTG ratio analysis in which furnaces have the lowest program attribution of all five measures. Given the small number of measures in the sample, it is difficult to explain this contradiction and no program design changes are recommended based on this limited evidence.

5.6 CONCLUSIONS

Overall, program participants are satisfied with the performance of the Heating Efficiency program in Colorado and with Xcel Energy in general. They report positive interactions with program staff, the contractors in their market, and the rebate process. In addition, aside from requesting shorter applications and larger incentives (common requests from program participants), they report few barriers to participating in the program, installing high efficiency equipment, or conducting boiler tune-ups.

However, results from these interviews indicate that participants that receive rebates for conducting boiler tune-ups, while still overall satisfied with the program, perceive less value from the program than those that receive rebates for installing new boilers, furnaces, water heaters, or boiler efficiency improvements. This perception is likely in part due to the nature of the efficiency improvement: participants that tune-up their boilers do not have a new piece of capital equipment



at the end of the project. Likewise, the financial costs of and benefits from conducting a boiler tune-up are limited in comparison to retrofitting an entire high efficiency boiler system.

6. EVALUATION RESULTS—NONPARTICIPANT FINDINGS

This section presents the results of 53 quantitative surveys of program nonparticipants in Colorado conducted for the Xcel Energy Commercial Heating Efficiency program evaluation. The research was conducted using telephone surveys implemented from July 7 through August 3, 2011.

In this section, first we discuss sampling and weighting methodology. Then, we highlight key findings from the nonparticipant surveys. This is followed by detailed findings in the following categories: Program Awareness and Interaction, Decision-Making Factors, Satisfaction, and Customer Profile.

6.1 INTRODUCTION

The objectives of the nonparticipant survey were to understand program awareness, installation of energy-using equipment, decision-making factors, satisfaction with Xcel Energy, and characteristics among customers who are eligible to participate in the Colorado Business Heating Efficiency program, but have not yet done so.

As shown in Table 6-1, we completed surveys with 53 respondents who were eligible for the Commercial Heating Efficiency program but had not previously participated (“heating nonparticipants”). Seventeen percent of the nonparticipants surveyed were classified by Xcel Energy as being managed accounts (nine of 53). The remaining businesses (44 respondents) were classified as nonmanaged, or those not having a dedicated Xcel Energy account manager.

Table 6-1. Number of Completed Surveys by Managed Status

	Number of Completed Surveys (n = 53)
Managed (per sample indicators)	9
Nonmanaged (per sample indicators)	44

During the survey, respondents were asked to confirm their managed status; several more respondents indicated they had an account manager in the survey than was found in the sample information (14 respondents reported that they were managed, compared to nine as recorded in the sample). We believe the remaining cases are likely due to the increased role of the Business Solutions Center in customer interaction; customers may be incorrectly be interpreting the role of the BSC as an account managed-type relationship. Therefore, for all weighting and analysis, we use the managed account information contained in the sample.

6.1.1 Detailed Sampling and Weighting

a. Sampling

Xcel Energy provided a data file containing information on customers they determined were likely eligible to participate in the Commercial Heating Efficiency program, but had not yet done so. At Xcel Energy’s request, any cases which had been sampled for other survey efforts since October of 2010 were removed from the eligible population to be sampled for this evaluation.



In the initial nonparticipant files, data was split out by premise, or location. Unlike the participant survey, which gathered data by premise/location for each type of equipment installed, the nonparticipant survey gathered higher-level information on program awareness, decision-making, barriers to program participation, etc. Therefore, we needed to aggregate (or collapse) the data to one case per company/contact person. The data were manually reviewed using debtor number, company name, address, phone number, and contact name to identify premises attached to the same company and/or contact person. These cases were then aggregated so only one case per company and/or debtor number remained in the sample.

Once aggregation was complete, we randomly sampled customers. As a final check on actual participation in the programs, sampled customers were screened against the current program participant lists and any cases listed as program participants were removed from the nonparticipant lists.

Finally, the sample was reviewed for cases flagged as “Do Not Call” or “Do Not Contact” by Xcel Energy. These cases were removed from the sample.

b. Survey Screening

Potential respondents were first asked a series of questions in order to screen out those who were ineligible to participate in the Commercial Heating Efficiency program. In Colorado, these screeners included whether they are current or recent participants of the Commercial Heating Efficiency program, as well as whether they currently have eligible heating equipment installed. During the screening process, eight sample points (three percent of the attempted sample) were flagged as ineligible for the Commercial Heating Efficiency program as they were already program participants, and eight (three percent of the attempted sample) were flagged as ineligible because they did not have eligible heating equipment at their facility. Surveys were not completed with these individuals, and these results were later used to adjust the population size for weighting (discussed below).

c. Weighting

Weighting is the adjustment of data to account for intervening factors during sampling or fielding which would negatively affect the representativeness of the final survey data. Depending on which factors may be intervening in the survey, some data are given more “weight,” or contribute more to the analysis, than others.

Survey data for this evaluation effort were weighted based on a managed/nonmanaged indicator found in the original sample in an attempt to more accurately represent both large and small businesses. Weights are calculated by dividing the adjusted population by the number of completed surveys for each stratum. Additionally, because of the ineligible cases found in the survey data, the population was adjusted to reflect this and allow for more accurate weighting. To adjust the population, the ratio of ineligible cases by stratum was determined, and then this ratio was applied to the population strata to determine the number of cases which were likely to be ineligible in the population. Table 6-2 below details the adjusted population size and number of completes for each stratum, as well as the weights determined for each. In this section, all counts shown are unweighted, while any overall percents are weighted. Additionally, only counts (not percents) are shown for any analysis where the number of responses is less than 30.

Table 6-2. Sampling and Weighting Determinations

	Original Population, after aggregation and post initial screening by Xcel Energy	Adjusted Population	Completed Surveys	Weights
Managed	184	172	9	19.125448
Nonmanaged	838	798	44	18.138528

6.2 SUMMARY OF FINDINGS

Key findings from the nonparticipant survey include:

- **Program awareness has not yet saturated the Colorado market.** While most nonparticipants (81 percent overall) were aware that Xcel Energy offers rebate and technical assistance programs, only 45 percent of all nonparticipants were aware of the Commercial Heating Efficiency program. Those who had heard of the program most frequently indicated that Xcel Energy informed them of the program in some way.
- **Program nonparticipants face significant barriers when deciding whether or not to install energy-efficient equipment.** In a sharp contrast to the participant survey findings, most nonparticipants gave at least one example of a barrier their business faces when looking to install energy-using equipment at their facility. Most often, nonparticipants mentioned financial barriers, either a lack of capital or initial cost, as their main barrier. Capital investment and budget availability were also rated the highest of a list of important factors nonparticipants consider when deciding whether or not to install new energy-using equipment or processes at their facility.
- **About one-quarter of heating nonparticipants plan to install new heating equipment in the future and a majority would appreciate help from Xcel Energy in doing so.** Heating nonparticipants who plan to install new heating equipment or improve upon their existing heating systems reported an interest in both learning more about program rebates from Xcel Energy, as well as receiving technical assistance or assessments to help them complete the projects.
- **Some nonparticipants are installing program-qualifying equipment outside of the program.** Thirty percent of heating nonparticipants have installed heating equipment outside the program. Of those, heating nonparticipants frequently mentioned installing boiler tune-ups, boilers, and improvements to their heating system. Seven respondents who conducted boiler tune-ups outside of the program reported that the tune-ups were part of an ongoing maintenance schedule or a service agreement. No respondents specifically mentioned a combustion analyzer test as part of this tune-up; however, five respondents were not able to describe the tune-up in any detail.
- **Nonparticipants rely on vendors or contractors for information about and implementation of energy-using equipment.** Over half of all nonparticipants (58 percent) indicated they would go to an equipment vendor or contractor to find out information about energy-using equipment, and 62 percent would contact an equipment vendor or contractor to actually implement the project.
- **Nonparticipants are generally satisfied with Xcel Energy as their energy provider.** Seventy-four percent of all nonparticipants indicated that they are satisfied or very satisfied with Xcel Energy. However, the average satisfaction rating among managed

accounts (67 percent satisfied) was lower than among nonmanaged accounts (75 percent satisfied). Of the few who were unsatisfied, one recalled an unsatisfactory customer service experience with Xcel Energy in the past and expressed dissatisfaction with the cost of energy. Another indicated dissatisfaction with the quality of the energy services they receive (this respondent was a managed account).

6.3 DETAILED FINDINGS

6.3.1 Program Awareness and Interaction

Eighty-one percent of heating nonparticipants were aware that Xcel Energy offers rebate and technical assistance programs. Forty-five percent of all surveyed nonparticipants indicated that they were specifically aware of the Commercial Heating Efficiency program. Respondents most frequently reported hearing about the program from Xcel Energy in a variety of ways; five of 24 respondents indicated they heard of the program through general information from Xcel Energy (which included mailings, phone conversations, or emails), while four indicated their account manager informed them of the program. Others reported hearing of the program from Xcel Energy through mass advertising campaigns or the Business Solutions Center. Four also mentioned hearing of the program from an equipment vendor or contractor. No respondents indicated hearing of the program online or through any social media (Facebook, Twitter, blogs).

Table 6-3 shows in detail the means through which respondents reported hearing about the Commercial Heating Efficiency program by managed status.

Table 6-3. How Respondent Heard Of Program¹²

	Nonmanaged (n = 20)	Managed (n = 4)	Total (n = 24)
	Responses	Responses	Responses
General information from Xcel	5	0	5
Account manager	1	3	4
Equipment vendor/contractor	3	1	4
Word of mouth/General knowledge	3	0	3
Mass advertising campaign	2	0	2
Other	2	0	2
BSC representative	1	0	1
Colleague/coworker at company	1	0	1
Xcel Energy event	1	0	1
Article in newspaper/magazine/newsletter	1	0	1
Through audit	1	0	1
Don't know	1	0	1

Source: Nonparticipant survey, question PA1

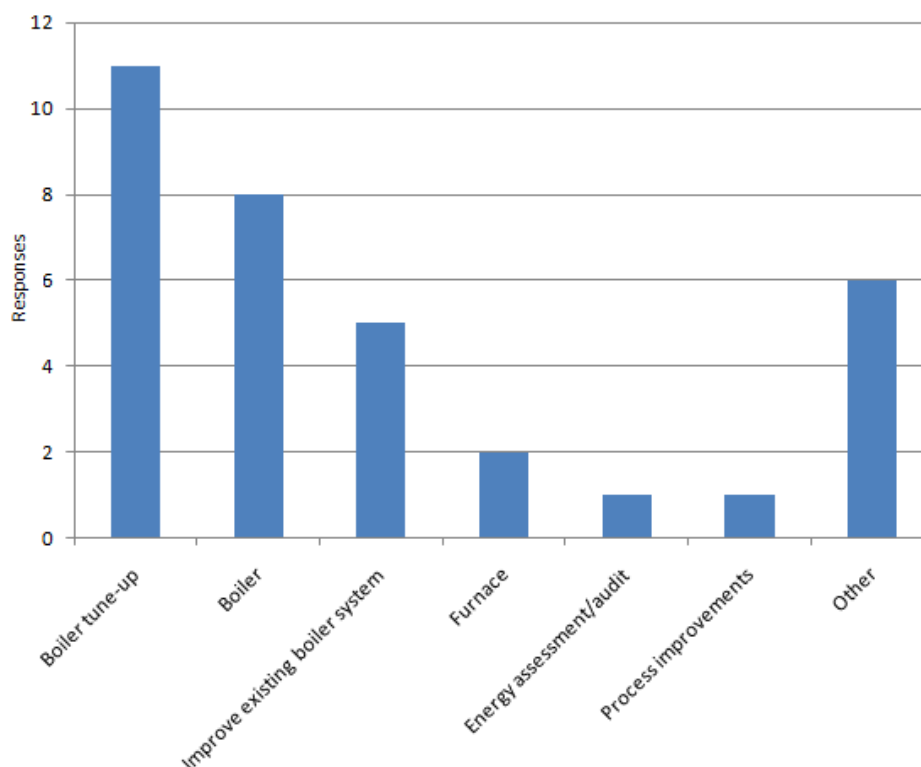
Only three of the 24 respondents who were aware of the Commercial Heating Efficiency program indicated that the means through which they heard of the program did not give them enough

¹² Some questions allowed multiple responses; therefore some percentages or counts will not add up to the total.

information to participate if they had they wanted to do so. Two of the three had heard of the program from Xcel Energy, while one had received the information from a vendor. Two of the three indicated their means of hearing about the program lacked specifics, such as Xcel Energy's contact information or details on what measures were eligible for the program, while one said they felt an in-person visit to their facility was needed before being able to determine whether they could participate or not (this respondent was a nonmanaged account).

Forty-nine percent of all nonparticipants indicated that they had either already installed or had considered installing heating equipment or boiler tune-ups in the past two years (30 percent had already installed while 19 percent had considered it). Most frequently, respondents mentioned a boiler tune-up (11 of 26 responses) or a boiler (eight of 26 responses). Five mentioned improving their current heating system, while two mentioned a furnace. Figure 6-1 below shows all equipment heating that nonparticipants reporting installing or considered installing in the past two years.

Figure 6-1. Heating Equipment Respondent Installed or Considered Installing (n = 26)



Source: Nonparticipant survey, question PA5

Those who indicated that they had already conducted a boiler tune-up outside the program (ten respondents) were asked whether these tune-ups were conducted as part of an ongoing maintenance schedule or service agreements. Seven of the ten respondents said the tune-up was part of an ongoing maintenance agreement. None of the ten respondents specifically mentioned that their tune-up included a combustion analyzer test; however, five respondents were not able to describe the boiler tune-up in any detail. Those who could indicated that the tune-up included cleaning of burners, as well as checking of gas pressure, piping, and valves. One respondent said:



“They test the pressure valve and the backup and the gas, it’s just the safety items, not efficiency items. Fluid levels, gas flow, standard procedures.”

Five respondents (of 14 who were aware of the Commercial Heating Efficiency program) indicated that they considered participating in the Commercial Heating Efficiency program when they considered or installed the heating equipment. Only one applied to participate in the program. When those who had considered participating were asked why they ultimately did not participate in the program, three replied that the amount of the rebate was not important enough, one indicated the application was denied because of the age of the boilers, and one said that their facility had recently moved outside of Xcel Energy’s territory.

When asked to rate their interest in participating in the Commercial Heating Efficiency program in the future on a scale from zero to ten, where zero is not at all interested and ten is very interested, 60 percent of respondents indicated that they would be interested in participating in the program (a score of six or greater). Of those who did not show a very high level of interest (25 respondents; a rating of six or below), six indicated that the rebate amount was not significant enough, while four said that a lack of capital or financing was a barrier. Three said they had already recently had work done, and two indicated they did not have enough information about the program. One respondent indicated that they already have a preferred implementer, most likely as part of an already-established service contract or maintenance plan.

About one-quarter of heating nonparticipants (27 percent) have plans to upgrade their current heating system or replace heating equipment. Of the 14 who have plans, ten respondents plan to install a new boiler. Two indicated that they planned to conduct boiler tune-ups and two planned to install hot water heaters. Eight respondents indicated they would appreciate more information regarding program rebates for these plans; another four requested technical assistance or assessments to help them complete their projects. Three would appreciate additional information on specific measures. Two respondents said they did not need any additional help.

6.3.2 Decision Making Factors

Businesses can obtain information on energy-using equipment and processes from a number of sources: equipment vendors or manufacturers, engineers or consultants, the Internet, word-of-mouth, as well as utility account managers and other utility staff. Overall, nonparticipants most frequently reported that they would contact an equipment vendor or contractor for information on energy-using measures (58 percent). About one-third of all nonparticipants (32 percent) indicated they would conduct a general Internet search to gather information on energy-using equipment. Ten percent mentioned their account manager, while nine percent mentioned Xcel Energy’s website. Table 6-4 details where respondents would go to search for information on energy-using equipment.

Table 6-4. Who Respondent Would Contact For Information on Energy-Using Equipment

	Nonmanaged (n = 44)		Managed (n = 9)	Total (n = 53)	
	Responses	Percent	Responses	Responses	Weighted Percent
Contractor/vendor	27	61%	4	31	58%
General internet search	12	27%	5	17	32%
Account manager	2	5%	3	5	10%
Xcel Energy website	4	9%	1	5	9%
Engineer	3	7%	1	4	8%
Manufacturer	3	7%	1	4	8%
BSC representative	2	5%	0	2	4%
Government resources	2	5%	0	2	4%
Contact people with more experience	1	2%	0	1	2%
Someone in company	1	2%	0	1	2%
Xcel Energy - unspecified	1	2%	0	1	2%
Architect	1	2%	0	1	2%
Trade organization/resources	1	2%	0	1	2%
Other	2	5%	0	2	4%
Don't know	2	5%	0	2	4%

Source: Nonparticipant survey, question IOA

If looking for someone to implement energy-using equipment, almost two-thirds of nonparticipants (62 percent) would contact an equipment vendor or contractor, while eight percent had someone within their company they would contact. Nine percent would contact Xcel Energy, and 13 percent did not know who they would contact. One respondent indicated that they would contact whoever was the cheapest or had the best price.

On a scale of zero to ten, where zero is not at all important and ten is very important, respondents were asked to rate a series of factors that influence their decision-making process to install new equipment or processes at their facility. Three of the four most highly-rated factors were financial: capital investment or budget availability (weighted mean of 9.3), money and energy savings (weighted mean of 9.1), and operating costs (weighted mean of 9.0). Compatibility with existing equipment was also rated highly, with a weighted average of 9.1. The three factors with the lowest average rating included the availability of a program rebate (weighted mean of 7.5), recommendation of a vendor or supplier (weighted mean of 7.1), and the recommendation of a utility (weighted mean of 6.5). Table 6-5 below details the weighted average rating for all factors that may influence a business's decision to install new equipment by managed status.

Table 6-5. Important Factors in Respondent Decisions-Making

	Nonmanaged		Managed		Total	
	Mean	n	Mean	n	Weighted Mean	n
Capital investment/budget availability	9.5	44	8.4	9	9.3	53
Money and energy savings	9.1	44	9.0	9	9.1	53
Compatibility with existing equipment	9.2	44	8.6	9	9.1	53
Operating cost	9.0	44	9.2	9	9.0	53
Performance concerns	9.1	44	8.3	9	8.9	53
Initial purchase cost	9.2	44	7.6	9	8.9	53
Life of new equipment	9.0	44	8.0	9	8.9	53
ROI	8.9	44	8.6	9	8.8	53
Efficiency level of new equipment	8.8	44	8.9	9	8.8	53
Life-cycle costs	8.4	42	8.2	9	8.4	51
Length of payback period	8.3	44	8.0	9	8.2	53
Age/condition of existing equipment	8.3	43	7.6	9	8.1	52
Environmental concerns	8.0	44	7.6	9	8.0	53
Amount of program rebate	7.8	44	6.8	9	7.7	53
If new equipment is readily available	7.9	44	6.0	9	7.6	53
Availability of program rebate	7.7	44	6.6	9	7.5	53
Recommendation of contractor/supplier	7.1	44	7.0	9	7.1	53
Recommendation of utility	6.7	43	5.4	8	6.5	51

Source: Nonparticipant survey, questions I1A to I1R

About one-quarter of nonparticipants have a policy mandating the installation of energy efficient equipment or processes (27 percent). When asked to describe their policy, six of the 14 respondents said their policy was “use the most efficient equipment available”. Other descriptions of business policies varied, ranging from an ROI-based policy, to using certain standards or codes when make purchasing decisions.

Five respondents (of 36) indicated that they have had an application denied by Xcel Energy.¹³ One of the five respondents said that within a single four week period, they had had three separate applications denied (for a chiller, an “automated system”, and a VFD) – this respondent did not share exactly why the rebates were denied. Another respondent said that their water heater application was denied because there was confusion as to whether it was for residential or commercial use. Another said the age of their boilers rendered their application ineligible. Respondents reported a variety of ways they were incorrectly informed of their eligibility for the program, including Xcel Energy’s Business Solutions Center, a vendor, and Xcel Energy program staff. Two mentioned it was their own incorrect understanding. This issue may be a result of the fact that programs are still relatively new in Colorado, and therefore, the customers and/or vendors may be less familiar with program protocols and requirements in general – this will likely decrease as time goes on. Distributing regular updates on program changes and eligibility requirements to all customer-facing staff (as well as participating vendors) in Colorado will likely make sure this trend decrease as these programs mature.

¹³ Due to a skip error, some people were not asked I1a-I3b. Callbacks were attempted.

Businesses today can face a wide variety of hurdles or roadblocks when looking to implement new equipment or processes at their facility. Unlike program participants, most of whom indicated that they did not perceive any barriers, nonparticipants brought up many obstacles to purchasing or installing new equipment. The most frequently mentioned barrier was a lack of capital (62 percent). Fifteen percent of all nonparticipants also mentioned the initial cost of equipment as a barrier. Less frequently mentioned were non-financial obstacles such as approval by decision-makers (eight percent), time constraints (seven percent), and immediate need for equipment (four percent). One respondent said that the barriers to installing new equipment at their facility were too “*numerous to mention*.” Responses in “Other” included: the hassle to meet local permit requirements for measure installation, age of the building, reliability of equipment, difficulty in obtaining information from contractors, and difficulty in renovating or retrofitting buildings which are currently occupied. Only six percent said they did not perceive any barriers to installing new equipment at their facility. Table 6-6 details all barriers mentioned by program nonparticipants by managed status.

Table 6-6. Barriers to Installing New Equipment

	Nonmanaged (n = 44)		Managed (n = 9)	Total (n = 53)	
	Responses	Percent	Responses	Responses	Weighted Percent
Lack of capital budget	27	61%	6	33	62%
Initial cost	8	18%	0	8	15%
Need to incorporate into longer term budget	4	9%	2	6	11%
Approval by decision-makers	3	7%	1	4	8%
Uncertainty regarding ROI	3	7%	1	4	8%
Time constraints	4	9%	0	4	7%
Need for equipment	1	2%	1	2	4%
Must meet additional standards	2	5%	0	2	4%
Lack of resources to implement	0	0%	1	1	2%
Lack of awareness about energy/money saving opportunities	1	2%	0	1	2%
Lack of awareness/knowledge about equipment	1	2%	0	1	2%
Energy efficiency/conservation low priority	1	2%	0	1	2%
Have not installed any new equipment at this facility	1	2%	0	1	2%
Other	10	23%	1	11	21%
None	3	7%	0	3	6%

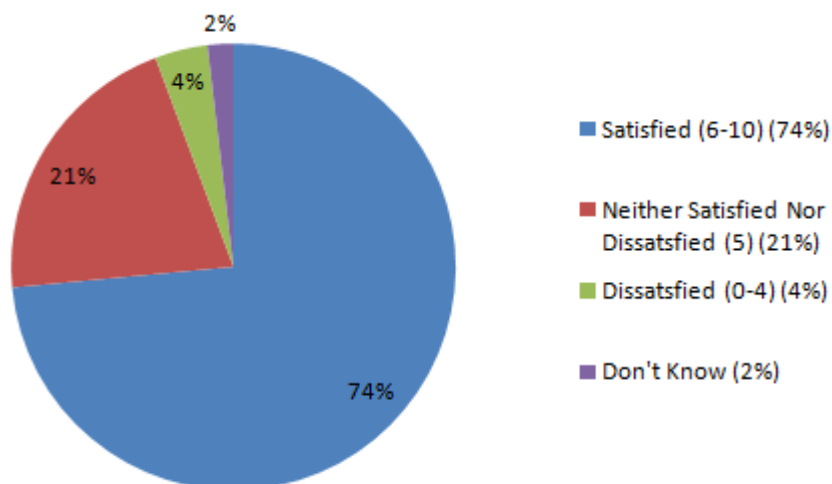
Source: Nonparticipant survey, question I4

6.3.3 Satisfaction

Overall, nonparticipants are quite satisfied with Xcel Energy as their energy provider. When asked to rate their satisfaction on a scale of zero to ten, where zero is not at all satisfied and ten is very satisfied, 74 percent of nonparticipants gave a rating of six or above (see Figure 6-2). Satisfaction was lower among managed accounts (67 percent satisfied) compared to nonmanaged accounts (75 percent satisfied). Overall, the weighted average satisfaction rating was 7.3. Those who were not satisfied (rating of four or below; two respondents) were asked to describe why they were unsatisfied as well as what Xcel Energy could do to improve their level of satisfaction. One

indicated that they had previously experienced customer service issues; this respondent was also dissatisfied with the cost of energy. The other respondent, a managed account, expressed dissatisfaction with the quality of their energy service, saying: “We are at the end of the grid; our power is not good at all.”

Figure 6-2. Satisfaction with Xcel Energy



Source: Nonparticipant survey, question SA8

6.3.4 Customer Profile

Nonparticipants reported a wide variety of business types, including lodging (this includes housing, such as apartment complexes; 37 percent), leisure or recreation (ten percent), office (ten percent), religious worship (nine percent), or health care (eight percent). A majority of respondents (91 percent) reported their business occupied an entire free-standing building.

About three-quarters of respondents (68 percent) own the space at their location. Eleven percent manage the property, while the remainder rent all, rent some and own some, or had some other ownership structure.

Only 13 percent of nonparticipants indicated that they had not implemented any additional energy-saving processes or purchased equipment in the past five years. Those that had installed equipment mentioned a wide variety of equipment types, including: installing high efficiency lighting equipment (28 percent), improvements to the building envelope (15 percent), process improvements (12 percent), motors and drives (ten percent), controls to HVAC systems (seven percent), high efficiency heating equipment (six percent), and energy audits or assessments (six percent). When asked what they were *considering* implementing in the next five years, 28 percent said they were not considering anything. Interestingly, ten percent said they planned to install solar equipment. Table 6-7 details the breakdown of measures nonparticipants are considering installing in the next five years by managed status.

Table 6-7. Equipment or Processes Respondent is Considering in Next Five Years

	Nonmanaged (n = 44)		Managed (n = 9)	Total (n = 53)	
	Responses	Percent	Responses	Responses	Weighted Percent
Make changes to building envelope	7	16%	1	8	15%
Install heating equipment - unspecified efficiency	4	9%	2	6	11%
Install high efficiency lighting equipment	5	11%	1	6	11%
Install solar equipment	3	7%	2	5	10%
Install high efficiency heating equipment	3	7%	1	4	8%
Process improvements	4	9%	0	4	7%
Install high efficiency cooling equipment	2	5%	0	2	4%
Install lighting equipment - unspecified efficiency	2	5%	0	2	4%
Add controls to HVAC systems	0	0%	1	1	2%
Retrofitting – equipment not specified	1	2%	0	1	2%
Energy assessment/audit - unspecified provider	1	2%	0	1	2%
Install motors or drives	1	2%	0	1	2%
Install cooling equipment - unspecified efficiency	1	2%	0	1	2%
Other	3	7%	2	5	10%
None	13	30%	2	15	28%
Don't know	4	9%	0	4	7%

Source: Nonparticipant survey, question F5A

When those who have not or do not plan to install efficiency improvements (18 respondents) were asked why not, frequently mentioned responses include high initial cost, capital concerns, or budget issues (three respondents each). Six respondents said they did not feel they currently had a need to install or upgrade any equipment.

6.4 CONCLUSIONS

Overall, nonparticipants are satisfied with Xcel Energy as their energy provider, and few had complaints or issues. Nonparticipants do face significant barriers to installing new equipment, including financial barriers. There is also still a segment of the population who are unaware of the specific Xcel Energy rebate programs available for the equipment they may be installing. Despite the barriers they face, a fairly significant number of nonparticipants (about a quarter) have installed heating equipment outside of the program.

7. EVALUATION RESULTS—TRADE ALLY FINDINGS

This section presents the results of qualitative trade ally interviews conducted as part of the evaluation of the Xcel Energy Heating Efficiency program in Colorado.

7.1 INTRODUCTION

The evaluation team conducted interviews with a sample of contractors and manufacturer representatives (trade allies) involved with the Colorado Business Heating Efficiency program. Evaluators interviewed a total of ten firms using a semi-structured in-depth interview guide approved by Xcel Energy. Interviews were conducted over a four-week period in June 2011. This research with the trade allies provided meaningful process insights into the program's operations, their interactions with the program, the customers the program is serving, and barriers to customers' participation in the program. The interviews focused on gathering the following types of information:

- How is the program leveraging the trade ally infrastructure and are there areas for improvement? How satisfied are trade allies with communications about the program? Are any changes needed?
- What impact has the program had on the relevant commercial market in terms of greater availability of efficient products or program services?
- How effective is the marketing of the program? Are there customer segments that marketing efforts should specifically target? What are strategies for effectively marketing the program to identified customer segments such as small/medium business? Is more program-specific marketing needed?
- Are rebate levels and program equipment/services optimally set to encourage participation while maximizing the cost-effectiveness of the program?
- What is the customer decision-making processes regarding participation in Xcel Energy's Business Colorado Business Heating Efficiency program? What are customer barriers to participation? What are the barriers to conducting boiler tune-ups and how can the program best overcome them?
- Has trade ally experience with the program changed the way trade allies conduct tune-ups? What influence does the program have on participants that have on-going service agreements for the boilers in their facility? What could Xcel Energy do to influence increased efficiency during any tune-up? During service agreement tune-ups?
- Is there customer demand for other heating equipment currently not included in the program?
- Is an incentive for trade allies' participation in the program needed? If so, what is the best way to structure this incentive?

The trade allies were selected from a list of participating contractors provided by Xcel Energy from the program's participant database. The data for the trade ally sample included contact information (contact name, phone, and email) and, for some firms, the number of tune-ups conducted or boiler/heating equipment installed in 2009 and 2010.



Next, this section summarizes the key findings from the trade ally interviews. These are followed by detailed findings.

7.2 SUMMARY OF FINDINGS

As part of this research, we spoke with ten contractor and manufacturer representatives in the Colorado service territory. Three of the firms identified themselves as manufacturers' representatives that provided equipment directly to contractors. The remaining firms identified themselves as HVAC contractors. A majority of these HVAC contractors both installed HVAC equipment (often specializing in hydronic heating equipment) and provided services to HVAC systems. These services included boiler tune-ups as well as equipment repair. Few of the contractors interviewed installed or sold high efficiency furnaces or hot water heaters. Therefore, although these measures are covered by the Colorado Business Heating Efficiency program, our findings are limited to boilers, boiler equipment, and boiler tune-up services.

Based on these interviews, we identified the following key findings:

- **Xcel Energy has effective trade ally outreach in Colorado.** All but one of the interviewed trade allies reported that they were first made aware of the commercial rebates available by Xcel Energy staff. The one contractor not directly learning of the program from Xcel Energy staff first heard of the program through mass market advertisement. In addition, trade allies reported appreciation of Xcel Energy informational seminars and would like to see more offered on a range of topics. The primary areas for improvement identified were increased staff responsiveness to trade inquiries as well as outreach activities geared toward upstream trade allies in addition to contractors.
- **In general, contractors are satisfied with the Xcel Energy Heating Efficiency program.** Nine of the ten contractors reported that they were satisfied with the program. The one contractor that was not satisfied was frustrated with the amount of paperwork needed as part of the application.
- **HVAC contractors harbor conflicting views about the quality and reliability of high efficiency boilers.** While a majority of contractors and all of the manufacturers' representatives interviewed reported that the incentives offered by the program for high efficiency boilers were effective, two contractors claimed that installing high efficiency boilers is not always a "no-brainer". One contractor believed the increased maintenance costs of a high efficiency boiler offset any savings from reduced energy. Another contractor believed that retrofitted boilers do not often run at maximum efficiency as the system is still using old heating peripherals that reduce efficiency. Xcel Energy reports that, in their experience, customers do not install high efficiency boilers in these situations because of the price differential, which would not be justified without realizing the energy savings, and therefore this is not an issue for the program.
- **Trade allies believe that the incentive for boiler tune-ups every other year is somewhat effective in increasing customer maintenance.** HVAC contractors reported that the tune-up incentive does encourage people to conduct tune-ups when they otherwise might not have. However, most contractors reported that they educate their customers that tune-ups are something that they should be doing regardless of financial incentives as part of routine maintenance. Likewise, they reported that the tune-up



mandated by Xcel Energy does not differ in any significant way from those conducted outside of the Xcel Energy program.

- **Return-on-investment or energy savings calculators provided by Xcel Energy for the Heating Efficiency program would be a useful sales tool for HVAC contractors.** These calculators would provide “hard numbers” for customers, encouraging them to see the long term savings available by upgrading to high efficiency boiler systems. In addition, trade allies were interested in co-operative marketing opportunities with Xcel Energy, additional trainings or symposiums on changes in the HVAC industry, and online or simplified program applications.
- **Additional energy technologies might be appropriate for the prescriptive Heating Efficiency program.** Several contractors identified possible technologies that Xcel Energy should consider including in the program including gas-fired infrared heating systems in warehouses. However, these technologies may not be cost-effective given the low gas prices in Colorado. In addition, several contractors mentioned that the program should include on-demand or instantaneous hot water heaters. As this technology is currently included as part of the prescriptive offerings, future marketing materials may want to highlight this equipment to educate contractors about available funds.
- **Trade ally incentives would not affect contractor behavior or performance in regards to their sales or installation of high efficiency boilers or boiler tune-ups.** While contractors responded positively to the possibility of a trade ally incentive from the program, none of them reported that it would change their sales or installation behavior. Therefore, while these funds may build “good will” towards the program, they would not help the program achieve greater savings.

7.3 DETAILED FINDINGS

Detailed findings are presented in the following topic areas: program awareness and involvement, customer interactions, program procedures, and the commercial market.

7.3.1 Program awareness and involvement

A majority of the contractors interviewed reported that they were first made aware of the commercial rebates available from Xcel Energy by Xcel Energy staff. Specifically, several firms mentioned their involvement with various advisory boards and prior experience with residential rebate programs as how they first became aware of the program. One contractor did report that they first heard of the program through a radio or newsprint mass market advertisement.

A majority of contractors reported that they wanted to be involved in the program as often as possible as the program “represents a good value for the customer.” Likewise, contractors reported that they routinely made high efficiency options part of their bid process and that the program works well as a selling point for presentations to potential customers. Contractors whose focus was on boiler tune-up service calls participated in the program more often than contractors that focused on boiler replacements. This trend is a result of the frequency with which contractors can conduct tune-ups (once every two years) versus the frequency with which customers replace boilers in commercial properties (“once every fifty years” per one contractor report).



In addition, contractors consistently reported that all program-eligible boilers installed for Xcel Energy customers applied for a rebate from the program. Likewise, most contractors reported that all program-eligible boiler tune-ups conducted for Xcel Energy customers applied for a rebate. Two contractors reported that they did not funnel the tune-ups they conducted for Xcel Energy customers through the program. When asked why they did not apply for rebates for the tune-ups, one contractor reported that his firm's unwillingness to attend required trainings kept them from participating in that portion of the program (they did install boilers through the program). However, as the commercial program does not require trainings, this contractor was likely confused with the requirements of the residential Heating Efficiency program. Another contractor reported that the required paperwork was too cumbersome to make it worthwhile. Overall, this finding suggests that few boilers are replaced with high efficiency option in the Colorado service territory without going through the program, and that the program is not covering all eligible boiler tune-ups.

a. Interactions with Program Staff

With some exceptions, all firms reported that their communications with Xcel Energy staff were satisfactory. Contractors reported that questions were answered in a thorough and timely manner and that seminars held by Xcel Energy provide "lots of good info". Of the firms that were not completely satisfied with program communication, one firm was a manufacturer's representative who reported that Xcel Energy communications tend to focus on contractors. Another firm reported that, when emailed with questions, Xcel Energy did not often provide quick feedback (though the contractor acknowledged that this problem was more prevalent with the residential programs). Finally, one firm reported that when they call into Xcel Energy with questions regarding specific customers or projects, they are placed on hold for lengthy periods of time.

b. Support from the Program

Firms reported that Xcel Energy makes an adequate effort trying to educate customers about the programs that are available to them. Contractors reported that many of their customers are already aware that rebates are available from Xcel Energy for efficient equipment, although customers are often vague on the details, requiring contractors to educate them about the specific details of equipment eligibility and rebate amounts. Contractors reported that they were familiar with the barriers involved with marketing to C&I customers (e.g., reaching the decision-maker, high staff turn-over, and competing priorities for limited resources). However, they had few suggestions about how to best market the program. One contractor reported that hotels and resorts may be overlooked by program marketing. However, program staff reported that some of the larger resorts are gas transport customers and therefore, not eligible for the program. Therefore, marketing materials tailored for that segment may not be effective.

When asked about co-operative marketing opportunities, contractors responded positively. Contractors believed that Xcel Energy branding would lend credibility to the contractors' presentations and bids. Likewise, firms often requested return-on-investment or energy savings calculators. As one contractor reported, "hard numbers go a long way" in convincing customers about the potential energy savings available in high efficiency equipment.

Finally, several contractors requested additional trainings or symposiums from Xcel Energy. Topics of interest included the proper technique for conducting boiler tune-ups for commercial customers, "commissioning" new equipment so that it is operating at peak efficiency from day one, and new technology available in the marketplace.



7.3.2 Customer Interactions

a. *Reasons for Participation*

Contractors reported many reasons why customers decide to upgrade to program-eligible equipment or conduct boiler tune-ups. These reasons include reduced energy costs, increased reliability, a desire to be “green”, reduced carbon emissions, and additional “bells and whistles” (features present on high efficiency boilers not often found on lower efficiency models). However, contractors provided mixed responses at how effective the Xcel Energy rebates were at convincing customers to either install a high efficiency boiler instead of a standard efficiency option, conduct a boiler tune-up on an every-other-year basis, or retire a “young”, functioning boiler in favor of a new high efficiency option.

Regarding boiler replacements, several contractors thought the program rebates were effective at convincing customers to upgrade to high efficiency boilers by reducing payback periods to attractive levels. One contractor reported that the rebates “remove any reason to look at conventional boilers”. However, others thought the reduced energy costs provided by the high efficiency equipment would not offset its increased maintenance costs. There also appears to be confusion among trade allies about the longevity of high efficiency boilers. Some contractors reported that lower efficiency boiler equipment has a longer effective useful life. Therefore, they typically install standard efficiency boilers that “just run”. However, others reported that customers were simply misinformed about boiler life-spans as they are relatively new to US markets. Program staff confirmed this finding, stating that both the program and manufacturing representatives work hard to convince HVAC contractors that condensing boilers are, in fact, cost-effective in certain situations.

In addition to concerns about equipment quality, two contractors reported that some local governments in Colorado (specifically Vail and Boulder) require high efficiency boilers by code. In these territories, the rebates offered by the program would be largely ineffective at changing customer behavior as at least some level of program-eligible equipment is already required. However, these claims could not be verified by evaluation staff. We recommend that Xcel Energy program staff pursue confirming if high efficiency boilers are, in fact, code in these municipalities and what the baseline efficiency is (reported as 90 percent for Vail; the contractor could not recall the requirement in Boulder).

Regarding boiler tune-ups, of the contractors that conducted tune-ups regularly, most felt that the rebate levels were adequate at encouraging customers to conduct tune-ups when they otherwise would not have. One contractor did think that higher rebate levels similar to those offered during tune-up promotions would increase the number of tune-ups by encouraging those “on the fence”. However, contractors also felt that tune-ups are part of routine boiler maintenance and should be conducted regardless of Xcel Energy incentives. In addition, when asked about what effect the program has had on how they conduct boilers tune-ups, only one contractor reported that their tune-ups have changed since they started to participate with the program, but only slightly. Most contractors reported that all of their boiler tune-ups are comprehensive and include everything on the Heating Efficiency boiler tune-up checklist.

Finally, as with the boiler replacement incentives, contractors provided mixed feedback regarding the Plan B option available in the Colorado program. Several contractors stated that regardless of rebates, customers are hesitant to retire a boiler early given that a 25 year old boiler may have another ten to 15 years of useful life remaining. One contractor reported “if they don’t need it,



they won't buy it." However, other contractors said they push early replacement and that the generous Plan B rebates help them convince customers to move forward with the change. In addition, one contractor reported that, in many circumstances, retiring boilers earlier does not result in the energy savings their customers expect. The reduced savings are a result of having to run condensing boilers at a higher water temperature (180 degrees instead of 140 degrees) in order to effectively heat a building with old heating peripherals. Therefore, this contractor did not push the Plan B option with his customers and thought Xcel Energy should remove that program component. However, Xcel Energy reports that, in their experience, contractors simply do not install high efficiency condensing boilers in these situations and therefore, do not receive program incentives. Furthermore, the program technical assumptions consider inlet water temperature when factoring savings.

Contractors were also asked for feedback regarding a trade ally incentive. While all contractors responded positively to the concept, none of them reported that it would change their involvement with the program. However, one contractor did acknowledge that it would likely encourage other contractors to get more involved with the sales of high efficiency equipment and boiler tune-ups.

b. Barriers and Recommendations for Increasing Customer Participation

Contractors reported several barriers that customers must overcome in order to install high efficiency boiler equipment instead of standard efficiency equipment. Two of the primary barriers are financial: a lack of available capital and long payback periods (in part due to low natural gas prices in Colorado). Other barriers include the belief that high efficiency equipment has a reduced effective useful life, the belief that high efficiency equipment costs more to maintain than standard efficiency equipment, the amount of paperwork required especially for emergency replacements, and the split incentive for property managers paying for equipment that benefits their tenants that pay the natural gas bill.

Contractors did have several suggestions about how to overcome these barriers. First, increased rebates would help customers overcome the first cost barrier and reduce payback periods. One contractor suggested that the program should offer rebates on a sliding scale based on efficiency instead of one low tier rebate and one high tier rebate. This sliding scale would encourage more customers to upgrade from the minimum efficiency required to receive the minimum rebate to higher efficiency systems. Second, providing ROI or energy savings calculators would give customers "hard numbers" about their energy savings. This evidence would help customers see past the short term costs of installation. One contractor mentioned that online calculators that customers can access have been especially effective in other programs with which he has participated.

7.3.3 Program Procedures

Overall, contractors reported few difficulties with the program procedures. A majority of the contractors completed the paperwork for their customers, filling in the required information and sending it to the customer for a signature. With few exceptions, they felt that the paperwork required by the program was reasonable and easy to complete. One contractor reported that his first attempt at completing the paperwork was difficult. However, Xcel Energy staff were very helpful and now that he is more familiar with what is required by the program, the process was very easy. Several contractors did request online forms or downloadable PDF forms with type-able fields.



Several contractors did report some concerns with the program procedures. One contractor reported that their customers do occasionally have delays in receiving rebates although he admitted this delay may have been caused by missing or incorrect information on the application. Another contractor reported that he had difficulty identifying which equipment was eligible for the rebates. He suggested that Xcel Energy work with manufacturers to develop a list of models that would qualify for the program rebates. Finally, one contractor believed that the program requires Xcel Energy staff to inspect boilers before replacement (this inspection is not a program requirement and per program staff, was likely undertaken by an Account Manager to ensure that the customer did qualify for the Plan B rebate) and that this process frustrated many of his customers. However, as the Heating Efficiency program does not require pre-inspection for prescriptive rebates, the evaluation team believe this contractor may have confused the Xcel Energy Heating Efficiency program either with another utility or with the Custom Efficiency program (which may require pre-inspection for some projects).

7.3.4 Commercial Market

Most of the contractors interviewed were very optimistic about the future of sales for high efficiency boiler systems and boiler-tune-up services. They felt that Colorado had potential for increased sales in the coming years as many customers have been “patching their boilers together” and are ready for a replacement. In addition, if the economy improves, customers will be more likely to focus on energy savings and “green” technology. In addition, as business prospers, the increased first cost will be less of a barrier for commercial customers. Finally, contractors believed that a revitalized economic picture might increase new construction, again increasing the opportunities for new high efficiency boiler sales.

Currently, contractors reported large variations in their sales of high efficiency boiler equipment and how the program has impacted those sales since its inception. Some contractors reported that a majority of their boiler sales were high efficiency; sometimes as high as 90 percent of all their boiler installations. Others reported relatively few high efficiency sales. Similarly, some contractors reported that the program has had limited effect on their high efficiency sales whereas others reported that the program has been a great benefit (although we should note that many contractors had a difficult time recalling sales prior to program participation). As the contractors that reported low high efficiency sales were often the same contractors that reported that the program has had limited effect on those sales, the evaluation team speculates that those contractors with limited high efficiency sales may not be effectively leveraging the Heating Efficiency program in their sales.

Several contractors did identify possible technologies that Xcel Energy should consider including in the program. These opportunities included gas-fired infrared heating systems in warehouses. The firms believed that these technologies not currently covered by any Xcel Energy program would offer significant natural gas savings to Xcel Energy customers and would benefit from rebates to encourage their installation over less efficient options.

7.4 CONCLUSIONS

In general, contractors are very satisfied with the offering of the Xcel Energy Heating Efficiency program. In the evaluation team’s experience, many of their requests for improvements (online applications, increased rebate amounts) are typical requests from trade allies and are not indicative of a poorly functioning program.



However, contractors did report conflicting information regarding the effectiveness and quality of high efficiency boilers. From this research, it is apparent that there are many conflicting beliefs regarding the high efficiency boiler market among trade allies. As trade allies also educate their customers about equipment, these conflicting beliefs are likely echoed among potential participants.



8. EVALUATION RESULTS—BENCHMARKING

This section presents the results of a benchmarking study of the Colorado Business Heating Efficiency program conducted for the Xcel Energy Demand Side Management Business Programs evaluation.

8.1 INTRODUCTION

The benchmarking study identified and characterized other utility programs of particular interest to Xcel Energy. The research focused on gathering the following types of information:

- Program goals, objectives, and scope: Are the goals, objectives, and program scope consistent with Xcel Energy's program?
- Effectiveness of the program in meeting goals and objectives: What has worked well and what has been a problem? What external influences may be influencing their programs and how are they addressing them?
- Key elements of program design: What are the structure, amount and type of incentive, and eligibility requirements?
- HVAC contractors: how does the program leverage the trade ally market infrastructure? What technical, sales support or incentives are provided to trade allies?
- Quantification of program impacts: How do they determine their baseline and technical assumptions and net-to-gross calculations?
- Marketing and recruitment of customers: How do they market and recruit customers?

We conducted our benchmarking research using a combination of Internet searches and interviews with utility program managers. The Internet research provided program background information for 13 programs. In addition, the product manager of the Xcel Energy Heating Efficiency program in Colorado identified programs of most interest for in-depth interviews. Evaluators were able to gain further information for six identified programs of most interest. Evaluators conducted four telephone in-depth interviews with program managers to obtain further insight into program design and implementation. In addition to the telephone in-depth interviews, two other program managers responded to questions via e-mail.

8.2 SUMMARY OF FINDINGS

- **Rebates for boilers are usually split into two tiers: an aggressive high efficiency level with rebates ranging from \$1000-\$5000/MMBTUH and a less aggressive high efficiency level with rebates ranging from \$500-\$2000/MMBTUH.** This rebate structure allows for programs to cost-effectively capture a wide variety of boiler installations. Rebates for furnaces, offered in 11 programs, ranged from \$100 - \$400 per unit.
- **Five of the 13 programs reviewed offered rebates for boiler tune-ups. Rebates ranged from \$100 to \$350 per tune-up.** The programs consistently stipulated that a boiler was only eligible for a tune-up rebate every other year. Program managers believed the rebates were effective at encouraging customers to conduct tune-ups when they otherwise would not have but indicated that the tune-ups rebated by their programs were similar to tune-ups conducted outside of the program (i.e., the program-incented tune-ups do not provide greater



- savings than tune-ups not incented by the program). One program manager reported that they did not offer boiler tune-ups as a prescriptive part of their program as, according to their deemed savings calculations, the unsubsidized payback period was already under 12 months (information regarding other programs was not available). As their programs will only incent measures with a payback period greater than one year, tune-ups are not eligible.
- **Programs treated net-to-gross (NTG) calculations in a variety of ways.** Three programs did not use any NTG adjustment. Five utilities used stipulated or negotiated adjustments. These ranged from 80 percent to 96 percent. Two programs had evaluated NTG adjustments: 36 percent in California and 27.6 percent in Wisconsin.
 - **Program managers reported that trade ally incentives are effective, especially in markets with a large population of small HVAC contractors.** Three programs offered incentives to trade allies that install equipment through the program. The incentives ranged from \$25 to \$175 per qualifying boiler. In addition, one program offered incentives for boiler enhancements and steam traps: \$15 to \$25 per enhancement and \$3 per repaired or replaced steam trap. Program managers reported that these incentives were well received, particularly by smaller HVAC contractors that used the money to compensate staff or invest in their business. Program managers reported that larger firms usually used the incentive to buy-down the cost to the customer.

8.3 DETAILED FINDINGS

This section first includes summary tables of the benchmarking results. Detailed findings are then presented in the following topic areas: program scope and goals, program design and incentives, engagement with HVAC contractors, program impacts, and program recruitment and participation.

Table 8-1 summarizes study information from the Internet research as well as general information from the program manager interviews. Utility programs covered only in the Internet research include Questar Gas, Mass Save, PG&E, UniSource, Consumers Energy, NorthWestern Energy, and MidAmerican Energy. Utility programs with both Internet research and program manager interviews include Manitoba Hydro, National Grid, CenterPoint Energy, Chicagoland Natural Gas Savings Program, Efficiency Vermont¹⁴, and Vermont Gas.

¹⁴ Efficiency Vermont only serves propane and fuel oil customers. However, as the structure of the program is similar to the Xcel Energy programs, it was included in our research.



Table 8-1. Heating Efficiency program Benchmarking Summary

Utility	State	Program	Goals	Technical Assistance	Trade Ally Incentive	Trade Ally Outreach and Support	NTG
Xcel Energy	Minnesota	Heating Efficiency Program	254,542 Dth	Yes	None	Staff support, newsletters, trainings, trade association events. No pre-qualification required.	100% deemed
Xcel Energy	Colorado	Commercial Heating Efficiency Program	42,012 Dth	Yes	None	Staff support, newsletters, trainings, Heating Advisor Board, trade association events. No pre-qualification required.	97% deemed
Questar Gas	Utah	Thermwise Business Program	Unknown	No	None	Unknown	80% deemed
Manitoba Hydro	Manitoba	Power Smart Program for Businesses	32,760 Dth	No	None	Seasonal mailers. Also, have support staff that meet with contractors regularly. No pre-qualification required.	If determined to be a free-rider during post-completion questionnaire, savings are not counted.
National Grid	New York	High-Efficiency Gas Heating and Water Heating Incentives for Commercial Buildings	45,690 Dth	No	None	Unknown	90% deemed
CenterPoint Energy	Minnesota	Commercial Rebate Program	354,000 Dth	Yes	Yes, ranging from \$25 to \$175 for each qualifying boiler, \$15 to \$25 for boiler enhancements, and \$3 for each repaired or replaced failed open steam trap.	Attend technical conferences. Also, have staff that meet with contractors regularly. Provide sales support but little technical support. No pre-qualification necessary.	Not used
Peoples Gas and North Shore Gas	Illinois	Chicagoland Natural Gas Savings Program	Unknown	No	None	Top participating contractors listed on program website. Marketing materials, co-operative marketing, and program trainings available.	80% for Custom 96% for Prescriptive
Columbia Gas of Massachusetts, The Berkshire Gas Company, National Grid, New England Gas Company, NSTAR, and Unitil	Massachusetts	Mass Save Commercial High-Efficiency Heating Equipment Rebate Program	Unknown	Yes	Available for some measures.	Training and marketing support.	Not used. Assessing in 2010.
PG&E	California	Energy Efficiency Rebates for Your Business	Unknown	Yes	None	Participating contractors listed on program website.	36% evaluated
Efficiency Vermont	Vermont	Commercial Rebate Program	Unknown	No	Yes	Email, phone, and in-person presentations. Listed on website and co-operative advertising program.	89% negotiated.
Vermont Gas	Vermont	Commercial Retrofit	~24,000 Dth	Yes	None	Unknown	Unknown
UniSource	Arizona	Energy Services Commercial Energy Solutions Program	Unknown	Unknown	None	Can apply for "trade ally" status.	Unknown
Consumers Energy	Michigan	Commercial Energy Efficiency	Unknown	Unknown	None	Incentive, marketing and technical support. Listed on program website trade ally list.	90% negotiated.
NorthWestern Energy	Montana	Commercial Energy Efficiency Rebate Program	Unknown	Unknown	None	Unknown	Unknown
MidAmerican Energy	South Dakota	Commercial Energy Advantage Rebate Program	Unknown	Unknown	None	Unknown	Unknown



8.3.1 Program Scope and Goal

The programs reviewed shared a common goal: reduce the natural gas consumption of their customers. Our research was able to identify the specific therm savings goals for four programs in Minnesota, Vermont, New York, and Manitoba. For three programs, the annual goal was under 50,000 Dth: 32,760 Dth in Manitoba, 45,690 Dth in New York, and 24,000 Dth in Vermont. These three goals are roughly equivalent to the savings goal for Xcel Energy's Colorado Business Heating Efficiency program: 42,012 Dth¹⁵. Likewise, the CenterPoint program in Minnesota has a savings goal of 354,000 Dth. While higher than the goal for Xcel Energy's Minnesota program (254,542 Dth), it is similar in that both Minnesota programs have goals significantly higher than their counterparts around the country. Two programs reported that they were on track to meet their 2011 goals. Another program reported they had successfully achieved their 2010 goals while another reported that they only achieved 55 percent of their 2010 goal. Historical or current data on progress towards goals were not available for the other programs reviewed.

None of the programs reviewed had an explicit goal of market transformation. However, while not an explicit goal, many of the programs have significant interaction with the manufacturers and distributors of HVAC equipment in their market. This interaction would suggest that market transformation may be occurring, though not measured or evaluated in any systematic way.

8.3.2 Program Design and Incentives

The programs reviewed were all designed to achieve their goals by reducing the incremental cost of installing high efficiency natural gas heating equipment or conducting tune-ups that increase the efficiency of existing systems. The programs accomplish this reduction by using custom and prescriptive financial incentives for qualifying equipment. In addition, many of the programs also include an educational or outreach component. This component usually consisted of outreach aimed at potential customers (to raise awareness of the program and the benefits of high efficiency natural gas equipment) and at HVAC contractors (to encourage including energy efficiency and the program as part of their sales process).

All reviewed programs included rebates for high efficiency boilers. These rebates are usually split into two efficiency tiers: an aggressive high efficiency level with rebates ranging from \$1000-\$5000/MMBTUH and a less aggressive high efficiency level with rebates ranging from \$500-\$2000/MMBTUH. This rebate structure allows for programs to cost-effectively capture a wide variety of boiler installations. Most programs limited incentives to boilers used for space heating; only one program (PG&E) included prescriptive rebates for process boilers. While the other programs may have incentives for process boilers, these rebates were funneled through a separate custom application process. This typical rebate structure is very similar to the structure in place for the Xcel Energy programs in Minnesota and Colorado. However, none of the reviewed programs included any rebates similar to the Plan B rebate offered in Xcel Energy's Colorado Business Heating Efficiency program in which enhanced incentives are offered for "young," still functioning boilers.

¹⁵ It is unclear what percentage of customers in Manitoba, New York, or Vermont are gas transport customers. A large percentage of gas transport customers should lower the savings goals when compared to a territory with few gas transport customers.



In addition to boilers, many of the 13 programs reviewed included other types of equipment with which natural gas savings could be achieved. This equipment included furnaces (11 programs), hot water heaters (nine programs), boiler system enhancements such as controls or turbulators (five programs), stream trap repair or replacements (four programs), and pipe or tank insulation (four programs).

Likewise, five programs offered rebates for boiler tune-ups. These rebates ranged from \$100 to \$350 and stipulated that a boiler was only eligible for a rebate once every other year. One program manager reported that they did not offer boiler tune-ups as a prescriptive part of their program as, according to their deemed savings calculations, the unsubsidized payback period was already under 12 months. As their programs will only incent measures with a payback period greater than one year, tune-ups are not eligible.

Table 8-2 details the equipment eligible for each program and the rebate amounts for qualifying equipment.

Table 8-2. Rebate Summary

Utility	Heating Measures Covered (food service measures not included)	Boiler Rebate	Furnace Rebate	Boiler Tune-up Rebate
Xcel Energy - Minnesota	Condensing boilers Non-condensing boilers High pressure steam boilers Low-pressure steam boilers Turbulators Stack Dampers Steam trap replacement/repair Boiler tune-up Pipe insulation w/ R-value 3-4 per inch	Condensing boilers: \$3,500/MMBTUH Non-condensing boilers: \$800/MMBTUH High pressure steam boilers: \$500/MMBTUH Low-pressure steam boilers: \$500/MMBTUH	N/A	25% of equipment cost, \$250 max per boiler every other year
Xcel Energy - Colorado	85%-91% efficiency boiler 92% efficiency boiler 92-93.9% AFUE furnace 94% AFUE furnace: Water heaters >150 MBTUH and min. 92% efficiency 3.5 - 7 R-value pipe insulation Boiler tune-up	85%-91% efficiency boiler: \$1,000/MMBTUH 92% efficiency boiler: \$4,000 or \$14,000 / MMBTUH	92-93.9% AFUE furnace: \$80 94% AFUE furnace: \$120	25% of project cost up to \$250 per boiler
Questar Gas	Steam & hot water boilers Infrared-heating systems Furnaces Hot water heaters (including tankless) Boiler tune-up	Hot water: < 300,000 Btu/hr & 85% AFUE: \$2,000/MMBTUH ≥ 300,000 Btu/hr & 90% Thermal Efficiency \$3,250/MMBTUH Steam: < 300,000 Btu/hr & 85% AFUE: \$2,000/MMBTUH ≥ 300,000 Btu/hr & 82% Thermal Efficiency: \$2,000/MMBTUH	< 300 MBTUH: \$200-\$400	Up to \$300
Manitoba Hydro	Condensing and near-condensing boilers	Condensing boiler: \$5/eligible MBH input capacity for new construction \$8/eligible MBH input capacity for retrofit Near condensing boiler: \$2/eligible MBH input capacity for retrofit	N/A	N/A
National Grid	Steam and hot water boilers Furnaces Condensing unit heaters Infrared heaters Hot water heaters Steam trap surveys	Steam boilers: > 81% AFUE & < 300 MBTUH: \$600 Hydronic boilers: \$800 - \$4,000 Condensing boilers: \$1,600 - \$12,000	< 300 MBTUH: \$200-\$400	N/A

8. Evaluation Results—Benchmarking



Utility	Heating Measures Covered (food service measures not included)	Boiler Rebate	Furnace Rebate	Boiler Tune-up Rebate
CenterPoint Energy	Hot water & steam boilers Infrared heaters Furnaces Boiler and boiler system components Steam trap rebates Boiler tune-up	Hot water boilers (up to 12.5 MMBtu): \$1,700 - \$4,100 per MMBTUH Low pressure steam: < 360 MBTUH input: \$400 per 100 MBTUH + (\$100 per 100 BTUH input x (New efficiency rating - 84)) > 360 MBTUH input: \$1,300 per MMBTUH + (\$200 per MMBTUH input x (New efficiency rating - 84)) High pressure steam: < 360 MBTUH input: \$400 per 100 MBTUH + (\$100 per 100 BTUH input x (New efficiency rating - 83)) > 360 MBTUH input: \$1,000 per MMBTUH + (\$200 per MMBTUH input x (New efficiency rating - 83))	< 225 MBTUH: \$150 - \$400 per unit	25% of tune-up cost, up to \$300/boiler every other year \$1,000 to \$1,500 per facility maximum, incentive depending on unit size
Peoples Gas and North Shore Gas	Furnaces Space-heating boilers Boiler tune-ups Boiler controls Hot water heaters Steam traps Pipe insulation	≥85% thermal efficiency and 300 - 3,000 MBTUH input capacity: \$2000/MMBTUH ≥90% thermal efficiency and 300 - 3,000 MBTUH input capacity: \$4000/MMBTUH	AFUE ≥92%: \$200/unit AFUE ≥95%: \$250/unit	Boiler tune-up: \$350
Massachusetts Utilities	Furnaces Condensing unit heaters Infrared heaters Hot water boilers Controls equipment	Hydronic Boilers (≥85% thermal efficiency): \$500 to \$5,000 Condensing Boilers (≥90% thermal efficiency): \$1,000 to \$15,000	\$400 to \$650	N/A
PG&E	Hot water & steam boilers Process boilers Hot water heaters Pipe & tank insulation Pool heating Steam trap replacements	Small hot water boiler < 300 MBTUH (≥82% AFUE): \$1000/MMBTUH Small steam boiler < 300 MBTUH (≥77% AFUE): \$1000/MMBTUH Large steam or water boiler ≥ 300-5,000 MBTUH (≥84% thermal efficiency): \$1000/MMBTUH	94-95.9% AFUE: \$150/unit Built-in VSM & 94-95.9% AFUE: \$200/unit ≥ 96% AFUE: \$250/unit Built-in VSM & ≥ 96% AFUE: \$300/unit	N/A
Efficiency Vermont	Boilers Furnaces	< 500 MBh: \$2000/MMBTUH Boilers <300 MBh require ≥85% AFUE Boilers 300-500 MBh require ≥87% thermal efficiency	\$2/MBTUH	N/A
Vermont Gas	Steam & hot water boilers Furnaces Hot water heaters Unit heaters Pool heating	≤ 300 MBTUH & 87%+ AFUE: \$550 < 300 MBTUH & 92%+ AFUE with multistage burner and outdoor reset: \$1000	90% to 92% AFUE: \$100 92.1 to 93.9% AFUE: \$300 ≥ 94% AFUE: \$400	N/A



Utility	Heating Measures Covered (food service measures not included)	Boiler Rebate	Furnace Rebate	Boiler Tune-up Rebate
UniSource	Condensing & non-condensing boilers Furnaces Hot water heaters	New boiler: \$1,000/MMBTUH up to 50% of total costs, or \$20,000, whichever is lesser 84.5% AFUE and 85% thermal efficiency for non-condensing boilers 94% AFUE or thermal efficiency for condensing boilers.	\$200 - \$350 depending on size and AFUE	N/A
Consumers Energy	Boilers Furnaces Hot water heaters Steam trap audit and replacement Boiler tune-up Controls Infrared heaters Pipe insulation	\$1000/MMBTUH (86% and <90% AFUE or Combustion Efficiency) \$2000/MMBTUH (90% AFUE or Combustion Efficiency)	\$350 or \$1750 per MMBTUH	\$150-\$350 depending on unit size.
NorthWestern Energy	Boilers Furnaces Hot water heaters Tank insulation Controls	≥ 90% AFUE or thermal efficiency: \$3,250/MMBTUH	≥ 90% AFUE: \$3,250/MMBTUH	\$100 once every two years
MidAmerican Energy	Boilers Furnaces Hot water heaters	< 300 MBTUH 85% - 89.9% AFUE: \$150 < 300 MBTUH ≥ 90% AFUE: \$400 ≥ 300 MBTUH 82 Thermal Efficiency (\$.80 + (\$.20 X (TE-82))) x MBTUH	92% - 93.9% AFUE: \$250 94% - 95.9% AFUE: \$325 ≥ 96% AFUE: \$400	N/A



8.3.3 Engagement with HVAC Contractors

Many of the program managers reported that while traditional marketing activities (i.e., program websites, email newsletters, bill inserts) are effective ways to reach potential participants, active engagement with HVAC contractors is a critical step in increasing program participation. Managers reported that during the bid process, contractors are in a unique position to encourage customers to upgrade the efficiency of their equipment. Managers who have effectively engaged the contractors in their market believe that those contractors will be more likely to leverage the benefits of program participation to overcome barriers their customers might have to installing higher efficiency equipment.

Almost all of the programs reviewed had established processes for including HVAC contractors as part of customer outreach. Three program managers interviewed reported that their organizations have dedicated staff that meet face-to-face with HVAC contractors and manufacturers in their territory, similar to the Channel Manager position at Xcel Energy. During these face-to-face meetings, program staff can discuss any upcoming changes to the program and have an opportunity to solicit feedback regarding incentives and program-eligible equipment. Likewise, contractors can ask questions about specific projects and the application process. Program staff reported that these meetings are both a positive experience for the program and for the contractors.

In addition to face-to-face meetings, five programs posted lists of participating contractors on their websites. These lists are designed to benefit both the contractor and the customer. Contractors benefit from no-cost exposure to potential customers and customers benefit by having an established pool of contractors from which they can choose. All utilities were careful to explain that the posted list of participating contractors does not imply endorsement of those firms. Likewise, none of the programs require any sort of pre-qualification to be on the list.

In addition to personal engagement and posted lists of participating contractors, several programs provided financial assistance to contractors engaged in energy efficiency. This assistance took the form of either cooperative advertising programs or trade ally incentives. The cooperative marketing programs allowed for contractors to not only use utility branding but also receive funds to pay for a portion of their advertising as long as it promoted energy efficiency. The trade ally incentives provided cash incentives (usually paid quarterly) to firms that installed qualifying equipment. The incentive amounts ranged from \$25 to \$175 per qualifying boiler. In addition, one program offered incentives for boiler enhancements and steam traps: \$15 to \$25 per enhancement and \$3 per repaired or replaced steam trap. Program managers reported that these incentives were well received, particularly by smaller HVAC contractors that used the money to reward staff or invest in their business. Program managers reported that larger firms usually used the incentive to buy-down the cost to the customer.

8.3.4 Program Impacts

As the reviewed programs focused on prescriptive measures, therm savings attributed to each project were usually deemed based on the size of system installed. One program (Manitoba Hydro) required detailed heating load loss studies to be conducted prior to having applications pre-approved. These studies were then used to calculate both the rebate amount and the savings for that project. The program manager reported that this pre-approval process has not resulted in lost opportunities for participation; only contractors new to the program provide any sort of push back.



The reviewed programs treated NTG calculations in a variety of ways. Three programs did not use any NTG adjustment when calculating net savings or used a stipulated NTG factor of 1.0. Five utilities used stipulated or negotiated adjustments. These ranged from 80 percent to 96 percent. Finally, only two programs had evaluated NTG adjustments for energy efficiency natural gas measures: 36 percent in California¹⁶ and 27.6 percent in Wisconsin¹⁷. The California study evaluated a separate NTG ratio for boiler equipment though it is unclear what percentage of the overall program savings are attributed to boiler installations. The report contains no additional details into what motivation drive the boiler attribution figure. The Wisconsin program evaluation (not included in the above review as the program is currently in transition) stated that the low attribution was primarily a result of incentives offered to buy-down the cost of boiler tune-up services. This measure had an evaluated NTG ratio of 18 percent and made up a large portion of the therm savings.

Unlike Xcel Energy, none of the program managers reported that they had any formalized measurement and verification (M&V) process for prescriptive boilers. Several programs did require the serial numbers of the boilers installed or serviced to avoid duplication. However, only informal on-site verification was conducted – usually by account managers on location for another purpose. The one exception we are aware of is the Focus on Energy program. Though the program manager was not interviewed (the program is currently in transition), the program does routinely evaluate a gross savings adjustment factor and an attribution factor (i.e., NTG) to create an overall realization rate. The evaluation consists of detailed engineering analysis of project documentation and interviews with participants. Likewise, on-site verification is conducted of a sample of commercial participants.

8.3.5 Program Recruitment and Participation

As mentioned previously, the interviewed program managers reported that the most effective method “for making energy efficiency part of the conversation” with potential customers was through proactive engagement and education of the HVAC contractors in their territory. However, program staff have taken several steps to raise awareness among the customer population. These marketing efforts include; updated program websites, presentations at energy efficiency expos, utility bill inserts, email newsletters, and direct mail campaigns. Likewise, program managers reported that account representatives can often identify opportunities with larger, managed customers and encourage the customer to upgrade that system. One program reported particular success once account managers were focused on particular sectors instead of geographic territories. Overall, these methods are very similar to marketing efforts undertaken in both the Minnesota and Colorado Xcel Energy Heating Efficiency program.

One program did report some success with social media. Efficiency Vermont has recently started a Twitter feed (<http://twitter.com/#!/EfficiencyVT>). This feed is not specifically targeted at one sector but instead contains information that residential customers, commercial customers, and contractors would find useful. Posts include energy saving tips, links to case studies, information

¹⁶ Itron, 2006-2008 Small Commercial Contract Group Direct Impact Evaluation Report, Prepared for the CPUC. February 9, 2010

¹⁷ Tetra Tech and KEMA, Business Programs Impact Evaluation Report: Last Quarter of Calendar Year 2009 and First Two Quarters of Calendar Year 2010. Prepared for the Public Service Commission of Wisconsin. January 27, 2011.



about upcoming promotions or contests, and requests for feedback from customers or contractors. The program manager reported that she feels the impact of the feed is worthwhile considering the minimal investment it requires.

8.4 CONCLUSIONS

After the review of programs nationwide that cover a variety of markets and climates, we conclude that Xcel Energy is currently using “best practices” in heating efficiency program design. These practices include tiered rebate levels for systems of varying efficiency, proactive, exhaustive, and personalized engagement with the trade ally network, and comprehensive marketing efforts including informed account representatives.

However, the benchmark research indicates that the boiler tune-up rebates, pipe insulation rebates, rebates for steam trap repair and replacement, and the Plan B option in Colorado will benefit from additional research in the remaining evaluation tasks. As a majority of the programs reviewed did not include either option in their design, we cannot conclude that these program components are best practice from this research alone. Follow-up on their effectiveness with trade allies, program participants, and potential program participants will allow a more thorough evaluation.

9. EVALUATION RESULTS—NET-TO-GROSS PROGRAM IMPACTS

This section presents the Colorado Business Heating Efficiency program net-to-gross ratio recommendation and details the methodology used to develop the estimated ratio.

9.1 INTRODUCTION

The recommended net-to-gross ratio (NTGR) for the Colorado Business Heating Efficiency program is based on a review of program files and interviews with: 1) recent (within the last 12 months of the program) participating customers and influential vendors (vendors identified by participating customers as being influential in their decision-making process), 2) in-depth interviews with trade allies, 3) a literature review and benchmarking interviews with program managers of similar programs in the US, and 4) results from surveys with eligible nonparticipants.

The NTG ratio is the ratio of net program-attributable savings over program gross savings. This ratio includes program free-riders (i.e., participants that would have implemented at least some, if not all, of the actions incentivized by the program in the absence of that program) and program-induced spillover (i.e., additional energy-efficiency projects implemented by a customer due to program influences but without any financial or technical assistance from the program).

When interpreting NTG ratio as one indicator of program performance, it is important to keep the following in mind:

- The NTG ratio is a conservative estimate of Xcel Energy's program attribution. Program attribution refers to energy impacts that can be confidently attributed to program efforts. While the NTG ratio does take into account participant-reported spillover (no vendor-reported spillover was identified), this is a conservative approach that is limited to 'like' spillover as discussed below. In addition, the NTG ratio does not take into account all market effects resulting from the programs (e.g., increased inventory, vendor changes in sales practices, etc.), although these effects are assessed to support the attributable savings. At the same time, we do employ a preponderance of evidence approach to most accurately recommend a NTG ratio by looking across multiple sources of data.
- The NTG ratio should continue to be revisited and revised as program modifications are made that would have an upward or downward effect on the NTG ratio. The NTG ratio analysis presented here is based on program participation in the last 12 months (May 2010 – May 2011) and any changes to program design, delivery, or target market should be taken into account when deciding what NTG ratio to apply to the program in the future.

Key findings from the NTG ratio research are highlighted below, followed by a detailed methodology overview and results.

Summary of Findings **Error! Reference source not found.** below presents the current deemed NTG ratio used for the Colorado Business Heating Efficiency program, the NTG ratio calculated as a result of using the California self report approach (SRA), the SRA NTG ratio adjusted for previous program participation, the SRA NTG ratio with the addition of participant-reported spillover and our recommended NTG ratio based on triangulation of multiple sources of information from

customers, vendors, secondary research, and future program design. We recommend using a NTG ratio of .86 for the 2012 program year. However, this should be adjusted somewhat upward if Plan B boilers become a larger part of program savings in future program years. The 2011 evaluation research indicates Plan B boilers most likely have a higher NTG (.90), however only a limited number of projects had been completed at the time of the survey and only two Plan B boiler projects are represented in survey completes.

Table 9-1. Colorado Business Heating Efficiency NTG Ratio

Source	Score
Current Deemed NTG ratio	0.97
California SRA, core NTG ratio	0.60
California SRA NTG ratio with previous program participation	0.74
Calculated NTG ratio with participant-reported spillover	0.85
Recommended NTG ratio	0.86

Error! Reference source not found. shows the number of participating customer decision makers interviewed by measure type¹⁸ and the corresponding population data.

Table 9-2. Breakdown of Respondents Used to Calculate the NTG Ratio

Program	Participants			Savings	
	Measure	Projects Surveyed	Projects in Population	Population (therms)	Percent of Total
Colorado Business Heating Efficiency Program	Boiler	40	79	351,625	65%
	Tune-up	59	186	106,748	20%
	Furnace	7	20	8,221	2%
	Hot water heater	2	4	2,975	1%
	Heating system improvement	7	38	67,644	13%
	Total	115	327	537,213	100%

Next we present the approach we used to calculate and recommend a NTG ratio for the program. The NTG ratio results are detailed at each step of the process.

9.1.1 Weighting

The NTG results are weighted to account for intervening factors during sampling or fielding which would otherwise reduce the representativeness of the final survey data. Depending on which

¹⁸ For participants that installed more than one measure type through the program, priority was placed on the rarer of the two measures.



factors may be intervening in the survey, some data are given more “weight,” or contribute more to the analysis, than others.

Measure-level calculated NTG ratios are weighted by the participant’s sampling weight multiplied by gross energy savings. The sampling weight is the same as applied to the participant survey results (methodology detailed in Section **Error! Reference source not found.** Measure-level NTG ratios are also weighted by gross therm savings to account for variations in the energy savings within the same measure type.

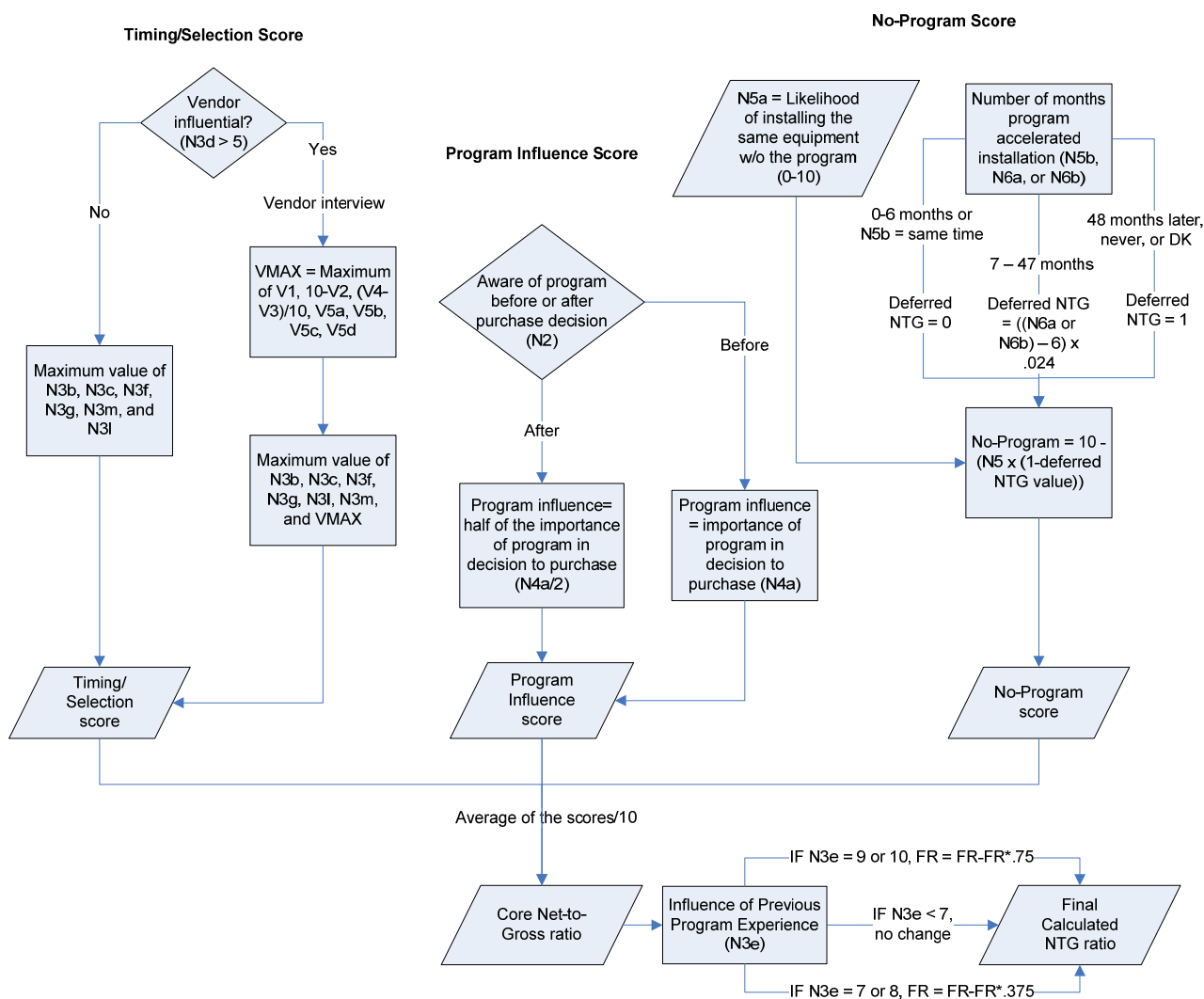
Program-level NTG ratios are weighted by the distribution of measure-level savings represented in the program population. Program-level NTG ratios are calculated by summing the product of each measure-level NTG ratio multiplied by the proportion of overall program gross savings in the population attributable to that measure.

9.2 DETAILED FINDINGS AND METHODOLOGY

9.2.1 Estimating the Net-to-Gross Ratio Using Self-Report Methods

Below, Figure 9-1 details the algorithm of the California SRA framework, with the addition of the previous program participation adjustment.

Figure 9-1. NTG Ratio Flowchart Based on Self-report Freeridership



We computed the NTG ratio following the California self-report framework for standard net-to-gross projects¹⁹. The standard NTG ratio analysis specified in the California framework uses three primary sources of information to estimate NTG ratio: program files and information, participant (decision-maker) surveys, and vendor (participating trade ally) surveys. Our approach to using each of these information sources for estimating freeridership and spillover is described in more detail below.

¹⁹ Methodological Framework for Using the Self-Report Approach to Estimating Net-to-Gross Ratios for Nonresidential Customers, Prepared for the Energy Division, California Public Utilities Commission by the Nonresidential Net-To-Gross Ratio Working Group, Revised May 8, 2009. This method estimates net-to-gross directly rather than estimating 1 minus freeridership.



Program information is used to provide key inputs needed for the decision-maker survey. This information includes contact information, services/equipment received through the program, participation date, and estimated energy savings.

The decision-maker survey, targeted at participating customers, asks highly structured questions about actions that would have been taken in the absence of the program. The survey questions for each participant were informed by the information contained in the program files. Respondents were first asked a series of questions to establish project context. They were then asked to rate the importance of program influences vs. non-program influences. Third, they were asked to rate the significance of different factors and events that may have led to their decision to install the efficient equipment at the time they did, including questions on the age or condition of the equipment, type of project, recommendations received, business policies related to equipment purchases, and previous experience with Xcel Energy programs. For participants that received rebates for conducting a boiler tune-up, additional questions were asked regarding whether or not the tune-up was part of an on-going service agreement.

The decision-maker survey also collected information about what participants would have done in the absence of the program. Specifically, respondents were asked a number of questions to assess the impact the program had on the timing, quantity, and efficiency level of the measures installed. Answers to these questions formed an initial picture of the program's influence—i.e., did the program impact the timing of the decision to replace equipment or have a tune-up, and if so, by how many months/years? Did the program impact the quantity of equipment installed, and if so, by how much (partial freeridership)? Did the program impact the efficiency of equipment installed, and if so, by how much (partial freeridership)? As discussed above, in cases where the decision maker states that the vendor was highly influential in their decision to participate in the program, we attempted to interview the vendor to get their perspective on program influence (these are referred to as 'influential vendors').

A NTG ratio was calculated for each participant. The calculation of the self-report-approach NTG ratio is based only on freeridership as summarized below in text and in Figure 1. In summary, the NTG ratio based on freeridership is calculated as an average of three scores representing responses to one or more questions about the decision to install a program measure. These scores are:

A **Timing and Selection** score that captures the influence of the most important of various program and program-related elements in influencing the customer to select the specific program measure at that time. Program influence through vendor recommendations is also captured in this score when the customer says the vendor was influential in their decision. In these cases, the influential vendor was also interviewed and their responses were incorporated into the timing and selection score. For the Colorado Business Heating Efficiency program, this score is 8.78 averaged across all measures (line 1 in **Error! Reference source not found.** below).

A **Program Influence** score that captures the perceived importance of the program (whether rebate, recommendation, or other information) in the decision to implement the specific measure that was eventually adopted or installed. The overall program influence score is reduced by half if the respondent says they learned about the program only after they decided to install the program qualifying measure. For the Colorado Business Heating Efficiency program, this score is 3.89 averaged across all measures (line 2 in **Error! Reference source not found.** below).



A **No-Program** score that captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available. This score accounts for deferred freeridership by capturing the likelihood that the customer would have installed program qualifying measures at a later date if the program had not been available. For the Colorado Business Heating Efficiency program, this score is 5.25 averaged across all (line 3 in **Error! Reference source not found.** below).

The core NTG ratio for each respondent is the average of these three scores divided by ten, as shown on line 4 of **Error! Reference source not found.** below.

a. Previous Program Participation

Finally, we also examined how participants' ranked the importance past participation in any Xcel Energy program in their decision to install the efficient equipment or conduct a boiler tune-up. In the current California NTG ratio battery, this factor is not included in the calculated NTG ratio, although a question is asked about the importance of previous program participation. Instead, we use the Massachusetts standardized methodology for estimating freeridership as it recognizes the importance that past participation may have had on the current project.

The Massachusetts methodology asks respondents to simply agree or disagree with three statements about the influence of past program participation on their decision to participate in the current program. If they agree to all three statements, the freeridership rate is reduced by 75 percent. If they agree to two of the statements, the freeridership rate is reduced by 37.5 percent. The California battery of questions asked participants to rate the importance of their previous experience with the program on their decision to implement the energy efficient measure/action at that time. Consistent with the Massachusetts methodology to recognize the importance of previous participation, if participants rated their past experience with the program as high (a nine or a ten on a scale of zero to ten with ten being "very important"), we reduced their freeridership rate by 75 percent. If they rated the importance of their past experience with the program a seven or an 8, we reduced their freeridership rate by 37.5 percent. Lower ratings of the importance of previous program participation did not receive any adjustment. This adjustment results in the subtotal calculated NTG ratio detailed in the last step of **Error! Reference source not found.** The downward adjustment of freeridership resulted in the core NTG being adjusted upwards by 14.1 percent (see line 5 of **Error! Reference source not found.** below).

Error! Reference source not found. presents the Timing and Selection, Program Influence, and No-Program Scores, as well as both the core and subtotal average NTG ratio based on freeridership self reports. Also shown is the previous program participation adjustment (discussed in detail under sub-section above), which accounts for the difference between the core and subtotal SRA NTG ratio.

Table 9-3. Independent Scores and Subtotal NTG Ratio Based on Self Report²⁰

Component ²¹	Score (n = 115)
1. Timing & Selection Score	8.78
2. Program Influence Score	3.89
3. No Program Score	5.25
4. Core SRA NTG Ratio	0.60
5. Previous Program Participation Adjustment	0.14
Subtotal SRA NTG Ratio <i>(excluding spillover, adjusted for previous program participation)</i>	0.74

9.3 SPILLOVER AND TRIANGULATION

9.3.1 Self-Report Net-To-Gross Ratio and Like Spillover

In addition to the California framework, we also examined spillover and free drivers to calculate the NTG ratio. **Spillover** refers to additional energy-efficient equipment installed by a customer due to program influences but without any financial or technical assistance from the program.

Participant “like” spillover occurs when a customer installed equipment or conducted services through the program in the past year and then installed additional equipment or conducted additional services of the same type due to program influences.

California’s self-report protocol includes a battery of questions to quantify spillover for use in estimating spillover. The spillover methodology uses a series of questions designed to measure “like” spillover. These questions ask about recent purchases (since program participation) of any additional energy-efficient equipment of the same type as installed through the program that were made *without* any technical or financial assistance from the utility, but were influenced by the program. Since California does not allow for spillover to be included in net savings estimates, we followed the Massachusetts analysis methodology²² for estimating spillover. A “like” spillover estimate is computed based on how much more of the same energy-efficient equipment the

²⁰ Aggregate Timing & Selection, Program Influence, and No Program scores are shown weighted by sampling weight * therm savings. Overall NTG ratios and Previous Program Participation Adjustments are weighted according to the methodology described in Section 9.1.1.

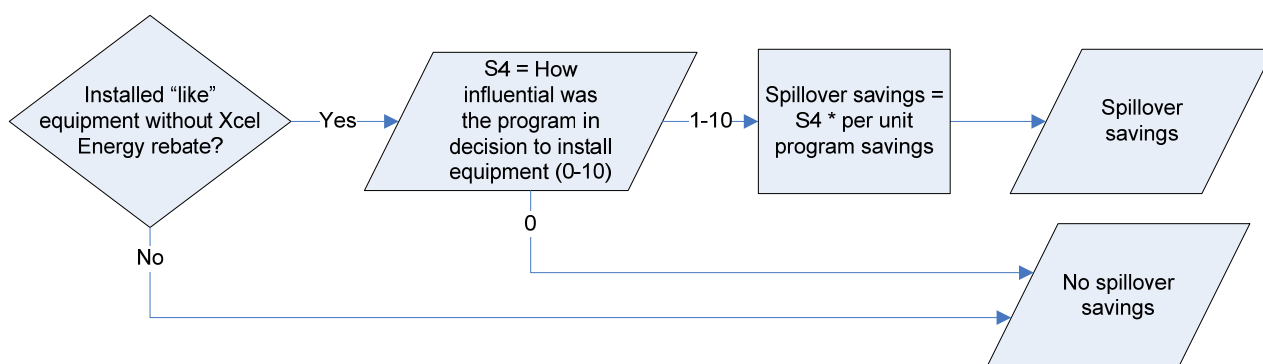
²¹ Xcel Staff requested component scores for the two Plan B boiler surveyed as part of the evaluation. The average Timing & Selection Score was “10”, the Program Influence score was “5.8”, and the No Program Score was “1.6”. These components equate to a Core NTG ratio of 0.58. Adjusted for previous program participation, the subtotal NTG ratio is 0.90. No spillover was identified.

²² “Standardized Methods for Freeridership and Spillover Evaluation—Task 5 Final Report (Revised)”, prepared for the Massachusetts Utilities, June 13, 2003.

participant installed outside the program and did so because of their positive experience with the program.

One of the issues with attempting to quantify spillover savings is how to value the savings of measures installed outside the program since we are relying on customer self-reports of the quantity and efficiency of any measures installed. We used a conservative approach and reported only those measures installed outside the program that were of exactly the same type and efficiency as the ones installed through the program. In addition, we specified that these measures must be installed at locations that are served by Xcel Energy customers and reviewed responses to remove any measures installed outside of Xcel Energy territory or installed for gas-transport customers²³. Our conservative approach allowed customers to be more certain about whether the equipment they installed outside the program was the same type as the program equipment. This, in turn, made it possible to use the estimated program savings for that measure to calculate the customer's "like" spillover savings. **Error! Reference source not found.** details the process for quantifying spillover savings.

Figure 9-2. Customer "Like" Spillover Savings



Free-riders in the Colorado Business Heating Efficiency program include customers that would have installed at least some program-eligible measures within four years or customers that would have conducted a boiler tune-up within three years without any financial assistance from the program. **Error! Reference source not found.** below presents the calculated NTG ratio and the calculated like spillover from customer self-reports as discussed above. The table displays both the "Core" ratio and the "Subtotal" ratio that has been adjusted for previous program participation.

Overall, participant-reported spillover resulted in a 10.8 percent adjustment to the subtotal NTG ratio. The overall combined NTG ratio and spillover from customer self-reports is .85. As this overall estimate is weighted by therm savings, the score is most affected by boiler tune-ups and boiler retrofits that make up a majority of the program's therm savings.

²³ This review resulted in the removal of three records from spillover analysis.

Table 9-4. Colorado Business Heating Efficiency Preliminary NTG Ratio Calculation Using Customer Self-reports

Measure	SRA NTG ratio			Spillover		NTG ratio + Spillover	Number of Projects	Savings	
	Core	Subtotal	90% Confidence Interval (±)	Mean	90% Confidence Interval (±)			Population (therms)	Percent of Total
Boiler	.609	.802	.051	.102	.062	.904	40	351,625	65%
Tune-up	.559	.599	.051	.086	.060	.685	59	106,748	20%
Furnace	.434	.471	.116	.010	.019	.481	7	8,221	2%
Hot water heater	.475	.560	.183	.079	.047	.639	2	2,975	1%
Heating system improvement	.629	.670	.110	.187	.150	.857	7	67,644	13%
Overall	.60	.74	N/A	.11	N/A	.85	115	537,213	100%

Participants reported that both program factors and non-program factors were influential in the decision to purchase energy efficient equipment or conduct a boiler tune-up at that time. The factor that was rated most influential was their organization's existing policy regarding equipment purchases or maintenance (a non-program factor): 56 percent of participants²⁴ reported that their policy was highly influential (a rating of nine or ten). The second most influential factor was the availability of the program rebate (a program factor): 46 percent²⁵ reported that the rebate was highly influential (a rating of nine or ten).

Overall, managed accounts in Colorado report higher program attribution than nonmanaged accounts. This finding is consistent at the program-level and the measure-level (for measures where managed accounts were interviewed). Given that the program is relatively new to the Colorado market, this finding suggests that account managers are successful at making managed Xcel Energy customers aware of the availability of the program early in the decision-making process. Ensuring that the program is “part of the conversation” early on is likely to maximize the amount of influence the program can have on any give project's design. **Error! Reference source not found.** details the NTG ratio by account type for measures and for the program overall.

²⁴ 54.6 percent of nonmanaged accounts and 69.5 percent of managed accounts.

²⁵ 43.4 percent of nonmanaged accounts and 66.7 percent of managed accounts.

Table 9-5. NTG Ratio by Account Type

Program	Measure	Account Type	Core	Subtotal	Spillover	NTG ratio	Number of Projects
Colorado Business Heating Efficiency Program	Boiler	Nonmanaged	.411	.608	0.121	0.729	32
		Managed	.708	.900	0.092	0.992	8
	Tune-up	Nonmanaged	.538	.555	0.001	0.556	53
		Managed	.635	.761	0.395	1.156	6
	Furnace	Nonmanaged	.434	.471	0.010	0.481	7
	Hot water heater	Nonmanaged	.475	.560	0.079	0.639	2
	Heating system improvement	Nonmanaged	.629	.670	0.187	0.857	7
	Total ²⁶	Nonmanaged	.46	.59	0.089	0.68	101
		Managed	.70	.89	0.109	1.00	14

9.3.2 Triangulation and Preponderance of Evidence

a. Partial Freeridership

The California framework defines partial freeridership as when, in the absence of the program, the participant would have installed something more efficient than the program-assumed baseline efficiency but not as efficient as the item actually installed as a result of the program. Of the 56 surveyed participants that installed equipment through the Commercial Heating Efficiency program, two participants reported that, in absence of the program, they would have either installed a smaller quantity of efficiency equipment. In addition, 12 participants reported that they would have installed equipment that was more efficient than standard or code equipment but less efficient than the equipment rebated through the program. For these cases, an adjustment could either be made to the NTG ratio or to the gross savings. For all 14 cases, we feel that the calculated NTG ratio already accurately accounts for the impact of the program on these participants. Therefore, no further adjustment to the NTG ratio was made.

b. Nonparticipant Installations of Eligible Equipment

Of the 53 nonparticipants interviewed as part of the nonparticipant survey, eleven had conducted boiler tune-ups, eight had replaced a boiler without any assistance from Xcel Energy, and five had added improvements to their existing boilers. These findings cannot be directly translated into an accurate NTG ratio without comparable sales data from a territory lacking a commercial HVAC DSM program. However, we can use these results to support our freeridership findings. Based on the calculated NTG ratio, approximately 24 percent of the Commercial Heating Efficiency program gross savings can be attributed to free-riders. While findings from the nonparticipant interviews cannot validate the precision of that figure, they can confirm that some Colorado customers do, in fact, purchase energy efficient equipment and conduct boiler tune-ups without financial or technical assistance from Xcel Energy.

²⁶ Total NTG and spillover ratios by account type are shown in aggregate, averaged across all measures weighted by sampling weight * therm savings.



c. *Nonparticipant Spillover*

Free drivers, or nonparticipant spillover, refer to energy efficient measures installed or services conducted by program nonparticipants due to the program's influence. The program can have an influence on design professionals and vendors as well as an influence on product availability, product acceptance, customer expectations, and other market effects. All may induce nonparticipants to buy more high efficiency products than they would have in the absence of the program.

The data for this type of analysis could be collected from nonparticipants directly or from the design professionals and vendors who recommended, sold, and/or installed qualifying high efficiency equipment. We prefer to survey the design professionals and/or vendors primarily because they typically provide much more accurate information about the efficiency level of installed equipment than nonparticipants do. Our experience has shown that customers cannot provide enough data about the new equipment they have installed to allow for accurate estimates of the energy savings achieved from the equipment. While they usually can report what type of equipment was installed, they typically cannot provide sufficient information about the quantity, size, efficiency, and/or operation of that equipment to determine whether the equipment is "program-eligible." On the other hand, design professionals and equipment vendors who have worked with the program are typically more knowledgeable about equipment and are familiar with what is and is not "program-eligible."

For this effort, participating vendors and providers were asked about any changes attributed to the program in their recommendations of program-eligible equipment or services, how frequent they recommend program-eligible equipment or services, and the amount of program-eligible equipment or services they sell that receive program incentives. These results were weighted by the number of full time employees to account for larger firms having a greater effect on the market. These responses were examined to determine what, if any, nonparticipant spillover might exist because of program activity. As above, our questions were limited to "like" nonparticipant spillover at locations that purchase natural gas from Xcel Energy. The savings estimate is computed based on how much more of the same energy-efficient equipment the nonparticipant installed outside the program and the amount of influence the program had on the participating vendor. As a portion of these projects reported by vendors are likely the same spillover projects reported by participants, participant-reported spillover estimates must be removed from the nonparticipant estimate. Only savings estimates above and beyond the participant estimate can be confidently attributed to nonparticipants.

In total, we conducted 10 qualitative interviews with HVAC trade allies that had participated in the Colorado Business Heating Efficiency program. These interviews explored the program's effect on their sales practices and collected feedback on future changes in the market. Additionally, we conducted eight quantitative interviews with trade allies identified during the participant survey as influential in the decision to install the high efficiency equipment or conduct the tune-up. These quantitative interviews discussed the specific projects at 15 facilities and informed the calculated NTG ratio for those sites.

Overall, trade allies reported that the program in Colorado has had some effect on their sales and stocking of energy efficient equipment or the frequency of boiler tune-up services. When asked about the change in recommendation practices, they reported an increase in recommendations of energy efficiency equipment or services by an average of 19 percent since they began participating in the program. In addition, by comparing their sales of energy efficient equipment



outside of the program (v6b) to the amount of equipment that vendor installed through the program (obtained from the participant database), we can assess the total amount of possible savings from nonparticipating customers. To assign program attribution for these savings, we determine the importance of the program on those sales for that vendor (v5a – v5e). Using this methodology, we were not able to quantify any nonparticipant spillover savings attributable to the program as, per vendors, all eligible equipment or services went through the program. One vendor reported that some of the tune-ups conducted outside of the program do not meet program requirements. He stated, “They don't want to go through the whole thing [and] do the combustion test. If you tell them you're going to do a combustion test and test gas pressure, they want the bare minimum.”

However, this finding contradicts results from the nonparticipant survey (detailed above). In addition; one participating vendor reported that as a result of their participation with the Colorado program, they now kept the tools on hand that allowed them to conduct an exhaustive, program-qualifying boiler tune-up. Another vendor reported that they promote energy efficient equipment or services differently to Xcel Energy customers when compared to non-Xcel Energy customers. While no nonparticipant spillover can be quantified for the program based on participating vendors' reports, future program changes (discussed below) reflect the program's planned outreach to Colorado vendors that will likely increase nonparticipant spillover savings attributable to the program.

d. Peer Utility Benchmarking

As part of the benchmarking review of similar programs offered in the U.S. and Canada, we examined the NTG ratio, and whether the NTG ratio for each program was a deemed value or whether it was based on an evaluation of that program. In cases where the programs were comparable in design and scope to Xcel Energy's program, and the NTG ratio reflected that specific program's performance (e.g., not deemed, evaluated at the program and not the sector level), we compared the NTG ratio for that program when examining adjustments to the Xcel Energy's NTG ratio.

Results from the benchmarking review indicated that NTG ratios currently applied in the reviewed programs range from 27.6 percent to 100 percent (both deemed and evaluated). A simple average of these rates is 78.5 percent although it is unclear from our research whether all these rates include spillover as part of attribution. In addition, benchmarking research conducted since our initial analysis identified additional sources of comparison. The benchmarked research shows NTG with spillover for business heating programs typically range from .80 to .89 for prescriptive measures²⁷. As our assessed NTG ratio (which includes spillover) is approximately mid-way between these two benchmarks, the benchmarking findings support the calculated NTG ratio of .85.

²⁷ Tetra Tech, Massachusetts Program Administrators and the Energy Efficiency Advisory Council Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential and Multi-Family HEHE Gas Programs, and Commercial and Industrial Gas Programs, July 8, 2011



e. *Known Future Program Considerations*

Based on interviews with Product Managers, we also considered any planned program changes in our final recommended NTG ratio for each program.

Currently, the Colorado Business Heating Efficiency plans to hold regular meetings with a Heating advisory Board. This board will be made up of HVAC contractors and vendors active in the Colorado Xcel Energy market and will help the program better engage contractors as trade allies of the program. As discussed above, per vendor reports, it is difficult to attribute spillover from nonparticipants (though participants do report several spillover projects) since participating vendors report sending all qualifying projects through the program. However, interviews with nonparticipating customers confirm that some program-eligible equipment and services are installed or conducted outside of the program. Therefore, we expect the positive outreach and increased engagement of the Heating advisory Board to increase trade ally support of the program and thus increase nonparticipant spillover savings attributable to the program in the future.

In addition, the program added a larger Plan B boiler rebate for early replacement in 2011. There were limited Plan B projects completed in 2011. However the NTG for the two projects included in the evaluation research were .90, higher than the regular boiler rebate, although this is only qualitative evidence due to the limited sample. Boilers do make up the majority of program savings and if Plan B boiler rebates increase as a percentage of these projects, an upward adjustment in the NTG ratio in the range of one – two percentage points is most likely warranted to account for the program's increased influence on these early retirement projects.

As programs mature, both vendor and customer awareness tends to increase, and often NTG increases as well as the program becomes more integrated into the customer decision-making process and vendor sales practices. Because the participant survey gathered data from customers who participated in the program from May 2010 to May 2011 (the second and third year of the program), we expect that attributable NTG will likely increase as the program continues to develop. We believe that an upward adjustment of one percent of the calculated NTG ratio to take into account that the program is beginning its next program cycle is warranted.

9.4 RECOMMENDED NET-TO-GROSS RATIO

Based on analysis of participant and trade ally self-report data, review of benchmarking results, and consideration of future program design changes, we recommend that the NTG ratio for the Colorado Business Heating Efficiency program be based on the calculated NTG with participant spillover of .85, adjusted upward by one percentage point for next year to account for the program gaining momentum in the marketplace. This results in a recommended NTG ratio of .86 for the Colorado Business Heating Efficiency program.

This is both consistent with the benchmarked programs' NTG ratios and with the recommended NTG ratio for the Xcel Energy Minnesota Heating Efficiency program of 1.0²⁸, which has been working in the market place longer and therefore has had more time to generate spillover.

²⁸ The higher NTG ratio in Minnesota is a result of the larger amount of participant and nonparticipant spillover resulting from the program. This difference is most likely due to the limited amount of time the Colorado program has had to generate spillover when compared to the Minnesota program. In theory, the longer a program operates in a market, the more likely that program will influence the long-term behavior of both customers and trade allies.



However, there is evidence that the NTG ratio for Plan B boilers is higher (.90) and therefore the NTG ratio should be adjusted upward by one to two percentage points if Plan B boilers make up a larger percentage of program savings in the future.

Table 9-6. Recommended NTG Ratio

Label	Component	Score
A	Subtotal Calculated NTG Ratio Without Spillover	0.74
B	Participant-reported Spillover	0.11
C	Vendor-reported Spillover	- ²⁹
D	Calculated NTG Ratio w/ Participant Spillover (A+B)	0.85
F	Recommended NTG Ratio	0.86

²⁹ Not quantifiable from the trade ally interviews.

10. EVALUATION RESULTS—TECHNICAL ASSUMPTIONS

This section presents the results of the baseline and technical assumptions review, Task 5c, conducted as a part of the Xcel Energy Business Demand-Side Management program evaluation for the Colorado Business Heating Efficiency Program.

10.1 INTRODUCTION

The objective of the review of the baseline and technical assumptions is to verify that the assumptions used in energy and demand savings calculations are reasonable and provide Xcel Energy with recommendations regarding any needed improvements for the program's savings estimates for subsequent program years.

Baseline and technical assumptions are used to determine “deemed savings” for prescriptive projects. Deemed savings are an estimate of an energy savings and/or demand savings outcome on a “per-unit” basis for installed energy efficiency measures (i.e., a steam trap).

The evaluation team focused on researching the following program baseline and technical assumptions: baseline and proposed equipment efficiencies or resulting increases in efficiency, measure life and hours of operation. Xcel Energy developed these assumptions based on research and details from other programs as well as published studies.

The review process then focused on three different aspects of the Heating Efficiency program deemed savings: the calculation algorithms, the input values used in calculating the deemed savings with the appropriate algorithm, and the final deemed savings values.

- **Calculation Algorithms.** The evaluation team reviewed the calculation algorithms to ensure their accuracy and consistency with engineering fundamentals. The evaluation team also compared these algorithms with those used by other programs in other jurisdictions for consistency.
- **Input values.** The evaluation team reviewed input values to the deemed savings for accuracy by comparing them to their original sources as well as values used in other jurisdictions.
- **Final deemed savings values.** The evaluation team assessed the actual claimed values for the program to ensure their accuracy with the previously mentioned algorithms and assumed values. Review of the claimed values also provided insight into the savings calculation methodology and any areas where potential errors may occur.

The program documentation and sources consulted to assist in this evaluation effort are as follows:

- Efficiency Vermont. Technical Reference Manual. 2004.
- ASHRAE Handbook, HVAC Applications. 2007.
- Database for Energy Efficient Resources. 2008.



- State of Ohio Energy Efficiency Technical Reference Manual. Vermont Energy Investment Corp. 2010.
- Arkansas Deemed Savings Quick Start Program Commercial Measures Final Report. 2007.
- Focus on Energy Evaluation: Deemed Savings Parameter Development. 2009.
- Focus on Energy Evaluation. Business Programs: Deemed Savings Manual v.1.0.
- Evaluation Measurement and Verification Report for the Local Small Commercial Energy Efficiency & Market Transformation Program. 2004.
- Minnesota Office of Energy Security, Conservation Improvement Program Deemed Savings Database. 2009.
- Michigan Energy Measures Database.
- MidAtlantic Technical Reference Manual, 2011. NorthEast Energy Efficiency Partnerships.
- *Prescriptive Condensing Boiler Impact Evaluation: Project 5 Prescriptive Gas*, Massachusetts Energy Efficiency Programs Large Commercial and Industrial Evaluation, Submitted to National Grid. KEMA, June 2, 2011.

10.2 SUMMARY OF FINDINGS

The Task 5c review found that the baseline and technical assumptions are reasonable, well-researched and documented, and generally consistent with other programs. Some areas for improvement or additional research were identified for Xcel Energy's consideration. Key findings are presented below. These are first summarized by equipment type regarding efficiency assumptions, followed by measure life and operating hours. Detailed findings follow. To briefly summarize:

- **New boiler efficiency.** For new boiler projects, the baseline efficiency is consistent with other programs, as well as compliant with current Colorado building and energy codes. The proposed boiler efficiencies are also the qualifying efficiencies and are reasonable when compared to the required efficiencies of other programs. The proposed boiler efficiency is collected and input into the savings calculation, but is not used to calculate the savings. Instead, an average efficiency is used to account for operating under non ideal test conditions. The average efficiency is reasonable, but the value used for condensing boilers is slightly higher than other sources found in the literature review.
- **Water heater efficiency.** The baseline efficiency is consistent with other programs for new and replacement boilers. Additionally, the baseline efficiency for new boilers is compliant with current Colorado state building and energy codes.
- **Furnace efficiency.** The proposed and baseline efficiency are reasonable, and in line with other programs.
- **Tune-ups, controls and add-ons.** The assumed increases in efficiency for modulating burners, tune-ups, outdoor air temperature resets, and stack dampers are all



reasonable and consistent with other programs. However, the evaluation team believes the outdoor air temperature reset measure can currently be claimed for all types of boilers. Since the water temperature for domestic hot water is fixed, domestic hot water only boilers cannot modulate temperature with outdoor air temperature.

- **Pipe insulation and steam traps.** Xcel Energy uses a quasi-custom analysis to determine the savings for pipe insulation. This allows greater flexibility than fixed values when determining the energy savings for a given project. Additionally the savings algorithms were developed using a highly used and well regarded insulation calculation software package. The literature review found that steam trap savings vary significantly based on the orifice size of the steam trap being replaced. Xcel Energy staff report that very few to no steam trap replacements are anticipated in the Colorado market.
- **Measure life.** The savings for high efficiency boiler projects are based on an expected useful life of 20 years. Based on the results of the literature review, this is reasonable and consistent with other programs. The expected useful life used for stack dampers appear to be greater than what is used in other programs. Conversely, the expected useful life for pipe insulation appears to be less than what is used in other programs.
- **Operating hours.** The space heating only effective full load hours (EFLH) are assumed to be 659 hours. This value appears to be reasonable based on the Colorado climate. The EFLH used in water heating only applications is 2,190 hours per year, and the EFLH used in water heating and space heating applications is 1,443 hours per year. These numbers also appear to be reasonable as do the assumptions for pipe insulation. The literature review showed that domestic water heater savings and hot water systems are not commonly calculated based on effective full load hours (EFLH) as done for the program. This does not suggest that the process or numbers used by Xcel Energy for hot water usage are not reasonable, but it limits the literature available for comparison.

Detailed findings supporting the above key findings are presented next.

10.3 DETAILED FINDINGS

We present detailed findings first for Boilers, Water Heaters and Furnaces, followed by Tune-ups and Add-ons and then Pipe Insulation and Steam Traps.

10.3.1 High Efficiency Boilers, Water Heaters, and Furnaces

a. *Baseline Boiler Efficiency*

For new boiler projects, the baseline efficiency is based on the minimum efficiency requirements found in 2006 IECC, ASHRAE 90.1, and the Federal Energy Management Program. The current calculations use 80 percent as the baseline efficiency for new boilers, and 78 percent for replacement boilers. This is consistent with other programs, as well as compliant with current Colorado building and energy codes. Therefore, no changes are recommended.



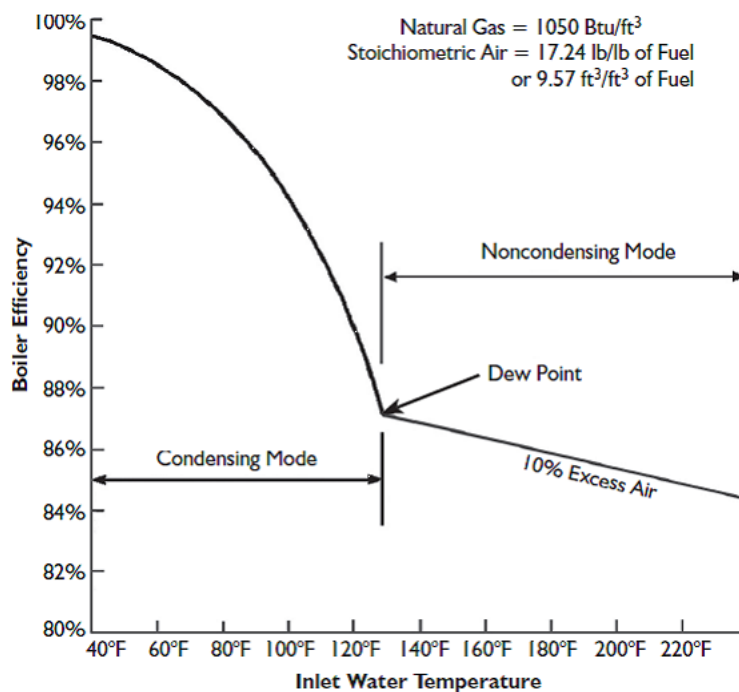
b. Proposed Boiler Efficiency

The proposed boiler efficiency for non-condensing boilers that is used appears to be based on engineering knowledge and experience, as there is no citation or reference for the information found in the technical assumptions. Additionally, the proposed boiler efficiencies found in the technical assumptions are also the qualifying efficiencies. The qualifying efficiencies for non-condensing boilers are reasonable when compared to other programs, therefore no changes are recommended.

c. Storage and Tankless Water Heaters Efficiency Levels

The savings for storage and tankless hot water heaters are based on increasing the recovery efficiency of the water heating system. The baseline efficiency for both storage tank and tankless water heaters is 80 percent. The high minimum efficiency required for both storage and tankless water heaters is 92 percent, and the efficiency used in the calculations is 96.2 percent. These are consistent with condensing water heaters. The use of the higher efficiency when calculating savings is valid as the incoming water temperature will be low (i.e., well or city water), which increases the efficiency of a condensing system, as shown in

Figure 10-1.

Figure 10-1. Effect of inlet water temperature on condensing boiler or water heater recovery efficiency³⁰

The proposed and baseline efficiencies are reasonable, and in line with other programs such as CenterPoint Energy, Mass Save Massachusetts statewide utility program, New Mexico Gas, and Consumers Energy. No changes are recommended in assumed efficiency for water heaters.

d. Condensing Boiler

Condensing boilers use the hot gas exhaust, and heat exchange it with the incoming water to extract more heat, thus increasing the efficiency. However, the exhaust gas is always at a fixed temperature, and therefore the lower the inlet water temperature the more heat is able to be transferred. This results in the efficiency of condensing boilers being highly dependent on the operating characteristics, mainly inlet water temperature, of the hot water system. A sample efficiency curve can be seen in

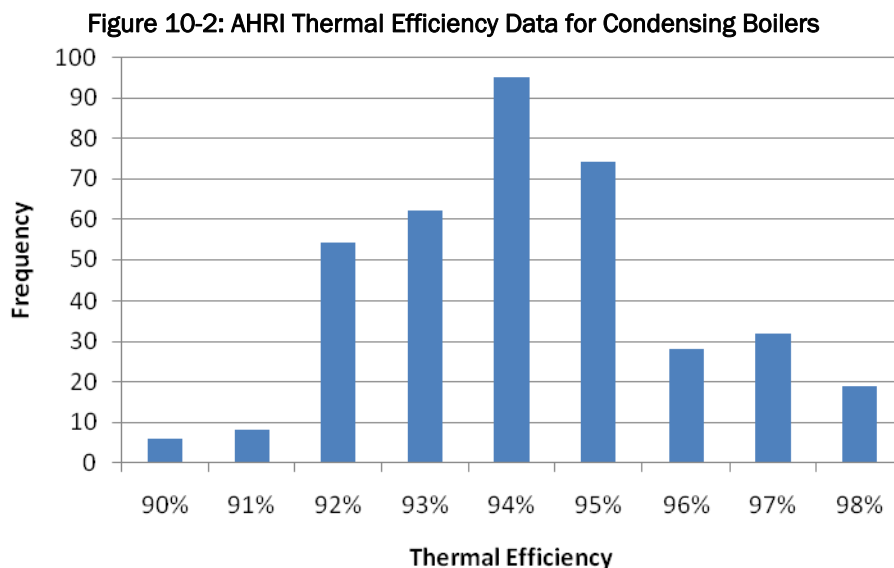
Figure 10-1.

The proposed efficiency currently assumed for condensing boilers is 96.2 percent. Per discussions with program staff, this value was chosen in order to be conservative when compared to manufacturer's specifications, which can be in excess of 98 percent. The proposed efficiency currently used is reasonable when considered for water heating only boilers. Water heating only boilers will have lower inlet water temperatures which deviate significantly from standard test conditions. Based on Figure 10-2, water heating only boilers would be expected to have efficiencies near the 96.2 percent that is currently being claimed.

³⁰ Durkin, Thomas. Boiler System Efficiency, *ASHRAE Journal*, July 2006.



The efficiency used for space heating only, as well as space heating and water heating boilers should be revised. Examination of the AHRI database for condensing commercial boilers shows the average efficiency of condensing boilers listed is 94.2 percent. The breakdown can be seen in Figure 10-2.



Additionally, the Prescriptive Condensing Boiler Impact Evaluation of the Massachusetts Energy Efficiency Programs found that the average nameplate thermal efficiency of boilers installed under the program was 93.9 percent. Additionally, the same evaluation report found that 20 out of 50 projects had savings that were less than anticipated due to operating conditions of the hot water system preventing the boiler from operating at its rated efficiency. While these operating characteristics may not translate directly to Xcel Energy's Colorado territory, they do suggest that a slight reduction in condensing boiler efficiency to 94 percent would be reasonable for space heating as well as space heating and water heating boilers.

The referenced study did not clarify if boilers were operating at full or partial load during measurement. Xcel Energy's assumptions are based on partial load. The report stated that "it was observed that on average boilers used only for domestic hot water operate at 3.00% less than rated efficiency, boilers used only for space heat operate at 5.08% less than rated efficiency, and boilers which provide both operate at 4.50% less than rated efficiency." Therefore while the evaluation team was unable to confirm the operating condition of the boilers during the study, we would assert that it is not realistic that the boilers will be operating at an efficiency that is 2.0% higher than the average rated efficiencies of the boilers tested through rigorous EM&V approaches.

Finally, through discussions with Xcel Energy program staff, new condensing boilers are not rebated for modulating burner controls or outdoor air reset. However, installing these additional controls does not appear to be a requirement for condensing boilers. The assumed condensing boiler efficiency is based on the fact that these measures are installed. Therefore, Xcel Energy should consider making modulating burner controls and outdoor air reset a requirement for participation for new condensing boilers.



e. *High Efficiency Furnace*

The baseline efficiency, as well as the proposed efficiency used for the high efficiency furnace measure, is reasonable and consistent with what is used in other programs and sources such as the Ohio TRM, DEER database, and the Michigan Energy Measures Database (MEMD).

f. *Measure Life*

The savings for high efficiency boiler and furnace projects are claimed based on an expected useful life of 20 years. Based on the results of the literature review, this is reasonable and consistent with other programs and is a conservative estimate. No changes are recommended.

g. *Hours of Operation*

The hours of operation for boiler projects are assumed to vary based on the application of the boiler: space heating only, domestic hot water heating only, and space heating and domestic water heating. It should first be noted that there are no references for the hours used in the calculations; therefore, it is assumed that they were derived using engineering knowledge and/or experience.

The space heating only effective full load hours (EFLH) are assumed to be 659 hours. This value appears to be reasonable based on the Colorado climate. The EFLH used in water heating only applications is 2,190 hours per year, and the EFLH used in water heating and space heating applications is 1,443 hours per year. These numbers also appear to be reasonable; however, there is little literature to support the domestic hot water EFLH.

Domestic water heater savings are not commonly calculated based on EFLH. The energy savings for hot water usage are dependent not only on the size of the boiler, but the hot water usage as well. A literature review showed that other programs calculate energy efficient water heater savings based on the hot water usage and shell losses, which are independent of boiler size. While this does not suggest that the process or numbers used by Xcel Energy for hot water usage are not reasonable, it significantly limits the literature available for comparison.

The hours of operation for commercial water heaters are assumed to be 1,092 EFLH per year. This is significantly different from the 2,190 EFLH used for hot water only boilers. The evaluation team was not able to find a reference or justification for the difference between the two values. We recommend this be added to the program assumptions documentation.

The results of the literature review found that the average EFLH for space heating boilers was 1,194 hours after adjusting for weather differences. This is slightly less than the value for space heating and hot water usage boilers currently used by Xcel Energy, but are within reason. Those utilities that break out the savings for space heating only boilers used 653 EFLH and 821 EFLH after adjusting for weather. None of the reviewed utilities had domestic hot water only boiler savings specifically. However, the close proximity of the space heating only, and space heating and water heating boilers suggests that no changes are needed at this time. Furnace hours of operation are consistent with the expected weather conditions, therefore, no changes are recommended for this measure.



10.3.2 Tune-Ups and Add-ons

The savings calculations for the following measures are based on a fixed percentage increase in efficiency. However, the savings for modulating burners, outdoor air resets, and stack dampers are based on sources that state the percentages are reductions in energy usage. It should be noted that these two definitions are not necessarily equivalent. Based on how the boiler is loaded, a two percent increase in efficiency, will not always yield a two percent reduction in energy usage. Xcel Energy currently employs an effective full load hours (EFLH) calculation method to determine the savings for all of these measures, which negates the difference between the two definitions. Therefore, at the current juncture there is no reason to adjust the savings calculations. However, if the calculation method is changed at a future date, these definitions will need to be considered to ensure the savings are calculated accurately.

a. *Modulating Burners*

Modulating burners are used to enable boiler burners to modulate to a lower firing rate when the boiler is operating at a lower load condition, as opposed to cycling on and off. The savings calculations assume a three percent increase in boiler efficiency due to this measure. It is important to note that this is not available as an incremental savings to a condensing boiler. A literature review revealed that this is consistent with other programs, where values range from one to five percent. No changes are recommended to the savings value.

b. *Tune-Up*

Boiler tune-ups provide cleaning and general maintenance to boilers to ensure they are in good running condition. The savings calculations assume a two percent increase in boiler efficiency as a result of the tune-up. The two percent efficiency improvement is not unreasonable, and is consistent with what is used in other programs. Additionally, the resulting savings of between 0.3 and 0.6 therms/kBtu/hr per year of savings also agree with the literature. No changes are recommended.

c. *Outdoor Air Reset*

Outdoor air reset adjusts the hot water temperature with the changing outdoor air temperature to help improve the performance of the boiler. The savings are based on a three percent efficiency improvement. A literature review shows that the three percent savings, as well as its corresponding 0.8 therm/kBtu/hr, are reasonable compared to the 3.8 percent used in some programs, and the 0.6 therm/kBtu/hr used in others. Therefore, no changes are recommended to the savings value.

One concern with the calculation of savings is that outdoor air reset is available for boilers that provide domestic hot water heating only. The advantage of outdoor air reset controls are that the boiler water temperature can modulate up and down with the outdoor air temperature. Domestic hot water temperatures are fixed, thus do not modulate, and will not realize savings for this measure. Therefore, we recommend domestic hot water heating only boilers should be excluded from claiming savings for this measure.

d. *Stack Dampers*



Installing stack dampers prevents heat loss up the stack from the space inside the boiler room (if it is conditioned), as well as heat loss from the boiler itself while it is idle or currently cycling off. The current calculations assume a one percent increase in efficiency as a result of installing stack dampers. A literature review shows there is a wide range of savings values for this measure, from a minimum of 3.4 percent to a maximum of 11 percent reduction in energy usage. However, there is little empirical or evaluation data to substantiate the claimed savings for these programs. The one percent reduction in energy usage currently used is in line with our experience and other projects that we have evaluated. However, it is conservative when compared to other sources. Through discussions with Xcel Energy program staff, due to the low level of certainty surrounding the savings associated with stack dampers, a conservative value is desired. Therefore, no changes are recommended to the savings value.

e. *Expected Useful Life*

The technical assumption documentation does not indicate the expected useful life (EUL) for the outdoor air reset, stack dampers, or O2 trim control measures. Therefore, it is assumed that these measures are currently using an EUL of 20 years, which is equal to what is used for new and replacement boilers. Table 10-1 shows the EUL currently in use, as well as the EUL that is used in other programs and resources.

Table 10-1. EUL Literature Review

Measure	Current EUL	NYSERDA	MEMD	MN OES	Other Literature
Tune – Up	2	2	2	2	2
Outdoor Air Reset	20	20	15	20	20
Stack Dampers	20	12	-	12	12
O2 Trim Controls	20	20	15	20	-

Examination of the above shows that tune-ups, outdoor air reset, turbulators, and O2 trim controls have EULs that are consistent with other programs and literature. The EUL of 20 for stack dampers is larger than what is found in the literature. The literature suggests an EUL of 12 years for stack dampers. Therefore, it is recommended that the EUL for stack dampers be changed to 12 years to be consistent with the literature.



10.3.3 Pipe Insulation and Steam Traps

a. *Pipe Insulation*

Pipe insulation savings are based on several key characteristics: the pipe diameter, length, insulation thickness, fluid temperature and hours of use. All of these aspects, except hours of operation, are used in a quasi-custom analysis to determine the savings. This allows greater flexibility than fixed values when determining the energy savings for a given project. Additionally, the savings algorithms were developed using 3E Plus, a highly used and well regarded insulation calculation software package.

The hours of operation for pipe insulation is broken down into four different possibilities: pipe located inside for domestic hot water only, pipe located outside for domestic hot water only, pipe located inside for space heating, and pipe located outside for space heating. All of the operating hours appear to be based on a facility with a balance temperature of 45 F, and a heating system lockout temperature of 60 F. Both of these conditions are reasonable for the Colorado climate, therefore no changes are recommended.

The EUL for pipe insulation is currently set at seven years. A review of the literature shows several reports and jurisdictions use between ten and 15 years for an EUL; however, there is no indication that any of the piping is located outdoors. Increasing the expected useful life to ten years will be consistent with the literature, while remaining conservative to account for the fact that some piping may be located outdoors.

b. *Steam Traps*

Repairing steam traps results in less steam “leaking” into the surrounding areas, and thus results in an increase in the loading on the steam system. The current deemed savings are based on data from the Energy Management Handbook by Wayne Turner. The gas savings are either 399 therms/year for per trap for low pressure steam, or 892 therms/year per trap for high pressure steam. A literature review shows that the savings associated with this measure are highly dependent upon the orifice size of the steam trap being replaced. For example, leakage from a trap with a 1/32” orifice operating at two psi is approximately 0.31 lbs/hr. However, a steam trap with an orifice that is 1/2” in diameter operating at two psi will have a leak rate of approximately 79.8 lbs/hr. These numbers are also dependent upon the pressure of the steam system, and increase significantly as pressure increases. Other programs, such as Ohio, Arkansas, and Alliant Energy, and sources such as NYSERDA and the MN OES deemed savings account for this by varying the energy savings claimed with the actual orifice size of the steam trap. This quasi-custom approach allows for greater flexibility than a fixed value when determining the energy savings for any given project. There are also programs that assume a fixed deemed value; however, there is a wide spread, ranging from 298 therms/year per trap to 1,100 therms/year per trap.

The large spread in the deemed savings values makes recommending one particular value difficult. This results in a couple of solutions to ensuring that the most appropriate value is used for the Xcel Energy Colorado territory. One way is to adopt a similar quasi-custom analysis that takes into account the actual orifice size of the trap being replaced. Adapting the savings claims to each project can prove a useful way to ensure that savings are not over or under claimed. A second way would be to consider further research to determine what the most common or appropriate orifice size for the Xcel Energy Colorado territory would be. This information then be



used to validate or adjust the current deemed savings value. Obtaining the detailed information on steam traps can be difficult, and costly. Therefore, the additional data should be collected if/when the savings for steam trap projects meet or exceed 30 percent of the total savings claimed for the Colorado Heating prescriptive program. Xcel Energy program staff report that they anticipate few to no steam trap projects in Colorado.



APPENDIX A: PROGRAM STAFF INTERVIEW GUIDE

Interview Objectives

- Understand program design, including recent changes and proposed changes.
- Characterize program activities, inputs (resources), outputs, short to medium term outcomes and long term outcomes to develop the program logic model
- Identify important influences on program operation and achievements
- Identify issues that should be incorporated into evaluation activities, including specific technical assumptions for investigation.
- Characterize program operations including staffing, outreach activities and marketing, types of customers participating and not participating and role of the trade allies
- Define participants and nonparticipants.
- Identify program areas that are working well and opportunities for improvement

Describe your role within Xcel Energy and with the program(s)

- 1) Responsibilities or role regarding the program
- 2) when became involved
- 3) how have responsibilities/role changed over time
- 4) on average, what percent of your workload is spent on the program monthly?
- 5) Who do you interact with (others) regarding the program?
- 6) other Xcel Energy staff, trade allies, customers, organizations, peer utilities
- 7) roles and responsibilities of these other persons
- 8) success of interactions; suggestions for improvements

Program Design and Marketing

- 9) Who was involved in the program design? Was the program patterned after another program(s)? If so, were any modifications made to improve the program design?
- 10) How has the program design changed in the past year? Why did you make these changes?
- 11) What are the program goals? How are program goals communicated internally and externally? How well has the program been performing in relation to goals? Why?



- 12) How does the type of equipment being purchased and installed through the program vary? Why do you think there is this variation?
- 13) How do you define participants, both prescriptive and custom? How do you define nonparticipants? What seems to lead to lost opportunities? Are your participants typically new to Xcel Energy CIP/DSM programs?
- 14) Are there similarities between the projects that participate in the program, or is each project unique?
- 15) What are the target markets within the commercial sector for the program? How is this changing?
- 16) What marketing activities are being used to reach the different target markets? How have these activities changed in the past year? How effective have each of these methods been in identifying and enrolling potential participants? Why?
- 17) What are major barriers to participation?
- 18) Why do you think customers choose to participate or not participate?
- 19) What are the comparative strengths of these reasons?
- 20) In your opinion, do the current marketing efforts adequately reinforce customers' reasons for participation and/or minimize reasons for nonparticipation?
- 21) Are there sufficient program resources to meet the programs goals? (Probe: Examples of resources are staff resources, incentives, program partners support (co-op ads, spiffs), and marketing materials.)

Program Operations

- 22) What are the participation steps from the customer's perspective? Can customers enter the program via various methods (i.e., study-driven)? Have these changed over time?
- 23) What is the overall quality/accuracy of the customer applications that you receive? Have you taken any steps recently to improve the quality of these applications? What improvements are needed but currently unavailable?
- 24) What is the level of customer satisfaction with the various aspects of the program (participation process, program application, measure performance, rebate processing, etc.)? How can satisfaction be improved?
- 25) Describe your communications and working relationship with trade allies. What support is provided through the program to trade allies? (Probe to see if systematic or ad-hoc.) In what areas could this be improved?
- 26) How are trade allies recruited into the program? What makes your trade allies unique in their offerings due to the program?
- 27) How are you seeing the market transform through your trade allies and customers?



- 28) What aspects of the program implementation are working well? Which are not working well?
- 29) Do the incentive levels seem appropriate? If not, why not? What, if any, changes in the incentive levels do you think may be needed? *(Probe about recent changes in incentive levels as relevant by program.)*
- 30) What do you see as future challenges for the program?
- 31) How are participants and non participants (i.e., marketing leads) tracked? Is the system used for tracking helpful or not? What would be helpful to track that is not currently available? How easy is it to use the tracking system?
- 32) How do you identify prospective customers for the program?

Program impacts—(Do not ask for the Colorado Self-Direct Custom Efficiency program)

- 33) *(Relevant for Energy Efficiency Engineers and Product Managers)* Next I'd like to ask you about various technical inputs into your current tracking system estimates for gross energy and demand impacts. Could you please briefly summarize your approach for these inputs and any concerns/issues you may have with the input. Capture across the specific pieces of program equipment.

Inputs	Summary of Approach	Concerns/issues (if any)
Baseline equipment		
Replacement equipment specifications (e.g., capacity, nominal rating of equipment capacity, energy efficiency ratio)		
Operating hours		
System coincidence factors		
Load factors		
O&M savings and/or costs		
Equipment/measure life		
Persistence, rebound, snapback, and degradation		
Incremental costs		
NTGR (Freeridership) and spillover rate		

- 34) Have these inputs changed over the course of the program? If so, how?
- 35) What level of rigor do you feel is needed around these technical assumptions, e.g., which are the most critical with respect to verification?
Are there any plans to make changes to these inputs moving forward? If so, how?
- 36) For custom projects, how is additional information gathered to determine impacts?
How is this process working? (Interviewer note: Probe for any concerns or



improvements in processes. The 2010 evaluation found concerns with turnaround times for approval of custom projects, but Xcel Energy has been working to improve this across the board and has had success doing so as measured by metrics.)

Evaluation

- 37) What do you hope to learn from the evaluation?
- 38) *(Probe if not mentioned in 1 or 2)* Do you have any specific questions that you want to make sure are included in primary data collection activities with market actors. Probe about trade ally interviews, participant and nonparticipant surveys, the benchmarking study and the engineering review.

Inputs for Logic Model.

This next series of questions will be used to supplement the program documentation to develop the program logic model. The program logic model is a visual representation of the program's theory. The program theory articulates what the program is trying to achieve, through what interventions, and with respect to which market actors.

- 39) What are the primary activities the program is expecting to conduct? (Interviewer note: Probe about activities with trade allies, other stakeholders and customers as applicable. If needed give examples such as recruitment and training of contractors, recruiting customers and installing high efficiency equipment or performing audit.)
- 40) For each of the activities we just discussed, what are the outputs of the activities? Outputs are direct, immediate results from the activity and often can be contract metrics for the program. Examples include number of trade allies participating, number of incentive equipment or marketing activities conducted.
- 41) Now for each program activity and corresponding output, what are the expected outcomes? For example, how do you expect the program to influence trade allies business practices? How is the program expected to influence customer awareness and behaviors? (Probe to distinguish outcomes that are in the program's control from those that are not)
- 42) Now for each of the outcomes we just discussed, can you tell me if you think this will be a near-term outcome of the program in the next 12 months or if this is a longer-term outcome of the program (2-3 years out)?
- 43) Now I would like to step back through each program activity with you and discuss the resources that are needed to support each program activity we talked about. (Interviewer note: Walk them through each program activity.) Examples of resources are staff resources, incentives, program partners and marketing materials.
- 44) What are other key outputs you have developed for the program that we have not already discussed? Examples include a tracking system or application materials.



Other Suggestions for Improvement

- 45) marketing
- 46) staffing
- 47) resources
- 48) training
- 49) quality control
- 50) program tracking system
- 51) communication
- 52) evaluation



APPENDIX B: TRADE ALLY INTERVIEW GUIDE

Interview Guide Format

This interview guide is for trade allies that have participated within the last two years in Xcel Energy's DSM business programs being evaluated in 2011. This includes both trade allies that have been fairly active in the program as well as 'informed' nonparticipants. Informed nonparticipants are trade allies that have completed a project through the program, but have had very limited involvement. An example would be a trade ally who has done one or two projects through the program or who completed projects in 2010, but not 2011 to-date. For the Self-Directed Custom program, informed nonparticipants would include any vendors who have submitted an application but have not yet completed a project through the program.

First the guide summarizes the key researchable issues that the interviews will explore across all the programs and at the program-specific level. Next, the interview guide presents the specific questions to be asked. Trade allies will only be asked about the relevant program, indicated by [program] when name of the program is to be stated or referred to as the program in the below guide. Specific questions and probes only relevant for one program are noted at the beginning of the question with the program indicated in (). There are also program specific modules, which will only be asked for that program.

Because senior staff will be conducting interviews, trade ally interviews will be semi-structured. Therefore the following interview protocol is only a guide to ensure certain topics are covered, but evaluators will follow the flow of the interview and modify questions as needed to fit the interviewee's circumstance.

Below we list the key researchable questions the trade ally interviews are intended to answer. This is followed by the actual script and questions to discuss with trade allies.

Overarching Key Researchable Issues

- How are the programs leveraging the trade ally infrastructure and are there areas for improvement?
- How satisfied are vendors with communications about the program? Are any changes needed?
- What impact have the programs had on the relevant commercial market in terms of greater availability of efficient products or program services?
- Per trade ally experience with other utility programs, is there anything trade allies would suggest to Xcel Energy?
- What are the opportunities to streamline the application and rebate process?
- Are trade allies effectively conveying program information and encouraging customer participation? What additional training or support from Xcel Energy do trade allies need to more effectively support the programs?



- How effective are trade reward promotions at influencing trade referrals of the program?
- How effective is the marketing of the programs? Are there customer segments that marketing efforts should specifically target? What are strategies for effectively marketing the program to identified customer segments such as small/medium business? Is more program-specific marketing needed?
- Are rebate levels and program equipment/services optimally set to encourage participation while maximizing the cost-effectiveness of the program?
- What is the customer decision-making processes regarding participation in Xcel Energy's Business DSM Programs? What are customer barriers to participation?
- How receptive are customers towards energy efficiency measures given the current economic conditions?

Motors/VSDs key Researchable Issues

- How informed are customers about program equipment and rebates?
- What barriers prevent customers from purchasing program equipment?
- What is the impact of the general economy, versus other factors?
- Is it difficult to obtain motors specification information?
- Are sales of VSDs projected to increase, decrease or remain level?
- Have vendor stocking or sales practices changed due to the new federal standards for motors?
- How effective are trade incentives for motors? Should there be any changes to the current structure?
- What would cause vendors to specify program equipment more often?
- How important are Xcel's vendor incentives in their equipment recommendations? How well is this program element working for vendors?

Minnesota and Colorado Commercial Heating Researchable Issues

- How can the program encourage participants that conduct a boiler tune-up or install efficiency enhancements to continue with the program by replacing larger equipment?
- What are the barriers to conducting boiler tune-ups and how can the program best overcome them?
- Has trade ally experience with the program changed the way trade allies conduct tune-ups? What influence does the program have on participants that have on-going service agreements for the boilers in their facility? What could Xcel Energy do to influence increased efficiency during any tune-up? During service agreement tune-ups?



- Is there customer demand for other heating equipment currently not included in the program?
- Are the sales of high efficiency boilers and boiler tune-up services expected to increase, decrease, or remain the same?
- How effective could a trade ally incentive be? What does an effective trade incentive look like? (INTERVIEWER NOTE: Xcel Energy is considering rolling out trade incentives at 10% of customer rebate for Commercial Heating).
- (IN COLORADO) How effective is the Plan B option in encouraging the replacement of “young” boilers?
- (IN COLORADO) Are trade allies aware of the eligibility requirements for their customers, specifically gas transport customers?
- (IN MINNESOTA) How can the program encourage more participation in the Heating Efficiency Optimization Study? Are customers familiar with the Heating Optimization Study?
- Is an incentive for trade allies’ participation in the program needed? If so, what is the best way to structure this incentive?
- If the program required pre-qualification in order to conduct tune-ups, would trade allies participate in the pre-qualification process?
- What do trade allies see as emerging issues or opportunities (e.g., “next big thing”) for enhanced efficiency that they’d like Xcel Energy to consider when developing future program options?

Self-Directed Custom Researchable Issues

- How much experience do participating vendors have with implementing custom energy efficiency projects and conducting measurement and verification of energy savings?
- What types of relationships did vendors have with participating customers prior to participating in the Self-Directed Program? Have they performed similar services for the customer in the past?
- What level of involvement do vendors have at each stage of implementation?
- How familiar are customers with the measurement and verification process?
- Are the increased incentive levels sufficient to encourage customers to conduct M&V on their own or hire a contractor to conduct M&V?
- What barriers, if any, have vendors faced in progressing from one stage to another throughout the participation process?



Introduction

My name is _____, with [company]. Xcel Energy has hired us to evaluate its [relevant program]. The study will provide recommendations on how they can improve the program for you and your customers. I would like to ask you some questions about your experience with the [program]. Your feedback on the program is extremely valuable as Xcel Energy wants to improve your experience and satisfaction with the program as well as your customers. As part of this study we are talking to approximately ten businesses such as yourself that work with the [program] as well as customers who have participated in the program, and those who have not. This interview should take approximately 30 minutes of your time. May we take some time now to do the interview? (If no, when would be a convenient time?)

NAME: _____

COMPANY: _____

TITLE: _____

PHONE: _____

INTERVIEWER: _____

DATE COMPLETED: _____ **LENGTH:** _____

Company Profile

Research company website before interview to learn about company.

F1. What is your primary role(s) in the supply and delivery of [relevant program equipment or service] to the commercial customer market? (Examples include manufacturer, manufacturer representative, wholesale distributor, engineering firm, contractor, energy services/management firm, etc.)

F2. Could you please tell me specifically the types of [program] equipment or services you sell/specify for commercial customers? (Probe for the specific types, sizes and efficiency levels as applicable.) (Self-Directed Custom: probe on whether provide M&V services) Note: Commercial refers to all businesses in Xcel Energy's territory that qualify for the program.

F3. What percentage of your commercial business is:

Planned Equipment Replacement (for currently operating equipment)? _____%

New Equipment Purchases (for new buildings or processes) _____%

Failed/Emergency Equipment Replacement _____%

(HEATING ONLY) Maintenance Services (such as boiler tune-ups) _____%



Other (specify)_____%

F3b. (HEATING ONLY AND IF CONDUCTS MAINTENANCE SERVICES) Do you have on-going service agreements with any of your customers? If so, how many?

F4. What percent of the projects that you completed in the last 12 months were for small or medium businesses in terms of energy usage versus large businesses? We are defining small businesses as those with 100 or less employees. Medium businesses have over 100 employees. Large businesses are those that have an Xcel Energy account manager.

Program Awareness and Involvement

P1. Could you describe for me your participation in [Program]? Probe for reasons trade ally participates at the reported level of activity.

P2. When did you first get involved with [Program]?

P3. How did you first hear about [Program]? (Do not prompt. Circle all that apply)

- Through Xcel Energy staff (probe if account manager, channel manager, product manager, etc.)
- Attended workshop or training seminar and learned about the program
- Through a manufacturer/supply house
- Learned about the program at trade show
- Saw/heard ads for the program (Where?_____)
- Attended a program-sponsored information session
- Magazine, newspaper, TV, radio, on-line advertising, or billboards (morning, evening, weekend,)..etc
- Xcel Energy Website
- Other Xcel Energy marketing efforts, such as a newsletter, email or mailing
- Business Colleague
- Business Customer
- Other _____
- Don't know/unsure

P4. Why did you decide to participate/get involved in the program? (Do not prompt)]

P4a. What is the primary benefit(s) you receive from [Program]?

P4b. When was the last time you completed a project through/sold equipment through the program?



P4c. (IF HAVEN'T COMPLETED A PROJECT/SOLD EQUIPMENT IN LAST YEAR) Why have you not completed a project through the program recently?

P5. Do you feel there are adequate program communications? Are any changes needed? How do you like to receive communications about the program?

P6. Who do you typically interact with from the program? For what purposes? How would you describe your interactions with program staff? (minimal, helpful, very involved, probe to characterize)?

P7. What additional support could the program offer that you would find beneficial? Are there any additional tools that the program should offer? (Self-Directed Custom: What level of support would you expect from a program such as Xcel Energy's Self-Directed Custom program?)

P7a. (IF TRADE INCENTIVE NOT MENTIONED IN P7) If Xcel Energy offered an incentive for trade allies, how would that change your participation in the [program]? What would be the best structure for this incentive?

P8. Are there other types of energy efficiency programs that you participate in /are aware of? If yes, do you think there are lessons learned for Xcel Energy from these other programs?

Customer Interactions

C1a. Do you actively promote [Program]? If yes, how?

C1b. What percent of your customers already know about [Program] before you tell them about it? Has customer program awareness increased or decreased in the past 12 months? Why do you think this is?

C1c. Who (title/position) do you need to work with in order to get interest and close the sale? What info do they seek from you? Why do customers call you – equipment failure, maintenance/service call, warranty work, primary interest in energy efficiency, other?

C2. What are the primary reasons customers typically want to install program-qualifying equipment/conduct program-eligible services?

C2a. What factors most influence customer project decision-making? Ask of mentioned factors: which are the one or two most important in influencing customers' decisions? Probe for differences among customer segments and differences for new construction and retrofits.

If needed, examples of factors include the following:

- Fits standard design
- Overall cost of the project
- Availability of a rebate through utility program
- Information and education provided by utility on the benefits of energy-efficient technologies or services
- Saves energy costs



- Helps the environment
- Shows good corporate citizenship
- Meets payback criteria
- Impact on company financials
- Recommendation of manufacturer, supplier, contractor, etc.

C3. On a scale of 1 to 5 where 1 is very difficult and 5 is not at all difficult, how difficult do you find it to sell [high efficiency program equipment or service] to your customers?

C3a. And why do you say that? (Probe to understand why the program equipment or service is easy or difficult to sell for respondent and why there are “lost opportunities” for Xcel Energy (e.g., projects that are not high efficiency that could have been). Characterize customer participation barriers (e.g., incremental cost of efficient high efficiency equipment, too long of a payback period, rebate application process, etc.) to the extent possible. If not mentioned, probe specifically about the effect of the slower economy on customers’ decision to participate in program.)

C4. What are the primary reasons customers typically do not want to participate in the program? Do these reasons vary across different customer segments? (PROBE: small vs large customers)

C5. What can be done to increase the number of participating customers in the program? Probe about managed accounts (large customers) versus small and medium size customers.

C6. What do you think are the main benefits your customers receive by participating in [Program]?

C7. Are there other opportunities to promote energy-efficient products and services to business customers that the program is not currently addressing?

C8. Would you like to see the program do more direct or specific marketing to customers eligible for the program? If yes, what kind of marketing would you like to see added? [For Motors and Drives, probe specifically about magazines Xcel Energy should use/subscribe to for placing program-specific advertising]. For heating explore the option for joint marketing efforts between the trade and Xcel.

Program Procedures

E1. On a scale of 1 to 5 where 1 is ‘very difficult’ and 5 is ‘not at all difficult’, how would you rate the difficulty of completing Xcel’s program applications? Why do you give this ranking?

E2. What is your involvement with the application portion of the program? What is working well about the application process from the customer’s point of view, if anything? Your point of view? How would you like to see the application process improved? [MOTORS] Probe to see if specifications requirements are a problem.

E3. Are the customer rebates offered through the program adequate? How would you like to see the rebate structure revised?



E3a. (HEATING equipment (not tune-ups) and MOTORS) Are you aware that the program changed its rebate levels in 2010? Has this change affected your communications with customers? Has it affected customer interest in the program?

Motors and Drives Specific Questions

M1. Are there components of the program that are confusing to you? (If YES) What do you find that is unclear or confusing about Xcel's program?

M2. What tools/resources do you use to promote the higher efficient equipment? Do you use any of the tools/resources that Xcel Energy makes available to you? Why or why not?

M3. What is the biggest challenge that you face with the motors/drive program?

M4. What do you need from the program to assist you in promoting motors and drive equipment? Are there any marketing materials or analytical tools (feature sheets, calculation spreadsheets) that would help you to sell/specify program equipment?

M5. How often do you do a motor inventory /assessment planning for your customers? An example of this is how many motors a customer has and what of their stock they should replace/repair or rewind.

M6. Have you received any incentive payments from Xcel Energy for your motors sales or specifications?

- (If YES) Please describe what you have to do to receive these incentives.
 - How well is this process working for you?
 - How important are these incentives to your promotion of program motors? Would you say they are: extremely important, very important, somewhat important, not very important, or not at all important?
- (If NO) Why haven't you received any payments? Probe to see if unaware of incentives, payments not worth effort, etc.

M7. Have you ever heard from a customer or Xcel Energy staff that you mistakenly recommended or installed equipment that did not qualify for Xcel's rebates?

Commercial Heating Specific Questions

H1. (IF CONDUCT TUNE-UPS) Does every boiler tune-up you perform, regardless of whether it goes through Xcel Energy's rebate program, include all of the items on the Xcel Energy checklist? Do tune-ups vary in any other way depending on if they receive a rebate? If yes, how do they differ?

H2. (IF TUNE-UPS DIFFER) Are the customers that receive a tune-up rebated by Xcel Energy aware of this difference? How do you communicate this difference to them?



H3. Did you conduct boiler tune-up services before your participation in Xcel Energy's program? Has there been any change in your tune-up practices offered outside of the Xcel Energy program **as a result** of your participation in the program? If yes, what changes?

H4. (IF HAS SERVICE AGREEMENTS) Has your participation in the program changed the way you work with customers that have on-going service agreements?

H5. How much "follow-up" do you do with customers where you conduct maintenance or replace parts (e.g., conduct a tune-up or replace a steam trap)? Do you use these opportunities to identify boilers that should be replaced?

H5A. (IF PERFORMS TUNE-UPS) Does the tune-up rebate eligibility of every other year serve as a reminder to customers that it's time to do a tune-up?

H5B. Do you typically contact customers to tell them it's time for a tune-up, or do you wait until they call to schedule an appointment? Who usually brings up the rebate – you or the customer?

H6. (IN COLORADO) How effective is the Plan B option in encouraging the replacement of boilers? Is 25 years an appropriate age limit? Are the incentive amounts effective at convincing customers to replace working boilers?

H7. (IN COLORADO) Are you aware of when your customers are "gas transport" customers (i.e., buy natural gas from a third party and have it distributed by Xcel Energy pipelines)? Does the sales process with these customers differ from other customers?

H8. (IN MINNESOTA) Minnesota offers rebates for conducting a Heating Optimization Study (explain in detail if necessary). How can the program encourage more participation in the Heating Efficiency Optimization Study? In your opinion, what benefit do customers receive from conducting an Optimization Study?

H9. If Xcel Energy required all tune-up providers participating in the rebate program to become pre-qualified in order to be eligible for rebates, would you apply? If no, why not? (Pre-qualification might consist of attending training and pre-qualified vendors might be listed on the Xcel Energy website and the only ones permitted to perform advanced tune-ups that include assessing additional energy-savings opportunities and offer a larger rebate.)

Self-Direct Specific Questions

S1. Can you please describe your involvement with each stage of the participation process? (Probe on submitting application, estimating savings, developing M&V plan, conducting baseline measurement, post-measurements).

S2. Did you experience any challenges or difficulties in progressing through the participation process, from start to finish? Do you have any recommendations for how to improve or streamline the process?

S3. Do you feel that the program provided you adequate information on what is expected to receive a rebate through the Self-Directed Custom program? (Probe on M&V requirements, pre-installation or baseline monitoring, TRC calculations, etc.)



S4. Did you have an existing relationship with the customer(s) who participated in the Self-Directed Custom program prior to your participation in the program? If yes, what types of work have you done for them?

S5. Based on your experiences, how familiar are business customers with the measurement and verification process?

S6. Do you feel that the higher rebate level for this program compared to other Xcel Energy programs is sufficient to encourage customers to conduct the necessary M&V on their own or to hire a contractor to conduct the M&V?

S7. Do you think the program could benefit for listing participating implementation and M&V vendors on the program's webpage? How so?

Market Transformation

MT1. How would you say Xcel Energy's program rebates affect your sales/installations of program-qualifying equipment? Since the program began, would you say that your sales/installations have increased: significantly, somewhat, a little, hardly at all?

MT2. Using a 0 to 100 percent scale, in what percent of total sales situations did you recommend high efficiency equipment/(IF APPLICABLE: "boiler tune-ups") before you learned about the [Program]?

MT3. And using the same 0 to 100 percent scale, in what percent of total sales situations do you recommend high efficiency equipment/(IF APPLICABLE: "boiler tune-ups") now that you have worked with the [Program]?

MT4. Approximately what percentage of your sales to Xcel Energy customers are energy efficient models that qualify for incentives from the Xcel Energy program?

MT5. Of those projects with Xcel Energy customers that qualify for incentives, approximately what percentage do not apply for the incentive (CO Heating addition to the question – "including transport gas customers)?

MT6. What direction do you see the commercial (IF HEATING: "gas") market taking in [state] in the next two years? Do you see specific challenges for Xcel Energy or opportunities to promote efficient equipment or services? Please describe.

MT7. Do you expect your sales/specifications/installations of program-qualified equipment/(IF APPLICABLE: "boiler tune-ups") to increase, decrease or stay the same in the next 12 months? Why? If not mentioned, probe specifically what the slower economy has on their current and expected involvement in the program.

MT8. [MOTORS OR CONDENSING BOILERS] Have you changed your equipment stocking or sales practices in any way due to the new federal motors standards or other factors like the general economy? Probe to see if carrying more/less US premium models, and/or particular hp sizes.

MT9. [MOTORS] Have the new federal motors requirements made it easier to sell program-qualifying motors?



Conclusion

C1. What do you think is working best in Xcel Energy's [program]?

C2. What do you think is most in need of improvement?

C3. Overall, how satisfied are you with the program? Would you say you are very satisfied, somewhat satisfied, neither satisfied or dissatisfied, somewhat dissatisfied, or very dissatisfied? How could your satisfaction be increased?

C4. Would you recommend the program to others in your field, i.e., other trade allies you know? Is there anything else that you would like to share concerning the [Program]?

Thank you for your time. This completes our interview



APPENDIX C: PARTICIPANT SURVEY INSTRUMENT AND COOPERATION RATE

Participant Survey Cooperation Rate

Table C-1. Minnesota Heating Efficiency Program Participant Survey Cooperation Rate

Sample Disposition	CO Heating Efficiency				
	Boilers	Boiler Efficiency Meas	Boiler Tune Ups	Water Heaters	Furnaces
Sample Size	81	28	172	6	18
Temporarily disconnected	0	0	0	0	0
Fax/data line	0	0	0	0	0
Non-working number/Number not in service	1	0	1	0	1
Disconnected number	1	0	0	0	0
Bad number, no listing	2	2	7	0	0
Ineligible - R no longer at company	3	1	4	1	0
Ineligible - does not recall participation	1	9	2	2	0
Adjusted Sample Size	73	16	158	3	17
Hard Refusal	2	3	12	0	2
Soft Refusal ¹	0	0	0	0	0
Incompletes (partial interviews)	0	0	2	0	1
Unavailable for duration	1	1	1	0	0
Language barrier/non-English	0	0	0	0	0
Active ²	27	6	84	1	7
Completed Surveys	43	6	59	2	7
Cooperation Rate³	58.9%	37.5%	37.3%	66.7%	41.2%

¹ Attempts were made to convert all soft refusals.

² An average of 7.2 contacts per active case were made to attempt to complete the interview.

³ Number of completed surveys divided by Adjusted Sample Size.

Participant Survey

One participant survey will be used for the following programs: Minnesota Motors and Drives Program, Colorado Business Heating Efficiency Program, and Minnesota Heating Efficiency Program specific questions are noted where applicable.

The complete list of survey modules follows:



- Introduction
- Identification of Decision-Maker
- Installation Verification
- Source of Program Information
- Net-to Gross (to be delivered and reviewed separately)
- Spillover (to be delivered and reviewed separately)
- Program Satisfaction
- Operating Hours
- Customer Profile

Sample variables

The following fills will be used throughout the survey. These fills are program and measure specific. Some of these may need to be revised once Tetra Tech has had a chance to examine the participant database.

[Program] Program name

- 1 Motors and Drives Program
- 2 Heating Efficiency Program (MN)
- 3 Commercial Heating Efficiency Program (CO)

[Date] Date of participation

[M_REBSUM] Sum of rebate dollar amounts for boiler, boiler tune-up, heating system improvements, furnace, and water heater

[OPTREB] Rebate dollar amount of Heating Optimization Study

[REBAMT] Rebate dollar amount

[Quantity] Quantity of measure installed (If greater than one, fill with quantity installed).

[Assistance] Assistance received through program

- 1 Rebate of **[REBAMT]** for **[MEAS_SUM]**
- 2 (MN Heating only) Rebate of **[OPTREB]** for a study focused on the heating system within your facility [if applicable and a rebate of **[M_REBSUM]** for **[MEAS_SUM]**]



[Action] Action program encouraged

Inside Net-to-Gross Section:

- 1 Purchase a(n) **[EE_MEAS]**

Outside Net-to-Gross Section:

- 1 Purchase a(n) **[MEAS_SUM]**
- 2 (MN Heating only) Conduct a Heating Optimization Study and purchase a(n) **[MEAS_SUM](s)**

[Measure type] Generic product description (May be expanded once sample is received)

- 1 Motor
- 2 Drive / VFD
- 3 Boiler upgrade
- 4 Boiler tune-up
- 5 (CO ONLY) Furnace
- 6 (CO ONLY) Hot water heater
- 7 Heating system improvements

[EEMeasure] Specific high efficiency equipment implemented or service performed
(May be expanded once sample is received)

- 1 NEMA Premium motor
- 2 Variable speed drive (adjustable frequency drive)
- 3 Energy efficient boiler
- 4 Efficiency boiler tune-up
- 5 (CO ONLY) Energy efficient furnace
- 6 (CO ONLY) Energy efficient hot water heater
- 7 Heating system improvements, (such as steam trap repair, optimization studies or pipe insulation)

[MEAS_SUM] Summarized description of high efficiency equipment implemented or service performed, for use outside the Net-to-Gross section.

[EE_MEAS] Prioritized description of high efficiency equipment implemented or service performed, for use inside the Net-to-Gross section.

[Address] Address where measure implemented

[Contact name] Contact listed in participant files

[Program contact and phone number] name and phone number of Xcel Energy Market

Research staff responsible for program evaluation:

Mandy McLean – Minnesota Heating Efficiency

Mike Morris – Minnesota Motors & Drives

Bruce Nielson - Colorado Business Heating Efficiency



Introduction

Hello, my name is [interviewer name], and I'm calling on behalf of Xcel Energy regarding your firm's participation in their [program]. May I speak with [contact name]?

- 1 Yes
- 2 No [attempt to convert]

I'm with Tetra Tech, an independent research firm. I am calling to learn about your experiences with the [MEAS_SUM] that you received a rebate for through Xcel Energy's [program].

I'm not selling anything; I'd just like to ask your opinion about this program. You may have already received an email or letter from Xcel Energy explaining the purpose of this study. Let me assure you that your responses will be kept confidential and your individual responses will not be revealed to anyone unless you grant permission.

Before we start, I would like to inform you that for quality control purposes, this call will be recorded and monitored and that this call will take between 15 and 20 minutes of your time.

(Who is doing this study: Xcel Energy has hired our firm to evaluate the program. As part of the evaluation, we're talking with customers that participated in the program to understand their experiences and satisfaction with the program.)

(Why are you conducting this study: Studies like this help Xcel Energy better understand customers' need for, and interest in, energy efficiency programs and services.)

(Timing: This survey should take between 15 and 20 minutes of your time. Is this a good time for us to speak with you? IF NOT, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-454-5070.)

(Sales concern: I am not selling anything; we would simply like to learn about your experience with the program. Your responses will be kept confidential and not revealed to anyone unless you grant permission. If you would like to talk with someone from Xcel Energy about this study, feel free to call [program contact and phone number]. [If needed, if you'd prefer to call someone you already have a working relationship with at Xcel Energy, please reference [program contact and phone number} when speaking with your contact to help facilitate a response])

(NOTE: For all questions, "DON'T KNOW" and "REFUSED" will be coded if offered as a response.)



Identification of Decision-Maker

C1a Program records indicate that you received a rebate for a [MEAS_SUM] through the [program] around [date]. This may have included equipment such as [detailed measure descriptions].

Is this correct? (ASK FOR EACH MEASURE REBATED)

- 1 Yes
- 2 Information is incorrect [SPECIFY WHAT IS INCORRECT]
- 3 Does not recall receiving [MEAS_SUM] [SKIP TO C2]

C1b (ASK IF CONDUCTED HEATING STUDY) Program records also indicate that you received a rebate for a Heating Optimization Study around [date]. Is this correct?

- 1 Yes [SKIP TO C5]
- 2 Information is incorrect [SPECIFY WHAT IS INCORRECT] [SKIP TO C5]
- 3 Does not recall receiving Heating Optimization Study

C2 (ASK IF DOESN'T RECALL THE MEASURE/STUDY) Is there someone else at your firm that would be more knowledgeable about your organizations' participation in Xcel Energy's [program]?

- 1 Yes (SKIP TO C4)
- 2 No
- D DON'T KNOW
- R REFUSED (TERMINATE)

C3 Through Xcel Energy's [program], your organization received [assistance]. Are you sure you don't recall this? (RECORD ONE NUMBER)

- 1 Don't remember (RECORD ANY COMMENTS, TERMINATE)
- 2 Remember (READ, "GREAT, THEN LET'S CONTINUE", SKIP TO C5)
- R REFUSED (TERMINATE)

C4 May I please speak with that person? (RECORD ONE NUMBER)

- 1 Yes (BEGIN THE SURVEY AGAIN WITH THIS NEW RESPONDENT)
- 2 No (TERMINATE)
- D DON'T KNOW (TERMINATE)
- R REFUSED (TERMINATE)



C5 Are you the person most knowledgeable about your organization's decision to [action] through Xcel Energy's [program]?

- 1 Yes
- 2 No
- D DON'T KNOW (TERMINATE)
- R REFUSED (TERMINATE)

C6 Who else at your company was involved in the decision of whether or not to [action] through the [program]?

(PROBE: IF MORE THAN ONE DECISION MAKER, ASK WHO WAS RESPONSIBLE FOR MAKING THE ULTIMATE DECISION)

- 1 No one else
- 2 (SPECIFY):

Name	Title	Phone number	Probe for role:

(IF RESPONDENT WAS INVOLVED IN THE DECISION, C5<>2, CONTINUE; ELSE TERMINATE AND DIAL ONE OF DECISION MAKERS IN C6)

Installation Verification

IO1a (IF CONDUCTED A HEATING OPTIMIZATION STUDY) How did you select the heating optimization study provider? (INDICATE ALL THAT APPLY)

- 1 List of providers
- 2 Obtain competitive bids from providers
- 3 Used previous provider
- 4 Recommendation from friend/colleague
- 5 White pages/Internet search
- 6 Internal staff conducted study
- 7 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



(REPEAT I1a – I4 SERIES FOR EACH EEMeASURE)

I1a [IF BOILER TUNE-UP, SKIP TO PA1] Is/are the **[Quantity] [EEMeasure]** still installed and operating at your business?

- 1 Yes
- 2 No (SKIP TO I2)
- D DON'T KNOW (IF NO OTHER KNOWLEDGEABLE, TERMINATE)
- R REFUSED (IF NO OTHER KNOWLEDGEABLE, TERMINATE)

I1c (MOTORS) On what type of equipment was the **[EEMeasure]** installed?

- 1 Fan
- 2 Pump
- 3 Air compressor
- 4 Something else (SPECIFY)

(ONLY ASK IF I1a = NO. ELSE SKIP TO I5)

I2 Was it/Were they ever installed?

- 1 Yes (SKIP TO I4)
- 2 No
- D DON'T KNOW
- R REFUSED

I3 Do you plan on implementing **[EEMeasure]** at **[address]**?

- 1 Yes → When do you plan to install it? _____ (month) ____ (year)
- 2 No
- D DON'T KNOW
- R REFUSED

I4 Why isn't it currently operating at **[address]**?

- 1 Equipment didn't work properly
- 2 Equipment failed/broke
- 3 Unhappy with performance [SPECIFY]
- 4 Installed at other location [SPECIFY ADDRESS]
- 5 Lack of order to product
- 6 Change in production schedule
- 7 Eliminated production line permanently
- 8 Eliminated production line temporarily
- 9 Other [SPECIFY]
- D DON'T KNOW
- R REFUSED



- I5** (MOTORS) Of the motors at your facility which control a fan or pump, what percent operate with a drive?

____% (RECORD RESPONSE)

D DON'T KNOW

R REFUSED

Source of Program Awareness/Social Media

- PA1** How did you learn about the [assistance] available through Xcel Energy's [program]? (DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 Through my account manager
- 2 Through a representative at the Business Solutions Center
- 3 Another Xcel Energy staff member (PROBE: Who?)
- 4 Information from Xcel Energy in general (i.e., bill inserts, direct mailings)
- 5 From an equipment vendor or contractor (PROBE: Who?)
- 6 From a colleague or coworker at my company
- 7 Previous experience with an Xcel Energy program
- 8 Xcel Energy event
- 9 An online resource (i.e., a website, blog, or online ad)
- 10 A mass advertising campaign
- 11 Saw an article in a newspaper, magazine, or newsletter
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

- PA1a** (FOR PA1 = 1,2,3,4,5; EACH OPTION SELECTED IN PA1) How did [RESPONSE FROM PA1] inform you about the [assistance] available through Xcel Energy's [program]? PROBE: Did you hear about the program any other way? (DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 A flyer in my Xcel Energy bill
- 2 Stand alone mailpiece/newsletter (e.g., Energy Solutions) from Xcel
- 3 Other information in the mail
- 4 Received a phone call
- 5 By making a phone call
- 6 Received an email
- 7 In a personal meeting
- 8 At a seminar or event
- 9 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



PA1d (IF PA1 = 9) Which online resource?
(DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 Xcel Energy's website
- 2 A vendor's website
- 3 An online ad
- 4 An Xcel Energy blog
- 5 A blog other than Xcel Energy's
- 6 Xcel Energy's Facebook fan page
- 7 Xcel Energy's Twitter page
- 8 Xcel Energy's Energy Solutions e-newsletter
- 9 A vendor's e-mail
- 10 An online radio ad
- 11 An online radio interview or podcast
- 12 Google search
- D DON'T KNOW
- R REFUSED

PA1e (IF PA1 = 10) What type of advertising campaign?
(DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 A radio ad
- 2 A television ad
- 3 A newspaper ad
- 4 Billboards
- 5 Print ads
- 6 Electronic or internet
- 7 Other
- D DON'T KNOW
- R REFUSED

Net-To-Gross and Spillover

(SKIP TO N1a IF NOT BOILER TUNE-UP)

N0a Prior to conducting the boiler tune-up that was rebated by Xcel Energy's Heating Efficiency program, when did your organization last pay for a tune-up of your boiler(s)?

- ___ ENTER YEAR
- N NEVER (SKIP TO N1a)
- D DON'T KNOW (SKIP TO N1a)
- R REFUSED (SKIP TO N1a)



N0b Did [contractor] conduct that tune-up in [N0a] or someone else?

- 1 Same contractor
- 2 Different contractor
- D DON'T KNOW
- R REFUSED

N0c Did you receive a rebate from Xcel Energy for the tune-up in [N0a]?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

N1a Why did you decide to [action]? (CHECK ALL THAT APPLY. DO NOT READ LIST. PROBE WITH "Were there any other reasons?")

- 1 (The program incentive)
- 2 (The program-provided technical assistance)
- 3 (A program-subsidized study)
- 4 (HEATING ONLY - the program-subsidized boiler tune-up)
- 5 (Recommendation of third party contractor/engineer)
- 6 (Recommendation of Xcel Energy staff)
- 7 (Recommendation of internal staff)
- 8 (Wanted to save energy)
- 9 (Wanted to reduce costs)
- 10 (Past experience with any Xcel Energy program) (SPECIFY)
- 11 (Funding from an outside source - SPECIFY SOURCE & AMOUNT)
- 12 (Part of an on-going service agreement)
- 13 (Something else - SPECIFY)
- D DON'T KNOW
- R REFUSED



N1b (IF BOILER TUNE-UP AND N1a = 12) Was this on-going service agreement in place before you first participated in Xcel Energy's Heating Efficiency program?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

N1c (IF N1b = Yes) Without the rebate from Xcel Energy, would you have ended this service agreement at some point?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

(PROGRAMMING NOTE: IF N1B = NO OR N1C = YES, REPLACE [ACTION] WITH "enter into a service agreement to conduct regular tune-ups of your boilers".)

N1d (IF BOILER) Prior to replacing the boiler through the [program], did you receive a rebate from the program for having your old boiler tuned up?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

N2 Did you hear about Xcel Energy's [program] BEFORE or AFTER you decided to [action] that was eventually purchased/implemented? (PROGRAM INFLUENCE SCORE)

- 1 Before
- 2 After
- D DON'T KNOW
- R REFUSED

N2a Did you receive a feasibility study, energy audit, or assessment from Xcel Energy?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED



N3 The **[program]** offered **[REBAMT]** to cover a portion of the additional cost to **[action]** (IF NOT TUNE-UP or VFD: over standard efficiency **[measure type]**).

(IF MINNESOTA HEATING) The **[program]** also offers rebates to cover a portion of the cost of a boiler tune-up, which checks the efficiency of your boilers, or a Heating Optimization Study, that focuses on your heating systems.

(IF COLORADO HEATING) The **[program]** also offers rebates to cover a portion of the cost of a boiler tune-up, which checks the efficiency of your boilers.

With that in mind, I'm going to ask you to rate the importance of factors that might have influenced your decision to **[action]**. Using a 0 to 10 scale, where 0 means not at all important and 10 means very important, please rate the importance of each of the following in your decision to **[action]** (IF NOT TUNE-UP: instead of a standard efficiency **[measure type]**) at this time.

(**ROTATE LIST**; AT END OF LIST ASK: Is there anything else that I may have missed?
RECORD RESPONSE AS OTHER)

- a. [MOTORS ONLY] The age or condition of the old equipment
- b. Availability of the program rebate (TIMING AND SELECTION SCORE³¹)
- c. (IF N2a=YES) Information provided through an Xcel Energy feasibility study or audit (TIMING AND SELECTION SCORE)
- d. Recommendation from a vendor/supplier (IF > 5, COLLECT NAME AND CONTACT INFORMATION OF VENDOR AND INTERVIEW VENDOR AT END OF SURVEY) (TIMING AND SELECTION SCORE)
- e. Previous experience with any Xcel Energy program
- f. Information from the program training course or seminar (TIMING AND SELECTION SCORE)
- g. Information from the program or utility marketing materials (TIMING AND SELECTION SCORE)
- h. Standard practice or corporate policy in your business (NOT BOILER TUNE UP: regarding equipment installation.)(TUNE UP: to always perform routine maintenance on equipment.)
- i. Payback on investment before any Xcel Energy rebates
- j. General concerns about the environment/global warming/energy independence
- k. Financial assistance or rebate from another organization (not Xcel Energy)
- l. [IF N1D = Yes] The services and consultation you received from the boiler tune up (TIMING AND SELECTION SCORE)
- m. Information or recommendations provided to you by any Xcel Energy staff (TIMING AND SELECTION SCORE)
- n. Other (SPECIFY)

³¹ For items that are used in the NTGR algorithm, we have indicated the score where the response is used.



N4 Now I'd like to ask you about the importance of the **[program]** to your decision.

Again using the 0 to 10 rating scale, where 0 means "Not at all important" and 10 means "Very important", I'd like you to rate the overall importance of the program and the overall importance of **[highest rated of N3a, N3h, N3i, N3j, or N3k in the case of a tie, show "factors outside of the program"]** in your decision to **[action]** (IF NOT A TUNE-UP: over a standard efficiency **[measure type]**) so that the two scores add up to 10.

(IF NEEDED: I'd like you to give me a 0 to 10 score for the program's influence and a 0 to 10 score for the influence of the most important other factor so that the two scores total 10.) (PROGRAM INFLUENCE SCORE)

- a. ___ rating of the importance of the **[program]**
- b. ___ rating of the importance of most important other factor

N5a Now I would like you to think about the action you would have taken if the **[program]** had not been available.

Using a 0 to 10 scale, where 0 is not at all likely and 10 is extremely likely, how likely is it that you would have **[action]** (IF NOT A TUNE-UP: over a standard efficiency **[measure type]**) if the **[program]** had not been available? (NO-PROGRAM SCORE)

- ___ (0-10)
- D DON'T KNOW
- R REFUSED

N5b (ASK IF N1B = NO OR N1C = YES) You just stated that there was a **[N5a]** in 10 likelihood that you would have entered into a service agreement if the **[program]** had not been available. If the program was not available, would you have conducted a tune-up of the boiler that was serviced in 2010 at the same time?

- 1 Yes (SKIP TO P1a)
- 2 No (SKIP TO N6b)
- D DON'T KNOW (SKIP TO N6b)
- R REFUSED (SKIP TO N6b)



N6a (ASK IF N5a>0 AND NOT BOILER TUNE-UP) You said that there was a [N5a response] in 10 likelihood that you would have [action] (if action not VFD: over a standard efficiency [measure type]) if the [program] had not been available. [When do you think you would have [action]]?

(INTERVIEWER: PLEASE ANSWER IN MONTHS)

- ___ Number of months
- ___ Never
- D DON'T KNOW
- R REFUSED

N6b (ASK IF N5b <> Yes AND TUNE-UP AND N5A<>0) When do you think you would have conducted a tune-up on that boiler?

(INTERVIEWER: PLEASE ANSWER IN MONTHS)

- ___ Number of months
- ___ Never
- D DON'T KNOW
- R REFUSED

PARTIAL FREERIDERSHIP BATTERY³²

(IF TUNE-UP ONLY, SKIP TO S1)

P1a Now I would like you to think one last time about what action you would have taken if the program had not been available. Supposing that you had not participated in the [program] and received information and expertise about [action] from Xcel Energy, which of the following alternatives would you have been MOST likely to do? (READ LIST, RANDOMIZE OPTIONS 1-6)

- 1 Install or implement fewer [action]
- 2 Install standard efficiency equipment or whatever required by code
- 3 Install equipment more efficient than code, but less efficient than we installed through the program
- 4 Repair/refurbish the existing equipment
- 5 Done nothing (keep the existing equipment as is)
- 6 Install the exact same equipment
- 7 Something else (specify)
- D DON'T KNOW
- R REFUSED

³² This battery is used to adjust gross savings prior to applying the NTGR.



P4 (IF P1a=1) How many measures would you have installed or implemented? (RECORD NUMBER OF UNITS OR PERCENTAGE OF UNITS ACTUALLY INSTALLED)

___ Number of units OR ___ Percentage of units

D DON'T KNOW

R REFUSED

P6 (IF P1a=3) Can you tell me what model or efficiency level you were considering as an alternative? (INTERVIEWER: IT IS OK TO TAKE AN ANSWER SUCH AS "10% more efficient than code", "10% less efficient than the program equipment", "standard efficiency motor", or "NEMA Premium efficiency motor" or "I would not have installed a VFD".)

(RECORD VERBATIM)

P7a Did this equipment replace existing equipment?

1 Yes

2 No

D DON'T KNOW

R REFUSED

P7B (IF P7A = YES) How long do you think the existing equipment would have lasted before requiring replacement?

___ Years

D DON'T KNOW

R REFUSED

Like Spillover

S1 Since you participated in the [program], have you [action] without the assistance of an Xcel Energy program at this facility or at other locations served by Xcel Energy?

1 Yes, only at this facility

2 Yes, only at another facility

3 Yes, at both this and another facility

4 No (SKIP TO SA1B)

D DON'T KNOW (SKIP TO SA1B)

R REFUSED (SKIP TO SA1B)



- S3** (IF NOT TUNE-UP) How do you know that this equipment is high efficiency or otherwise saves energy? (PROBE: IS IT LABELED AS “NEMA PREMIUM”? IS IT ENERGY STAR® RATED; BOILERPLATE EFFICIENCY RATING, DID THE VENDOR TELL YOU?)

(RECORD VERBATIM)

- S4** I'm going to read a statement about the energy efficiency measure that you purchased/implemented on your own. On a scale from 0-10, with 0 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statement.

My past experience with **Xcel Energy's programs** influenced my decision to install or implement this **[action]** on my own.

_____ (0-10)

D DON'T KNOW

R REFUSED

- S5** Why did you purchase/implement this energy efficiency measure without going through an Xcel Energy program? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 Application process too burdensome/Too much paperwork
- 2 Takes too long to receive the rebate
- 3 No time to participate, needed equipment immediately
- 4 The program had ended
- 5 The equipment would not qualify (PROBE: WHY NOT?)
- 6 The amount of the rebate wasn't important enough (PROBE: How much rebate would you need in order to decide to [ACTION] through the [PROGRAM]?)
- 7 Did not know program was available for this equipment
- 8 There was no program available
- 9 Outside of Xcel Energy territory
- 10 Other (SPECIFY)
- 11 DON'T KNOW
- 12 REFUSED



One nonparticipant survey will be used for the following programs: Motor and Drive Efficiency Program, Colorado Business Heating Efficiency Program and the Minnesota Heating Efficiency Program. Program specific questions are noted where applicable. Separate sample lists will be provided by Xcel Energy program staff.

The complete list of survey modules follows:

- Introduction
- Identification of Decision-Maker
- Source of Program Information/Social Media
- Important Factors in Decisions to Purchase New Equipment
- Satisfaction
- Operating Hours
- Customer Characteristics

Sample variables

The following fills will be used throughout the survey. These fills are program and measure specific. Some of these may need to be revised once we have had a chance to examine the participant database.

[Program] Program name

- | | |
|---|--|
| 4 | Motor & Drive Efficiency Program |
| 5 | Colorado Business Heating Efficiency Program |
| 6 | Minnesota Heating Efficiency Program |

[Program description] Program description

(MOTORS) provides rebates for the installation of energy efficient motors and variable speed drives (sometimes referred to as adjustable frequency drives, ASDs or VFDs) for controlling the motors that operate fans and pumps.

(CO Heating) provides rebates for the installation of high-efficiency heating equipment including boilers and furnaces, as well as auxiliary equipment, insulation and boiler tune-ups, which improve the efficiency of existing boiler equipment.

(MN Heating) provides rebates for the installation of high-efficiency boilers and boiler system components, as well as heating optimization studies, which identify opportunities for efficiency improvement at your facility, and boiler tune-ups, which improve the efficiency of existing boiler equipment.

[Action] Action taken on own

(MOTORS) Installed energy efficient motors on fans, pumps, air compressors, or other equipment and variable speed drives on fans or pumps.

(CO Heating): Installed heating equipment such as a boiler or furnace, or conducted a boiler tune-up to improve boiler efficiency.

(MN Heating) Installed heating equipment such as a boiler, installed auxiliary equipment to improve efficiency, such as a outdoor reset or modulating burner, installed pipe



insulation on existing pipe, repaired failed steam traps, conducted a boiler tune-up to improve boiler efficiency, or had a heating optimization study conducted in your facility.

[Address] address where measure implemented

[Contact name] contact listed in participant files

[Program contact and phone number] name and phone number of Xcel Energy staff responsible for program evaluation

Introduction

Hello, my name is **[interviewer name]**, and I'm calling on behalf of Xcel Energy. May I speak with the person most familiar with purchasing and maintaining the energy-using equipment for **[business name]** at **[address]**?

- 1 Yes
- 2 No [attempt to convert]

I'm with Tetra Tech, an independent research firm. We have been hired by Xcel Energy to talk with some of their customers about the types of energy using equipment they have at their company and about the programs that Xcel Energy is offering to their business customers.

I'm not selling anything; I'd just like to ask your opinions. Let me assure you that your responses will be kept confidential and your individual responses will not be revealed to anyone unless you grant permission.

Before we start, I would like to inform you that for quality control purposes, this call will be recorded and monitored.

(Who is doing this study: Xcel Energy has hired our firm to evaluate one of the energy efficiency business programs. As part of the evaluation, we're talking with customers that did and did not participate in the program to understand their awareness and experiences with the program.)

(Why are you conducting this study: Studies like this help Xcel Energy better understand customers' need for and interest in energy efficiency programs and services.)

(Timing: This survey should take about 10 minutes of your time. Is this a good time for us to speak with you? IF NOT, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-454-5070.)

(Sales concern: I am not selling anything; we would simply like to learn about your experience with high efficiency equipment and energy efficiency programs. Your responses will be kept confidential. If you would like to talk with someone from Xcel Energy about this study, feel free to call **[program contact and phone number]**.)



(NOTE: For all questions, "DON'T KNOW" and "REFUSED" will be coded if offered as a response.)

Identification of Decision-Maker

C1 Are you the person who is most knowledgeable about the decision making process for maintaining or purchasing new energy-using equipment at this location?

- 1 Yes (SKIP TO C3)
- 2 No (ASK C2)

C2 Who else at your firm would be more knowledgeable about your organizations' decision making processes related to maintaining existing equipment or purchasing new energy using equipment at this location? May I please speak with that person? (RECORD ONE NUMBER)

- 1 Yes (SPECIFY NAME AND BEGIN THE SURVEY AGAIN WITH THIS NEW RESPONDENT)
- 2 No (TERMINATE)
- D DON'T KNOW (TERMINATE)
- R REFUSED (TERMINATE)

C3 Who else at your company is typically involved in the decision of whether or not to purchase new equipment at this location?

- 1 No one else
- 2 (SPECIFY)

Screener

SCR1 Does your organization have (IF MOTORS: any motors; IF CO HEATING: a natural gas boiler or furnace; IF MN HEATING: a boiler) at this location/(IF MULTIPLE) any of your locations?

- 1 Yes
- 2 No (THANK & TERMINATE)
- D DON'T KNOW (THANK & TERMINATE)
- R REFUSED (THANK & TERMINATE)



SCR1A (IF CO OR MN HEATING) Is your/Are any of your boiler(s) used for space heating or domestic hot water use?

- 1 Yes
- 2 No (THANK & TERMINATE)
- D DON'T KNOW (THANK & TERMINATE)
- R REFUSED (THANK & TERMINATE)

SCR2 Do you have an Xcel Energy account representative assigned to your company?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

SCR3 Is your company currently participating in Xcel Energy's [PROGRAM], or have you participated in the past?

- 1 Yes (THANK AND TERMINATE)
- 2 No
- D Don't Know
- R Refused

Source of Program Awareness/Social Media

PA0a Xcel Energy offers rebate and technical assistance programs to assist customers in making energy saving improvements in their facilities. Before today, were you aware Xcel Energy offers these types of programs? (RECORD ONE NUMBER)

- 1 Yes
- 2 No (SKIP TO PA4)
- D DON'T KNOW (SKIP TO PA4)
- R REFUSED (SKIP TO PA4)

PA0b One specific program Xcel Energy offers is called the [program], which [program description]. Before today, had you heard of this program? (RECORD ONE NUMBER)

- 1 Yes
- 2 No (SKIP TO PA4)
- D DON'T KNOW (SKIP TO PA4)
- R REFUSED (SKIP TO PA4)



PA1 How did you learn about Xcel Energy's **[program]**? PROBE: Did you hear about the program from any other sources? (DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 Through my account manager
- 2 Through a representative at the Business Solutions Center
- 3 Another Xcel Energy staff member (PROBE: Who?)
- 4 Information from Xcel Energy in general (i.e., bill inserts, direct mailings)
- 5 From an equipment vendor or contractor (PROBE: Who?)
- 6 From a colleague or coworker at my company
- 7 Previous experience with an Xcel Energy program
- 8 Xcel Energy event
- 9 An online resource (i.e., a website, blog or online ad)
- 10 A mass advertising campaign
- 11 Saw an article in a newspaper, magazine, or newsletter
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA1a (FOR PA1 = 1,2,3,4,5; EACH OPTION SELECTED IN PA1) How did **[RESPONSE FROM PA1]** inform you about Xcel Energy's **[program]**? PROBE: Did you hear about the program any other way? (DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 A flyer in my Xcel Energy bill (PROBE: Was this in your home, or your business energy bill?)
- 2 A stand alone direct mail piece or newsletter (e.g., Energy Solutions) from Xcel Energy
- 3 Other information in the mail
- 4 **[RESPONSE FROM PA1]** called me
- 5 I/We called **[RESPONSE FROM PA1]**
- 6 In person meeting with **[RESPONSE FROM PA1]**
- 7 Received an email
- 8 In a personal meeting
- 9 At a seminar or event
- 10 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



PA1d (IF PA1 = 9) Which online resource?

- 1 Xcel Energy's website
- 2 A vendor's website
- 3 An online ad
- 4 An Xcel Energy blog
- 5 A blog other than Xcel Energy's
- 6 Xcel Energy's Facebook fan page
- 7 Xcel Energy's Twitter page
- 8 Xcel Energy's Energy Solutions e-newsletter
- 9 A vendor's e-mail
- 10 An online radio ad
- 11 An online radio interview or podcast
- 12 Google search
- 13 Other [SPECIFY]
- D DON'T KNOW
- R REFUSED

PA1e (IF PA1 = 10) What type of advertising campaign?

- 1 A radio ad
- 2 A television ad
- 3 A newspaper ad
- 4 Billboards
- 5 Print ads
- 6 Electronic or internet
- 7 Other [SPECIFY]
- D DON'T KNOW
- R REFUSED

PA2 You said that you received information from [insert sources of information from PA1]. Did this provide you with enough information to know how to participate in the program if you wanted to?

- 1 Yes
- 2 No → What additional information would you have liked to receive? (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA4 The [PROGRAM] offers rebates for [ACTION]. Have you implemented, or considered implementing any of these measures in the past two years?

- 1 Yes, implemented
- 2 Yes, considered
- 3 No (SKIP TO PA8)
- D DON'T KNOW (SKIP TO PA8)
- R REFUSED (SKIP TO PA8)



PA5 What did you [IF PA4 = 1: do, IF PA4 = 2, consider doing]? (INDICATE ALL THAT APPLY)

- 1 NEMA Premium motor (SPECIFY QUANTITY AND HP CLASS BY 1 to 40 HP, 41 to 100 HP, 101 to 200, 201 to 300, 301 to 500 HP, or 501 plus HP)
- 2 Variable speed drive (SPECIFY QUANTITY AND HP CLASS BY 1 to 40 HP, 41 to 100 HP, 101 to 200) (SPECIFY QUANTITY)
- 3 Installed a boiler
- 4 Took other action to improve efficiency of existing boiler system (such as installed controls, insulated pipes, repaired failed steam traps, etc.)
- 4 (IF CO HEATING) Installed a furnace
- 5 Conducted a boiler tune-up
- 6 (IF MN HEATING) Conducted a heating optimization study
- 7 Other (SPECIFY TYPE AND QUANTITY)
- D DON'T KNOW
- R REFUSED

PA5b (IF PA4 = 1 and PA5 = 5) How much did you pay to have this boiler tune-up?

___ (RECORD RESPONSE)

- N Part of ongoing maintenance schedule or service agreement
- D DON'T KNOW
- R REFUSED

PA5b (IF PA5b <> "Part of ongoing service agreement", PROBE) Is this boiler tune-up part of an ongoing maintenance schedule or service agreement?

- 1 Yes
- 2 No
- D Don't know
- R Refused

PA5d (IF PA4 = 1 and PA5 = 5) Can you describe the boiler tune-up you had conducted outside of Xcel Energy's Heating Efficiency Program?

(PROBE: What specific actions did the contractor or vendor take to tune up your boiler?)
(RECORD RESPONSE)

PA6 (ASK IF PA0b = YES) Did you consider participating in the [Program] when you [IF PA4 = 1: did this?][IF PA4 = 2, considered doing this]?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED



PA6a (ASK IF PA6=1) Did you apply to participate in the **[Program]**?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

PA7 (IF PA6a<>1) Why didn't you do this through this program? (IF PA6a=1) Why didn't you complete **[PA5]** through the program? (DO NOT READ) (RECORD ALL THAT APPLY)

- 1 Application process too burdensome/Too much paperwork
- 2 Takes too long to get approval
- 3 No time to participate, needed equipment immediately
- 4 The program had ended
- 5 The equipment would not qualify (PROBE: WHY NOT?)
- 6 Rebate amount wasn't important enough
- 7 Did not know program was available for this equipment (PROBE: Did your rep walk you through the process and offer assistance on the paperwork?)
- 8 There was no program available (PROBE: Which program?)
- 9 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA7a (ASK IF PA6a=1) What additional support would you need to **[PA5]** through the program?

(RECORD VERBATIM)

PA8 Using a scale of 0 to 10, with 0 being not at all interested and 10 being very interested, how interested will you be in participating in the **[Program]** in the future?

- ____ (0-10)
- D DON'T KNOW
 - R REFUSED



PA9 (ASK IF PA8 < 7) Why wouldn't you consider participating in this program in the future? (DO NOT READ) (RECORD ALL THAT APPLY)

- 1 Application process seems too burdensome/Too much paperwork
- 2 Would take too long to get internal approval
- 3 No time to participate, would need equipment immediately
- 4 Rebate amount isn't important enough
- 5 Program is still unclear/difficult to understand
- 6 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA9A (ASK IF PA9 = 4) How much rebate would you need in order to decide to (IF ASKED PA5: [PA5], else show[ACTION]) through the [PROGRAM]?

- ___ (RECORD RESPONSE)
- D DON'T KNOW
- R REFUSED

PA9B (ASK IF PA9 = 5) What additional information or clarification would you need in order to participate in the [PROGRAM]?

(RECORD VERBATIM)

Important Factors in Decisions to Purchase New Equipment

Next I'd like to ask some questions about decision making at your business.

IOa If you were considering installing processes to save energy, or money by installing new energy efficient equipment at your company, where would you look for information regarding the new equipment or processes? (DO NOT READ, INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 Xcel Energy website
- 5 Xcel Energy account manager
- 6 General Internet search (e.g., Google search)
- 7 Contractor/vendor
- 8 Engineer
- 9 Manufacturer
- 10 Xcel Energy-sponsored event
- 11 Advertising campaign
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



IOb And who would you contact to implement the new equipment or process? (DO NOT READ, INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 Contractor/vendor
- 5 Engineer
- 6 Xcel Energy
- 7 Manufacturer
- 8 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

I1 On a scale of 0-10, with 0 being not at all important and 10 being very important, how important would each of the following be to your business when considering new equipment or processes? (ROTATE LIST)

- ___ age or condition of existing equipment
- ___ availability of a program rebate
- ___ amount of program rebate
- ___ recommendation of utility
- ___ recommendation of contractor or supplier
- ___ compatibility with existing equipment
- ___ initial purchase cost
- ___ operating cost
- ___ length of payback period (IF GT 5, What payback period do you strive for?)
- ___ efficiency level of new equipment
- ___ life of new equipment
- ___ if new equipment is readily available
- ___ environmental concerns
- ___ performance concerns
- ___ life-cycle costs
- ___ return on investment or ROI
- ___ capital investment or budget availability
- ___ money and energy savings
- ___ (ALWAYS READ LAST) some other consideration not already mentioned (SPECIFY)

I2 Does your business have a policy that mandates the installation of energy efficient equipment when purchasing new equipment?

- 1 Yes
- 2 No (SKIP TO I4)
- D DON'T KNOW (SKIP TO I4)
- R REFUSED (SKIP TO I4)



I3 What is the policy? (PROBE AND SPECIFY)

(RECORD VERBATIM)

I3A Have you ever had a rebate application denied by Xcel Energy because the equipment you purchased did not actually qualify for the program?

- 1 Yes (PROBE: What equipment were you submitting the rebate for?)
- 2 No (SPECIFY TIMEFRAME AND EQUIPMENT FOR WHICH THE REBATE APPLICATION WAS DENIED)
- D Don't know
- R Refused

I3B (IF I3A= 1) Who told you that you would qualify for the program? (READ LIST)

- 1 A vendor or contractor
- 2 Xcel Energy account manager
- 3 Xcel Energy Business Solutions Center representative
- 4 Other Xcel Energy program staff
- 5 Another person in your company
- 6 No one else, it was your understanding
- 7 Or were you not sure of the eligibility and decided to apply anyway?
- D Don't Know
- R Refused

I3C (IF MOTOR NP) Have you ever tried to purchase a new NEMA Premium motor, and been unable to find it through a vendor?

- 1 Yes
- 2 No (SKIP TO I3F)
- D DON'T KNOW (SKIP TO I3F)
- R REFUSED (SKIP TO I3F)

I3D (IF MOTOR NP) Do you recall the size/horsepower of the NEMA Premium motor you wanted to purchase?

- ___ [RECORD RESPONSE]
- D DON'T KNOW
- R REFUSED

I3E (IF MOTOR NP) What did you do after you couldn't find the new NEMA Premium motor you wanted? For instance, did you buy a new motor less efficient than a NEMA Premium motor instead, wait for an NEMA Premium motor to be stocked, or defer your purchase for the time being?



- 1 Bought a new standard efficiency motor instead
- 2 Waited for an efficient motor to be stocked
- 3 Deferred purchase for the time being
- 4 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

I3F (IF MOTOR NP) Have you ever purchased a *used* standard efficiency motor?

- 1 Yes
- 2 No (SKIP TO I4)
- D Don't know (SKIP TO I4)

I3G (IF MOTOR NP) Why did you purchase a used standard efficiency motor? [DO NOT READ]

- 1 New efficient motor not stocked by vendors
- 2 New standard motor not stocked by vendors
- 3 Wanted to save money
- 4 Other (SPECIFY)
- D Don't Know

I3H (IF MOTOR NP) What was the size/horsepower of the used motor?

- ___ [RECORD RESPONSE
- D DON'T KNOW
- R REFUSED

I4 What are some of the major obstacles or barriers that your business faces when considering purchasing new energy using equipment at your facility? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 Need to incorporate purchases or plans into longer term budget
- 2 Lack of capital budget
- 3 Time constraints
- 4 Lack of resources to implement
- 5 Approval by decision-makers
- 6 Uncertainty regarding return on investment
- 7 Contractors aren't familiar with measures
- 8 Lack of awareness of or knowledge about energy and money saving opportunities
- 9 Lack of awareness/knowledge about equipment characteristics or performance
- 10 Lack of knowledge about how to obtain assistance from Xcel Energy
- 11 Low prioritization of energy efficiency or conservation in firm
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



- I5** (IF CO OR MN HEATING SKIP TO I10) Regarding your drives or VFDs for fans and pumps, are all, some, or none of your motors driven by VSDs, ASDs, or variable frequency drives?
- 1 All
 - 2 Some (PROBE: Approximately what percentage of your motors are driven by variable frequency drives?)
 - 3 None
 - D DON'T KNOW
 - R REFUSED
- I6** Have you ever repaired or rewound a motor instead of replacing it with a new motor?
- 1 Yes
 - 2 No
 - D DON'T KNOW
 - R REFUSED
- I7** (IF I6 = YES) How do you decide whether to rewind or repair a motor versus buying a new motor? (PROBE ON WHAT IS THE THRESHOLD)
- (RECORD VERBATIM)
- I8** Do you plan to install any new drives/VFDs or motors in the next year?
- 1 Yes
 - 2 No (SKIP TO SA8)
 - D DON'T KNOW (SKIP TO SA8)
 - R REFUSED (SKIP TO SA8)
- I9** Which equipment types and sizes are you are likely to install, regardless if you use Xcel Energy's program or not?
- 1 1 to 40 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 2 41 to 100 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 3 101 to 500 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 4 500+ horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 5 1 to 50 horsepower VFD
 - 6 51 to 200 horsepower VFD
 - 7 200+ horsepower VFD
 - D DON'T KNOW
 - R REFUSED



I10 (IF MOTORS, SKIP TO SA8) Do you (IF PA4 = CONSIDERED, SHOW: “currently”) have any plans to replace or upgrade any part of your heating system at this or any other facility?

- 1 Yes
- 2 No (SKIP TO SA8)
- D Don't know (SKIP TO SA8)

I11 What are your plans? (SELECT ALL THAT APPLY)

- 1 Conduct Heating Optimization Study
- 2 Conduct boiler tune-up(s)
- 3 Install new boiler(s)
- 4 Install new furnace(s)
- 5 Install heating system enhancement (e.g., pipe insulation, O₂ trim controls)
- 6 Repair existing systems
- 7 Other (SPECIFY)

I12 What services could Xcel Energy provide to help you with this project?

- 1 Information on or assistance with program rebates
- 2 Information on specific measures or equipment
- 3 Technical assistance, audits, or assessments
- 4 Provide list of qualified contractors
- 5 Other (SPECIFY)
- D Don't Know

I13 Would you like someone from Xcel Energy to contact you regarding these plans?

- 1 Yes
- 2 No
- D Don't know



Satisfaction

SA8 I would like you to think in terms of your satisfaction with Xcel Energy overall. On a 0-to-10 scale where 0 means VERY DISSATISFIED and 10 means VERY SATISFIED, how would you rate your satisfaction with Xcel Energy? (IF NECESSARY, SAY:) You can use any number from 0 to 10. (REPEAT SCALE IF NECESSARY)

_____ (0-10) (PROBE IF RATING LT 5: Why do you say that? What could make your experience with Xcel Energy better?)

D DON'T KNOW

R REFUSED

Customer Characteristics

F1 Last, I'd like to ask you a few more questions regarding your facility.

What business activity accounts for most of the floor space covered by your Xcel Energy bill at [ADDRESS]? (RECORD VERBATIM AND THEN CODE BELOW)

- 1 Office/professional
- 2 Data center/computer server farm
- 3 Warehouse or distribution center
- 4 Food sales or service
- 5 Retail
- 6 Education
- 7 Religious worship
- 8 Public assembly
- 9 Health care
- 10 Service
- 11 Lodging
- 12 Public order and safety
- 13 Industrial/Manufacturing (SPECIFY)
- 14 Agricultural (SPECIFY)
- 15 Vacant (SPECIFY)
- 16 Leisure/Recreation (SPECIFY)
- 17 Government or City building
- 18 Other (SPECIFY IN DETAIL)
- D DON'T KNOW
- R REFUSED



F2_A Does the space covered by your Xcel Energy bill at [PREMISE ADDRESS]... (READ LIST)

- 1 occupy an entire free-standing building [SKIP TO F3]
- 2 occupy part of a free-standing building [SKIP TO F3]
- 3 or something else

F2_B Then which of the following best describes the space covered by your Xcel Energy bill at [PREMISE ADDRESS]? Is it . . . ? (READ LIST)

- 1 Located in an enclosed shopping mall
- 2 Located in an unenclosed shopping mall
- 3 Occupies part of a single building with apartments attached
- 4 Occupies an entire single building with apartments attached
- 5 Located in a complex of buildings
- 6 Space at this address is the common area of an apartment/rental property
- 7 Occupies part of a free-standing building; both manufacturing & office space
- 8 Other [SPECIFY]
- 9 DON'T KNOW
- 10 REFUSED

F3 Do you own or rent/lease the space you occupy at this location?

- 1 Own
- 2 Rent/lease
- 3 Own some and rent/lease some
- 4 Manage property
- 5 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

F4 What is the approximate square footage of the space your business occupies at this location?

- ___ Square feet
- D DON'T KNOW
- R REFUSED



F5 What additional actions other than the ones we have already discussed has your business taken at this location within the past three to five years in order to reduce your energy use? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 None
- 2 Installed high efficiency lighting equipment
- 3 Added lighting controls, occupancy sensors, and or time clocks
- 4 Installed high efficiency cooling equipment
- 5 Installed high efficiency heating equipment
- 6 Installed high efficiency ventilation equipment
- 7 Added controls to the heating, ventilation or air conditioning systems to reduce use
- 8 Made changes to the heating, ventilation or air conditioning system maintenance schedule
- 9 Made changes to the building envelope such as insulation, window film, etc.
- 10 Participated in other Xcel energy efficiency programs (SPECIFY)
- 11 Facility-wide energy awareness training
- 13 Recommissioning or recommissioning
- 14 Process improvements
- 15 Installed high efficiency motors or drives
- 16 Installed high efficiency refrigeration equipment
- 17 Tuned up existing equipment
- 18 Participated in other Xcel Energy on-site assessment or completed a study
- 19 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



F5a What additional actions has your business considered implementing or planned to implement at this location within the next three to five years in order to reduce your energy use? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 None
- 2 Install high efficiency lighting equipment
- 3 Add lighting controls, occupancy sensors, and or time clocks
- 4 Install high efficiency cooling equipment
- 5 Install high efficiency heating equipment
- 6 Install high efficiency ventilation equipment
- 7 Add controls to the heating, ventilation or air conditioning systems to reduce use
- 8 Make changes to the heating, ventilation or air conditioning system maintenance schedule
- 9 Make changes to the building envelope such as insulation, window film, etc.
- 10 Participate in other Xcel energy efficiency programs (SPECIFY)
- 11 Facility-wide energy awareness training
- 13 Recommissioning or recommissioning
- 14 Process improvements
- 15 Install high efficiency motors or drives
- 16 Install high efficiency refrigeration equipment
- 17 Tune up existing equipment
- 18 Participate in other Xcel Energy on-site assessment or completed a study
- 19 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



F7 (IF HAVEN'T DONE ANYTHING OR HAVEN'T PLANNED TO DO ANYTHING) What are the reasons you (IF F5 = 1: haven't made) (or) (IF F5a = 1: aren't planning to make) any additional energy saving improvements at this facility? (DO NOT READ; CIRCLE ALL THAT APPLY)

- 1 No need
- 2 Lack of available equipment
- 3 High initial cost
- 4 Don't know what to do
- 5 Don't have the staff and/or time to identify or make these improvements
- 6 Customer comfort
- 7 Need for certain look/feel (aesthetics)
- 8 Disruption to business operations
- 9 Lease the space
- 10 Poor economy
- 11 Budget constraints
- 12 Capital budget issues
- 13 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

F8 Can we have your permission to release your company's answers to Xcel Energy on an individual basis and possibly have a representative from Xcel Energy follow up with you to discuss issues that are of particular concern to you?

- 1 Yes
- 2 No
- D DON'T KNOW

F9 As part of our evaluation, we may need to follow-up on some of this information. Would it be all right if someone called you if needed?

- 1 Yes (Collect Contact Information)
- 2 No
- D DON'T KNOW

F10 Those are all of the questions that we have. For confirmation, can you please tell me your title?

(RECORD VERBATIM)



COM I'd like to thank you for your help with this survey! Do you have any comments you'd like to share?

(RECORD VERBATIM)

Next I'd like to ask you some questions about your experiences when participating in the [program].

SA1b (IF RECEIVED HEATING OPTIMIZATION STUDY) Who completed the Heating Optimization Study rebate application? (INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 The study vendor
- 5 Respondent
- 6 Someone else at your company
- 7 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

SA1c Who completed the rebate application form? (INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 The equipment vendor
- 5 Respondent
- 6 Someone else at your company
- 7 Other (SPECIFY)
- N Not yet complete
- D DON'T KNOW
- R REFUSED



SA1d (IF SA1c = 5) Did you require any assistance from Xcel Energy staff or an equipment vendor?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

SA1e (IF SA1d = 1) With what did you require assistance? (DO NOT READ)

- 1 Motor type
- 2 Model number
- 3 Drive HP
- 4 Motor HP
- 5 Efficiency level
- 6 General specifications (product specifications sheet)
- 7 Business type classification
- 8 Boiler information
- 9 Tune-up information
- 10 Other [SPECIFY]



SA2a (IF RECEIVED HEATING OPTIMIZATION STUDY) Who told you how much rebate you would receive for conducting a Heating Optimization Study? (INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 Study vendor
- 5 No one – I figured it out myself
- 6 Other (specify)
- D DON'T KNOW
- R REFUSED

SA2b Who told you how much rebate you would receive for installing [MEAS_SUM] through the program? (INDICATE ALL THAT APPLY)

- 1 It was listed on the rebate application
- 2 Xcel Energy account manager
- 3 Xcel Energy Business Solutions Center representative
- 4 Other Xcel Energy program staff
- 5 Contractor or vendor
- 6 No one – I figured it out myself
- 7 Other (specify)
- D DON'T KNOW
- R REFUSED

SA3A (IF RECEIVED HEATING OPTIMIZATION STUDY) Was the rebate amount you received for the Heating Optimization Study less, more, or the same as was initially determined/estimated?

- 1 Less → Why was it less? (RECORD VERBATIM)
- 2 More
- 3 The Same
- D DON'T KNOW
- R REFUSED

SA3B Was the rebate amount you received less, more, or the same as was initially determined/estimated for project implementation?

- 1 Less → Why was it less? (RECORD VERBATIM)
- 2 More
- 3 The Same
- D DON'T KNOW
- R REFUSED



SA3B2 Was the rebate included as part of your capital spending proposal to get the project approved?

- 1 Yes
- 2 No
- D Don't know
- R Refused

SA3C Have you ever had a rebate application denied by Xcel Energy because the equipment you purchased did not actually qualify for the program?

- 1 Yes
- 2 No
- D Don't know
- R Refused

SA3D (IF SA3c = 1) Who told you that you would qualify for the program? (READ LIST)

- 1 A vendor or contractor
- 2 Xcel Energy account manager
- 3 Xcel Energy Business Solutions Center representative
- 4 Other Xcel Energy program staff
- 5 Another person in your company
- 6 No one else, it was your understanding
- 7 Or were you not sure of the eligibility and decided to apply anyway?
- D Don't Know
- R Refused

SA4 Using a 0 to 10 scale, with 0 being very dissatisfied and 10 being very satisfied, how satisfied are you overall with the Xcel Energy [program]?

- ___ (0-10)
- D DON'T KNOW
- R REFUSED

SA5 Why do you say that?

(RECORD VERBATIM)



SA6 Next, I'd like you to tell me how satisfied you are with specific aspects of the [program] on that same 0-10 scale with 0 being very dissatisfied and 10 being very satisfied. (ROTATE LIST)

- a. __ (0-10) The type of equipment eligible for the program (If <5, probe: Why is that?)
- b. __ (0-10) Requirements for equipment eligibility (If <5, probe: Why is that?)
- c. __ (0-10) The amount of the rebate (If <5, probe: Why is that?)
- d. __ (0-10) The rebate application process in general
- e. __ (0-10) (HEATING OPTIMIZATION STUDY) The study done to identify potential energy saving measures (If <5, probe: Why is that?)
- f. __ (0-10) The program's handling of your questions or complaints (If <5, probe: Why is that?)
- g. __ (0-10) The amount of time it took to receive the rebate (If <5, probe: Why is that? When did you apply for this rebate?)
- h. __ (0-10) The contractor who installed the equipment or implemented the measures (If <5, probe: Why is that?)
- i. __ (0-10) The information you received from Xcel Energy (If <5, probe: Why is that?)
- j. __ (0-10) The amount of energy savings you've seen since the project completed (If <5, probe: Why is that?)
- k. __ (0-10) (IF BOILER TUNE-UP) The thoroughness of the tune-up provided (If <5, probe: Why is that?)

SA6x (IF SA6d<7) You mentioned earlier that you weren't completely satisfied with the application process. What is the most difficult part of the application process? (DO NOT READ, RECORD ALL)

- 1 Understanding how to complete the application
- 2 Time required to fill out application
- 3 Amount of information required
- 4 Getting/providing the technical specifications
- 5 Determining the rebate
- 6 Determining if motor is enhanced efficiency/higher than premium
- 7 Time lapse between completing the application and getting approval from Xcel Energy
- 8 Other
- D DON'T KNOW
- R REFUSED



SA7b What barriers did you face, either inside or outside of your company, when deciding whether or not to purchase or implement this [MEAS_SUM] through the program? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 No barriers
- 2 Other priorities for capital spending
- 3 Lack of funds available for investment
- 4 Lack of financing
- 5 Economy
- 6 Amount of management time to oversee projects
- 7 Incremental cost for more efficient equipment higher than we expected
- 8 Rebate amount not high enough (PROBE: How much rebate would you need in order to decide to [ACTION] through the [PROGRAM]?)
- 9 Business hesitant to replace existing working equipment
- 10 Upper management doesn't see the benefit of energy efficient equipment
- 11 Unsure of energy savings potential
- 12 We lease the space
- 13 Contractors weren't familiar with program
- 14 Internal staff lacked expertise about measures
- 15 Rebate application process was challenging
- 16 Other (SPECIFY)
- D DON'T KNOW

SA7C (IF PROGRAM = CO HEATING OR MN HEATING, SKIP TO SA7K) Have you ever tried to purchase a new program qualifying efficient motor, and been unable to find it through a vendor?

- 1 Yes
- 2 No (SKIP TO SA7F)
- D DON'T KNOW (SKIP TO SA7F)
- R REFUSED (SKIP TO SA7F)

SA7D Do you recall the size/horsepower of the efficient motor you wanted to purchase?

- ___ [RECORD RESPONSE]
- D DON'T KNOW
 - R REFUSED



SA7E What did you do after you couldn't find the new efficient motor you wanted? For instance, did you buy a new standard efficiency motor instead, wait for an efficient motor to be stocked, or defer your purchase for the time being?

- 1 Bought a new standard efficiency motor instead
- 2 Waited for an efficient motor to be stocked
- 3 Deferred purchase for the time being
- 4 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

SA7F Have you ever purchased a *used* standard efficiency motor?

- 1 Yes
- 2 No (SKIP TO SA8)
- D Don't know (SKIP TO SA8)

SA7G Why did you purchase a used standard efficiency motor? [DO NOT READ]

- 1 New efficient motor not stocked by vendors
- 2 New standard motor not stocked by vendors
- 3 Wanted to save money
- 4 Other (SPECIFY)
- D Don't Know

SA7H What was the size of the used motor?

- ___ [RECORD RESPONSE]
- D DON'T KNOW
- R REFUSED

SA7I Do you plan to install any new drives or motors in the next year?
[DO NOT READ, SELECT ALL THAT APPLY]

- 1 Motor
- 2 Drive
- 3 Neither (SKIP TO SA7K)
- 4 DON'T KNOW (SKIP TO SA7K)
- 5 REFUSED (SKIP TO SA7K)



SA7J Which equipment types and sizes are you likely to install, regardless if you use Xcel Energy's program or not?

- 1 1 to 40 horsepower (HP) motor (SPECIFY: Is this an upgrade or replacement?)
- 2 41 to 100 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
- 3 101 to 500 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
- 4 Greater than 500 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
- 5 1 to 50 horsepower VFD
- 6 51 to 200 horsepower VFD
- 7 200 or greater horsepower VFD
- D DON'T KNOW
- R REFUSED

SA7K (IF RECEIVED HEATING OPTIMIZATION STUDY) Have you implemented any of the heating optimization study's recommendations?

- 1 Yes
- 2 No (PROBE: Why not?)

SA7K_1 (IF SA7K = 1) What have you implemented? (SELECT ALL THAT APPLY)

- 1 Conduct boiler tune-up(s)
- 2 Install new boiler(s)
- 3 Install new furnace(s)
- 4 Install heating system enhancement (e.g., pipe insulation, O₂ trim controls)
- 5 Repair existing systems

SA7L (IF PROGRAM = MOTORS, SKIP TO SA8) Do you have any (IF SA7K=1, SHOW: "additional") plans to replace or upgrade any part of your heating system at this or any other facility?

- 1 Yes
- 2 No (SKIP TO SA8)
- D Don't know (SKIP TO SA8)



SA7M What are your plans? (SELECT ALL THAT APPLY)

- 1 Conduct Heating Optimization Study
- 2 Conduct boiler tune-up(s)
- 3 Install new boiler(s)
- 4 Install new furnace(s)
- 5 Install heating system enhancement (e.g., pipe insulation, O₂ trim controls)
- 6 Repair existing systems

SA7N What additional services could Xcel Energy provide to help you with this project?

(RECORD VERBATIM)

SA7O Would you like someone from Xcel Energy to contact you regarding these plans?

- 1 Yes
- 2 No
- D Don't know

SA8 Which aspects of the [program], if any, would you change? (DO NOT READ LIST; INDICATE ALL THAT APPLY. PROBE: Anything else?)

- 1 No change
- 2 Include additional types of equipment (SPECIFY)
- 3 Increase the rebate level (SPECIFY)
- 4 Speed up the rebate processing
- 5 Simplify the program application process or form (SPECIFY)
- 6 Require less information
- 7 (MOTORS) Do not require motors specifications
- 8 Have completely web-based/online process
- 9 Give more detailed instructions or examples on application/form
- 10 Ensure that quoted rebate is the same as actual rebate
- 11 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

SA9 I would like you to think in terms of your satisfaction with Xcel Energy overall. On a 0-to-10 scale where 0 means very dissatisfied and 10 means very satisfied, how would you rate your satisfaction with Xcel Energy? (IF NECESSARY, SAY:) You can use any number from 0 to 10. (REPEAT SCALE IF NECESSARY)

- ___ (0-10)
- D DON'T KNOW
 - R REFUSED



Hours of Operation

Now I'd like to talk about the hours that your business is open.

H1 During what days of the week and hours of the day is your business open for operations?
(RECORD DAYS OPEN AND OPENING AND CLOSING TIME)

- 1 Monday OPEN TIME:_____ CLOSE TIME: _____
- 2 Tuesday OPEN TIME:_____ CLOSE TIME: _____
- 3 Wednesday OPEN TIME:_____ CLOSE TIME: _____
- 4 Thursday OPEN TIME:_____ CLOSE TIME: _____
- 5 Friday OPEN TIME:_____ CLOSE TIME: _____
- 6 Saturday OPEN TIME:_____ CLOSE TIME: _____
- 7 Sunday OPEN TIME:_____ CLOSE TIME: _____
- 8 Open M-F OPEN TIME:_____ CLOSE TIME: _____
- 9 Open 24 hours a day, 7 days a week

H2 Do you operate your facility differently depending on the season or production cycle?

- 1 Yes (SPECIFY HOW VARIES)
- 2 No
- D DON'T KNOW
- R REFUSED

H3 Does your [MEASURE TYPE] have significantly different operating hours from your business's operating hours we just discussed?

- 1 Yes (PROBE: What are the operating hours for your [MEASURE TYPE]?)
- 2 No
- D Don't Know
- R Refused



Customer Profile

F1 What business activity accounts for most of the floor space covered by your Xcel Energy bill at [PREMISE ADDRESS]?

- 1 Office/professional
- 2 Data center/computer server farm
- 3 Warehouse or distribution center.
- 4 Food sales or service
- 5 Retail
- 6 Education
- 7 Religious worship
- 8 Public assembly
- 9 Health care
- 10 Service
- 11 Lodging
- 12 Public order and safety
- 13 Industrial/Manufacturing (SPECIFY)
- 14 Agricultural (SPECIFY)
- 15 Vacant (SPECIFY)
- 16 Municipal/Governmental
- 17 Other (SPECIFY IN DETAIL)
- D DON'T KNOW
- R REFUSED

F2_A Does the space covered by your Xcel Energy bill at [PREMISE ADDRESS]... (READ LIST)

- 1 occupy an entire free-standing building [SKIP TO F3]
- 2 occupy part of a free-standing building [SKIP TO F3]
- 3 or something else

F2_B Then which of the following best describes the space covered by your Xcel Energy bill at [PREMISE ADDRESS]? Is it . . . ? (READ LIST)

- 1 Located in an enclosed shopping mall
- 2 Located in an unenclosed shopping mall
- 3 Occupies part of a single building with apartments attached
- 4 Occupies an entire single building with apartments attached
- 5 Located in a complex of buildings
- 6 Space at this address is the common area of an apartment/rental property
- 7 Occupies part of a free-standing building; both manufacturing & office space
- 8 Other [SPECIFY]
- 9 DON'T KNOW
- 10 REFUSED



F3 Do you own or rent/lease the space you occupy at this location?

- 1 Own
- 2 Rent/lease
- 3 Own some and rent/lease some
- 4 Manage property
- 5 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

F4 What actions other than the ones we have already discussed has your business taken at this location within the past three to five years in order to reduce your energy use. (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 None
- 2 Installed high efficiency lighting equipment
- 3 Added lighting controls, occupancy sensors, and or time clocks
- 4 Installed high efficiency cooling equipment
- 5 Installed high efficiency heating equipment
- 6 Installed high efficiency ventilation equipment
- 7 Added controls to the heating, ventilation or AC systems to reduce use
- 8 Made changes to the heating, ventilation or AC system maintenance schedule
- 9 Made changes to the building envelope such as insulation, window film, etc.
- 10 Participated in other Xcel energy efficiency programs [SPECIFY]
- 11 Facility-wide energy awareness training
- 12 Recommissioning or retrocommissioning
- 13 Process improvements
- 14 Installed high efficiency motors or drives
- 15 Installed high efficiency refrigeration equipment
- 16 Tuned up existing equipment
- 17 Participated in other Xcel energy on-site assessment or completed a study
- 18 Other [SPECIFY]
- D DON'T KNOW
- R REFUSED



F5 (IF HAVEN'T DONE ANYTHING) What are the reasons you haven't been able to make any additional energy saving improvements at this facility? (DO NOT READ; CIRCLE ALL THAT APPLY)

- 1 No need
- 2 Lack of available equipment
- 3 High initial cost
- 4 Don't know what to do
- 5 Don't have the staff to identify or make these improvements
- 6 Customer comfort
- 7 Need for certain look/feel (aesthetics)
- 8 Disruption to business operations
- 9 Lease the space
- 10 Poor economy
- 11 Budget constraints
- 12 Capital budget issues
- 13 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

N3_DVEN (Ask if N3_D > 5)

Earlier you indicated that the recommendation from a vendor or supplier influenced your decision to [Action]

Could you give me the contact information of the vendor you worked through?

- 1 Yes (Collect Contact Information)
- 2 No

F6 Can we have your permission to release your company's answers to Xcel Energy on an individual basis and possibly have a representative from Xcel Energy follow up with you to discuss issues that are of particular concern to you?

- 1 Yes
- 2 No
- D DON'T KNOW

F7 As part of our evaluation, we may need to follow-up on some of this information. Would it be all right if someone called you if needed?

- 1 Yes (Collect Contact Information)
- 2 No
- D DON'T KNOW



F8 Those are all of the questions that we have. For confirmation, can you please tell me your title?

(RECORD VERBATIM)

COM I'd like to thank you for your help with this survey! Do you have any comments you'd like us to share with Xcel Energy?

(RECORD VERBATIM)



APPENDIX D: NONPARTICIPANT SURVEY AND COOPERATION RATE

Nonparticipant Survey Cooperation Rate

Table D-1. Minnesota Heating Efficiency Program Nonparticipant Survey Cooperation Rate

Sample Disposition	CO Heating Efficiency
Sample Size	314
Bad number	45
Ineligible - Current Participant	8
Ineligible - Doesn't have measure	3
Ineligible - Process Boiler	5
Adjusted Sample Size	258
Hard Refusal	17
Soft Refusal ¹	18
Incompletes (partial interviews)	5
Unavailable for duration	1
Language barrier/non-English	0
Active²	164
Active, but on hold (8 attempts)	129
Completed Surveys	53
Cooperation Rate³	20.5%

¹ Attempts were made to convert all soft refusals.

² An average of 7.2 contacts per active case have been made to attempt to complete the interview.

³ Number of completed surveys divided by Adjusted Sample Size.

Nonparticipant Survey

One nonparticipant survey will be used for the following programs: Motor and Drive Efficiency Program, Colorado Business Heating Efficiency Program and the Minnesota Heating Efficiency Program. Program specific questions are noted where applicable. Separate sample lists will be provided by Xcel Energy program staff.

The complete list of survey modules follows:

- Introduction
- Identification of Decision-Maker
- Source of Program Information/Social Media
- Important Factors in Decisions to Purchase New Equipment



- Satisfaction
- Operating Hours
- Customer Characteristics

Sample variables

The following fills will be used throughout the survey. These fills are program and measure specific. Some of these may need to be revised once we have had a chance to examine the participant database.

[Program] Program name

- | | |
|---|--|
| 7 | Motor & Drive Efficiency Program |
| 8 | Colorado Business Heating Efficiency Program |
| 9 | Minnesota Heating Efficiency Program |

[Program description] Program description

(MOTORS) provides rebates for the installation of energy efficient motors and variable speed drives (sometimes referred to as adjustable frequency drives, ASDs or VFDs) for controlling the motors that operate fans and pumps.

(CO Heating) provides rebates for the installation of high-efficiency heating equipment including boilers and furnaces, as well as auxiliary equipment, insulation and boiler tune-ups, which improve the efficiency of existing boiler equipment.

(MN Heating) provides rebates for the installation of high-efficiency boilers and boiler system components, as well as heating optimization studies, which identify opportunities for efficiency improvement at your facility, and boiler tune-ups, which improve the efficiency of existing boiler equipment.

[Action] Action taken on own

(MOTORS) Installed energy efficient motors on fans, pumps, air compressors, or other equipment and variable speed drives on fans or pumps.

(CO Heating): Installed heating equipment such as a boiler or furnace, or conducted a boiler tune-up to improve boiler efficiency.

(MN Heating) Installed heating equipment such as a boiler, installed auxiliary equipment to improve efficiency, such as a outdoor reset or modulating burner, installed pipe insulation on existing pipe, repaired failed steam traps, conducted a boiler tune-up to improve boiler efficiency, or had a heating optimization study conducted in your facility.

[Address] address where measure implemented

[Contact name] contact listed in participant files



[Program contact and phone number] name and phone number of Xcel Energy staff responsible for program evaluation

Introduction

Hello, my name is **[interviewer name]**, and I'm calling on behalf of Xcel Energy. May I speak with the person most familiar with purchasing and maintaining the energy-using equipment for **[business name]** at **[address]**?

- 1 Yes
- 2 No [attempt to convert]

I'm with Tetra Tech, an independent research firm. We have been hired by Xcel Energy to talk with some of their customers about the types of energy using equipment they have at their company and about the programs that Xcel Energy is offering to their business customers.

I'm not selling anything; I'd just like to ask your opinions. Let me assure you that your responses will be kept confidential and your individual responses will not be revealed to anyone unless you grant permission.

Before we start, I would like to inform you that for quality control purposes, this call will be recorded and monitored.

(Who is doing this study: Xcel Energy has hired our firm to evaluate one of the energy efficiency business programs. As part of the evaluation, we're talking with customers that did and did not participate in the program to understand their awareness and experiences with the program.)

(Why are you conducting this study: Studies like this help Xcel Energy better understand customers' need for and interest in energy efficiency programs and services.)

(Timing: This survey should take about 10 minutes of your time. Is this a good time for us to speak with you? IF NOT, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-454-5070.)

(Sales concern: I am not selling anything; we would simply like to learn about your experience with high efficiency equipment and energy efficiency programs. Your responses will be kept confidential. If you would like to talk with someone from Xcel Energy about this study, feel free to call **[program contact and phone number]**.)

(NOTE: For all questions, "DON'T KNOW" and "REFUSED" will be coded if offered as a response.)



Identification of Decision-Maker

C1 Are you the person who is most knowledgeable about the decision making process for maintaining or purchasing new energy-using equipment at this location?

- 1 Yes (SKIP TO C3)
- 2 No (ASK C2)

C2 Who else at your firm would be more knowledgeable about your organizations' decision making processes related to maintaining existing equipment or purchasing new energy using equipment at this location? May I please speak with that person? (RECORD ONE NUMBER)

- 1 Yes (SPECIFY NAME AND BEGIN THE SURVEY AGAIN WITH THIS NEW RESPONDENT)
- 2 No (TERMINATE)
- D DON'T KNOW (TERMINATE)
- R REFUSED (TERMINATE)

C3 Who else at your company is typically involved in the decision of whether or not to purchase new equipment at this location?

- 1 No one else
- 2 (SPECIFY)

Screener

SCR1 Does your organization have (IF MOTORS: any motors; IF CO HEATING: a natural gas boiler or furnace; IF MN HEATING: a boiler) at this location/(IF MULTIPLE) any of your locations?

- 1 Yes
- 2 No (THANK & TERMINATE)
- D DON'T KNOW (THANK & TERMINATE)
- R REFUSED (THANK & TERMINATE)

SCR1A (IF CO OR MN HEATING) Is your/Are any of your boiler(s) used for space heating or domestic hot water use?

- 1 Yes
- 2 No (THANK & TERMINATE)
- D DON'T KNOW (THANK & TERMINATE)
- R REFUSED (THANK & TERMINATE)



SCR2 Do you have an Xcel Energy account representative assigned to your company?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

SCR3 Is your company currently participating in Xcel Energy's [PROGRAM], or have you participated in the past?

- 1 Yes (THANK AND TERMINATE)
- 2 No
- D Don't Know
- R Refused

Source of Program Awareness/Social Media

PA0a Xcel Energy offers rebate and technical assistance programs to assist customers in making energy saving improvements in their facilities. Before today, were you aware Xcel Energy offers these types of programs? (RECORD ONE NUMBER)

- 1 Yes
- 2 No (SKIP TO PA4)
- D DON'T KNOW (SKIP TO PA4)
- R REFUSED (SKIP TO PA4)

PA0b One specific program Xcel Energy offers is called the [program], which [program description]. Before today, had you heard of this program? (RECORD ONE NUMBER)

- 1 Yes
- 2 No (SKIP TO PA4)
- D DON'T KNOW (SKIP TO PA4)
- R REFUSED (SKIP TO PA4)



PA1 How did you learn about Xcel Energy's **[program]**? PROBE: Did you hear about the program from any other sources? (DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 Through my account manager
- 2 Through a representative at the Business Solutions Center
- 3 Another Xcel Energy staff member (PROBE: Who?)
- 4 Information from Xcel Energy in general (i.e., bill inserts, direct mailings)
- 5 From an equipment vendor or contractor (PROBE: Who?)
- 6 From a colleague or coworker at my company
- 7 Previous experience with an Xcel Energy program
- 8 Xcel Energy event
- 9 An online resource (i.e., a website, blog or online ad)
- 10 A mass advertising campaign
- 11 Saw an article in a newspaper, magazine, or newsletter
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA1a (FOR PA1 = 1,2,3,4,5; EACH OPTION SELECTED IN PA1) How did **[RESPONSE FROM PA1]** inform you about Xcel Energy's **[program]**? PROBE: Did you hear about the program any other way? (DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 A flyer in my Xcel Energy bill (PROBE: Was this in your home, or your business energy bill?)
- 2 A stand alone direct mail piece or newsletter (e.g., Energy Solutions) from Xcel Energy
- 3 Other information in the mail
- 4 **[RESPONSE FROM PA1]** called me
- 5 I/We called **[RESPONSE FROM PA1]**
- 6 In person meeting with **[RESPONSE FROM PA1]**
- 7 Received an email
- 8 In a personal meeting
- 9 At a seminar or event
- 10 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



PA1d (IF PA1 = 9) Which online resource?

- 1 Xcel Energy's website
- 2 A vendor's website
- 3 An online ad
- 4 An Xcel Energy blog
- 5 A blog other than Xcel Energy's
- 6 Xcel Energy's Facebook fan page
- 7 Xcel Energy's Twitter page
- 8 Xcel Energy's Energy Solutions e-newsletter
- 9 A vendor's e-mail
- 10 An online radio ad
- 11 An online radio interview or podcast
- 12 Google search
- 13 Other [SPECIFY]
- D DON'T KNOW
- R REFUSED

PA1e (IF PA1 = 10) What type of advertising campaign?

- 1 A radio ad
- 2 A television ad
- 3 A newspaper ad
- 4 Billboards
- 5 Print ads
- 6 Electronic or internet
- 7 Other [SPECIFY]
- D DON'T KNOW
- R REFUSED

PA2 You said that you received information from [insert sources of information from PA1]. Did this provide you with enough information to know how to participate in the program if you wanted to?

- 1 Yes
- 2 No→What additional information would you have liked to receive? (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA4 The [PROGRAM] offers rebates for [ACTION]. Have you implemented, or considered implementing any of these measures in the past two years?

- 1 Yes, implemented
- 2 Yes, considered
- 3 No (SKIP TO PA8)
- D DON'T KNOW (SKIP TO PA8)
- R REFUSED (SKIP TO PA8)



PA5 What did you [IF PA4 = 1: do, IF PA4 = 2, consider doing]? (INDICATE ALL THAT APPLY)

- 1 NEMA Premium motor (SPECIFY QUANTITY AND HP CLASS BY 1 to 40 HP, 41 to 100 HP, 101 to 200, 201 to 300, 301 to 500 HP, or 501 plus HP)
- 2 Variable speed drive (SPECIFY QUANTITY AND HP CLASS BY 1 to 40 HP, 41 to 100 HP, 101 to 200) (SPECIFY QUANTITY)
- 3 Installed a boiler
- 4 Took other action to improve efficiency of existing boiler system (such as installed controls, insulated pipes, repaired failed steam traps, etc.)
- 4 (IF CO HEATING) Installed a furnace
- 5 Conducted a boiler tune-up
- 6 (IF MN HEATING) Conducted a heating optimization study
- 7 Other (SPECIFY TYPE AND QUANTITY)
- D DON'T KNOW
- R REFUSED

PA5b (IF PA4 = 1 and PA5 = 5) How much did you pay to have this boiler tune-up?

___ (RECORD RESPONSE)

- N Part of ongoing maintenance schedule or service agreement
- D DON'T KNOW
- R REFUSED

PA5b (IF PA5b <> "Part of ongoing service agreement", PROBE) Is this boiler tune-up part of an ongoing maintenance schedule or service agreement?

- 1 Yes
- 2 No
- D Don't know
- R Refused

PA5d (IF PA4 = 1 and PA5 = 5) Can you describe the boiler tune-up you had conducted outside of Xcel Energy's Heating Efficiency Program?

(PROBE: What specific actions did the contractor or vendor take to tune up your boiler?)
(RECORD RESPONSE)

PA6 (ASK IF PA0b = YES) Did you consider participating in the [Program] when you [IF PA4 = 1: did this?][IF PA4 = 2, considered doing this]?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED



PA6a (ASK IF PA6=1) Did you apply to participate in the **[Program]**?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

PA7 (IF PA6a<>1) Why didn't you do this through this program? (IF PA6a=1) Why didn't you complete **[PA5]** through the program? (DO NOT READ) (RECORD ALL THAT APPLY)

- 1 Application process too burdensome/Too much paperwork
- 2 Takes too long to get approval
- 3 No time to participate, needed equipment immediately
- 4 The program had ended
- 5 The equipment would not qualify (**PROBE: WHY NOT?**)
- 6 Rebate amount wasn't important enough
- 7 Did not know program was available for this equipment (**PROBE: Did your rep walk you through the process and offer assistance on the paperwork?**)
- 8 There was no program available (**PROBE: Which program?**)
- 9 Other (**SPECIFY**)
- D DON'T KNOW
- R REFUSED

PA7a (ASK IF PA6a=1) What additional support would you need to **[PA5]** through the program?

(RECORD VERBATIM)

PA8 Using a scale of 0 to 10, with 0 being not at all interested and 10 being very interested, how interested will you be in participating in the **[Program]** in the future?

- ____ (0-10)
- D DON'T KNOW
 - R REFUSED



PA9 (ASK IF PA8 < 7) Why wouldn't you consider participating in this program in the future? (DO NOT READ) (RECORD ALL THAT APPLY)

- 1 Application process seems too burdensome/Too much paperwork
- 2 Would take too long to get internal approval
- 3 No time to participate, would need equipment immediately
- 4 Rebate amount isn't important enough
- 5 Program is still unclear/difficult to understand
- 6 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

PA9A (ASK IF PA9 = 4) How much rebate would you need in order to decide to (IF ASKED PA5: [PA5], else show[ACTION]) through the [PROGRAM]?

- ___ (RECORD RESPONSE)
- D DON'T KNOW
- R REFUSED

PA9B (ASK IF PA9 = 5) What additional information or clarification would you need in order to participate in the [PROGRAM]?

(RECORD VERBATIM)

Important Factors in Decisions to Purchase New Equipment

Next I'd like to ask some questions about decision making at your business.

IOa If you were considering installing processes to save energy, or money by installing new energy efficient equipment at your company, where would you look for information regarding the new equipment or processes? (DO NOT READ, INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 Xcel Energy website
- 5 Xcel Energy account manager
- 6 General Internet search (e.g., Google search)
- 7 Contractor/vendor
- 8 Engineer
- 9 Manufacturer
- 10 Xcel Energy-sponsored event
- 11 Advertising campaign
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



IOb And who would you contact to implement the new equipment or process? (DO NOT READ, INDICATE ALL THAT APPLY)

- 1 Xcel Energy account manager
- 2 Xcel Energy Business Solutions Center representative
- 3 Other Xcel Energy program staff
- 4 Contractor/vendor
- 5 Engineer
- 6 Xcel Energy
- 7 Manufacturer
- 8 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

I1 On a scale of 0-10, with 0 being not at all important and 10 being very important, how important would each of the following be to your business when considering new equipment or processes? (ROTATE LIST)

- ___ age or condition of existing equipment
- ___ availability of a program rebate
- ___ amount of program rebate
- ___ recommendation of utility
- ___ recommendation of contractor or supplier
- ___ compatibility with existing equipment
- ___ initial purchase cost
- ___ operating cost
- ___ length of payback period (IF GT 5, What payback period do you strive for?)
- ___ efficiency level of new equipment
- ___ life of new equipment
- ___ if new equipment is readily available
- ___ environmental concerns
- ___ performance concerns
- ___ life-cycle costs
- ___ return on investment or ROI
- ___ capital investment or budget availability
- ___ money and energy savings
- ___ (ALWAYS READ LAST) some other consideration not already mentioned (SPECIFY)

I2 Does your business have a policy that mandates the installation of energy efficient equipment when purchasing new equipment?

- 1 Yes
- 2 No (SKIP TO I4)
- D DON'T KNOW (SKIP TO I4)
- R REFUSED (SKIP TO I4)



I3 What is the policy? (PROBE AND SPECIFY)

(RECORD VERBATIM)

I3A Have you ever had a rebate application denied by Xcel Energy because the equipment you purchased did not actually qualify for the program?

- 1 Yes (PROBE: What equipment were you submitting the rebate for?)
- 2 No (SPECIFY TIMEFRAME AND EQUIPMENT FOR WHICH THE REBATE APPLICATION WAS DENIED)
- D Don't know
- R Refused

I3B (IF I3A= 1) Who told you that you would qualify for the program? (READ LIST)

- 1 A vendor or contractor
- 2 Xcel Energy account manager
- 3 Xcel Energy Business Solutions Center representative
- 4 Other Xcel Energy program staff
- 5 Another person in your company
- 6 No one else, it was your understanding
- 7 Or were you not sure of the eligibility and decided to apply anyway?
- D Don't Know
- R Refused

I3C (IF MOTOR NP) Have you ever tried to purchase a new NEMA Premium motor, and been unable to find it through a vendor?

- 1 Yes
- 2 No (SKIP TO I3F)
- D DON'T KNOW (SKIP TO I3F)
- R REFUSED (SKIP TO I3F)

I3D (IF MOTOR NP) Do you recall the size/horsepower of the NEMA Premium motor you wanted to purchase?

- ___ [RECORD RESPONSE]
- D DON'T KNOW
- R REFUSED

I3E (IF MOTOR NP) What did you do after you couldn't find the new NEMA Premium motor you wanted? For instance, did you buy a new motor less efficient than a NEMA Premium motor instead, wait for an NEMA Premium motor to be stocked, or defer your purchase for the time being?



- 1 Bought a new standard efficiency motor instead
- 2 Waited for an efficient motor to be stocked
- 3 Deferred purchase for the time being
- 4 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

I3F (IF MOTOR NP) Have you ever purchased a *used* standard efficiency motor?

- 1 Yes
- 2 No (SKIP TO I4)
- D Don't know (SKIP TO I4)

I3G (IF MOTOR NP) Why did you purchase a used standard efficiency motor? [DO NOT READ]

- 1 New efficient motor not stocked by vendors
- 2 New standard motor not stocked by vendors
- 3 Wanted to save money
- 4 Other (SPECIFY)
- D Don't Know

I3H (IF MOTOR NP) What was the size/horsepower of the used motor?

- ___ [RECORD RESPONSE]
- D DON'T KNOW
 - R REFUSED

I4 What are some of the major obstacles or barriers that your business faces when considering purchasing new energy using equipment at your facility? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 Need to incorporate purchases or plans into longer term budget
- 2 Lack of capital budget
- 3 Time constraints
- 4 Lack of resources to implement
- 5 Approval by decision-makers
- 6 Uncertainty regarding return on investment
- 7 Contractors aren't familiar with measures
- 8 Lack of awareness of or knowledge about energy and money saving opportunities
- 9 Lack of awareness/knowledge about equipment characteristics or performance
- 10 Lack of knowledge about how to obtain assistance from Xcel Energy
- 11 Low prioritization of energy efficiency or conservation in firm
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



- I5** (IF CO OR MN HEATING SKIP TO I10) Regarding your drives or VFDs for fans and pumps, are all, some, or none of your motors driven by VSDs, ASDs, or variable frequency drives?
- 1 All
 - 2 Some (PROBE: Approximately what percentage of your motors are driven by variable frequency drives?)
 - 3 None
 - D DON'T KNOW
 - R REFUSED
- I6** Have you ever repaired or rewound a motor instead of replacing it with a new motor?
- 1 Yes
 - 2 No
 - D DON'T KNOW
 - R REFUSED
- I7** (IF I6 = YES) How do you decide whether to rewind or repair a motor versus buying a new motor? (PROBE ON WHAT IS THE THRESHOLD)
- (RECORD VERBATIM)
- I8** Do you plan to install any new drives/VFDs or motors in the next year?
- 1 Yes
 - 2 No (SKIP TO SA8)
 - D DON'T KNOW (SKIP TO SA8)
 - R REFUSED (SKIP TO SA8)
- I9** Which equipment types and sizes are you are likely to install, regardless if you use Xcel Energy's program or not?
- 1 1 to 40 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 2 41 to 100 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 3 101 to 500 horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 4 500+ horsepower motor (SPECIFY: Is this an upgrade or replacement?)
 - 5 1 to 50 horsepower VFD
 - 6 51 to 200 horsepower VFD
 - 7 200+ horsepower VFD
 - D DON'T KNOW
 - R REFUSED



I10 (IF MOTORS, SKIP TO SA8) Do you (IF PA4 = CONSIDERED, SHOW: “currently”) have any plans to replace or upgrade any part of your heating system at this or any other facility?

- 1 Yes
- 2 No (SKIP TO SA8)
- D Don't know (SKIP TO SA8)

I11 What are your plans? (SELECT ALL THAT APPLY)

- 1 Conduct Heating Optimization Study
- 2 Conduct boiler tune-up(s)
- 3 Install new boiler(s)
- 4 Install new furnace(s)
- 5 Install heating system enhancement (e.g., pipe insulation, O₂ trim controls)
- 6 Repair existing systems
- 7 Other (SPECIFY)

I12 What services could Xcel Energy provide to help you with this project?

- 1 Information on or assistance with program rebates
- 2 Information on specific measures or equipment
- 3 Technical assistance, audits, or assessments
- 4 Provide list of qualified contractors
- 5 Other (SPECIFY)
- D Don't Know

I13 Would you like someone from Xcel Energy to contact you regarding these plans?

- 1 Yes
- 2 No
- D Don't know



Satisfaction

SA8 I would like you to think in terms of your satisfaction with Xcel Energy overall. On a 0-to-10 scale where 0 means VERY DISSATISFIED and 10 means VERY SATISFIED, how would you rate your satisfaction with Xcel Energy? (IF NECESSARY, SAY:) You can use any number from 0 to 10. (REPEAT SCALE IF NECESSARY)

_____ (0-10) (PROBE IF RATING LT 5: Why do you say that? What could make your experience with Xcel Energy better?)

D DON'T KNOW

R REFUSED

Customer Characteristics

F1 Last, I'd like to ask you a few more questions regarding your facility.

What business activity accounts for most of the floor space covered by your Xcel Energy bill at [ADDRESS]? (RECORD VERBATIM AND THEN CODE BELOW)

- 1 Office/professional
- 2 Data center/computer server farm
- 3 Warehouse or distribution center
- 4 Food sales or service
- 5 Retail
- 6 Education
- 7 Religious worship
- 8 Public assembly
- 9 Health care
- 10 Service
- 11 Lodging
- 12 Public order and safety
- 13 Industrial/Manufacturing (SPECIFY)
- 14 Agricultural (SPECIFY)
- 15 Vacant (SPECIFY)
- 16 Leisure/Recreation (SPECIFY)
- 17 Government or City building
- 18 Other (SPECIFY IN DETAIL)
- D DON'T KNOW
- R REFUSED

F2_A Does the space covered by your Xcel Energy bill at [PREMISE ADDRESS]... (READ LIST)

- 1 occupy an entire free-standing building [SKIP TO F3]
- 2 occupy part of a free-standing building [SKIP TO F3]
- 3 or something else



F2_B Then which of the following best describes the space covered by your Xcel Energy bill at [PREMISE ADDRESS]? Is it . . . ? (READ LIST)

- 1 Located in an enclosed shopping mall
- 2 Located in an unenclosed shopping mall
- 3 Occupies part of a single building with apartments attached
- 4 Occupies an entire single building with apartments attached
- 5 Located in a complex of buildings
- 6 Space at this address is the common area of an apartment/rental property
- 7 Occupies part of a free-standing building; both manufacturing & office space
- 8 Other [SPECIFY]
- 9 DON'T KNOW
- 10 REFUSED

F3 Do you own or rent/lease the space you occupy at this location?

- 1 Own
- 2 Rent/lease
- 3 Own some and rent/lease some
- 4 Manage property
- 5 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

F4 What is the approximate square footage of the space your business occupies at this location?

- ___ Square feet
- D DON'T KNOW
- R REFUSED



F5 What additional actions other than the ones we have already discussed has your business taken at this location within the past three to five years in order to reduce your energy use? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 None
- 2 Installed high efficiency lighting equipment
- 3 Added lighting controls, occupancy sensors, and or time clocks
- 4 Installed high efficiency cooling equipment
- 5 Installed high efficiency heating equipment
- 6 Installed high efficiency ventilation equipment
- 7 Added controls to the heating, ventilation or air conditioning systems to reduce use
- 8 Made changes to the heating, ventilation or air conditioning system maintenance schedule
- 9 Made changes to the building envelope such as insulation, window film, etc.
- 10 Participated in other Xcel energy efficiency programs (SPECIFY)
- 11 Facility-wide energy awareness training
- 13 Recommissioning or recommissioning
- 14 Process improvements
- 15 Installed high efficiency motors or drives
- 16 Installed high efficiency refrigeration equipment
- 17 Tuned up existing equipment
- 18 Participated in other Xcel Energy on-site assessment or completed a study
- 19 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



F5a What additional actions has your business considered implementing or planned to implement at this location within the next three to five years in order to reduce your energy use? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 None
- 2 Install high efficiency lighting equipment
- 3 Add lighting controls, occupancy sensors, and or time clocks
- 4 Install high efficiency cooling equipment
- 5 Install high efficiency heating equipment
- 6 Install high efficiency ventilation equipment
- 7 Add controls to the heating, ventilation or air conditioning systems to reduce use
- 8 Make changes to the heating, ventilation or air conditioning system maintenance schedule
- 9 Make changes to the building envelope such as insulation, window film, etc.
- 10 Participate in other Xcel energy efficiency programs (SPECIFY)
- 11 Facility-wide energy awareness training
- 13 Recommissioning or recommissioning
- 14 Process improvements
- 15 Install high efficiency motors or drives
- 16 Install high efficiency refrigeration equipment
- 17 Tune up existing equipment
- 18 Participate in other Xcel Energy on-site assessment or completed a study
- 19 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED



F7 (IF HAVEN'T DONE ANYTHING OR HAVEN'T PLANNED TO DO ANYTHING) What are the reasons you (IF F5 = 1: haven't made) (or) (IF F5a = 1: aren't planning to make) any additional energy saving improvements at this facility? (DO NOT READ; CIRCLE ALL THAT APPLY)

- 1 No need
- 2 Lack of available equipment
- 3 High initial cost
- 4 Don't know what to do
- 5 Don't have the staff and/or time to identify or make these improvements
- 6 Customer comfort
- 7 Need for certain look/feel (aesthetics)
- 8 Disruption to business operations
- 9 Lease the space
- 10 Poor economy
- 11 Budget constraints
- 12 Capital budget issues
- 13 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

F8 Can we have your permission to release your company's answers to Xcel Energy on an individual basis and possibly have a representative from Xcel Energy follow up with you to discuss issues that are of particular concern to you?

- 1 Yes
- 2 No
- D DON'T KNOW

F9 As part of our evaluation, we may need to follow-up on some of this information. Would it be all right if someone called you if needed?

- 1 Yes (Collect Contact Information)
- 2 No
- D DON'T KNOW

F10 Those are all of the questions that we have. For confirmation, can you please tell me your title?

(RECORD VERBATIM)

COM I'd like to thank you for your help with this survey! Do you have any comments you'd like to share?

(RECORD VERBATIM)



APPENDIX E: BENCHMARKING PROGRAM MANAGER INTERVIEW GUIDE

Introduction

Identify Xcel Energy as the company commissioning this study; provide a brief description of Xcel Energy's program, then a brief description of the program that we're interested in learning more about in an effort to improve Xcel Energy's program.

Explain purpose of study and which measures you want to discuss (e.g., motors and drives, boilers, etc.) if others may be included in program.

Offer to share results as motivation to participate – see needed information to share study results at the end of this interview guide.

Program scope and goals

- 1) How long has the program been offered?
- 2) What are your roles and responsibilities for the program? Is the program delivered internally or by a 3rd party?
- 3) What are your program goals and/or objectives? (Probe for both written and informal) Who sets the goals? Are they annual goals or multi-year goals? How does the program fit within your overall business portfolio goals and objectives (important probe for Self Directed)?
- 4) Overall, how effective has the program been in achieving these goals and objectives (actual or estimated savings, participant data)? Are there ways you think the program could be more effective in achieving its goals?

Program Design, Measures and Incentives

- 1) (Self Directed Custom) What types of energy efficiency projects are eligible for the program? What types of projects are typically implemented through the program?
- 2) (Motors/Heating) What are the products/measures offered by your program?
 - A) Which measures comprise the bulk of the program participation and energy savings?
 - B) (Motors, if Drives component) What types of end use equipment must the drives be used for?
 - C) What are the HP parameters for both motors and VFDs? For example, 1 to 500 HP motors and 1 to 200 HP VFDs?



- D) (Heating if program includes tune-ups) Do you find repeating participants for tune-ups? How frequently do you typically see/allow repeat customers?
- E) (Motors) How is your program changing as a result of new motor standards? Do you plan to close your prescriptive portion of the program due to the NEMA Premium standards change that took place on 12-19-2010?
- F) (Motors/Heating) Do you have a custom measure component? What is/are the qualifying criteria? What percent of program participation/achievement is from the custom component?
 - i. (If YES) What types of projects are typically covered?
- 3) (Heating) Do you limit participation in your prescriptive rebate program to certain uses? (such as space/domestic water heating)? If no, how do you deem operating hours for additional process loads?
- 4) (Motors) Do you have a motor inventory program?
 - A) (If YES) Is the program run in-house or outsourced?
 - i. What aspects are outsourced?
 - ii. Is the inventory program leading to efficient motor purchases? Do you also identify opportunities for VFDs as part of this inventory?
- 5) (Motors) Do you offer rebates for green motor rewinds?
 - A) (if YES) How are qualifying rewind shops selected?
 - B) How do you measure energy savings for these projects? Are there any industry standards you are following?
- 6) (Motors) Did you change any program offerings in 2011 due to the new federal motors legislation? If no, do you expect to change offerings in 2012 and how?
- 7) (Heating) Does the program offer a heating optimization study component? If yes, what are the parameters of the study? Does the program offer a boiler tune-up component? If yes, what are the tune-up requirements?
 - A) (Heating) Are there any limitations to what types of boilers are covered?
- 8) Are there any particular measures that customers are not purchasing/installing? (If YES) Why do you think this is?
- 9) (Heating, if studies/audits offered) What percentage of your customers implement the opportunities identified in the study within one year? What is the typical timeframe for implementing measures?
- 10) (Heating, if tune-ups offered) How does the program-rebated tune-up differ from a standard tune-up?
- 11) What is the incentive structure (i.e., prescriptive, custom, both)? How are incentive levels determined – are they based on estimated incremental costs and/or other factors?



- A) (IF MOTORS) Do you offer higher rebates for motors that are not NEMA Premium?
- 12) Do you offer rebates for motors that exceed baseline NEMA Premium levels? How much more are these rebates versus your standard rebates?
- 13) What criteria do you use to determine motors that exceed baseline NEMA Premium levels?
- 14) What are the current rebate/incentive levels? Probe to see average incentives levels as a percentage of total project costs.
- 15) What are the current rebate/incentive levels payback estimates?
- 16) (Heating) Of your heating rebates for space/DHW systems, which provide the greatest energy savings impact overall to your program, and which have the most participation?
- 17) (Heating) Specifically, discuss the availability, success and impacts of the following rebate program components:
 - A) Condensing boiler rebates
 - B) Non-condensing boiler rebates
 - C) Steam boiler rebates
 - D) Do you offer different rebate amounts for new vs. replacement (early retirement) new boiler installations?
 - E) Steam to hot water conversions
 - F) Modulating burner controls
 - G) Outdoor air resets controls
 - H) Stack dampers
 - I) Turbulators
 - J) O2 trim controls
 - K) Cut-out controls
 - L) Steam trap repair
 - M) Steam trap audits
 - N) Pipe insulation – new or replacement
 - O) Commercial water heaters
 - P) What else do you offer that's been successful?
- 18) How have your rebate levels changed over time?
 - A) (If changes made) Why did you make these changes?



19) What documentation or approvals are required to receive a rebate?

- A) (Motors) Does this vary by motor size?
- B) Do you require spec sheets for all motors that receive a rebate?
- C) Do you have any special arrangements for receiving applications from trade allies on behalf of customers?
- D) Have you had any problems obtaining correctly completed documentation from customers or trade allies?
 - i. If YES, What problems do you have, and what steps have you taken to address this?

Trade Ally Outreach

1) How does the program leverage the trade ally market infrastructure?

- A) (If allies utilized) How do you conduct outreach to trade allies? Has this been effective?
- B) What do allies have to do to participate in the program (e.g., attend training, register, etc)
- C) (Heating, if studies/audits/tune-ups are offered) How does the program communicate what is expected in the study or tune-up to the vendors?
- D) What tools or information do you provide to vendors to inform their customers about program offerings and requirements?
- E) What types of vendors typically participate in the program (e.g., lighting, HVAC, process, ESCOs, engineering consultants)?
- F) Do trade allies receive incentives from your program?
 - i. (If YES) What are the incentive levels, and what is required of the trade allies to get them?
- G) Are the incentives offered always or periodically? Why?
 - i. (IF NO) Have you ever offered these incentives?
 - ii. (IF YES) Why did you eliminate the incentives?
- H) Do you belong to any trade organizations such as Motor Decisions Matter (MDM) or other type of affiliation?



Program Recruitment, Outreach, and Participation

- 1) What types of customers do you target for the program (business types, size, etc.)? Typically which customer segments deliver the most participation/energy savings?
 - A) (Motors/Heating) What is the mix of managed and non-managed accounts?
 - B) Do you have eligibility requirements relating to customer energy consumption or building size? If so, what are those thresholds, and how did you determine them?
- 2) What is the process for recruiting customers for the program, and who does this?
 - A) Do you use any outside contractors for customer recruitment or providing other services to customers related to the program?
 - B) Are there other marketing efforts? Any social media marketing? Case studies or success stories?
 - C) (Motors) Do you do targeted advertising specifically for motors and VFDs?
- 3) (Motors, Heating) Do you do anything different to target small to mid-size businesses? Probe about any effective strategies with this sector. Probe about any specific incentives or rebates if applicable.
- 4) (Self-Directed Custom) Are customers able to implement eligible projects through any other programs sponsored by your organization? What factors go into customers choosing one program over another? How does this affect your marketing strategy, both at the program and portfolio level (probe how they avoid 'cannibalizing' their other program offerings)? How does this impact setting participation and energy savings goals?
- 5) Can you describe the participation steps from the customer's perspective?
- 6) Why do customers typically decide to participate in the program? Do reasons vary by customer types (or segments)?
- 7) What are the major barriers to participation?
- 8) What external influences are impacting your program? How are you addressing them?
 - A) (Motors) Probe on any unexpected impacts of federal legislation.
 - B) (Motors) Probe to see if customers buying more used motors.
 - C) (Motors) Probe to see if issues with customers buying non-NEMA premium motors.



Program Impacts and M&V

- 1) What M&V is required as part of project implementation? For Self-Directed programs probe specifically about who is responsible for conducting the necessary M&V and any issues encountered.
 - A) (Motors) Probe to see if audits are conducted on completed projects.
- 2) How do you determine your baseline and technical assumptions for energy impacts? What M&V do you conduct as part of project implementation? Probe about savings thresholds for conducting M&V, percentage of projects metered, etc.
- 3) Have you performed any net-to-gross or spillover calculations for the program? At the portfolio level? (If YES) How were those derived, and what are the results? Can we see a copy of the study? (If NO) Does your program incorporate net-to-gross, freeridership or spillover, and if yes, what are those numbers?
- 4) How do you estimate and track penetration and standard practice in your market? Does this vary by customer segment?
- 5) How much of your overall energy savings for businesses is contributed by your <program> program?

Program Successes and Challenges

- 1) What has worked particularly well with the program? What has been a problem?
- 2) What do you see as future challenges for the program?

Conclusion

- 1) Are there any other topics that we have not covered in this interview that we should be aware of about this program?
- 2) Do you have any program information (e.g., FAQ sheets, evaluation results) that you would be willing to share with us?

Thank you for your time. Verify their name, position and email address for receiving the summary of results (if a summary of the results is desired).