

Black Hills Colorado Gas, Inc. d/b/a Black Hills Energy (successor in interest to Black Hills/Colorado Gas Utility Company, Inc. (“BHCOG” and Black Hills Gas Distribution, LLC (“BHGD-CO”))

2019 Evaluation Results Report - Final





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ACKNOWLEDGMENTS

We would like to acknowledge the many individuals who contributed to the 2019 energy efficiency evaluations for Black Hills Energy gas and gas distribution companies. This evaluation effort would not have been possible without their help and support.

We would like to specifically thank Amy Fiala, Jim Dillon, and Jessica Oliveto of Black Hills Energy, who provided invaluable insight into Black Hills Energy's programs and operations as well as ongoing evaluation deliverable reviews and discussions. We would also like to thank Allie Marshall of Cadmus, who graciously responded to follow-up questions and data and documentation requests.

The Tetra Tech Evaluation Team was made up of the following individuals:
Kimberly Bakalars, Carrie Koenig, Mark Bergum, Najoua Jouini, Shaadie Ali, Dayna Ball, Pam Rathbun, and Laura Meyer.

1.0 EXECUTIVE SUMMARY

Black Hills Energy is committed to offering the highest quality energy efficiency programs to its customers—programs that both meet energy savings goals and result in high customer satisfaction. To assist Black Hills Energy in running effective energy efficiency programs, Black Hills Energy selected an independent Evaluation, Monitoring, and Verification (EM&V) contractor to provide program evaluation services of select Black Hills Energy's efficiency programs for the 2019 program year. The EM&V team will conduct a comprehensive evaluation of each program once within the Combined 2018–2020 Natural Gas Energy Efficiency Plan (DSM Plan) cycle.

This report presents the results of 2019 EM&V activity for both BHBHCOG and BHGD-CO.

1.1 EVALUATION ACTIVITIES

This Executive Summary provides an overview of the 2019 program year evaluation results relevant to Black Hills Energy's Colorado gas service territory. The evaluation activities, including both process and impact activities, are detailed in Table 1.

Table 1. Summary of Program Year 2018 Evaluation Activities

Program name	Evaluation activities
Residential Retrofit - Evaluation Program	<ul style="list-style-type: none"> • Interviews with implementation staff and auditors • Surveys with participants • Savings review • Tracking system review • Measurement of installation rates • Net-to-gross estimation
Residential Retrofit - Prescriptive Program	<ul style="list-style-type: none"> • Interviews with contractors • Surveys with participants • Savings review • Tracking system review • Measurement of installation rates • Net-to-gross estimation
Commercial Direct Install Program	<ul style="list-style-type: none"> • Interview with implementation staff • Interviews with program participants • Tracking system review • Engineering review • Net-to-gross estimation

1.2 EVALUATION SUMMARY

Figure 1 and Figure 2 show the amount of savings estimated for the entire portfolio of 2019 programs for each territory in dark blue. Savings goals for the three programs evaluated for 2019 are shown below that in green. The 2019 savings goals for the remaining programs are included in the gold bars. This shows the relative contribution of savings goals from the 2019 evaluated programs in comparison to the overall portfolio savings goal. This is based on the program plan only and is not intended to depict actual 2019 results but show the contribution from evaluated programs to the overall portfolio savings for 2019.

Figure 1. Colorado Gas (BHCOG) Portfolio Savings

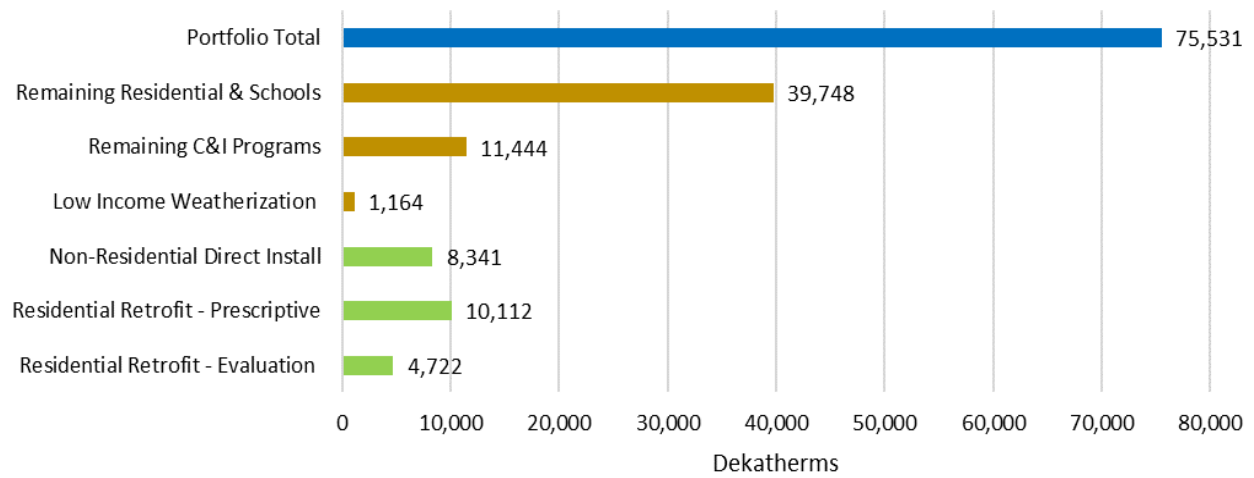
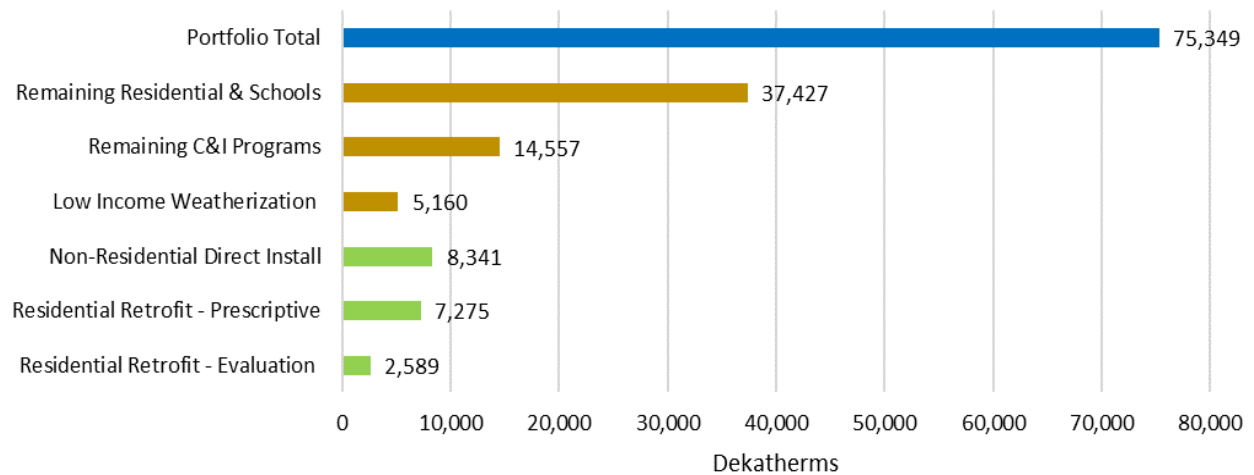


Figure 2. Colorado Gas Distribution (BHGD-CO) Portfolio Savings



1.3 FINDINGS AND RECOMMENDATIONS

Recommendations are provided in program-specific sections below. Each recommendation is accompanied by supporting findings.

1.3.1 Residential Evaluation Component Recommendations

Overall, respondents from both the online and all in-home evaluations were satisfied with their experience with the program. Respondents from both programs appreciate the information that was provided through the program and provided few recommendations for program improvements. Participants in the in-home evaluations are following through with recommendations for both behavioral and equipment improvements.

Compared with the previous evaluation where the activity was primarily walkthrough evaluations in the Colorado gas territory, 2019 participation was much higher for Level 2 & 3 evaluations and focused more heavily in the Colorado gas distribution territory where program partners were more abundant. In addition, more energy evaluators are installing equipment during the in-home evaluation, which is an improvement from 2016.

For the in-home evaluation, it appears that savings are claimed for the energy evaluation in addition to the direct install equipment and that an in-service rate is not applied to the equipment installed. While the three types of in-home evaluations are entered into Vision as they are completed, the online evaluation activity is tracked separately and not entered until the end of the year.

Based on the findings of this evaluation, our recommendations for the Residential Evaluation program are as follows:

- **Continue to apply an NTG ratio of 90 percent for the in-home portion of the Residential Evaluation Program.** This NTG ratio includes free-ridership, and participant spillover indicators from customer self-reports from the participant survey and a secondary review of NTG estimates from programs similar to the Residential In-home Evaluation program. Free-ridership rates remain low, and the program produces a small amount of spillover savings. In addition, participants report energy-saving activity based on evaluation recommendations.
- **Increase marketing and outreach for all components of the Residential Evaluation program.** Participation in almost all evaluation program components was short of DSM plan goals, with the exception of Level 2 evaluations for Colorado gas distribution customers. Savings and participation were bolstered by a high number of Level 2 evaluations in the Colorado gas distribution territory in 2019. The energy evaluations are the educational foundation of the residential portfolio and motivate customers to take energy efficiency actions. Black Hills Energy staff should work with corporate marketing to increase the frequency and breadth of outreach options for the program. In addition, Black Hills Energy should continue to work closely with both implementers to facilitate and brainstorm new outreach options.
- **Review the online kit savings claimed and consider opportunities to improve the installation rates for kit measures.** The evaluation analysis shows that the savings for the kits are reasonable on a per unit basis, but the low installation rates of kit measures are resulting in lower verified savings of 1.07 dekatherms (dth) per kit on average. The installation of the kits by participants improved since the last evaluation, but there is still a lot of improvement possible to make sure the equipment is installed. Since this is a remotely operated program (*i.e.*, kits are mailed to participants), increasing the installation rate of measures is difficult.
- **Consider updating the savings claimed going forward for energy audits.** The majority of the savings claimed in the residential evaluation program is recorded with the

energy evaluation itself. It is best practice for programs to claim savings for each measure or service (i.e., turning down water heater) separately when they are directly installed by the energy evaluator and to refrain from claiming savings for the educational portion of the evaluation, which is difficult to quantify and verify.

- **Continue to leverage energy evaluators to directly install more equipment.** In the past couple of years, the energy evaluators have begun to directly install equipment for participants. This ensures that the equipment provided is installed and saving energy. However, the amount of directly installed equipment remains low. Increasing the amount of equipment directly installed by the evaluators will increase the energy savings associated with each project.

1.3.2 Residential Prescriptive Component Recommendations

Participant satisfaction with the Residential Prescriptive component remains high, and most participants are likely to recommend the program to others. But the program is not meeting participation or savings goals. With the program outreach heavily reliant on contractors and staffing changes at Black Hills Energy, contractors were not receiving the typical level of information needed to promote the program.

On a positive note, the equipment installed through the program remains installed, and the existing level of project documentation collected is useful. Documentation packages were found to include AHRI certificates, project application sheets, and other project-specific information that allows for verification of savings. In addition, the Vision tracking system logged the critical information for easy confirmation of qualification and savings calculation. However, water-saving kits distributed through the Residential Prescriptive program were only recorded in Vision as a single line item, limiting the tracking information available.

Based on data collection activities completed, we present the following findings and recommendations for the Residential Prescriptive component:

- **The evaluation team recommends continuing with an NTG ratio of 75 percent.** The participant customer surveys found lower customer self-report NTG ratios for BHCOG than last time (BHGD-CO is new), but participation is also much lower than in 2016. The self-report results are somewhat lower than most NTG estimates found from comparison programs with similar measures in nearby territories, though estimates range up to 91 percent. Qualitative feedback from customers and participating contractors indicates higher program attribution than reflected in the calculated self-report NTG estimate. For this program, contractors are a leading source of customer awareness, and active participating contractors reported routinely using the program rebates as part of their sales process, but due to staff changes at Black Hills Energy, limited needed information. Triangulating the customer self-reports, contractor feedback, prior NTG evaluation research, and NTG values used for nearby comparison programs with similar measures, the evaluation team recommends that Black Hills Energy continue with an NTG ratio of 75 percent.
- **Continue using bill inserts, website, and contractors as the means to market the program to customers.** Marketing of the program using the Black Hills website and contractors are the most effective approaches to gaining awareness of the program. Over half of all participants said they learned of the program from Black Hills Energy, with one-half of those saying they learned about it from the website. One-third of those who heard of the program from Black Hills heard of it from a bill insert, so the inserts are

still effective even though the website is gaining ground. One-third of all participants said they learned about the program from their contractor.

- **Provide contractors with a consistent program contact, along with periodic program updates and marketing materials.** Contractors are the key delivery mechanism for this program. Most contractors indicated they often had to seek out program information on their own to be informed of eligible equipment. They would like more program communication from Black Hills Energy prior to the start of the program year to learn of any potential changes, along with periodic updates throughout the year, especially if rebate funds may run out. Several contractors also expressed a need for more marketing materials to hand out to customers, which could also help boost participation in the program.
- **Black Hills Energy should update application forms to collect additional equipment data, such as the existing thermostat type.** Savings for thermostat incentivization programs vary widely depending on the existing thermostat type onsite and method of installation. Collecting this information and incorporating it into savings calculations can generate more transparent savings.
- **Track water-saving kits distributed.** The water savings kit measures were tracked in a single line item with no supporting documentation about when they were distributed or who receive the kit. As is typical with kits, the installation rate is most likely low, although without tracking information, there is no way to determine the uptake and satisfaction of the recipients.

1.3.3 Commercial Direct Install Component Recommendations

Black Hills Energy and Franklin Energy felt that the program is running well. Franklin Energy reported some challenges due to the unique geographic characteristics of the territory and lack of contractors (some customers are located in areas that have only one contractor). Franklin Energy's outreach is conducted through cold calls, canvassing, and community events. Franklin Energy is new to the area and is working on increasing its outreach to customers and contractors. The outreach has been effective so far in generating leads to the program as most of the interviewed participants learned about the program from Black Hills Energy or Franklin Energy. Franklin Energy reported that relationships with municipalities have also been successful in generating new leads.

Participants are generally satisfied with the energy evaluation and the program overall. The program highly encouraged them to conduct the energy assessment and to purchase additional follow-up energy-efficient equipment outside what was directly installed.

Recommendations for the Commercial Direct Install program are as follows:

- **The evaluation team recommends Black Hills Energy continue using an NTG ratio of 91 percent for the Commercial Direct Install program in upcoming program years to estimate net savings.** The participant interviews resulted in a high self-report NTG ratio, inclusive of free-ridership and participant like-spillover. The interviews produced an average self-report free-ridership rate of 31 percent for the direct install equipment and 31 percent for follow-up measures, with no spillover attributable to the program. This resulted in an NTG ratio of about 70 percent. For multiple reasons, including the low participation rate, difficulty finding contractors in BHCOG areas, that this is the first evaluation for BHGD-CO, and the educational aspect of the program

design, which also provides assisted installation, we do not recommend changes to the NTG ratio at this time. However, NTG should be reviewed once the participation levels improve.

- **Ensure the implementer is following up with customers on direct install measures.** Two customers reported that some of the direct install measures did not work properly and had to be removed (mainly aerators and showerheads). The evaluation team recommends that the implementer conducts follow-up visits or calls a few weeks after installation to check if the direct install equipment is still installed and working.
- **Utilize building type-specific parameters to estimate savings for direct install measures.** The evaluation team found that average values were utilized to estimate savings for the direct install measures instead of building type-specific values, which vary drastically (for example, for the measure type Aerator, annual water usage varies from 1,278 to 16,436). The evaluation team recommends that a comprehensive energy savings calculation and data tracking process be developed that includes building type-specific parameters leading to more accurate energy savings estimates. The building type can be easily documented during the energy assessment.
- **Track measures for the restaurant kit separately in Vision.** The evaluation found that the savings for the restaurant kit were tracked under a single measure. Breaking out each measure, in addition to using building type-specific parameters, will result in more accurate savings calculations and a higher level of quality assurance.
- **Document assumptions used for savings calculation.** After our review of the savings calculator tool, many of the algorithms are based on the Iowa TRM and appear accurate. However, the assumptions regarding some of the parameters used in the algorithms were not documented. Documenting these assumptions will add clarity on their origin and allows vetting by Black Hills Energy as well as interested stakeholders.

1.3.4 Overarching Savings Recommendations

The completeness of documentation was generally good for single measure projects. However, not all documentation was consistent across projects. In addition, there were a few instances that data entry into Vision was found to be inconsistent with information on project documents. Quality control would be more efficient with more standardized savings and access to complete project documentation.

- **Consider a master document for tracking savings values used across all programs.** In order to facilitate quality control of savings values used across programs, as implementers changes and measures and markets evolve, it is important for Black Hills Energy to have a master document that records all methods for claiming savings. This can be in the form of a program implementation manual or the use of a TRM. Black Hills Energy could update the WY Program Implementation Manual to include savings calculations and values or customize a TRM from another territory. The use of a single TRM or implementation manual that is well-documented and annually updated will reduce the swings in energy savings between program years and create a foundation that will make evaluation results more predictable. One recommended source of information is the Iowa TRM, with minimal adjustments for the local weather and peak demand period. The TRM will also provide guidance and consistency across implementers and programs.

- **Update the documentation standards for programs.** The documentation from implementers that are tracked and uploaded in Vision is inconsistent across programs. The evaluation team recommends developing a standard for implementation contractors to follow when uploading to Vision or delivering project information to Black Hills Energy. This additional supporting documentation can be used in place of entry into Vision. The evaluation recommends the following documents when applicable to the program:
 - Single document (spreadsheet) detailing the information to be entered into Vision.
 - Project Application
 - Customer Confirmation
 - Final Report delivered to the participant
 - Savings Calculator
 - Implementer Customer Data File (spreadsheet or database report)

Develop a Quality Assurance and Quality Control Plan. The combination of the use of a master savings document and documentation standards will provide the foundation for Black Hills Energy to implement a Quality Control Plan for program savings. The evaluation team recommends that the plan cover quality assurance for both the energy savings calculations and the data tracked in Vision.

2.0 RESIDENTIAL EVALUATION COMPONENT

This chapter presents the results of the 2019 process and impact evaluation of Black Hills Energy's Residential Retrofit Program - Evaluation (Residential Evaluation) component.

2.1 BACKGROUND

The Residential Evaluation program is designed to help residential natural gas customers gain immediate energy savings by providing recommendations on ways their households can reduce energy consumption in their homes. Evaluation recommendations may include behavioral changes, suggestions about installing low-cost and easy-to-install energy-saving equipment, and suggestions about repairing, upgrading, or replacing larger, relatively expensive equipment or systems. The Residential Evaluation program is comprised of four sub-components:

- Free online evaluation
- Free Level 1 walkthrough in-home energy evaluation
- Level 2 in-home evaluation with diagnostic testing
- Level 3 in-home evaluation with diagnostic testing and verification test-out.

The free online evaluation, managed by the implementer Uplight, is available on Black Hills Energy's website and available to all customers. The tool utilizes customer inputs about the size and characteristics of their house and energy-using equipment to inform potential savings opportunities. The online evaluation produces a report that contains recommendations for energy-efficient upgrades and a home score relative to other customers that have completed the online evaluation. Customers who complete the online evaluation have the opportunity to request a mailed kit of low-cost energy-efficient measures,¹ which are distributed by a third-party contractor (ATEC). The implementer tracks customers who receive an online evaluation and those who provide their address for kits.

The three in-home evaluations are implemented by a third-party energy evaluation firm, Energy Smart Colorado, who is responsible for scheduling and conducting the evaluations. While in the home, the energy evaluator assesses insulation and infiltration levels, equipment efficiency and operating condition, and behavior-related factors influencing energy consumption. In addition, the evaluator installs low-cost measures, provides education on the benefits of energy efficiency and about the performance of their home, informs customers of other Black Hills Energy programs that could address any of the recommendations, tracks participant data, and reports to Black Hills Energy.

Level 2 and 3 evaluations are more comprehensive than the walkthrough in-home evaluation. Diagnostic testing (with a blower door and, if requested, an infrared scan) is used to quantify and identify sites of air leakage. Level 3 evaluations incorporate the whole-house approach and involve two separate visits to the home—(1) an initial test-in visit to assess the home's performance prior to any energy-saving upgrades, and (2) a follow-up test-out visit to assess the home after the customer installs recommended energy savings measures.

¹ Showerhead, kitchen aerator, bathroom aerator, FilterTone™ alarm, digital thermometer, flow rate test bag.

Participants in all four evaluation sub-programs receive an energy savings report outlining the cost-effective energy-efficiency recommendations. Measures and incentives included in the Residential Evaluation program are outlined in the table below.

Table 2. Residential Evaluation Program Measures and Incentives

Sub-program	Component detail	Customer cost	Incentive
Online evaluation	Web-based assessment with an option to request a mailed kit	Free	Value of kit and online education
Free evaluation	Walkthrough evaluation	Free	Value of evaluation and direct install measures
Level 2 evaluation	Comprehensive evaluation and diagnostic testing	\$300	\$200
Level 3 evaluation	Comprehensive evaluation, diagnostic testing, and test-out	\$400	\$300

Customers eligible for this program are customers whose homes are heated with natural gas and homes that are more than ten years old. Any customers who contact Black Hills Energy with a high bill complaint and have above-average consumption are also program prospects. Participation and savings goals for BHCOC and BHGD-CO are outlined in Table 3 and Table 4, respectively. Savings and participation for BHGD-CO were bolstered by a high number of Level 2 evaluations in the Colorado gas distribution territory.

Table 3. Residential Evaluation Program Participation and Savings Goals - BHCOC

Sub-program	Participation goals	Savings goals (dth) ²	Actual participation	Actual savings (dth)
Online evaluation	400		67	191
Walkthrough evaluation	241		37	351
Level 2 evaluation	25		11	111
Level 3 evaluation	12		1	10
Total	678	4,722 dth	116	663 dth

² Savings from the free online tool and in-home evaluations contribute to an overall program savings goal.

Table 4. Residential Evaluation Program Participation and Savings Goals - BHGD-CO

Sub-program	Participation goals	Savings goals (dth) ³	Actual participation	Actual savings (dth)
Online evaluation	100		45	93
Walkthrough evaluation	221		77	805
Level 2 evaluation	3		323	3,295
Level 3 evaluation	2		1	10
Total	326	2,589 dth	446	4,303 dth

2.2 EVALUATION METHODOLOGY

In addition to Black Hills Energy staff interviews, the process and impact evaluation activities conducted for the Residential Evaluation program are summarized below.

Implementation of staff interviews. We conducted interviews with the implementation staff to better understand the design and management of the online evaluation tool. We contacted the third-party in-home energy evaluation implementer to better understand the procedures followed for the in-home evaluations. The interviews were designed to improve our understanding of the program and get background information on program design and implementation practices that would assist us in our design of the interview guides and surveys for on-site evaluators and customers.

In-home evaluator interviews. The implementer provided contact information for 18 in-home evaluator partners. We completed interviews with nine energy evaluators across four geographies. Energy evaluator feedback is used as a comparison with feedback received from participating households.

Participant surveys. In December 2019, the evaluation team downloaded a list of customers who completed either an online evaluation or who received one of the three types of in-home evaluations in 2019. Participants were contacted by telephone to complete a survey regarding their experience with the evaluation program, sources of awareness, satisfaction with various aspects of the program, energy efficiency recommendations they have implemented, and any additional actions they have taken since the evaluation. The survey can be found in Appendix E. The telephone survey was fielded between January 2020 and February 2020. Response rates are shown in Table 5.

Table 5. Residential Evaluation Response Rates

Program	Starting sample	Completes	Response rate
Online evaluation	111	31	30%
BHCOG in-home walkthrough	32	10	40%
BHCOG Level 2 and 3	9	4	44%
BHGD-CO in-home walkthrough	55	19	36%

³ Savings from the free online tool and in-home evaluations contribute to an overall program savings goal.

Program	Starting sample	Completes	Response rate
BHGD-CO Level 2 and 3	242	50	23%

The online evaluation program data only included contact information at the address level, without indicators for gas or gas distribution territory at the time it was pulled for surveys. Therefore, the survey data and results described throughout this report are aggregated to the combined gas and gas distribution territory. In addition, process surveys were conducted with kit recipients only. As a result, the online evaluation findings should not be used to extrapolate to the overall online evaluation program and should only be used qualitatively in speaking about customers who received a kit.

Net-to-gross estimation. As part of the participant surveys, all in-home evaluation program participants were asked a series of questions to better understand their decision-making process regarding their purchase of program qualifying equipment, and the influence of the program. The recommended net-to-gross (NTG) ratio includes free-ridership and participant spillover indicators from participant self-reports and a secondary review of NTG estimates from programs similar to the Residential Evaluation program.

Claimed savings review. The evaluation team reviewed the values claimed for each measure to see if they followed typical engineering best practices. We also checked deemed savings values for appropriate supporting information and against multiple TRMs and the accuracy of any calculations used.

Tracking system review. Overall, we reviewed the tracking system to ensure that project and account numbers are unique, deemed savings values are consistently applied, and data was entered completely. This was done through an analysis of the Vision tracking data downloaded on January 6, 2020, and a comparison to a sample of documentation downloaded from Vision.

Measure installation rates. As part of the telephone interviews with participants in the online and in-home evaluations, the evaluation team asked participants to verify the installation of measures received through the program. These responses were used to develop installation rates for the various measures.

2.3 FINDINGS AND RECOMMENDATIONS

Overall, respondents from both the online and all in-home evaluations were satisfied with their experience with the program. Respondents from both programs appreciate the information that was provided through the program and provided few recommendations for program improvements. Participants in the in-home evaluations are following through with recommendations for both behavioral and equipment improvements.

Compared with the previous evaluation where the activity was primarily walkthrough evaluations in the Colorado gas territory, 2019 participation was much higher for Level 2 & 3 evaluations and focused more heavily in the Colorado gas distribution territory where program partners were more abundant. In addition, more energy evaluators are installing equipment during the in-home evaluation, which is an improvement from 2016.

For the in-home evaluation, it appears that savings are claimed for the energy evaluation in addition to the direct install equipment and that an in-service rate is not applied to the equipment installed. While the three types of in-home evaluations are entered into Vision as they are

completed, the online evaluation activity is tracked separately and not entered until the end of the year.

Based on the findings of this evaluation, our recommendations for the Residential Evaluation program are as follows:

- **Continue to apply an NTG ratio of 90 percent for the in-home portion of the Residential Evaluation Program.** This NTG ratio includes free-ridership, and participant spillover indicators from customer self-reports from the participant survey and a secondary review of NTG estimates from programs similar to the Residential In-home Evaluation program. Free-ridership rates remain low, and the program produces a small amount of spillover savings. In addition, participants report energy-saving activity based on evaluation recommendations.
- **Increase marketing and outreach for all components of the Residential Evaluation program.** Participation in almost all evaluation program components was short of DSM plan goals, with the exception of Level 2 evaluations for Colorado gas distribution customers. Savings and participation were bolstered by a high number of Level 2 evaluations in the Colorado gas distribution territory in 2019. The energy evaluations are the educational foundation of the residential portfolio and motivate customers to take energy efficiency actions. Black Hills Energy staff should work with corporate marketing to increase the frequency and breadth of outreach options for the program. In addition, Black Hills Energy should continue to work closely with both implementers to facilitate and brainstorm new outreach options.
- **Review the online kit savings claimed and consider opportunities to improve the installation rates for kit measures.** The evaluation analysis shows that the savings for the kits are reasonable on a per unit basis, but the low installation rates of kit measures are resulting in lower verified savings of 1.07 dth per kit on average. The installation of the kits by participants improved since the last evaluation, but there is still a lot of improvement possible to make sure the equipment is installed. Since this is a remotely operated program (*i.e.*, kits are mailed to participants), increasing the installation rate of measures is difficult.
- **Consider updating the savings claimed going forward for energy audits.** The majority of the savings claimed in the residential evaluation program is recorded with the energy evaluation itself. It is best practice for programs to claim savings for each measure or service (*i.e.*, turning down water heater) separately when they are directly installed by the energy evaluator and to refrain from claiming savings for the educational portion of the evaluation, which is difficult to quantify and verify.
- **Continue to leverage energy evaluators to directly install more equipment.** In the past couple of years, the energy evaluators have begun to directly install equipment for participants. This ensures that the equipment provided is installed and saving energy. However, the amount of directly installed equipment remains low. Increasing the amount

of equipment directly installed by the evaluators will increase the energy savings associated with each project.

2.4 PROCESS EVALUATION RESULTS

The remainder of this chapter presents the detailed process results for the Residential Evaluation program data collection efforts. The results are organized in the following sub-sections:

- Participant characteristics
- Marketing practices
- Program experience
- Program interactions (with the implementers and Black Hills Energy)
- Overall program satisfaction and recommendations.

2.4.1 Participant Characteristics

2.4.1.1 Online Participants

One-third of the online evaluation participants who received kits were between 55 and 64 years old. Another one-third were between 35 and 54 years old. More than 60 percent of the participants are highly educated.

Table 6. Residential Online Evaluation Demographics - Kit Recipients

		Percent
Age Group	25 to 34	13.3%
	35 to 44	16.7%
	45 to 54	16.7%
	55 to 64	33.3%
	65 to 74	13.3%
	75 or over	6.7%
	Respondents (n)	30
Highest level of education completed	Some high school	0.0%
	Completed high school	16.7%
	Some college	20.0%
	Completed college	23.3%
	Graduate studies or advanced degree	40.0%
	Respondents (n)	30

Source: Question DEM1, DEM2.

Note: Totals may not sum to 100 percent due to rounding.

Almost all (97 percent) report living in a single-family home, and while almost 50 percent of homes are between 1,500 and 3,000 square feet, another 32 percent are 3,000 square feet or more. Home ages ranged from 4 to 130 years old. Online evaluation participants have lived in their homes for an average of 11 years, and 60 percent have two to three household members.

Table 7. Residential Online Evaluation Participant Home Characteristics

		Online kits
Own or rent house	Own	100.0%
	Rent/lease	0.0%
	Respondents (n)	31
Home type	Single-family detached house	96.8%
	Single-family attached house (townhouse, row house, or duplex)	3.2%
	Apartment building with 2 to 4 units	0.0%
	Apartment building with 5 or more units	0.0%
	Mobile home or house trailer	0.0%
	Respondents (n)	31
Square footage of home	Less than 1,000 square feet	0.0%
	1,000 to 1,500 square feet	19.4%
	1,501 to 2,000 square feet	25.8%
	2,001 to 3,000 square feet	22.6%
	More than 3,000 square feet	32.3%
	Respondents (n)	31
Years lived in home	Minimum	1.0
	Maximum	28.0
	Mean	11.0
	Respondents (n)	31
People living in house full time	1	9.7%
	2	38.7%
	3	22.6%
	4	16.1%
	5	9.7%
	6	0.0%
	7	0.0%
	8	3.2%
	Respondents (n)	31

Source: Question HC1-HC12.

Note: Totals may not sum to 100 percent due to rounding.

2.4.1.2 In-Home Participants

Except for the Colorado gas Level 2 & 3 participants, a large portion of in-home evaluation participants is older than 55. Over 70 percent of respondents have completed college or have an advanced degree.

Table 8. Residential In-Home Evaluation Demographics

		BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Age Group	25 to 34	11.1%	0.0%	5.9%	11.6%
	35 to 44	22.2%	50.0%	11.8%	14.0%
	45 to 54	0.0%	25.0%	17.6%	20.9%
	55 to 64	11.1%	25.0%	11.8%	9.3%
	65 to 74	22.2%	0.0%	47.1%	27.9%
	75 or over	33.3%	0.0%	5.9%	16.3%
	Respondents (n)	9	4	17	43
Highest level of education completed	Some high school	0.0%	0.0%	0.0%	0.0%
	Completed high school	0.0%	0.0%	23.5%	0.0%
	Some college	30.0%	0.0%	5.9%	14.0%
	Completed college	60.0%	75.0%	52.9%	46.5%
	Graduate studies or advanced degree	10.0%	25.0%	17.6%	39.5%
	Respondents (n)	10	4	17	43

Source: Question DEM1, DEM2.

Note: Totals may not sum to 100 percent due to rounding.

All the in-home evaluation participants own their homes, the majority of which are single-family detached structures. Colorado gas distribution participants have been in their homes for an average of 12 years. Square footage of homes varies by program component, but the household size is typically two or one residents.

Table 9. Residential In-Home Evaluation Home Characteristics

		BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Own or rent house	Own	100.0%	100.0%	100.0%	100.0%
	Rent / Lease	0.0%	0.0%	0.0%	0.0%
	Respondents (n)	10	4	19	43
Home type	Single-family detached house	90.0%	100.0%	94.4%	79.1%
	Single-family attached house (townhouse, row house, or duplex)	10.0%	0.0%	0.0%	14.0%
	Apartment building with 2 to 4 units	0.0%	0.0%	0.0%	2.3%
	Apartment building with 5 or more units	0.0%	0.0%	0.0%	4.7%
	Mobile home or house trailer	0.0%	0.0%	5.6%	0.0%
	Respondents (n)	10	4	18	43
Years in home	Minimum	2.0	0.0	3.0	0.0
	Maximum	40.0	14.0	26.0	50.0
	Mean	21.1	7.3	12.4	12.3
	Respondents (n)	10	4	18	43
Square footage of home	Less than 1,000 square feet	10.0%	0.0%	0.0%	2.4%
	1,000 to 1,500 square feet	20.0%	0.0%	25.0%	19.0%
	1,501 to 2,000 square feet	30.0%	0.0%	31.3%	42.9%
	2,001 to 3,000 square feet	20.0%	0.0%	37.5%	21.4%
	More than 3,000 square feet	20.0%	100.0%	6.3%	14.3%
	Respondents (n)	10	4	16	42
People living in house full time	1	10.0%	0.0%	22.2%	27.9%
	2	60.0%	50.0%	44.4%	37.2%
	3	10.0%	0.0%	11.1%	18.6%
	4	10.0%	0.0%	11.1%	14.0%
	5	0.0%	25.0%	11.1%	2.3%
	6	0.0%	0.0%	0.0%	0.0%
	7	10.0%	25.0%	0.0%	0.0%
	8	0.0%	0.0%	0.0%	0.0%
	Respondents (n)	10	4	18	43

Source: Question HC1-HC12.

Note: Totals may not sum to 100 percent due to rounding.

2.4.2 Marketing Practices

Marketing of the Online Evaluation is conducted by Black Hills Energy and primarily consists of bill inserts and an online presence on the Black Hills Energy website.

The In-home Evaluation outreach is managed by Energy Smart Colorado partners in areas where they exist. Leads will also come from high bill concerns made to Black Hills Energy and ATEC. Black Hills Energy also provides program outreach and marketing.

2.4.2.1 Online Evaluation

Table 10 below shows the sources of program awareness that online evaluation respondents identified in our survey. More than half of the respondents heard about the Online Evaluation from the utility. The participants who did not hear about the program from the utility did research online and found the program or heard about it from a contractor.

Table 10. Sources of Awareness for Online Participants

Source of Awareness	Respondents (n)	Percent
Utility	14	56.0%
General website/online	7	28.0%
Contractor	3	12.0%
Other-specify	1	4.0%
Respondents (n)	25	25

Note: Percentages will not sum to 100 percent as multiple answers per respondent were permitted.

Source: PI1

2.4.2.2 In-Home Evaluation

Results from the previous evaluation showed that 74 percent of respondents heard of the Colorado gas in-home evaluation program from the utility. In 2019, the utility was still the primary source of program awareness. However, sources of awareness for participants in the Colorado gas distribution Level 2 & 3 evaluation were much more varied.

Table 11. Sources of Awareness for In-Home Evaluation Participants

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Utility	80.0%	100.0%	68.4%	18.8%
Word of mouth	10.0%	0.0%	21.1%	14.6%
Other-specify	0.0%	0.0%	26.3%	39.6%
General website/online	0.0%	0.0%	0.0%	8.3%
Contractor	0.0%	25.0%	10.5%	12.5%
Newspaper ad	10.0%	0.0%	0.0%	14.6%
Local government, community or non-profit agency	0.0%	0.0%	0.0%	10.4%
In-store display or signage	0.0%	0.0%	0.0%	2.1%

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Salesperson	0.0%	0.0%	0.0%	4.2%
TV advertising	0.0%	0.0%	0.0%	2.1%
Home builder, developer, real estate agent	0.0%	0.0%	0.0%	2.1%
Respondents (n)	10	4	19	48

Note: Percentages will not sum to 100 percent as multiple answers per respondent were permitted.

Source: PI1

Specific sources of program information from the utility are shown in Table 12. The utility bill inserts continue to generate interest in the in-home evaluations, especially from gas distribution customers. The proportion of participants selecting each source indicates that multiple types of utility methods are needed to reach a larger percentage of all customers.

Table 12. Utility Methods for In-Home Evaluation Outreach Mentioned by Respondents

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Utility bill insert	37.5%	33.3%	69.2%	62.5%
Utility newsletter or direct mailing	25.0%	0.0%	15.4%	37.5%
Utility call center or program staff	12.5%	33.3%	23.1%	25.0%
Utility website	25.0%	33.3%	0.0%	0.0%
Utility email	12.5%	0.0%	7.7%	12.5%
Respondents (n)	8	3	13	8

Note: Percentages will not sum to 100 percent as multiple answers per respondent were permitted.

Source: PI2

2.4.2.3 Use of Black Hills Energy Website

As expected, a high proportion of the online evaluation participants visited the Black Hills Energy website for energy efficiency information. For most of the in-home evaluation segments, at least 45 percent of participants visited the website. Those who did visit the website rate the usefulness between 6.0 and 8.5 on average.⁴

Table 13. Proportion of Participants Visiting the Black Hills Energy Website

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3	Online kits
Yes	50.0%	33.3%	47.4%	46.7%	66.7%
No	37.5%	66.7%	52.6%	53.3%	30.0%
Do not have internet access	12.5%	0.0%	0.0%	0.0%	3.3%

⁴ Provided a rating of 7 or higher on a scale of 0 to 10, where 0 is “not at all useful” and 10 is “very useful.”

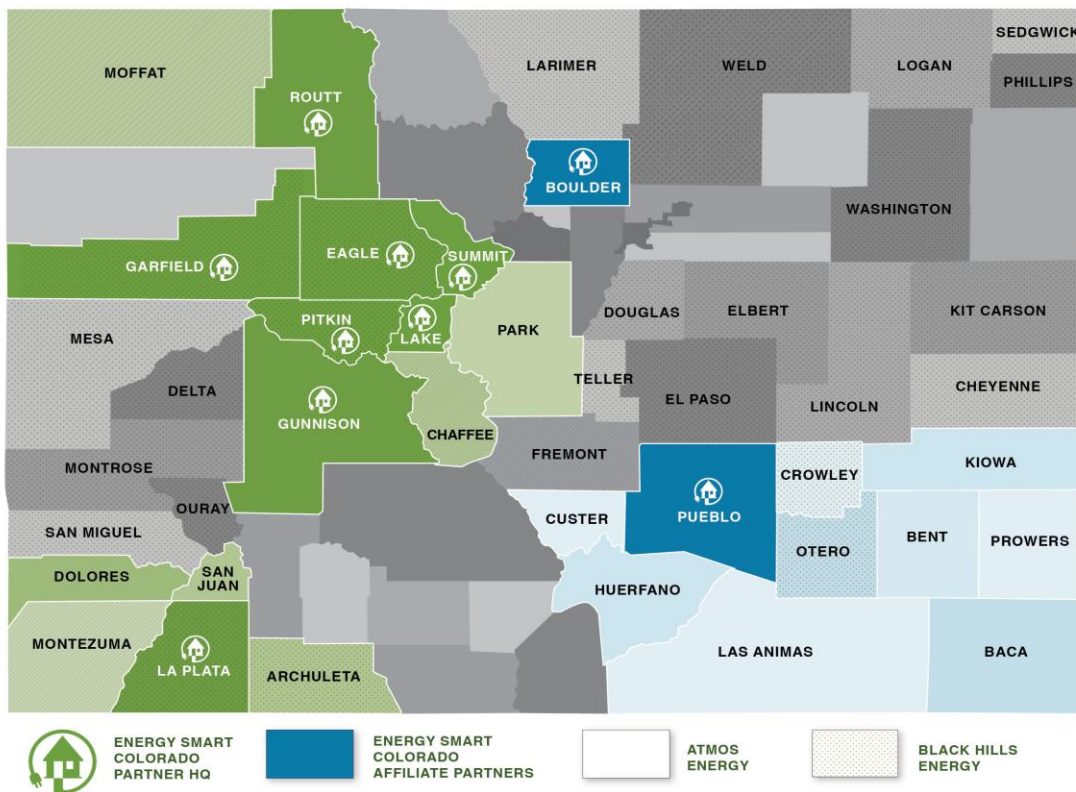
	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3	Online kits
Respondents (n)	8	3	19	45	30
Mean Usefulness	8.5	6.0	6.2	7.7	7.4
Respondents (n)	4	1	9	20	19

Source: BHE1 and BHE2

2.4.3 Program Experience

The program delivery in the Colorado gas and Colorado gas distribution territories differs from program delivery in other areas. For most other Black Hills Energy evaluation programs, the energy evaluation or assessment staff are employed by the selected program implementer. In the gas and gas distribution territories, Energy Smart Colorado is managing the process, but they contract with several third-party groups and individuals to deliver the in-home energy evaluations.

Figure 3. Energy Smart Colorado Partner Coverage



One challenge that Energy Smart Colorado experienced when they took over the program management was finding BPI certified analysts in the eastern plains communities. This partially explains the lower participation rates in the gas territory compared with the gas distribution territory. Energy Smart Colorado feels they have resolved this particular challenge. Based on the tracking data, about half a dozen partners complete the majority of the in-home evaluations.

Table 14. In-Home Evaluation Partner Activity Levels

Auditor Company	Eagle River/Vail Valley	Energy Smart Colorado	Four Corners	Roaring Fork/ Crystal River Valley	Total
A Tight House	1			80	81
About Saving Heat SM				12	12
Active Energies	37			3	40
Building Performance Contractors				9	9
Cady & Associates Inc				82	82
CLEARresult Consulting, Inc.		9			9
CSU Extension		1			1
Deeper Green Consulting	6				6
E3 Power		69			69
Efficiency Colorado	21				21
Efficiency Insights, LLC		1			1
Home Inspection Colorado, LLC		1			1
Independent Home Energy Raters		27			27
Intention Architecture	40				40
Lotus Energy Solutions		5			5
Lundquist Architectural Engineering PLLC	13				13
Pinnacle Building Performance			5		5
Revolution Energy				38	38
Total Projects by Territory	118	113	5	224	460
Completed Interviews by Territory	3	2	1	3	9

Most energy evaluators or auditors involved in the program have plenty of experience and have been with the program for several years or since it started in their area (at the latest, early 2018). In terms of their role in the program, all who were interviewed did energy evaluations that included small direct install measures. None of those interviewed were involved in marketing or other services for the program. Energy evaluators typically reported doing anywhere between 20 and 100 energy evaluations in the past year. Most (7 out of 9) reported that they never do a basic walkthrough level energy evaluation, but always do a Level 2 & 3 level evaluation. In addition to the Black Hills Energy evaluation, they reported involvement in new construction work, HERS ratings, retrofit work, additions, and remodeling.

2.4.3.1 Reasons for In-Home Evaluation Participation

Table 15 shows the primary reasons respondents gave for having an in-home evaluation. The most common reason was an interest in reducing energy bills, followed by energy savings, and a curiosity about their home's efficiency. Reduce energy bill was the most common response among customers receiving only the in-home evaluation, while Levels 2 & 3 also cited curiosity about home's efficiency.

Table 15. Primary Reason for In-Home Evaluation

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Reduced energy bill	60.0%	50.0%	73.7%	28.0%
Energy savings	30.0%	25.0%	52.6%	32.0%
Curious about home's efficiency	50.0%	50.0%	21.1%	44.0%
Other-specify	10.0%	0.0%	15.8%	26.0%
The financial incentive (rebate or payment for participating)	20.0%	25.0%	5.3%	16.0%
Improved home comfort	20.0%	25.0%	15.8%	10.0%
Needed new equipment	10.0%	25.0%	5.3%	2.0%
Protecting the environment	0.0%	0.0%	5.3%	16.0%
Respondents (n)	10	4	19	50

Note: Percentages will not sum to 100 percent as multiple answers per respondent were permitted.

Source: PI12.

Since participating in the in-home evaluation program, at least 40 percent of walk-through evaluation participants in both territories feel they have more control over their energy bills. Colorado gas distribution Level 2 & 3 evaluation participants were the most likely to feel that they have more control after participating (64 percent). Just one of the walk-through evaluation participants in the gas distribution territory felt they had less control of their energy bills after the evaluation.

Table 16. The Amount of Control Participants Reported After the In-Home Evaluation

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3	Online kits
Less control	0.0%	0.0%	5.3%	0.0%	0.0%
About the same	60.0%	50.0%	52.6%	36.4%	41.9%
More control	40.0%	50.0%	42.1%	63.6%	58.1%
Respondents (n)	10	4	19	44	31

2.4.3.2 Kit Contents Installed

As part of the participation in the online evaluation, customers could request to receive a kit with energy-saving equipment such as water-saving devices, furnace filter alarm, digital thermometer, and flow rate test bag.

Of the 30 online customers who received a kit and completed a survey, three respondents did not recall receiving the kit. For those who did recall receiving a kit, the most popular item installed was the low-flow showerhead (installed by 14 of the 27 who recalled the kit) followed by the kitchen aerator (installed by 10) (Table 17). Most items that participants reported installing are still installed, although a few showerheads have been removed. All but one customer has at least one of the kit items still installed.

Table 17. Online Evaluation Kit Contents Installed

	Installed	Still installed
Low-flow showerhead	14	10
Kitchen aerator	10	10
Furnace filter alarm	8	4
Digital thermometer	6	5
Bath aerator	8	7
Weatherstripping or caulk	4	4
Respondents (n)	24	22

Source: RO1, RO2.

2.4.3.3 Equipment Recommendations Implemented from the In-Home Evaluations

Information regarding recommendations from each in-home evaluation was not readily accessible, so participants were asked what recommendations they recalled from their evaluation visit and report (Table 18) and which of those recommendations they have acted upon (Table 20). In-home evaluation participants were most likely to recall changing out incandescent lighting to LEDs and increasing insulation or air sealing.

Table 18. Recommendations from In-Home Evaluations

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Change out incandescent lighting to LEDs	44.4%	50.0%	44.4%	65.3%
Increase insulation or air sealing (infiltration and attic bypass)	22.2%	100.0%	33.3%	59.2%
Install water-saving devices such as low flow showerheads and faucet aerators	0.0%	25.0%	27.8%	22.4%
Install new windows or doors	22.2%	0.0%	16.7%	22.4%
Upgrade water heater	11.1%	50.0%	11.1%	16.3%
Upgrade furnace or boiler	0.0%	25.0%	16.7%	22.4%
Install ENERGYSTAR® dishwasher	0.0%	0.0%	5.6%	16.3%
Install ENERGYSTAR® clothes washer	0.0%	0.0%	0.0%	10.2%
Replace air conditioning system	0.0%	0.0%	11.1%	4.1%
None of the above	11.1%	0.0%	11.1%	2.0%
Respondents (n)	9	4	18	49

Source: Question RE11

Note: Totals may not sum to 100 percent as respondents could select more than one answer.

More than 75 percent of those who received recommendations from the in-home evaluation said they followed through with at least one recommended action.

Table 19. Proportion Following Through on Evaluation Recommendations

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Yes	75.0%	100.0%	81.3%	83.0%
No	25.0%	0.0%	18.8%	17.0%
Respondents (n)	8	4	16	47

Individual recommendations most often followed through with included switching out incandescent light or adding rebated measures such as increasing insulation or air sealing.

Table 20. Actions Taken Based on Evaluation Recommendations

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Change out incandescent lighting to LEDs	33.3%	25.0%	46.2%	69.2%
Increase insulation or air sealing (infiltration and attic bypass)	0.0%	100.0%	23.1%	35.9%
Install water-saving devices such as low flow showerheads and faucet aerators	0.0%	0.0%	30.8%	12.8%
Install new windows or doors	33.3%	0.0%	0.0%	12.8%
Upgrade water heater	0.0%	50.0%	7.7%	10.3%
Install ENERGYSTAR® clothes washer	0.0%	0.0%	0.0%	7.7%
Install ENERGYSTAR® dishwasher	0.0%	0.0%	0.0%	5.1%
Upgrade furnace/boiler	0.0%	0.0%	0.0%	2.6%
None of the above	0.0%	0.0%	15.4%	5.1%
Respondents (n)	6	4	13	39

Source: Question RE13

Note: Totals may not sum to 100 percent as respondents could select more than one answer.

Most in-home evaluation respondents made changes to reduce energy bills and save energy. A few others installed the recommended measures to improve home comfort or protect the environment.

Table 21. Primary Reasons Participants Followed Through on Evaluation Recommendations

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Reduced energy bill	33.3%	75.0%	54.5%	56.8%
Energy savings	66.7%	100.0%	63.6%	56.8%
Improved home comfort	16.7%	0.0%	9.1%	21.6%
Other-specify	16.7%	25.0%	18.2%	13.5%
Protecting the environment	16.7%	0.0%	18.2%	21.6%

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Rebate was available	0.0%	0.0%	0.0%	2.7%
The auditor recommended that it be done	0.0%	0.0%	9.1%	2.7%
Respondents (n)	6	4	11	37

2.4.3.4 Behavior Recommendations Implemented from the In-Home Evaluation

Along with recommendations to upgrade equipment to be more energy-efficient, participants were also given many tips on how they can change household behaviors to save energy and money. The proportion of respondents recalling recommendations for energy-saving activities are shown in Table 22. Colorado gas distribution respondents (especially those who received a Level 2 or 3 evaluation) were more likely to remember a wider variety of recommendations than those in the gas territory. Almost half of the participants overall recall recommendations to turn off lights when not in use and clean furnace filters regularly. About one-third remembered the recommendation to look for ENERGYSTAR® labels and unplug electronics when not in use.

Table 22. Behavioral Recommendations from Evaluations

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Turn off lights when not in use	33.3%	50.0%	44.4%	38.8%
Clean furnace filter regularly	55.6%	50.0%	33.3%	38.8%
Look for ENERGYSTAR® labels on appliances	11.1%	25.0%	38.9%	49.0%
Unplug electronics when not in use or use power strips	22.2%	25.0%	27.8%	34.7%
Close off rooms when not in use	0.0%	0.0%	27.8%	28.6%
Use drapes or shades to stay cool in summer or warm in winter	11.1%	0.0%	16.7%	36.7%
Lower water heater temperature	11.1%	25.0%	22.2%	32.7%
Conduct maintenance on furnace or boiler	22.2%	25.0%	16.7%	26.5%
Install or use a setback programmable thermostat	11.1%	0.0%	33.3%	32.7%
Wash clothes in cold water or take shorter showers	11.1%	0.0%	16.7%	24.5%
None of the above	11.1%	0.0%	11.1%	2.0%
Respondents (n)	9	4	18	49

Source: Question RE11

Note: Totals may not sum to 100 percent as respondents could select more than one answer.

In line with the recommendations that respondents remembered from the evaluation, about 40 percent of respondents overall reported cleaning their furnace filters regularly. Between one-third and one-half turn off lights when not in use, and another one-third look for ENERGYSTAR®

labels on appliances and unplug electronics when not in use, although these are activities focused on electric savings.

Table 23. Behavioral Actions Taken Based on Evaluation Recommendations

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Turn off lights when not in use	33.3%	50.0%	46.2%	33.3%
Clean furnace filter regularly	16.7%	50.0%	38.5%	38.5%
Look for ENERGYSTAR® labels on appliances	0.0%	25.0%	38.5%	43.6%
Unplug electronics when not in use or use power strips	33.3%	0.0%	30.8%	25.6%
Close off rooms when not in use	0.0%	0.0%	38.5%	17.9%
Use drapes or shades to stay cool in summer/warm in winter	16.7%	0.0%	15.4%	23.1%
Wash clothes in cold water or take shorter showers	16.7%	0.0%	15.4%	25.6%
Conduct maintenance on furnace or boiler	16.7%	0.0%	23.1%	23.1%
Lower water heater temperature	16.7%	25.0%	15.4%	15.4%
Install or use a setback programmable thermostat	16.7%	0.0%	30.8%	20.5%
None of the above	0.0%	0.0%	15.4%	5.1%
Respondents (n)	6	4	13	39

Source: Question RE13

Note: Totals may not sum to 100 percent as respondents could select more than one answer

In-home evaluation respondents who made at least one behavioral or equipment improvement were asked how influential the information they received from the evaluator was in their decision to make the change using a 0 to 10 scale, where 0 is “not at all influential,” and 10 is “very influential.” On average, in-home evaluation respondents rated the influence a 7.7, similar to the 7.5 average rating from the previous evaluation. Gas distribution participants were more likely to rate the influence higher.

Table 24. Level of Evaluation Influence on Actions Taken

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Minimum	1.0	1.0	3.0	4.0
Maximum	10.0	9.0	10.0	10.0
Mean	7.0	6.3	7.8	7.8
Respondents (n)	6	4	11	37

Gas saving activities that respondents are most likely to act on in the future include cleaning the furnace filter and washing clothes in cold water or taking shorter showers (mean likelihood score

of 9.0 or higher⁵). Closing off rooms when not in use and using drapes or shades to control temperature are also likely activities with mean ratings of 7.0 or higher.

Table 25. Mean Likelihood that Respondents will Act on Evaluation Recommendations

		BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO – walkthrough	BHGD-CO - levels 2 & 3
Clean furnace filter regularly	Mean	9.5		10.0	9.8
	Respondents (n)	4		1	4
Wash clothes in cold water or take shorter showers	Mean			10.0	10.0
	Respondents (n)			1	2
Close off rooms when not in use	Mean				8.0
	Respondents (n)				7
Conduct maintenance on furnace or boiler	Mean	10.0	2.0		6.3
	Respondents (n)	1	1		4
Use drapes or shades to stay cool in summer/warm in winter	Mean			10.0	7.3
	Respondents (n)			1	9
Install or use a setback programmable thermostat	Mean			9.0	5.5
	Respondents (n)			2	8
Increase insulation or air sealing (infiltration and attic bypass)	Mean	3.5		4.0	6.1
	Respondents (n)	2		3	15
Install water-saving devices such as low-flow showerheads and faucet aerators	Mean		1.0	9.0	5.0
	Respondents (n)		1	1	5
Upgrade water heater	Mean	5.0		5.0	4.8
	Respondents (n)	1		1	4
Install new windows or doors	Mean			3.7	5.5
	Respondents (n)			3	6
Lower water heater temperature	Mean			10.0	3.0
	Respondents (n)			2	10
Upgrade furnace/boiler	Mean		8.0	2.7	2.4
	Respondents (n)		1	3	9

Source: PI19, PI20.

When asked what the program could do to make it more likely for respondents to act on the recommendations or improvements, many respondents were happy with their program

⁵ On a scale of 0 to 10, where 0 is “not at all likely” and 10 is “very likely.”

experience. Those who had suggestions mentioned providing larger rebates or financial assistance for items, checking in after the evaluation to make sure they received their report or to see if they had any questions, and providing more information on contractors that can handle the follow-up projects.

2.4.3.5 Transition from Online Evaluation to In-Home Evaluation

All 31 online evaluation respondents were asked their awareness of in-home evaluations and the different evaluation levels. Fourteen online evaluation respondents were aware of the walkthrough evaluation, while fewer were aware of the Level 2 & 3 evaluations. Respondents who were aware of the in-home evaluations were asked if they have participated in the in-home evaluation; half of those aware of the free walk-through said they had one.

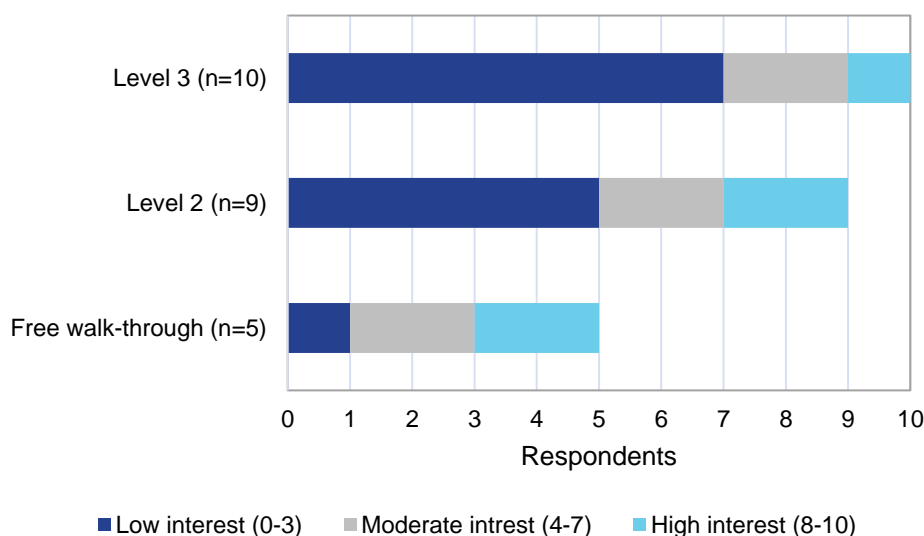
Table 26. Awareness and Participation in In-Home Evaluation

	Aware	Participated
Free walk-through home energy evaluation	14	7
(Level 2) whole-home evaluation with blower door test	9	2
(Level 3) whole-home evaluation with test-out verification	4	1

Source: PI19, PI20.

Respondents who were aware of the in-home evaluations but have not participated were asked their level of interest (using a 0 to 10 scale) in participating in the in-home evaluation levels. In general, respondents had low interest in the in-home evaluation, with only five of the 24 respondents rating their interest as high among the different evaluation levels (an 8 or higher).

Figure 4. Level of Interest in the In-Home Evaluations*



*Source: PI21

2.4.4 Program Interactions

Separate businesses implement the online and in-home components of the Residential Evaluation program.

2.4.4.1 Online Evaluation

Black Hills Energy staff have regular interactions with the Online Evaluation implementer, Uplight. Black Hills Energy and the implementer meet quarterly to discuss program status and ideas for improving the Online Evaluation and to match up recommendations with current program offerings and available rebates. The implementer provides direct access to participation data from their customer site to Black Hills Energy, and staff can download information as needed.

Online Evaluation participants do not have any direct contact with the implementer. However, Black Hills Energy does provide follow-up contact with customers who have completed the Online Evaluation, and participants often initiate contact with Black Hills Energy after completing the Online Evaluation to schedule an in-home evaluation.

2.4.4.2 In-Home Evaluation

Energy Smart Colorado is the implementer for the in-home evaluation. For scheduling purposes, Energy Smart Colorado sends leads to the evaluation contractors, who then take full responsibility for scheduling the in-home energy evaluations. The geographical distance between appointments is not a major issue for any of the evaluators. Many evaluators travel up to one hour each way for audits. They mentioned that the travel time is part of living in a rural area. However, one evaluator did note that he makes sure to confirm appointments for the basic walkthrough level evaluations because he has had problems with arriving and nobody being present.

The time needed to complete an energy evaluation varies among evaluators. The most common answer was about three to four hours, with estimates as short as two hours and as long as seven hours. They stressed that every house is different and that the size of the home is a major factor in the time needed. These estimates all refer to Level 2 & 3 energy evaluations. An evaluator estimated that a basic walkthrough takes about an hour. In addition, writing up an energy evaluation report generally takes at least two hours, with the potential to take up to several hours for exceptionally large homes.

The energy evaluators fill out a form designed by Energy Smart Colorado that populates the Black Hills Energy form. Generally, feedback about the form was positive in that it is comprehensive and easy to use. There were no common issues with the report, but a few noted the report is short on room for large homes, limited on the amount of photos that can be added, the output is not necessarily customer-friendly, it is missing functionality for different heating zones in a home, it could use more space to make notes about heat tape/snow melt systems, and it could contain calculations beyond the shortest payback period to present alternative options for customer action. Regarding automation in the report, energy evaluators suggested filling in the gas usage, which the energy evaluators noted could be obtained but required a lot of work. However, one evaluator already thought this was in place.

2.4.5 Program Satisfaction and Recommendations

At least 70 percent of In-Home Evaluation participants are very or extremely satisfied with overall service from Black Hills Energy. Most participants said they have never had any issues with Black Hills Energy service and appreciate the customer service they receive.

Table 27. Overall Satisfaction with Black Hills Energy Service

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3	Online kits
Extremely satisfied	30.0%	25.0%	21.1%	15.2%	32.3%
Very satisfied	70.0%	50.0%	47.4%	73.9%	45.2%
Somewhat satisfied	0.0%	25.0%	26.3%	8.7%	22.6%
Not at all satisfied	0.0%	0.0%	5.3%	2.2%	0.0%
Respondents (n)	10	4	19	46	31

Source: Question SAT11

Some specific responses regarding why participants rated Black Hills Energy service highly are listed below:

"I had two occasions on two different houses where I needed help with something, and Black Hills Energy sent someone out, I believe, same day. Both had to do with the meter, and they came and immediately fixed it for free, which was pretty awesome."
(Online Evaluation participant)

"They've replaced meters and are good at maintaining their equipment. They inform you before the bill comes, so it is advance, and they have auto bill pay." (BHCOG Walk-through Evaluation participant)

"Because usually when I have a problem with my appliances, they are very responsive and come out and fix it." (BHCOG Level 2 & 3 Evaluation participant)

"Because I never had a problem with them, no outages leaks. I can look at my account online." (BHGD-CO Walk-through Evaluation participant)

"Because gas is a much cheaper way to heat your home, when I call in, I can always speak to somebody, and the billing online is easy to navigate." (BHGD-CO Level 2 & 3 Evaluation participant)

Most of the participants who had an online or in-home evaluation have recommended or would recommend the program to others. One Colorado gas Level 2 & 3 participant felt the "cost for the evaluation was way too high for the rebates you are getting." A couple of the Colorado gas participants do not intend to recommend the program since they did not find the evaluation useful, or the energy evaluator was not friendly.

Table 28. Number of Participants Who Would Recommend the Program

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3	Online kits
Have recommended	4	0	7	23	4
Would recommend	6	3	8	23	19
Will not recommend	0	1	3	2	5
Respondents (n)	10	4	18	48	31

Source: Questions SAT9 and SAT10
Online had a few Don't Know and Refused responses

Overall, customers participating in the in-home evaluations rated the type of information they received highly. On a 0 to 10 scale, where 0 is “not at all useful” and 10 is “very useful,” average ratings from participants in the Colorado gas distribution territory are generally higher than from participants in the Colorado gas territory.

Table 29. Usefulness of the Information Received for In-Home Participants

		BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
The type of information provided by the energy evaluator during the visit	Mean	6.6	6.0	7.1	7.8
	Respondents (n)	10	4	19	50
The type of information provided in the written report	Mean	8.1	6.5	7.0	8.1
	Respondents (n)	8	4	18	49

Source: RE10a, RE10b.

Participants in the in-home evaluations were asked if the evaluation addressed the issues that motivated them to participate in the first place. More than half (56 and 50 percent) of the Colorado gas participants felt the energy evaluation addressed the issues they had. The Colorado gas distribution Level 2 & 3 participants were most likely to feel the energy evaluation provided what they needed (84 percent).

Table 30. In-Home Energy Evaluation Addressed Issues Motivating Participation

	BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
Yes	55.6%	50.0%	63.2%	84.0%
No	33.3%	0.0%	26.3%	10.0%
Somewhat or partially	11.1%	50.0%	10.5%	6.0%
Respondents (n)	9	4	19	50

Source: Question RE2

Note: Totals may not sum to 100 percent due to rounding.

When participants said the energy evaluation did not address the issues they expected, participants were asked why not. A few of the reasons are listed below:

“Well, he didn't have any suggestions on how to save energy, said close blinds, etc. but nothing really that we weren't already doing. He said to tune the furnace. But really not much said.” (BHCOG Walk-through participant)

“Not charging so much to have the evaluator to come out the 1st time. Not charging for 2nd visit pre blower door and post blower door test. Pre blower door \$250 and post blower door test was \$200. The rebate at the end was not even remotely worth it - only \$15.” (BHCOG Level 2& 3 participant)

“Well, I think if there were specific things I could concentrate on that were using excessive energy. I don't remember anything besides some insulation needing to be reinstalled, but besides that, it was not very specific. They didn't talk about windows or doors losing energy or anything like that.” (BHGD-CO Walk-through participant)

“One of the things that was really upsetting to me was the guy that came out didn't go into the attic to check the insulation. And he said later that he couldn't find it but he could of just asked me. Other people have been in my home and haven't had issues finding the attic.” (BHCOG Level 2& 3 participant)

“The representative was very smart and professional, but I would've liked more energy-saving ideas.” (BHCOG Level 2& 3 participant)

2.4.5.1 Online Evaluation

Online Evaluation respondents were asked a series of questions to gauge their satisfaction with various aspects of the Online Evaluation and their experience with the program overall. Respondents were asked to rate their satisfaction on a scale of 0 to 10, where 0 is “not at all satisfied,” and 10 is “very satisfied.” The table below shows the mean scores for each program aspect, along with the program overall. Respondents were generally satisfied with the program, the evaluation, and the kit they received through the program. Compared with average satisfaction ratings from 2016, the 2019 participants reported higher average satisfaction on all program aspects.

Table 31. Satisfaction Levels for Various Aspects of the Online Evaluation Program

	2016 mean	Respondents (n)	2019 mean	Respondents (n)
The program overall	6.9	15	7.6	29
The time you had to wait to receive your kit	8.0	15	9.0	24
The information provided through the evaluation process	6.7	11	7.5	28
The equipment provided as part of the kit	5.8	14	7.4	24

Source: Question SAT3

When respondents were asked what they liked best about the program, the most common response was the energy-saving tips and ideas (7 participants). Respondents also liked the

energy savings (5 participants), the free kit of items, and the ease of the online evaluation (3 participants each), and the information on rebates and the fact that it was free were mentioned by two participants.

Alternatively, respondents were also asked about one thing they would change about the program. The majority of respondents (19 respondents) did not know of anything they would change. Four respondents suggested more customized kits that include items each customer can use (fewer faucet aerators, more showerheads). Other suggestions included a better combo electric and gas audit as well as better information on how to set programmable thermostats.

2.4.5.2 In-Home Evaluations

Satisfaction with in-home evaluations remains high. In addition, almost all participants have or will recommend the program to others.

Table 32. Satisfaction Levels for Various Aspects of the In-Home Evaluation

		BHCOG - walkthrough	BHCOG - levels 2 & 3	BHGD-CO - walkthrough	BHGD-CO - levels 2 & 3
The program overall	Mean	7.6	6.3	7.4	8.9
	Respondents (n)	10	4	19	47
The scheduling of your free energy evaluation	Mean	8.7		8.7	
	Respondents (n)	9		19	
The number of days you had to wait before an auditor came to your house	Mean	7.9	7.7	7.4	9.1
	Respondents (n)	8	3	18	40
The friendliness and helpfulness of the auditor	Mean	9.0	8.8	9.4	9.5
	Respondents (n)	10	4	18	47
The knowledge of the auditor	Mean	8.3	8.0	8.4	9.2
	Respondents (n)	10	4	16	46
The information the auditor gave you throughout the evaluation process	Mean	8.4	8.0	8.2	8.6
	Respondents (n)	8	4	19	47
The equipment left with you or installed in your home	Mean	8.0	1.0	8.3	8.4
	Respondents (n)	3	1	10	37
The scheduling of your comprehensive test-in evaluation	Mean		8.5		9.0
	Respondents (n)		4		46
The availability of scheduling a test-out evaluation	Mean		8.7		8.9
	Respondents (n)		3		40

Source: Question SAT2, SAT7

When respondents were asked what they liked best about the program, many of the responses focused on the amount the participants learned about the current level of efficiency of their

homes, what else they could do and the knowledgeable and friendly energy evaluators. Examples of respondent feedback are provided below:

BHCOG Walk-through participant:

"An objective party to look at home to suggest improvements and efficiencies."

BHCOG Level 2 & 3 participants:

"They pinpointed things that could be done, very actionable items."

"We got really good photos of where the house was not efficient."

BHGD-CO Walk-through participants:

"They installed a lot of devices that saved me a lot of money; the maintenance info given to me regarding the furnace and water heater was very helpful in helping me save money."

"It was nice to know we were doing what we could. We'd done mostly all the recommended suggestions."

"The ability to have someone come out to the house because of living in a rural area."

BHGD-CO Level 2 & 3 participants:

"I like all of it. I just think the more you know about your home, the better you can take care of it."

"I like that I got expert knowledge for free, and the auditor I had was super friendly."

"It was a good value. It costs \$100, and the thermostat was at least \$100."

"It's nice to have actual facts and to give us a plan of action of what we can do in the future."

"Just getting an expert's opinion and testing in different areas of the home."

"Looking forward to implementing some recommendations and interested in rebates."

"I liked receiving evaluations, so I could chip away and that I have a list to get back to."

"That I was treated well, and even if I asked questions, he would backtrack and answer them."

Alternatively, respondents were also asked about one thing they would change about the program. While many participants said they had no suggestions for changes to the program, those who did suggest changes thought they could have received more information, wanted more information on rebates, or they would have liked more guidance on equipment or contractors.

BHCOG Walk-through participant:

"I would like to have received a hand-out packet of all applicable energy rebates or know a little more of what to expect. I was not given any information on what to expect from the auditor."

BHCOG Level 2 & 3 participants:

"The cost for the evaluation and to add attic insulation as one of the rebates."

"Provide options to solve the problems."

BHGD-CO Walk-through participants:

"Maybe that they recommend contractors for the insulation I need to install or if he sat down with me for which water heater and furnaces would be best."

"More consulting. A follow up to the report would be nice."

BHGD-CO Level 2 & 3 participants:

"It would be helpful if they could make the list of recommendations and someone to help me put the recommendation into action, like helping set up an appointment with the auditor."

"More information on rebates."

"Needs to be more interactive with the type of housings available and provide more than a checklist."

2.5 IMPACT RESULTS

This section presents the impact results of the in-home portion of the Residential Evaluation Program. The impact evaluation included net-to-gross (NTG) research, a deemed savings review, and assessment of installation rates.

2.5.1 Net-to-Gross

The NTG research for the Residential Evaluation program included an assessment of free-ridership and participant spillover indicators through customer self-reports from the participant survey and a secondary review of NTG estimates from programs similar to the Residential Evaluation program. NTG is calculated as follows:

$$NTG \text{ ratio} = (1 - \text{free-ridership}) + \text{spillover}$$

The evaluation team recommends continuing to use an NTG ratio of 90 percent. Results from the self-report and benchmarking effort support this recommendation. Also, the number of self-reports for NTG is extremely low, so results should be used with caution. Table 33 and Table 34 show the NTG results for both 2016 and 2019.

Table 33. 2016-2019 Net-to-Gross Results—Residential In-Home Evaluation Program BHCOG

Program	2016				2019			
	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG (1 - FR + SO)	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG (1 - FR + SO)
In-home evaluation	52	65.50%	5.20%	39.70%	1	0.00%	1.90%	101.90%

Table 34. 2016-2019 Net-to-Gross Results—Residential In-Home Evaluation Program BHGD-CO

Program	2016				2019			
	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG (1 - FR + SO)	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG (1 - FR + SO)
In-home evaluation	52	65.5%	5.2%	39.7%	6	22.8%	1.3%	78.5%

2.5.1.1 Free-Ridership

The participant survey, targeted at participating customer decision-makers, asked a limited series of structured questions about actions that participants would have been taken in the absence of the program to assess free-ridership for direct install measures. Free-ridership was evaluated at the measure-category level. Respondents were first asked questions to establish the project context and verify the installation of measures. Those who confirmed installation were then asked a series of questions to assess the impact the program had on the installation and timing of the measures installed. A free-ridership rate was calculated for each installed measure for each participant, following the scoring algorithm presented in Appendix A.

One respondent confirmed the installation of one program measure (pipe insulation). Three measure-level responses were collected; however, two were for measures not in the program tracking data and were excluded from NTG analysis.

Overall, the participant self-report resulted in zero free-ridership. The one respondent said they would not have installed the pipe insulation at the same time or in the future if they had not received them from the program. This result should be viewed with extreme caution due to the very small sample size.

Table 35. Self-Report Free-Ridership Results—Residential Evaluation Program BHCOG

Measure	Respondents (n)	Free-ridership estimate	90% CI (+/-)*
Pipe insulation	1	0.0%	N/A
Overall	1	0.0%	N/A

*Confidence intervals are not shown where the number surveyed is less than 10.

Respondents confirmed the installation of a total of six program measures. A total of 37 measure-level responses were collected; however, 31 were for measures not in the program tracking data and were excluded from NTG analysis. The 31 measures not in the tracking data were electric measures, primarily LEDs.

Overall, the participant self-reports resulted in an average free-ridership rate of 23 percent. Five of the six respondents said they would not have installed these measures at the same time if they had not received them from the program, but because four respondents said they would have installed the measures at a later date within one year of participation, this increased free-ridership. Weatherstripping had the highest self-report free-ridership rates (44 percent), but this was lower than the free-ridership rate of 83 percent reported in 2016. Free-ridership rates were zero for aerators and low-flow showerheads. Measure-level results should be viewed with caution due to the very small sample size.

Table 36. Self-Report Free-Ridership Results—Residential Evaluation Program BHGD-CO

Measure	Respondents (n)	Free-ridership estimate	90% CI (+/-)*
Faucet aerators	1	0.0%	N/A
Low-flow showerheads	2	0.0%	N/A
Weatherstripping	3	43.9%	N/A
Overall	6	22.8%	N/A

*Confidence intervals are not shown where the number surveyed is less than 10.

2.5.1.2 Participant Spillover

In addition to free-ridership, the participant survey included a series of questions designed to measure spillover. Spillover refers to purchases of energy-efficient equipment since participation that were made *without* any financial assistance from Black Hills Energy because of the customer's participation in the Residential In-home Evaluation program. A participant spillover estimate is computed based on energy savings from energy-efficient equipment the customer installed on their own since participating because of their experience with the program. To estimate spillover savings, the evaluation reviewed the energy-efficient equipment mentioned against equipment available for rebates through a Black Hills Energy program. The algorithm used to calculate individual spillover rates is documented in Appendix A.

The participant survey identified a 1.9 percent overall Colorado gas participant spillover rate. Only one respondent had gas spillover savings attributable to the Residential In-home Evaluation program (water heater). The participant rated the importance of their participation in the program on their purchase decision a 5 out of 10, where 0 is “not at all important,” and 10 is “extremely important.” Results should be viewed with caution due to the very small sample size.

Table 37. Self-Report Participant Spillover Results—Residential Evaluation Program BHCOG

Program	Respondents (n)	Spillover estimate	90% CL (+/-)*
Residential Evaluation program	1	1.9%	NA

*Confidence intervals are not shown where the number surveyed is less than 10.

The participant survey identified a 1.3 percent overall Colorado gas distribution participant spillover rate. Only one respondent had gas spillover savings attributable to the Residential In-home Evaluation program (water heater). The participant rated the importance of their participation in the program on their purchase decision a 10 out of 10, where 0 is “not at all important,” and 10 is “extremely important.” Results should be viewed with caution due to the very small sample size.

Table 38. Self-Report Participant Spillover Results—Residential Evaluation Program BHGD-CO

Program	Respondents (n)	Spillover estimate	90% CL (+/-)*
Residential Evaluation program	6	1.3%	NA

*Confidence intervals are not shown where the number surveyed is less than 10.

2.5.1.3 Benchmarking Research

The evaluation team compared the participant survey results with NTG ratios estimated for other direct-install or leave-behind programs with similar measures. The 2016 evaluation resulted in an NTG ratio of 40 percent. The NTG results from this year's evaluation are substantially higher at 101.9 percent. This is close to the NTG estimates from comparison programs, which most commonly ranged between 69 percent to 100 percent. The NTG ratio from other territories reviewed included Iowa, Illinois, Nevada, and Pennsylvania.

Despite having one respondent from the self-report free-ridership and spillover assessment, there was evidence of behavioral changes made due to the recommendations from the energy auditor. Twelve total Colorado gas survey respondents said they were provided recommendations from the auditor, and 10 (83 percent) of them implemented those recommendations. Sixty-four total Colorado gas distribution survey respondents said they were provided recommendations from the auditor, and 48 (75 percent) of them implemented those recommendations.

Based on the program influence, combined with the benchmarking results of similar programs, the evaluation team does not recommend adjusting the NTG estimate of 90 percent for future planning.

2.5.2 Savings Overview

The savings for the Residential Evaluation program are claimed based on the installation of energy efficiency measures in conjunction with an energy evaluation completed in-home or online. Hot Water blankets and pipe insulation, aerators for kitchens and bathrooms, low-flow showerheads, weatherstripping, and programmable thermostats are available to be installed during the onsite evaluation. Insulation and air sealing projects may follow the evaluation. A deemed savings amount is used per measure installed with the exception of the insulation and air sealing measures, which are based on the square feet.

The online audit was not originally tracked in Vision, and once entered, contained a single line item for all packages. Therefore, savings and packages cannot be tracked to each customer. A spreadsheet was delivered from the implementer, which identified the participants from Colorado and the date they participated. Table 39 and Table 40 show the number of participants tracked in Vision for Colorado Gas. The tracking system does not identify the online audits resulting in a kit being delivered versus declined. Overall, 112 participants completed the online audit, and 46 percent requested the energy efficiency kit.

Table 39. Online Evaluation 2019 participants - BHCOG

Measure	Online evaluation kit requested	Total number of online evaluations
Tracked online energy audits	35	67

Table 40. Online Evaluation 2019 participants - BHGD-CO

Measure	Online evaluation kit requested	Total number of online evaluation
Tracked online energy audits	17	45

The Residential In-home Evaluation program component was more extensive and created more engagement with each participant. The measure level quantity and energy savings claimed in the Vision data reports are shown in Table 41 and Table 42 by territory. It is separated between the measures associated with a participant who had a walkthrough evaluation and the measures associated with a Level 2 & 3 level audit.

Table 41. Residential Evaluation Gross Claimed Savings - BHCOG

Measure	Walkthrough quantity	Claimed gross dth at the meter	Level 2 and 3 quantity	Claimed gross dth at the meter
Walkthrough energy evaluation	37	333.8		
Energy audit test-in			11	107.3
Energy audit test-out			1	9.8
Hot water heater blanket	8	10.7	1	1.3
Hot water heater pipe insulation	24	6.5	8	2.2
Total		350.97		120.56

Table 42. Residential Evaluation Gross Claimed Savings - BHGD-CO

Measure	Walkthrough quantity	Claimed gross dth at the meter	Level 2 and 3 quantity	Claimed gross dth at the meter
Walkthrough energy evaluation	77	694.6		
Energy audit test-in			323	3,150.8
Energy audit test-out			1	9.8
Hot water heater blanket	11	14.8	60	80.5
Hot water heater pipe insulation	152	41.0	386	104.1
Low-flow bathroom aerator	8	4.9	13	8.0
Low-flow kitchen aerator	3	1.6	1	0.5
Low-flow showerhead	2	2.2	6	6.5
Programmable thermostat	14	41.5	38	126.6
Weatherstripping	3	4.0	14	18.4
Total		804.5		3,505.3

During 2019, the program claimed savings from the educational portion of the in-home energy evaluation, in addition to each directly installed measure. Claiming energy savings for actions taken as a result of the energy evaluation recommendations requires a significant amount of rigor to support. There are also few direct install measures claimed for the in-home evaluations. This could mean that the energy evaluations are not taking full advantage of the ability to directly install measures for participants but relying upon the actions of the resident.

2.5.3 Tracking System Review

Overall, we reviewed the tracking system to ensure that project and account numbers are unique, deemed savings values are consistently applied, and data was entered completely. This was done through an analysis of the Vision tracking data downloaded on January 6, 2020, and a comparison to a sample of documentation downloaded from Vision. The following items were found during the analysis:

- Energy savings was consistently claimed for the energy evaluation.
- Wall Insulation and attic insulation savings were claimed based on a custom calculation, although the calculation components were not available in the tracking data. The documentation reviewed showed that the energy audit identified the necessary data collected from the site.
- The hot water piping insulation measure had significant differences between the documentation and the claimed quantities.
- The age of the residence was generally collected in the energy evaluation but not always documented in the tracking system.
- The tracked area of the house generally used the blower door test area. The blower door test area includes all spaces within the envelope, which could be greater than the living space.
- One participant had a walkthrough audit previously and received a Level 2 audit in PY2019. This project claimed a full audit, although no other consultation or measures were provided outside the blower door test.
- One audit claimed a walk-through audit but actually completed a Level 2 audit.
- One audit claimed savings for a house that had electric heat.

The savings accuracy for Residential On-site Energy Evaluation program is highly dependent on the information collected through the energy evaluation and the measures installed. The data collected during the energy evaluation is generally sufficient, although the documentation in Vision of that information is not as accurate or expansive as expected. The quality control and savings verification would be more straightforward if all the information from the energy evaluation were available in Vision, although that is not always possible with data entry practices currently used. The consistent uploading of the energy evaluation report as supporting documentation is a good practice. Many of the concerns above could be addressed with a more effective and comprehensive quality control system.

The accuracy of the data for measures, quantities, heating type, and insulated areas is critical to the accuracy of the program savings. In the reviewed documentation of the sample, several discrepancies were identified, which had minimal effect on the energy savings of that individual project but could have a large effect if they occurred on other projects. Of specific note is the hot

water pipe insulation, which consistently has discrepancies across Black Hills Energy Residential Evaluation programs. The hot water pipe insulation is documented either by the linear foot of the pipe insulated or the number of lengths of six-foot insulation that are used. Ensure in-home evaluators, implementation teams, Vision managers, and Black Hills Energy program staff have a consistent understanding of the units for each measure that matches the DSM plan.

2.5.4 Installation Rates

Another step in the review process was using the phone survey data to determine the installation rates of the various measures installed as part of the online and in-home Residential Evaluation Program. Customers were asked to indicate if the items claimed in the tracking system were installed.

2.5.4.1 Online Evaluation

The installation rate of the online evaluation varied from the installation rate of the in-home energy evaluation. Participants of the online evaluation who requested a kit were also interviewed about the online evaluation. They were asked to confirm whether or not they had received the kit they requested. Ten percent of the respondents did not recall receiving a kit. If they had received a kit, they were asked which kit items they had installed.

Table 43. Installation Rates for Online Evaluation Respondents Who Received a Kit

Measure	Total quantity ⁶	Installed quantity	Removed quantity	Never installed quantity	Installation rate (%)	Previous evaluation ISR
Low-flow showerhead	24	14	4	10	42%	38%
Kitchen aerator	24	10	0	14	42%	23%
Bath aerator	24	8	1	16	29%	8%
Furnace filter alarm	24	8	3	16	21%	23%
Digital thermometer	24	6	2	18	17%	15%
Weatherstripping or caulk	24	4	0	20	17%	

Source: RO0, RO1, RO2.

These installation rates are slightly increased from the installation rate of the previous evaluation of the online kits. Most notably, the installation of low flow aerators and showerheads have dramatically increased. This may be a result of the function of improved equipment and improved direction on how and why to install these components.

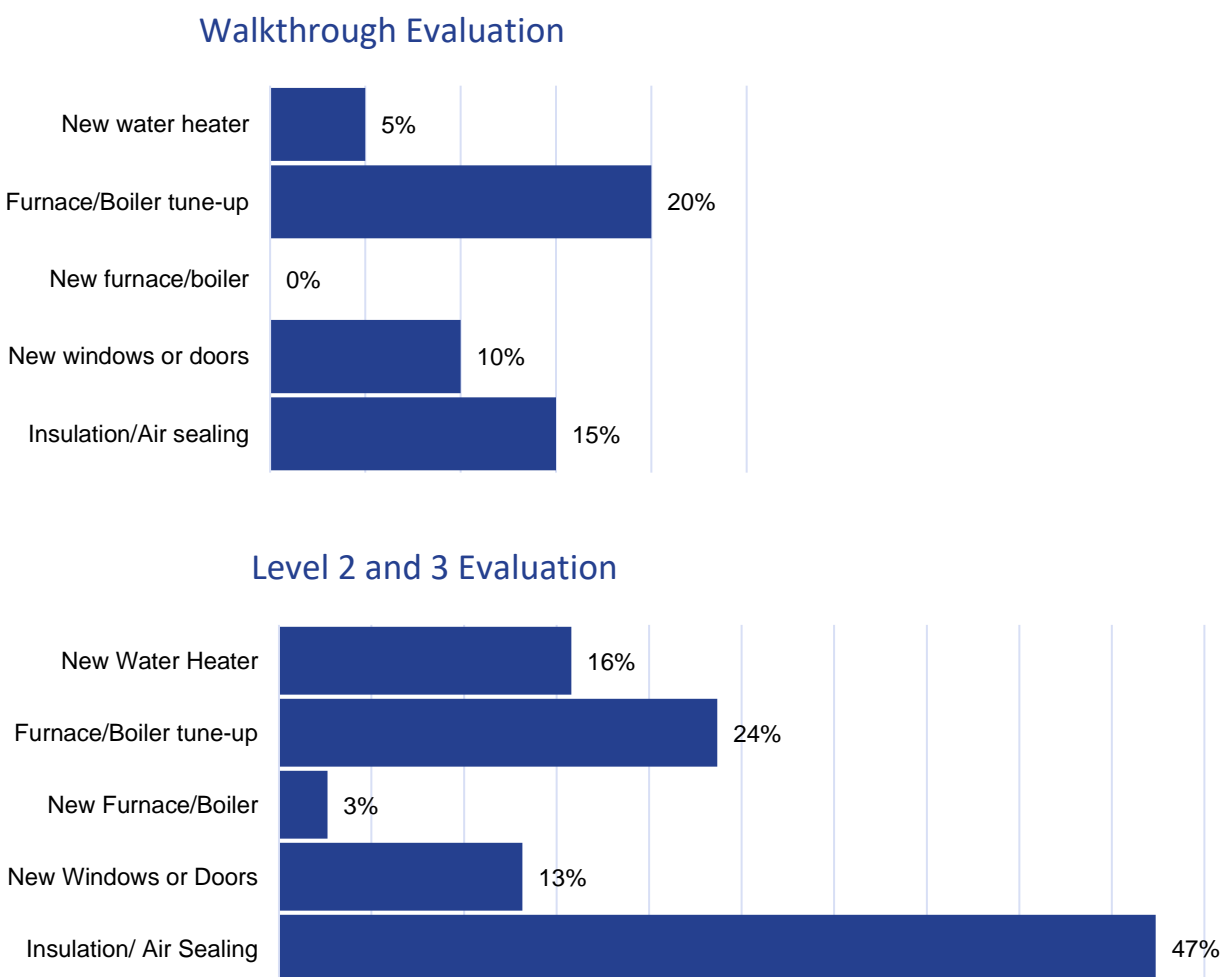
⁶ This is the total quantity of surveyed participants who received a kit.

2.5.4.2 Residential In-Home Energy Evaluation

The installation rate of the direct install measures for the in-home energy evaluation is considered to be 95 percent for the equipment claimed. The tracking system assigned the majority of the energy savings to the energy evaluation, and the survey responses are minimal regarding the equipment installed.

The survey results on the energy evaluation recommendations showed a significant difference in participant actions depending on whether they received a walk-through evaluation or a Level 2 or 3 evaluation. The installation rates of equipment following the energy evaluation is much higher for high-cost HVAC items, such as a water heater or furnace. The percentage of participants who completed a heating system tune-up remained relatively similar across the participants.

Figure 5: Follow-Up Installation Rates From Participants Who Received an In-Home Evaluation



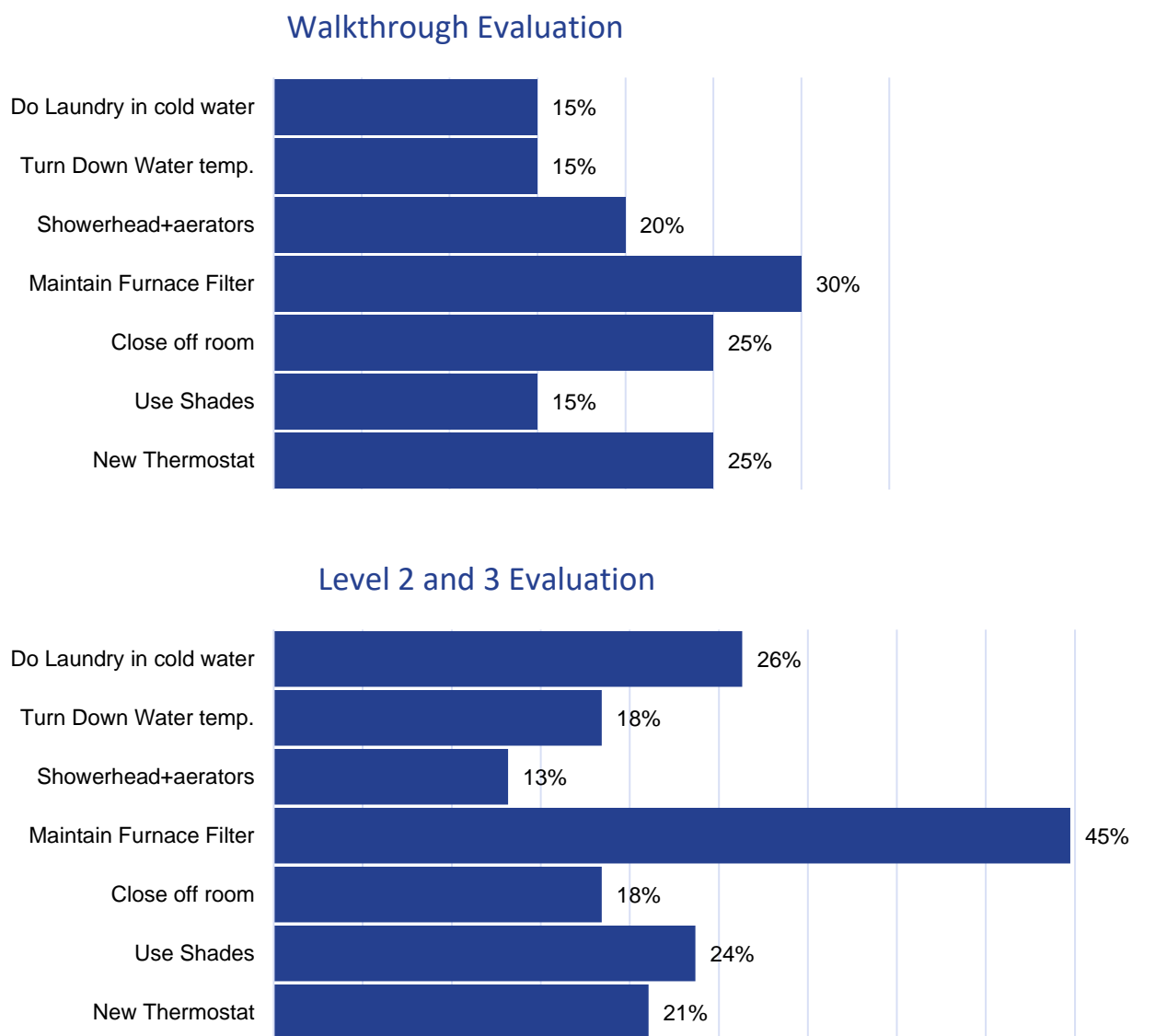
The largest difference is the insulation and air sealing measure. This difference is because the Level 2 energy evaluation completes the blower door test to set the foundation for the measurement of the improvement in air sealing. Less than half of the participants who received a Level 2 evaluation completed the follow-up air sealing and insulation in 2019. It is expected this percentage will rise as more 2019 audit participants complete improvements in their house.

Level 3 evaluations are the test out post-air sealing, which means that 100 percent of the Level 3 evaluations have completed air sealing.

But the 47 percent implementation rate of the measure has implications on the energy savings claimed from a Level 2 evaluation. The Level 2 evaluation claims energy savings indicative of 100 percent of a deemed savings amount for air sealing. If the Level 2 evaluation continues to claim energy savings for the evaluation based on the air sealing upgrade, the installation rate should be 47 percent. Concurrently, the Level 3 energy evaluation should claim the remainder of the savings for that customer, equal to an installation rate of 53 percent.

Another interesting component of the evaluation is the follow-through of participants who complete low-cost and no-cost recommendations. The participation rates for many of the activities are in the expected range, with the exception of the performance of furnace and boiler tune-ups.

Figure 6: No-Cost/Low-Cost Implementation by Surveyed Participants



It is also interesting that the percent of participants having installed showerheads and aerators is much lower than the online evaluation installation rates. This may be because when an in-home evaluator installs these things, they are easily forgotten by the participant.

2.5.5 Measure Savings

2.5.5.1 Online Kit

The savings per measure for the online kit was multiplied by the installation rates presented in Table 43 to determine the average savings per participant. This calculation is shown in Table 44.

Table 44. Evaluated Savings for Kit Measures

Measure	Claimed kit savings (dth)	A Evaluation measure savings (dth)	B Installation rate	AxB Evaluated kit savings (dth)
Kitchen aerator	5.469	0.5229	42%	0.220
Bathroom aerator		0.6157	29%	0.179
Low flow showerhead		1.075	42%	0.452
Furnace Filter alarm		0	21%	0.000
Thermometer		0	17%	0.000
Weatherstripping or caulk		1.3174	17%	0.224
Total		3.531	30%	1.074

The kit contained a collection of equipment that can be installed around a residence to claim savings. Black Hills Energy added up the unit savings values to 5.469 dth per kit (gross at the meter). Although the per-unit savings value is not available, it is believed that this value is used based on unit measure savings from pre-2016. The evaluation team identified the deemed gross savings from other Black Hills Energy program for each component listed to use current evaluated values that are in the DSM plan. For a kit that includes one unit of each measure included in the kit, the total energy savings potential in a kit is 3.531 dth, which is significantly less than the 5.469 dth claimed. The installation rates of the measures by residents account for a further reduction in evaluated savings for the kit, resulting in actual savings of 30 percent of the claimed savings, or 1.074 dth.

The low installation rates of the measures are a key driver of the lower verified savings. Since this is a remotely operated program (*i.e.*, kits are mailed to participants), increasing the installation rate of measures is difficult. The program already only sends kits to about 50 percent of the online evaluation participants, meaning that the online evaluation supports self-selection for participants who are willing to install a measure. Black Hills Energy could consider offering a few different kit options to allow the participant to better select their measure mix. Alternatively, the utility can send reminder emails or letters to customers who indicated they received a kit. This would remind some customers to install the items they received if they had not done so previously.

Black Hills Energy should also consider revising the savings claimed per kit going forward to account for the lower installation rate observed during the evaluation. This value is close to the evaluated savings of 1.3 dth from the previous evaluation.

2.5.5.2 Residential In-Home Energy Evaluation

The residential energy evaluation currently claims savings for both the evaluation and the installed measures. The best practice is to claim no energy savings for the energy evaluation or the blower door test but claim savings for the equipment or services provided through a direct install process.

2.5.5.3 Direct Install Measures

There was a limited amount of savings attributed to individual measures in the Residential Evaluation program. Implementing the recommendation to claim savings for measures installed, as opposed to the evaluation process, it is expected that the quantities claimed of measures will increase significantly. It is assumed for direct install measures that approximately 95 percent of the equipment will remain, and only a small portion will be removed or break before the expected lifetime. This calculation is shown in Table 45 to detail evaluated saving for each measure.

Table 45. Evaluated Savings for Direct Install Measures

Measure	Claimed gross savings at the meter (dth)	Installation rate	Evaluated kit savings (dth)
Hot water heater blanket	1.34200	0.95	1.275
Hot water heater pipe insulation	0.26977	0.95	0.256
Low-flow bathroom aerator	0.61566	0.95	0.585
Low-flow kitchen aerator	0.52292	0.95	0.497
Low-flow showerhead	1.07504	0.95	1.021
Programmable thermostat	2.96647	0.95	2.818
Weatherstripping	1.31741	0.95	1.252

3.0 RESIDENTIAL PRESCRIPTIVE COMPONENT

This chapter presents the results of the 2019 process and impact evaluation of Black Hills Energy's Residential Retrofit Program - Prescriptive (Residential Prescriptive) Component.

3.1 BACKGROUND

The Residential Prescriptive component under the Residential Retrofit Program umbrella provides incentives to residential customers for installing energy-efficient measures such as furnaces, boilers, water heaters, insulation, programmable thermostats, weatherstripping, and air sealing. Most program eligible equipment offers a set rebate amount based on the efficiency level of the equipment. For infiltration and insulation measures, incentives are provided as a percentage of the total project cost, capped at a specified value. A-TEC is responsible for the processing and tracking of all incentives.

Black Hills Energy utilizes mass marketing materials, such as bill inserts, and trade allies to promote the program. Trade allies have a significant role as they are the ones who have the opportunity to recommend program-eligible equipment. Because of their importance, dealer spiffs are offered to North American Technician Excellence (NATE) certified contractors for select HVAC equipment.

Black Hills Energy requires that all space heating equipment bears the Air Conditioning, Heating and Refrigeration Institute (AHRI) Certified® mark. All water heaters must include either AHRI certification or be listed as ENERGYSTAR®-qualified equipment. In addition, participants must have a pre- and post-blower door test to confirm the proper installation of infiltration measures prior to submitting the rebate application, and customers receiving the duct-sealing incentive must confirm proper sealing with a pre- and post-duct blaster test.

Measures eligible for rebates are listed in the table below, along with the rebate amount.

Table 46. Residential Prescriptive Component Measure Incentives

Measure	Efficiency	Customer rebate	Dealer spiff
Furnace	AFUE ≥94 percent and AFUE <96 percent	\$250	
Furnace	AFUE ≥96 percent	\$350	\$100
Furnace quality install	Furnace Quality Install		\$60
Storage water heater ≥50 and ≤55 gallons	ENERGYSTAR® - storage 0.67 to 0.79 EF and ≥50 and ≤55 gallons	\$150	\$20
Water heater tankless greater than 0.90 EF	ENERGYSTAR® tankless or instantaneous WH, EF ≥0.90	\$400	\$60
Integrated space and water heater	Integrated space and water heater ≥ 90 percent CAE	\$850	\$100
Multi-zone thermostat	Individual room temperature control for major occupied rooms	Up to \$100	
Setback thermostat (customer installation)	Setback thermostat (customer installation)	Up to \$25	

Measure	Efficiency	Customer rebate	Dealer spiff
Setback thermostat (professional installation)	Setback thermostat (professional installation)	\$50	
Wi-Fi programmable thermostat	Wi-Fi programmable thermostat	Up to \$100	
Insulation (wall) R-13	R-13 or max fill	\$0.50 per square foot, up to \$850	
Insulation (rim and band joist)	R-15/19	\$0.25 per square foot, up to \$250	
Insulation (foundation/basement wall) R-15/19	R-15/19	\$0.50 per square foot, up to \$250	
Infiltration control (weatherstripping, caulking, etc.)	Air sealing materials and diagnostic testing	70 percent of the incremental cost, up to \$900	
Duct repair, sealing, and insulation	Duct sealing and R-8 duct insulation (Pikes Peak Regional Building Code 2011 – Zone 5)	70 percent of cost up to \$200	
Water savings kit	Two 1.5 GPM showerheads Two 1.0 GPM bathroom faucet aerators One 1.5 GPM kitchen faucet aerator	Free	

The two tables below show the participation and savings goals from the DSM Plan as well as the actual 2019 participation information from Vision. The program was short of goals in both territories. This was primarily due to staff changes that affected outreach and support to trade allies at the beginning of the year.

Table 47. Residential Prescriptive Component Participation and Savings Goals - BHCOG

	2019 goals	2019 actuals ⁷	2019 percentage goal achieved	2016 percentage goal achieved
Participants	2,774	577	21%	48%
Measures	3,254	842	26%	147%
Savings	10,112 dth	4,408 dth	44%	205%

⁷ Evaluation counts may vary from counts reported in the Annual Status Report due to differences in the timing of the evaluation versus the annual report and changes in project status that may have occurred within that timeframe. The tracking data were pulled three months prior to the annual report analysis.

Table 48. Residential Prescriptive Component Participation and Savings Goals - BHGD-CO

	2019 goals	2019 actuals ⁸	2019 percentage goal achieved	2016 percentage goal achieved
Participants	2,604	370	14%	NA
Measures	2,719	1,230 ⁹	45%	NA
Savings	7,275 dth	4,749 dth	65%	NA

3.2 EVALUATION METHODOLOGY

In addition to our initial discussions with Black Hills Energy program staff, the process and impact evaluation activities conducted for the Residential Prescriptive program component are summarized below.

Installation contractor interviews. Contractors were identified in the participant database and from the Black Hills Energy website. The evaluation team reviewed the level of activity for the 200 contractors identified. We sampled 14 priority contractors and another 16 with a mix of high, medium, and low participation. Interviews were completed with seven of the 30 contractors attempted in February 2020. Discussion topics included program awareness, program guidelines and processes, interactions with customers, and firmographics. A contractor guide can be found in Appendix D.

Participating customer surveys. In December 2019, the evaluation team pulled a list of customers who received program rebates in 2019. Surveys with these customers were completed between January 2020 and February 2020. The number of completed surveys is shown in Table 49. The participant survey can be found in Appendix E. The purpose of the surveys was to inform process-related researchable issues, calculate net-to-gross estimates, and determine installation rates.

Table 49. Residential Prescriptive Response Rates

Program	Starting sample	Completes	Response rate
BHCOG Prescriptive	366	75	23%
BHGD-CO Prescriptive	241	67	30%

Net-to-gross (NTG) estimation. As part of the participant surveys and contractor interviews, we investigated customers' decision-making processes regarding purchases of program qualifying equipment and the influence of the program on those decisions, as well as the influence of the program on contractors' sales process. The recommended NTG ratio includes free-ridership, and participant spillover estimates from customer self-reports from the participant

⁸ Evaluation counts may vary from counts reported in the Annual Status Report due to differences in the timing of the evaluation versus the annual report and changes in project status that may have occurred within that timeframe. The tracking data were pulled three months prior to the annual report analysis.

⁹ Approximately 700 kits were entered in Vision under BHGD-CO. A portion of these were likely distributed in the BHCOG territory.

survey, qualitative feedback from participating contractors, and a secondary review of NTG estimates from programs similar to the Residential Prescriptive component in nearby territories.

Background and Technical Assumptions review. Black Hills Energy developed these assumptions based on customer research and details from other programs as well as published studies. The background documentation and technical assumptions used to determine the deemed savings values were reviewed. Similar measures from other jurisdictions were referenced to ensure the assumptions were consistent with best practices. The assumptions were also reviewed to ensure they were consistent with engineering fundamentals.

Claimed savings values verification. The evaluation team assessed the actual claimed savings values for the program to assess their accuracy. A review of the claimed values also provided insight into the savings calculation methodology and any areas where potential errors may occur.

Desk Reviews. The evaluation team completed desk reviews of eight program participant projects to ensure that record-keeping was consistent and that the savings were claimed appropriately in the tracking system.

3.3 FINDINGS AND RECOMMENDATIONS

Participant satisfaction with the Residential Prescriptive component remains high, and most participants are likely to recommend the program to others. But the program is not meeting participation or savings goals. With the program outreach heavily reliant on contractors and staffing changes at Black Hills Energy, contractors were not receiving the typical level of information needed to promote the program.

On a positive note, the equipment installed through the program remains installed, and the existing level of project documentation collected is useful. Documentation packages were found to include AHRI certificates, project application sheets, and other project-specific information that allows for verification of savings. In addition, the Vision tracking system logged the critical information for easy confirmation of qualification and savings calculation. However, water-saving kits distributed through the Residential Prescriptive program were only recorded in Vision as a single line item, limiting the tracking information available.

Based on data collection activities completed, we present the following findings and recommendations for the Residential Prescriptive component:

- **The evaluation team recommends continuing with an NTG ratio of 75 percent.** The participant customer surveys found lower customer self-report NTG ratios for BHCOC than last time (BHGD-CO is new), but participation is also much lower than in 2016. The self-report results are somewhat lower than most NTG estimates found from comparison programs with similar measures in nearby territories, though estimates range up to 91 percent. Qualitative feedback from customers and participating contractors indicates higher program attribution than reflected in the calculated self-report NTG estimate. For this program, contractors are a leading source of customer awareness, and active participating contractors reported routinely using the program rebates as part of their sales process, but due to staff changes at Black Hills Energy, limited needed information. Triangulating the customer self-reports, contractor feedback, prior NTG evaluation research, and NTG values used for nearby comparison programs with similar measures, the evaluation team recommends that Black Hills Energy continue with an NTG ratio of 75 percent.

- **Continue using bill inserts, website, and contractors as the means to market the program to customers.** Marketing of the program using the Black Hills website and contractors are the most effective approaches to gaining awareness of the program. Over half of all participants said they learned of the program from Black Hills Energy, with one-half of those saying they learned about it from the website. One-third of those who heard of the program from Black Hills heard of it from a bill insert, so the inserts are still effective even though the website is gaining ground. One-third of all participants said they learned about the program from their contractor.
- **Provide contractors with a consistent program contact, along with periodic program updates and marketing materials.** Contractors are the key delivery mechanism for this program. Most contractors indicated they often had to seek out program information on their own to be informed of eligible equipment. They would like more program communication from Black Hills Energy prior to the start of the program year to learn of any potential changes, along with periodic updates throughout the year, especially if rebate funds may run out. Several contractors also expressed a need for more marketing materials to hand out to customers, which could also help boost participation in the program.
- **Black Hills Energy should update application forms to collect additional equipment data, such as the existing thermostat type.** Savings for thermostat incentivization programs vary widely depending on the existing thermostat type onsite and method of installation. Collecting this information and incorporating it into savings calculations can generate more transparent savings.
- **Track water-saving kits distributed.** The water savings kit measures were tracked in a single line item with no supporting documentation about when they were distributed or who receive the kit. As is typical with kits, the installation rate is most likely low, although without tracking information, there is no way to determine the uptake and satisfaction of the recipients.

3.4 PROCESS RESULTS

The following section presents the detailed process results for the Residential Prescriptive program data collection efforts. The results are organized in the following sub-sections:

- Participant characteristics
- Marketing practices
- Program experience
- Program satisfaction
- Contractor feedback

3.4.1 Participant Characteristics

2019 participants are younger than participants in 2016. There were fewer participants 65 years old or more and larger numbers of participants in the 55-64 age group. Participants in the 35-54 age range also increased slightly. Education levels have also changed. More 2019 participants

reported having some college or college degrees than in 2016, although fewer 2019 participants had completed graduate studies.

Table 50. Residential Prescriptive Participant Demographics

		BHCOG	BHGD-CO	Total	2016 gas
Age group	25 to 34	5.4%	12.3%	8.6%	9.1%
	35 to 44	23.0%	18.5%	20.9%	16.9%
	45 to 54	21.6%	16.9%	19.4%	16.9%
	55 to 64	28.4%	26.2%	27.3%	19.5%
	65 to 74	14.9%	13.8%	14.4%	22.1%
	75 or over	6.8%	12.3%	9.4%	15.6%
	Respondents (n)	74	65	139	77
Highest level of education completed	Some high school	1.4%	1.5%	1.4%	0.0%
	Completed high school	2.7%	7.6%	5.0%	15.8%
	Some college	16.2%	30.3%	22.9%	14.5%
	Completed college	39.2%	37.9%	38.6%	27.6%
	Graduate studies or advanced degree	40.5%	22.7%	32.1%	42.1%
	Respondents (n)	74	66	140	76

Source: Question DEM1, DEM2.

Note: Totals may not sum to 100 percent due to rounding.

Most of the participants own single-family detached homes. Colorado gas homes are larger than in 2016 (more of them larger than 3,000 square feet). While many of the Colorado gas distribution participant households were two-person (55 percent), the Colorado gas participant households were more likely to have three or four people per household (41 percent compared with 23 percent).

Table 51. Residential Prescriptive Participant Housing Characteristics

		BHCOG	BHGD-CO	Total	2016 gas
Own or rent home	Own	97.3%	98.5%	97.9%	98.7%
	Rent/lease	2.7%	1.5%	2.1%	1.3%
	Respondents (n)	75	66	141	77
Home type	Single-family detached house	100.0%	89.4%	95.0%	93.5%
	Single-family attached house (townhouse, row house, or duplex)	0.0%	6.1%	2.8%	2.6%
	Apartment building with 5 or more units	0.0%	3.0%	1.4%	NA
	Mobile home or house trailer	0.0%	1.5%	0.7%	3.9%

		BHCOG	BHGD-CO	Total	2016 gas
Respondents (n)		75	66	141	77
Square footage of home	Less than 1,000 square feet	0.0%	6.1%	2.8%	2.7%
	1,000 to 1,500 square feet	6.7%	24.2%	14.9%	13.3%
	1,501 to 2,000 square feet	10.7%	24.2%	17.0%	14.7%
	2,001 to 3,000 square feet	37.3%	28.8%	33.3%	32.0%
	More than 3,000 square feet	45.3%	16.7%	31.9%	37.3%
	Respondents (n)	75	66	141	75
People living in house full time	0	0.0%	4.5%	2.2%	1.3%
	1	4.1%	9.1%	6.5%	16.0%
	2	45.2%	54.5%	49.6%	41.3%
	3	19.2%	7.6%	13.7%	14.7%
	4	21.9%	15.2%	18.7%	20.0%
	5	6.8%	7.6%	7.2%	6.7%
	6	1.4%	1.5%	1.4%	0%
	7	1.4%	0.0%	0.7%	0%
	Respondents (n)	73	66	139	75

Source: Question HC1-HC12.

Note: Totals may not sum to 100 percent due to rounding.

3.4.2 Marketing Practices

The Residential Prescriptive program is marketed by Black Hills Energy and installation contractors. Black Hills Energy works closely with contractors to communicate program opportunities and rebates available. They also market the program through bill inserts, various media, and on the Black Hills Energy website.

3.4.2.1 Sources of Program Awareness

The primary ways participants learned about the program were from Black Hills Energy or from a contractor). A similar number of participants learned about the program online/through a general website. Most of the 21 participants who heard of the program from the utility mentioned the utility website as the source of program information followed by utility bill inserts. The percentage of people learning about the program from the utility decreased in 2019. Table 52 shows the detailed results.

Table 52. Sources of Residential Prescriptive Program Awareness

Source of awareness	BHCOG respondents (n)	BHCOG percentage	BHGD-CO respondents (n)	BHGD-CO percentage	2016 percentage
Utility	23	32%	21	32%	53%
Utility website	12	57%	9	45%	20%
Utility bill insert	6	29%	7	35%	54%
Utility newsletter or direct mailing	4	19%	5	25%	15%
Utility call center or program staff	1	5%	2	10%	15%
Contractor	23	32%	20	31%	34%
General website/online	21	29%	16	25%	n/a
In-store display or signage	6	8%	3	5%	n/a
Salesperson	5	7%	1	2%	4%
Word of mouth	4	5%	8	12%	14%
Other-specify	4	5%	14	22%	8%
Previous participation in a Black Hills Energy program	4	5%	2	3%	3%
Home builder, developer, real estate agent	0	0%	1	2%	1%
Local government, community or non-profit agency			3	5%	
School, classes, energy center, meeting, or other event			1	2%	
Respondents (n)	73		65		77

Note: Percentages will not sum to 100 percent as multiple answers per respondent were permitted.

“Don’t know” and refusals were removed.

3.4.2.2 Leads to In-Home Evaluations

Customers who participated in the program and received measures other than envelope were asked if they were aware of the online and in-home energy evaluations offered through the program. Sixty-seven percent of the respondents said they were aware of the online evaluation, and nearly half of respondents were aware of the level 1 walk-through evaluation (48 percent). Of those that were aware of the online evaluation, 19 percent said they participated, and 23 percent of those that were aware of the in-home evaluation have received one. The level of participation for all but Level 3 evaluation has decreased. Respondents who were not aware of

the program were asked how interested they would be in participating in the online or in-home evaluations, using a scale of 0 to 10, where 0 is “not at all interested” and 10 is “very interested.” Table 53 and Table 54 show a greater interest in the online home energy audit (6.0 and 5.7 rating for BHCOG and BHGD-CO, respectively) than the in-home evaluations.

Table 53. Awareness and Interest in Energy Evaluations (BHCOG)

	Free online home audit	Level 1 free walk-through evaluation	Level 2 whole-home evaluation	Level 3 whole-home evaluation
Aware	67%	48%	23%	15%
Respondents (n)	73	73	73	73
<i>PY2016 aware</i>	53%	50%	35%	12%
<i>PY2016 respondents (n)</i>	76	34	34	34
Participated	19%	23%	18%	18%
Respondents (n)	47	35	17	11
<i>PY2016 participated</i>	36%	65%	42%	0%
<i>PY2016 respondents (n)</i>	39	17	12	4
Mean level of interest	6.0	4.3	2.4	2.5
Respondents (n)	25	65	67	69
<i>PY2016 level of interest</i>	5.2	4.8	2.6	2.4
<i>PY2016 respondents (n)</i>	34	8	14	19

Table 54. Awareness and Interest in Energy Evaluations (BHGD-CO)

	Free online home audit	Level 1 free walkthrough evaluation	Level 2 whole-home evaluation	Level 3 whole-home evaluation
Aware	57%	42%	23%	16%
Respondents (n)	67	64	64	64
Participated	8%	0%	7%	10%
Respondents (n)	38	27	15	10
Mean level of interest	5.7	3.4	2.5	2.2
Respondents (n)	26	63	62	60

3.4.3 Program Experience

3.4.3.1 Reasons for Participating

Customers were asked what their primary reason was for participating in the program; most (68 percent) said it was the financial incentive (rebate or payment for participating). Other frequently mentioned reasons were needing new equipment and energy savings (30 percent for each).

These results differ somewhat from past findings in 2016, which saw a reduced energy bill as the top reason for participating.

3.4.3.2 Ease of Use

Overall, the Residential Prescriptive program participants found the program very easy to use. Participants were asked to rate four items on a scale of 0 to 10, where 1 is “very difficult,” and 10 is “very easy.” The average rating for the program overall was 9.2 in both 2019 and 2016. Participants were also asked about understanding program requirements (9.1 and 8.6 for BHCOG and BHGD-CO, respectively), completion of the application (8.8 and 8.7 ratings, respectively), and interactions with program staff (8.9 and 8.8 ratings respectively).

Table 55. Ease of Participation with Various Residential Prescriptive Program Aspects (BHCOG)

Program aspect	Respondents (n)	2019 mean rating	2016 mean rating
Understand the program requirements	75	9.1	8.6
Complete the program application and paperwork	74	8.8	8.7
Interact with program staff	32	8.9	9.2
Participate in the program	75	9.2	9.2

Table 56. Ease of Participation with Various Residential Prescriptive Program Aspects (BHGD-CO)

Program aspect	Respondents (n)	2019 mean rating	2016 mean rating
Understand the program requirements	67	8.6	NA
Complete the program application and paperwork	67	8.7	NA
Interact with program staff	36	8.8	NA
Participate in the program	66	9.2	NA

3.4.4 Program Satisfaction

Program satisfaction remains high among participants. The average rating overall on a 0 to 10 scale is 8.9, where 0 is “not at all satisfied” and 10 is “very satisfied.” Some of the highest-rated aspects of the program were: the performance of the new equipment (9.5), the rebate application process, and the type of equipment eligible for the program (both 9.0). All program aspects received average ratings above 8.0.

Table 57. Satisfaction Levels for Various Aspects of the Prescriptive Program

		BHCOG	BHGD-CO	Total
The program overall	Mean	9.0	8.8	8.9
	Respondents (n)	75	64	139

		BHCOG	BHGD-CO	Total
The performance of the new equipment	Mean	9.4	9.6	9.5
	Respondents (n)	73	63	136
The rebate application process	Mean	9.0	8.9	9.0
	Respondents (n)	73	62	135
The type of equipment eligible for the program	Mean	8.9	9.1	9.0
	Respondents (n)	69	61	130
The rebate amount	Mean	8.9	8.8	8.8
	Respondents (n)	72	63	135
Information provided about the rebate program	Mean	8.6	8.6	8.6
	Respondents (n)	71	62	133
Amount of time it took to receive the rebate	Mean	8.8	8.3	8.6
	Respondents (n)	70	61	131
Assistance from the contractor who you worked with	Mean	8.7	8.2	8.4
	Respondents (n)	44	39	83

Source: Question SAT4 and SAT7

High satisfaction levels are supported by the proportion of participants who said they have or would recommend the program to others. All but two of the respondents would recommend the Residential Prescriptive program to people they know. At least half of the participants reported they had already recommended the program.

Table 58. Number of Participants Who Would Recommend the Program

	BHCOG	BHGD-CO	Total
Have recommended	38	36	74
Would recommend	35	29	64
Will not recommend	1	1	2
Respondents (n)	74	66	140

Source: Questions SAT9 and SAT10

Online had a few Don't Know and Refused responses

When asked what they liked most about the Residential Prescriptive program, almost 50 percent of respondents mentioned the availability of the rebate. Several respondents who liked the rebate appreciated that it allowed them to purchase better, more energy-efficient equipment that they may not have otherwise purchased. Another 15 percent thought the application and participation process was easy. A few others were happy with the education they received through the program and the types of equipment eligible. Some comments from participants about what they liked most follow:

“Ease of use pushed me to purchase a better, more efficient product.”

“I could find everything needed on the website, and the application was very easy.”

"I think that it (the program) exists and helps clients out, and helping people get more energy-efficient equipment is a good ethical thing to do."

"It really helps people make a better decision. It helps when I was wondering what equipment to install, it helps make better decisions long term."

"The rebate; educating people on better options."

"The fact that it is available to those who chose to look at conserving energy."

"I honestly like that it exists, and Black Hills recognizes the need for energy efficiency in the world and is interested in incentivizing that for its customers."

In contrast, participants were asked what one feature of the program they would change. Almost 60 percent of respondents did not have any suggested changes. For those who provided a suggested change, the most common response was to offer larger rebates (30 percent). Another 16 percent would like an easier application process, including less need for contractor input and an area to record if the equipment is self-installed. Almost 15 percent suggested more marketing and advertising of the program to get the word out to more customers. And 10 percent felt that more products could be included in the rebate program.

"Advertise it better, so people are more aware of it."

"An online application process instead of having to fill out paperwork, that would've been nice."

"Better publicized, we had to hunt it up."

"I don't know. Make some TV commercials for the people who don't read a lot."

"I think revamping the application form for people who don't speak the language (btu and wattage)."

"Increase the reimbursement amount to offset the massive amount of equipment cost."

"It'd be nice to have electronically-fillable documents so that it doesn't have to be printed and sent in. "

"Maybe if when you add equipment that you are going to rebate on - maybe if I could get an email on - NEW this month! (Little reminders in the bill would be nice.)"

"On hot water heaters, it is hard to find one that meets their criteria."

"Providing technical assistance during installation and maintenance of the system. When something didn't go right, it would have been nice to call someone at Black Hills and talk to them about my technical issues."

"The application process was a little over-extensive because I had to involve the contractor. It seemed like there was an extra step involved. It would have been nice if the contractor could have given us a piece of paper already filled out and apply online."

"The ease of the form. There was a specific test they kept asking for that needed to be done, and the contractor ended up having to take over filling form out."

"The time it took to get the money, the approval time."

“Update the application process to include a self-install option.”

Satisfaction with Black Hills Energy as their utility provider is also high. Colorado gas participants are slightly more satisfied with Black Hills Energy overall than Colorado gas distribution participants.

Table 59. Overall Satisfaction with Black Hills Energy Service

	BHCOG - Res Prescriptive	BHGD-CO - Res Prescriptive	Total
Extremely satisfied	44.0%	40.9%	42.6%
Very satisfied	50.7%	47.0%	48.9%
Somewhat satisfied	5.3%	9.1%	7.1%
Not at all satisfied	0.0%	3.0%	1.4%
Respondents (n)	75	66	141

Source: Question SAT11

Note: Totals may not sum to 100 percent due to rounding

High satisfaction with Black Hills Energy is due primarily to participants having no service issues with their gas service. In addition, participants who have had interactions with Black Hills Energy report good experiences with customer service.

“I have lived in other parts of the US, and Black Hills has better communication with the customers in notifying them on outages, and I don't experience outages with them where I have experienced outages in other places.”

“It is just my experience with them has been very good. Any issues I had they handled very quickly and very efficiently.”

“Pricing is fair, I think, compared to where I came from. And the rebate program was easier to deal with than some other areas where I have been.”

“They have had a good website; the billing process has been straight forward, rebate program being available, they seem to have a good selection of programs and are good for people to make good choices.”

“They seem to be very efficient and responsive. If I've had issues and called them, they've responded right away. They have good customer service.”

“Anytime there is a problem, you can call or go on the website for clarification. I can get in contact with them quite easily.”

“People have always been very helpful; billing questions were not dismissed by the staff.”

“The rebate was very easy, and managing my bill was very easy.”

3.4.5 Contractor Feedback

In addition to participating customers, the evaluation team also conducted Interviews with seven participating contractors. Overall, the contractors were happy with the program and reported no major concerns other than a desire for more program communication from Black Hills Energy.

The majority of contractors thought that the program's administrative burden (e.g., requirements, paperwork) was not very difficult. Several contractors mentioned that they were pleased they no longer have to submit a separate form in order to get their spiffs. Two interviewees suggested that being able to submit an "online" application could reduce paperwork. This would also potentially allow the contractors to track the process – one contractor mentioned not knowing what happens after the customer submits the paperwork.

Most of the contractors did not feel adequately informed of program changes. Almost all the contractors felt that they had to proactively research program incentive and application form changes at the beginning of each year and throughout the year to make sure that they were providing their customers with up to date information. One contractor also expressed that the new rebate information is not available soon enough and would like at least a preview of what the coming year's changes will be. There is a desire among the contractors for brochures or other marketing pieces they can hand out to clients to spread awareness of the program and make it easier to understand than the current documentation, which one interviewee cited as being four pages long.

Current activity levels varied among the contractors interviewed. Based on these interviews, it seems the lower activity level contractors participate less due to not having many services or products that qualify, rather than issues with administrative burden.

3.5 IMPACT RESULTS

This section presents the impact evaluation results for the Residential Prescriptive program component. The impact evaluation included net-to-gross (NTG) research, a deemed savings review, and assessment of installation rates.

3.5.1 Net-to-Gross

The NTG research for the Residential Prescriptive Rebate program included an assessment of free-ridership and participant spillover indicators through customer self-reports from the participant survey and feedback from contractor interviews, as well as a secondary review of NTG, estimates from programs similar to the Residential Prescriptive Rebate Program.

$$NTG\ ratio = (1 - free-ridership) + spillover$$

The evaluation team recommends continuing to use an NTG ratio of 75 percent. Results from the self-report and benchmarking effort discussed below support this recommendation. Table 60 and Table 61 show the NTG results for both 2016 and 2019.

Table 60. 2016-2019 Net-to-Gross Results—Residential Prescriptive Rebate Program BHCOG

Program	2016				2019			
	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG
				(1 - FR + SO)				(1 - FR + SO)
Prescriptive	76	53.5%	3.8%	50.3%	75	61.6%	1.0%	39.4%

Table 61. 2016-2019 Net-to-Gross Results—Residential Prescriptive Rebate Program BHGD-CO

Program	2016				2019			
	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG	Surveyed (n)	Free-ridership (FR)	Spillover (SO)	NTG
				(1 - FR + SO)				(1 - FR + SO)
Prescriptive	76	53.5%	3.8%	50.3%	67	58.6%	6.6%	48.0%

3.5.1.1 Free-Ridership

The participant survey asked decision-makers a series of highly structured questions about the influence of the program on their decision to purchase qualifying equipment and actions that would have been taken in the absence of the program to assess free-ridership. A preliminary free-ridership rate was calculated for each participant, following the scoring algorithm presented in Appendix A. Preliminary free-ridership scores were further reviewed for consistency with additional consistency check questions included in the participant survey. In some cases, preliminary free-ridership scores were adjusted based on these consistency checks to more accurately reflect program attribution.¹⁰ Individual free-ridership rates were then weighted to adjust for proportional sampling differences, non-response, and gross energy savings to calculate the program-level free-ridership rate.

The participant self-reports resulted in an overall free-ridership rate of 62 percent for BHCOG. Self-report free-ridership rates were lowest among programmable thermostat participants (55 percent), and highest among wall insulation participants (70 percent).

Colorado gas participants provided mixed feedback on the influence of the program in their decision-making. On average, participants rated the influence of the rebate on the decision to install their rebate equipment a 6.2 out of 10, where 0 is “not at all influential,” and 10 is “very influential.” Also, where applicable, respondents rated the influence of a recommendation at an average of 7.4 out of 10, and information provided by an audit at an average of 2.5 out of 10. At the same time, 71 percent of respondents (53 of 75) reported that they were already planning to install their rebated equipment before they learned about the rebate available through the program. Also, on average, respondents rated the likelihood that they would have purchased the exact same equipment if the program had not been available a 7.2 out of 10, where 0 is “not at all likely,” and 10 is “completely likely.” Those who gave a rating of 0 rated the likelihood of purchasing the equipment within 12 months an 8.1 out of 10, on average, using the same scale.

Table 62. Self-Report Free-Ridership Results—Residential Prescriptive Rebate Program BHCOG

Measure	Surveyed (n)	Population ex-ante savings		Free-ridership estimate	90% CI (+/-)*
		kWh	dth		
Floor insulation	1	NA	70.0	62.5%	NA
Furnace	22	NA	1,686.8	64.7%	8.0%
Programmable thermostat	36	NA	1,134.8	54.8%	7.9%
Wall insulation	1	NA	79.6	70.0%	NA

¹⁰ A total of four preliminary free-ridership scores were adjusted downward by half (preliminary FR / 2) based on the consistency check review.

Measure	Surveyed (n)	Population ex-ante savings		Free-ridership estimate	90% CI (+/-)*
		kWh	dth		
Water heater	15	NA	388.3	66.0%	11.2%
Overall**	75	NA	3,359.5	61.6%	5.0%

*Confidence intervals are not shown where the number surveyed is less than 10

Colorado gas distribution participant self-reports resulted in an overall free-ridership rate of 59 percent. Self-report free-ridership rates were lowest among air sealing participants (14 percent), and highest among furnace participants (66 percent).

Participants provided mixed feedback on the influence of the program in their decision-making. On average, participants rated the influence of the rebate on the decision to install their rebate equipment a 6.2 out of 10, where 0 is “not at all influential,” and 10 is “very influential.” Also, where applicable, respondents rated the influence of a recommendation at an average of 7.8 out of 10, and information provided by an audit at an average of 9.3 out of 10. At the same time, 69 percent of respondents (46 of 67) reported that they were already planning to install their rebated equipment before they learned about the rebate available through the program. Also, on average, respondents rated the likelihood that they would have purchased the exact same equipment if the program had not been available a 7.1 out of 10, where 0 is “not at all likely,” and 10 is “completely likely.” Those who gave a rating of 0 (6 respondents) rated the likelihood of purchasing the equipment within 12 months an 8.4 out of 10, on average, using the same scale.

Table 63. Self-Report Free-Ridership Results—Residential Prescriptive Rebate Program BHGD-CO

Measure	Surveyed (n)	Population ex-ante savings		Free-ridership estimate	90% CI (+/-)*
		kWh	dth		
Air sealing	2	NA	23.7	13.8%	NA
Floor insulation	2	NA	100.6	40.0%	NA
Furnace	21	NA	968.7	66.2%	6.9%
Programmable thermostat	15	NA	502.1	46.3%	12.9%
Water heater	27	NA	400.8	62.8%	6.7%
Overall**	67	NA	1,995.9	58.6%	5.0%

*Confidence intervals are not shown where the number surveyed is less than 10

Feedback from participating contractors provides evidence of higher program attribution than indicated by the customer self-report free-ridership results. The program relies on contractors as a primary source of program awareness, outreach, and promotion, which contractors expressed was limited for 2019 due to staff changes at Black Hills Energy. Results from the participant survey show that at least one-third of customers learn about the program from contractors. Also, active participating contractors interviewed reported using the rebates as part of their sales process, including incorporating rebates into project proposals, which encourages customers to purchase program-qualifying equipment. Participants often mentioned the influence of contractor recommendations on their decision to install their rebated equipment, though these communications may not always be considered by customers as directly related to the program activities. Considering the contractor-driven nature of the program, the program’s influence on

customers' decision-making is likely underrepresented in the customer self-report free-ridership results.

3.5.1.2 Participant Spillover

In addition to free-ridership, the participant survey included a series of questions designed to measure spillover. Spillover refers to purchases of energy-efficient equipment since participation that were made *without* any financial assistance from Black Hills Energy as a result of the customer's participation in the program. A participant spillover estimate is computed based on energy savings from energy-efficient equipment the customer installed on their own since participating because of their experience with the program. To estimate spillover savings, the evaluation reviewed the energy-efficient equipment mentioned against equipment available for rebates through a Black Hills Energy program. The algorithm used to calculate individual spillover rates is documented in Appendix A.

The participant survey identified a 1.0 percent overall Colorado gas participant spillover rate. Four respondents had quantifiable gas spillover savings attributable to the Residential Prescriptive Rebate program. Non-rebated purchases for which spillover savings could be quantified, and the respondent attributed some influence to their participation in the program included furnaces (n=2), dishwasher (n=1), and attic insulation (n=1). On average, the four participants with quantifiable spillover rated the importance of their participation in the Residential Prescriptive Rebate program on their purchase decision a 5.8 out of 10, where 0 is "not at all important," and 10 is "extremely important."

Table 64. Self-Report Participant Spillover Results—Residential Prescriptive Rebate Program BHCOG

Program	Surveyed (n)	Spillover estimate	90% CI (+/-)
Prescriptive	75	1.0%	0.4%

The participant survey identified a 6.6 percent overall Colorado gas distribution participant spillover rate. Four respondents had quantifiable gas spillover savings attributable to the Residential Prescriptive Rebate program. Non-rebated purchases for which spillover savings could be quantified, and the respondent attributed some influence on their participation in the program included water heaters (n=3) and a central air conditioner (n=1). On average, the four participants with quantifiable spillover rated the importance of their participation in the Residential Prescriptive Rebate program on their purchase decision a 7.3 out of 10, where 0 is "not at all important," and 10 is "extremely important."

Table 65. Self-Report Participant Spillover Results—Residential Prescriptive Rebate Program BHGD-CO

Program	Surveyed (n)	Spillover estimate	90% CI (+/-)
Prescriptive	67	6.6%	11.3%

3.5.1.3 Benchmarking Research

The evaluation team compared the participant survey results with NTG ratios estimated for other prescriptive programs with similar measures. The 2016 evaluation resulted in an NTG ratio of 50 percent. The NTG results from this year's evaluation are 39 and 48 percent. This is close to the NTG estimates from comparison programs, which most commonly ranged between 49 percent to 91 percent. The NTG ratio from other territories reviewed included Iowa, Illinois,

and Nevada. In Nevada, prospective NTG estimates made for the 2019-2021 program years is 82 percent. In keeping with the benchmarking results of similar programs, and due to the low program participation and limited communication with contractors, the evaluation team does not recommend adjusting the NTG estimate of 75 percent for future planning at this time.

3.5.2 Savings Overview

The savings for the Residential Prescriptive program are claimed based on the purchase and installation of energy-efficient equipment and measures. Furnaces, programmable thermostats, Wi-Fi-enabled thermostats, insulation, infiltration control, water heaters, and water savings kits are available for incentives. All measures receive prescriptive savings.

The measure level quantity and energy savings claimed in the Vision data reports are shown in Table 66.

Table 66. Residential Prescriptive Gross Claimed Savings – BHCOG

Measure	Quantity	Claimed savings (gross dth)
Condensing furnace - 94 AFUE	34	307.8
Condensing furnace - 96 AFUE	167	1,882.1
Infiltration control (weatherstripping, caulking, etc.)	2	9.7
Insulation (foundation) R-15/19	4	70.0
Insulation (wall) R-13	5	102.7
Programmable thermostat (professionally installed)	58	186.0
Programmable thermostat (self-installed)	21	94.7
Wi-Fi thermostat	370	1,199.4
Storage water heater - 0.67 EF or 0.64 UEF	127	269.7
Tankless water heater - 0.90 EF or 0.87 UEF	41	57.1
Integrated space/water heating – 95 percent AFUE	13	229.4
TOTAL	842	4,408.4

Table 67. Residential Prescriptive Gross Claimed Savings - BHGD-CO

Measure	Quantity	Claimed savings (gross dth)
Condensing Furnace - 94 AFUE	77	523.4
Condensing Furnace - 96 AFUE	82	838.8
Infiltration control (weatherstripping, caulking, etc.)	8	27.3

Measure	Quantity	Claimed savings (gross dth)
Insulation (foundation) R-15/19	7	106.1
Insulation (rim and band joist) R-15/19	3	9.7
Insulation (wall) R-13	4	94.3
Programmable thermostat (professionally installed)	161	590.7
Programmable thermostat (self-installed)	28	99.7
Wi-Fi thermostat	9	42.9
Storage water heater - 0.67 EF or 0.64 UEF	49	104.0
Tankless water heater - 0.90 EF or 0.87 UEF	77	106.9
Integrated space/water heating – 95 percent AFUE	25	441.1
TOTAL	530	2,984.9

Nearly half of the energy savings in the Prescriptive Program are from the condensing furnaces measures. The thermostat measures have the second-highest savings at about 25 percent of the program, while air sealing and insulation and water heating make up the remainder of the program.

3.5.2.1 Water Savings Kit

The water savings kit component of the program was not originally tracked in Vision, and once entered, contained a single line item for all packages. Therefore, savings and packages cannot be tracked to each customer. Table 68 identifies the number of kits provided to Black Hills Energy customers and the claimed energy savings. The tracking system does not identify the participants and whether they participated in other energy efficiency programs or which territory they are from.

Table 68. Online Evaluation 2019 participants - Overall

Measure	Prescriptive water saving kits	Prescriptive water saving kit savings (dth)
Water savings kit	700	1,764.1

3.5.3 Tracking System Review

Overall, we reviewed the tracking system to ensure that project and account numbers are unique, deemed savings values are consistently applied, and data entered is complete. This was completed through an analysis of the Vision tracking data downloaded on January 6, 2020, and comparison to a sample of documentation downloaded from Vision. The following items were found during the analysis:

- The majority of data provided on the application was accurately entered into the Vision tracking system.
 - Documentation for furnace retrofits consistently includes AHRI certifications. This is a best practice and is useful in determining the efficiency of the units in question.
 - Documentation consistently included invoices for work done or products purchased.
 - On retrofit measures, the age of the old unit was generally collected in the documentation but not tracked.
- Some measures noted SG1 or SG2 (e.g., SG1 – Programmable Thermostat) but did not note whether the measure was contractor installed or self-installed.
- The customer tracking does not correlate between the Residential Evaluation Program and the Prescriptive Program.

The success of the Residential Prescriptive program is highly dependent on the information collected through the installation of measures. Measures rely on site-specific data for savings, which makes accurate and transparent data collection important. The data collected is sufficient and accurate, though Vision would benefit from tracking a few key additional parameters—for instance, a dedicated column for the method of installation on measures (self-install vs. professional install) and coordination of customers across programs.

3.5.4 Installation Rates

A final step in the review process was using the telephone survey data to determine the installation rates of the various measures installed as part of the Residential Prescriptive program. As described in the methodology, telephone surveys were used to gather information from participants regarding their experience with the program.

Customers were asked to indicate if the measures claimed in the tracking system were still installed. Survey responses show that all of the reported prescriptive measures were still installed at the time of the interviews. Therefore, no further adjustments were made to the program savings.

3.5.5 Measure Savings

The evaluation team reviewed the deemed savings that were used during the 2019 program year. In most cases, documentation was insufficient to fully assess savings calculations. Where documentation allowed for significant findings, those findings are discussed below on a measure level.

3.5.5.1 Furnaces and Boilers

Furnaces and boilers both appear to be calculating savings according to a prescriptive method. However, it is not clear how these savings are calculated. Key inputs in most TRMs often rely on AFUE, efficiency, unit capacity, building type, and heating type. All these values are collected and reported in Vision. We believe that this is a good practice and should be continued.

However, we recommend that the calculation methodology for these measures be readily available.

In our surveys, we found that a significant number (36 percent) of program participants replaced units that were running with no performance issues. This is considered an early retirement which claims higher savings because it uses the existing unit as the baseline. A replace-on-burnout option uses a marketplace typical new unit as a baseline. For this reason, consider drawing a distinction between early retirement and replace-on-burnout measures. Most TRMs include separate calculations for each measure, and information on replace on burnout measures can be collected alongside existing information in Vision.

3.5.5.2 Setback Thermostats

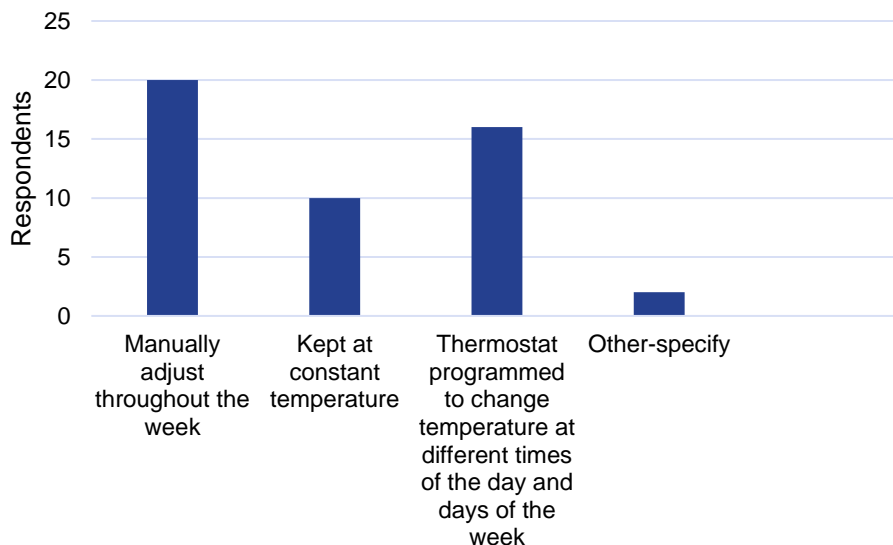
Black Hills Energy currently has three different rebates for programmable thermostats; programmable thermostat self-install, programmable thermostat professional install, and WIFI enabled programmable thermostat. The evaluation team conducted a literature review of other jurisdictions with similar measures, the results of which can be seen in Table 69. Black Hills Energy's deemed savings are similar to those used in Wisconsin. Iowa and Illinois, however, deem more savings to thermostats that are professionally installed and to Wi-Fi thermostats and less for self-installed units.

Table 69. Programmable Thermostat Deemed Savings Literature Review

Jurisdiction	Programmable thermostat self-install savings (therms/unit)	Programmable thermostat professional install savings (therms/unit)	Wi-Fi-enabled thermostat savings (therms/unit)
Black Hills Energy	29.7	32.3	32.3
Iowa	23.0	41.0	41.0
Wisconsin	33.2	20.0	30.0
Illinois	11.2	59.2	66.9
Average	22.5	40.1	46.0

There is a wide range of deemed savings values, largely due to the difference in heating seasons. Many of these jurisdictions have completed detailed research specific to their state as well. The evaluation team has seen numerous cases of programmable thermostats not living up to their high savings expectations due to things such as installation rates and effective programming. This was seen with the telephone survey responses for the thermostat measures.

According to the telephone surveys, 42 percent stated they manually adjust the thermostat throughout the week. Another 21 percent keep the thermostat at a constant temperature. This suggests that a significant number of surveyed customers would likely experience minimal savings from the installation of a new programmable thermostat. The total number of responses from the telephone survey participants can be seen in Figure 7. Existing Thermostat Usage of Participants

Figure 7. Existing Thermostat Usage of Participants

Therefore, while Black Hills Energy's current claimed value might appear conservative, it is likely more accurate compared to the other jurisdictions. Focusing future evaluation efforts on developing or verifying programmable thermostat savings may be appropriate for Black Hills Energy to consider if the measure constitutes a significant portion of the residential gas savings portfolio. To ensure the accuracy of savings, we recommend collecting information on existing thermostats and thermostat usage. Until such values are collected, no changes to savings are recommended.

3.5.5.3 Water Savings Kit

The water savings kit is provided to customers as an introduction to hot water energy savings. The customers who received the kit were not tracked; therefore, it was not possible for the evaluation team to determine the individual use of the kit measures. The analysis below is developed using the information available from the online kit data from the Residential Evaluation program, which tracked participation in a separate spreadsheet outside Vision. The installation rates and recommended energy savings are presented in Table 70.

Table 70. Evaluated Savings for Kit Measures

Measure	Claimed kit savings (dth)	A Evaluation measure savings (dth)	B Installation rate	AxB Evaluated kit savings (dth)
Kitchen aerator	2.5201	0.5229	42%	0.220
Bathroom aerator		0.6157	29%	0.179
Low-flow showerhead		1.075	42%	0.452
Total		2.214	38%	0.851

The kit contained a collection of equipment that can be installed by a resident to claim savings. Black Hills Energy added up the unit savings values to 2.5201 dth per kit (gross at the meter). Although the per-unit savings value is not available for each measure in the kit, it is believed

that the values shown are used based on unit measure savings from pre-2016. The evaluation team identified the deemed gross savings from other Black Hills Energy program for each component listed to use current evaluated values that are in the DSM plan. For a kit that includes one unit of each measure included in the kit, the total energy savings potential in a kit is 2.214 dth, which is approximately 10 percent less than the 2.5201 dth claimed. The installation rates of the measures by residents account for a further reduction in evaluated savings for the kit, resulting in actual savings of 38 percent of the claimed savings, or 0.851 dth.

The low installation rates of the measures are a key driver of the lower verified savings. Since these are give-away measures, increasing the installation rate of measures is difficult. The current kit offering is using the measures that have the highest installation rate when provided in a kit.

Black Hills Energy could consider offering a few different kit options to expand participation and allow the participant to better select their measure mix in an effort to increase installation. Black Hills Energy should also consider revising the savings claimed per kit going forward to account for the lower installation rate observed during the evaluation.

4.0 COMMERCIAL DIRECT INSTALL COMPONENT

This chapter presents the results of the process and impact evaluation of the 2019 Commercial Direct Install component of the Non-Residential Retrofit program offered in Black Hills Energy's Colorado gas and gas distribution territories.

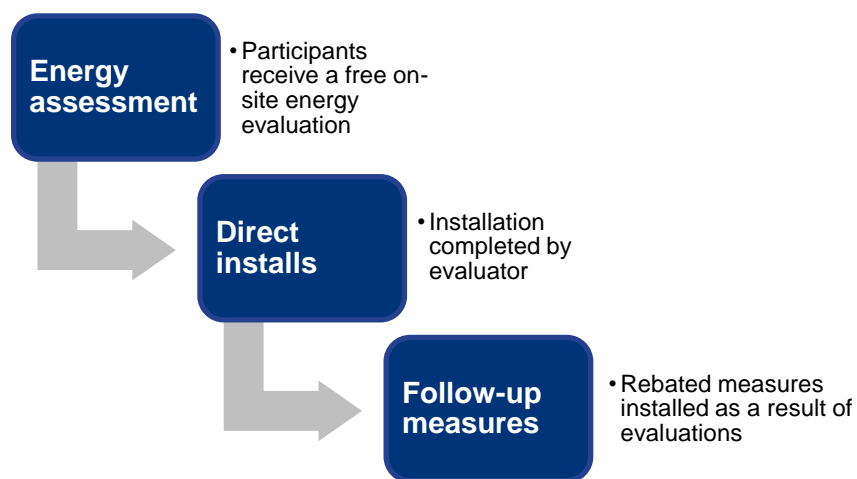
4.1 PROGRAM DESIGN

As described in the 2018–2020 DSM Plan, the Commercial Direct Install component promotes efficiency among small commercial customers through professional energy evaluators performing on-site analyses to identify energy efficiency opportunities and directly installing energy efficiency measures. Direct-installation measures may include aerators, showerheads, low flow pre-rinse spray valve, and water heater temperature setback.

The Commercial Direct Install component serves as a conduit for customers to learn about and access the Companies' Nonresidential Program energy efficiency offerings and to understand how these opportunities can be specifically applied to their buildings. Evaluators receive training and tools and materials to help them promote appropriate offerings that can reduce the costs of installing energy efficiency measure recommendations identified during the evaluation, such as furnaces, boilers, water heaters, insulations, and tune-ups.

The Commercial Direct Install component is delivered through a third-party implementation contractor, Franklin Energy. Customers may be directly approached by this provider, or they may contact Black Hills Energy to schedule an evaluation. The evaluation and direct install measures will cost an estimated \$670. Once an evaluation has taken place, the third-party contractor would work with the customer to encourage the recommended efficiency upgrades, assisting in contractor selection, and measure installation.

Figure 8. Overview of Program Process



The target market for the Commercial Direct Install component is small commercial customers with facilities less than 25,000 square feet, as well as commercial customers with more intensive natural gas consumption, such as restaurants. Eligible measures, along with incentives and savings per unit, are listed in Table 71.

In the last quarter of 2019 and in order to achieve its savings goals, Black Hills Energy provided direct install restaurant kits to customers who were interested in having one. These customers did not receive an energy assessment. The kit included one pre-rinse spray, four aerators, and two sections of water heater pipe insulation (3' pieces).

Table 71. Commercial Direct Install Measures, Cost, and Incentives

Program component	Component detail	Customer cost	Incentive
Small commercial assessment and direct install measures	Small commercial evaluation (≤25,000 square feet) Aerators showerheads Caulking gun and caulk Weatherstripping Switch and outlet covers Hot water temperature card Low-flow pre-rinse spray valve Set-back thermostat	Free	\$670
Follow-up measures or assisted installations	Additional energy-efficient measures supported and installed by the component beyond direct install measures	Cost dependent on the measure(s) installed; equivalent to Nonresidential Prescriptive component measure cost	Incentive amount dependent on the measure(s) installed; equivalent to Nonresidential Prescriptive component incentive amount

According to the 2018–2020 Black Hills Energy Natural Gas Energy Efficiency Plan, the Commercial Direct Install component was to be promoted through bill inserts and targeted traditional marketing, presentations to trade associations, advertising in trade publications targeted to individual market segments, the Black Hills Energy website, and other media outlets, as appropriate.

Planned and achieved participation and energy savings for the gas distribution territory for 2019 is outlined in Table 72. Although the program achieved the planned participation levels, only 65 percent of the energy savings were realized.

Table 72. 2019 BHGD-CO Participation and Energy Savings

	Goal	Actual
Annual participation	50	55
Energy savings (dth)	8,341	5,392

In contrast, much higher participation is reported in the Colorado gas territory, but reported savings are much lower than the goal (see Table 73). Through a review of projects in Vision, this appears to be a result of a very high proportion of restaurant kits that were handed out in the gas territory. The participants receiving the restaurant kits did not receive energy assessments, and there are only five assisted installation projects as a result. These include three furnaces, one water heater, and a custom project. The lack of a follow-up assisted installation project explains the much lower than expected savings.

Table 73. 2019 BHCOG Participation and Energy Savings

	Goal	Actual
Annual participation	50	108
Energy savings (dth)	8,341	1,565

4.2 EVALUATION METHODOLOGY

In addition to Black Hills Energy staff interviews, the process and impact evaluation activities conducted for the Commercial Direct Install program are summarized below.

Implementation of staff interview. An interview was conducted with staff from the implementer, Franklin Energy, to better understand the delivery, operation, and status of the Commercial Direct Install program. The interview helped inform the design and content of the participants' interview guide.

Participant interviews. Telephone interviews were conducted with nine participants (four gas and five gas distribution) in the Commercial Direct Install program in February 2020. The purpose of the interviews was to inform process-related researchable issues and estimate net-to-gross. Participants were asked about their experience with the program, sources of awareness, satisfaction with various aspects of the program, reasons for interest in energy efficiency, and the current installation status of rebated equipment. The interview guide can be found in Appendix B.

Net-to-gross (NTG) estimation. As part of the telephone interviews with participants in the Commercial Direct Install program, the evaluation team asked participants a series of questions to better understand actions that would have been taken in the absence of the program to assess free-ridership. The recommended NTG ratio includes free-ridership and participant spillover estimates from participant self-reports.

Tracking system review. The evaluation team assessed the tracking system for consistency of claimed savings with the DSM plan, the scope of work for each customer, and overall data accuracy. All information entered into the tracking system was checked for accuracy against what was provided in the documentation.

Savings validation. The evaluation team assessed the actual claimed values for the program to ensure their accuracy with the previously mentioned algorithms and assumed values. A review of the claimed values also provided insight into the savings calculation methodology and any areas where potential errors may occur.

4.3 FINDINGS AND RECOMMENDATIONS

Black Hills Energy and Franklin Energy felt that the program is running well. Franklin Energy reported some challenges due to the unique geographic characteristics of the territory and lack of contractors (some customers are located in areas that have only one contractor). Franklin Energy's outreach is conducted through cold calls, canvassing, and community events. Franklin Energy is new to the area and is working on increasing its outreach to customers and contractors. The outreach has been effective so far in generating leads to the program as most of the interviewed participants learned about the program from Black Hills Energy or Franklin Energy. Franklin Energy reported that relationships with municipalities have also been successful in generating new leads.

Participants are generally satisfied with the energy evaluation and the program overall. The program highly encouraged them to conduct the energy assessment and to purchase additional follow-up energy-efficient equipment outside what was directly installed.

Recommendations for the Commercial Direct Install program are as follows:

- **The evaluation team recommends Black Hills Energy continue using an NTG ratio of 91 percent for the Commercial Direct Install program in upcoming program years to estimate net savings.** The participant interviews resulted in a high self-report NTG ratio, inclusive of free-ridership and participant like-spillover. The interviews produced an average self-report free-ridership rate of 31 percent for the direct install equipment and 31 percent for follow-up measures, with no spillover attributable to the program. This resulted in an NTG ratio of about 70 percent. For multiple reasons, including the low participation rate, difficulty finding contractors in BHCOC areas, that this is the first evaluation for BHGD-CO, and the educational aspect of the program design, which also provides assisted installation, we do not recommend changes to the NTG ratio at this time. However, NTG should be reviewed once the participation levels improve.
- **Ensure the implementer is following up with customers on direct install measures.** Two customers reported that some of the direct install measures did not work properly and had to be removed (mainly aerators and showerheads). The evaluation team recommends that the implementer conducts follow-up visits or calls a few weeks after installation to check if the direct install equipment is still installed and working.
- **Utilize building type-specific parameters to estimate savings for direct install measures.** The evaluation team found that average values were utilized to estimate savings for the direct install measures instead of building type-specific values, which vary drastically (for example, for the measure type Aerator, annual water usage varies from 1,278 to 16,436). The evaluation team recommends that a comprehensive energy savings calculation and data tracking process be developed that includes building type-specific parameters leading to more accurate energy savings estimates. The building type can be easily documented during the energy assessment.
- **Track measures for the restaurant kit separately in Vision.** The evaluation found that the savings for the restaurant kit were tracked under a single measure. Breaking out each measure, in addition to using building type-specific parameters, will result in more accurate savings calculations and a higher level of quality assurance.
- **Document assumptions used for savings calculation.** After our review of the savings calculator tool, many of the algorithms are based on the Iowa TRM and appear accurate. However, the assumptions regarding some of the parameters used in the algorithms were not documented. Documenting these assumptions will add clarity on their origin and allows vetting by Black Hills Energy as well as interested stakeholders.

4.4 PROCESS EVALUATION RESULTS

The program evaluation team conducted in-depth interviews with nine participants in the program. Participants included both customers who received an evaluation and follow-up services through the program (five participants) as well as customers who only received an energy assessment and installation of direct install measures (four participants). The primary

business activities of the respective sites included mainly hotels (5) in addition to a retail store, a fitness center, and a restaurant.

4.4.1 Awareness and Outreach

As the implementer, Franklin Energy is responsible for program marketing and outreach to small business customers. Black Hills Energy also markets the program through its website and bill inserts. Six of the nine interviewed participants mentioned being approached by Black Hills or Franklin Energy about the program through door-to-door contact (4 BHGD-CO) or cold calls (2 BHCOG). One gas distribution participant searched for incentives online and reached out to Black Hills Energy, another gas participant heard about it from a contractor, while one participant learned about it through general word of mouth.

Customer preference on how they would like to receive program information was mainly email, mentioned by five of the six customers who were asked the question.

4.4.2 Program Experience

None of the participants interviewed had previously participated in a Black Hills Energy program prior to receiving services through the Commercial Direct Install program. When asked why they decided to participate in the program and receive an assessment, most participants cited energy or cost savings (4 BHGD-CO and 3 BHCOG), two participants mentioned water savings and two participants mentioned upgrading to more efficient equipment. One BHCOG participant added that reducing their energy use and switching to green energy is part of their corporate strategy.

4.4.2.1 Energy Assessment and Direct Install Measures

During an energy assessment, the implementation evaluator completes a walk-through evaluation of the business to identify energy efficiency opportunities and install the direct install measures such as aerators and showerheads. The evaluator then reviews the anticipated costs and savings of the recommended follow-up measures, along with information on incentives offered by Black Hills Energy. Customers are provided with a customized energy assessment report that details this information.

All participants but one received an energy assessment from Black Hills Energy as part of their participation in the program. The BHCOG participant who did not receive an energy assessment received a restaurant kit that he installed on his own. Six participants (4 BHGD-CO and 2 BHCOG) who were at their site during the assessment indicated that they were very satisfied with the scheduling of the evaluation, the knowledge of the evaluator, and the information provided during the evaluation. All participants felt they learned what they had hoped to learn from the energy assessment.

Satisfaction with the energy assessment overall and the installed equipment was also high. The four BHGD-CO participants were “very satisfied,” and the two BHCOG participants were “satisfied.” Only half of the participants who received an assessment recalled receiving an energy assessment report. They were generally very satisfied with the level of detail provided in the report (three participants were “very satisfied,” and one gas distribution participant was “satisfied”).

When asked about their likelihood of paying to have a similar evaluation done if it was not provided free as part of the program, three participants indicated they were not at all likely to

have had an evaluation done. One BHCOG participant gave a rating of a “3” (on a 0 to 10 scale where 0 was “not at all likely” and 10 was “extremely likely”). Three participants provided a rating of a “5,” and one BHCOG respondent provided a rating of an “8” with the comment that his company promotes green energy and energy efficiency and would probably pay for such assessment.

All participants but one (5 BHGD-CO and 3 BHCOG) had direct install measures installed after the assessment. Six of them reported that the direct install equipment is still installed, and the other two BHCOG respondents noted issues with the installed measures, especially the aerators and showerheads. One participant indicated that most of the aerators and about half of the showerheads did not fit properly and needed to be removed. The other respondent reported that the showerheads did not work for them and had to be replaced.

The participants expressed similar ratings when asked about their likelihood of installing the direct install measures on their own in the next six months. Three participants (2 BHGD-CO and 1 BHCOG) indicated they were not at all likely to install the measures. One participant who gave the likelihood of paying for an assessment a rating of a “5” noted that they would have probably installed the direct install measures but not within six months. Most of the participants reported that they did not know about the type of energy efficiency measures that were installed, especially the aerators. One participant noted the following:

“We probably wouldn’t have done it to the extent that we did. It would have just been replacing some with more efficient ones. It wouldn’t have been a wide-spread replacement like we did.”

4.4.2.2 Follow-up Measures

Mirroring satisfaction with the energy assessment, the five participants who received follow-up measure installations also reported high levels of satisfaction with the type of measures or upgrades eligible through the program, the financial assistance provided by the program, and the amount of time it took to complete the installation (four respondents were “very satisfied” and one gas distribution respondent was “satisfied”). Another aspect that was highly rated by the participants was the contractor who installed the follow-up measures; all five participants said that they were “very satisfied” with their contractor.

When asked to rate their satisfaction with the amount of energy savings since project completion, one gas respondent was very satisfied, and the remaining four participants reported not seeing savings yet or not being able to compare savings (e.g., because they just recently purchased the facility). They, however, highlighted other benefits from their participation in the program. Those included water savings, a better working system, and a comfortable working environment for the employees. One respondent reported major water savings:

“It does save a lot of water. We used to spray a lot of hot water out, and now we use 1/10 of the water. There is a lot more pressure than what I’m used to.” (BHCOG participant)

Most of the participants who received follow-up measure installations completed the recommendations in the assessment report. One gas distribution participant noted that there is one measure that he did not get to complete this year, but he is planning to do it next year.

Similar to responses about the direct install measures, the program appears to be very influential in driving the customers to install energy efficiency equipment. One participant reported the following when asked about the installation of furnaces as follow-up measures:

“Once we learned about the incentive, we decided to do more than what we planned to. We probably wouldn’t have done it without it.”

When asked about the importance of different factors in the decision to implement projects through the program, the recommendation from an equipment vendor or contractor was the highest rated item (mean rating of 9.0), as outlined in Table 74. This was followed by information provided through the evaluation and recommendation by the contractor. The availability of the program equipment was rated an average of 9.3 by three participants; however, the fourth participant gave it a rate of a “5” because they were remodeling the facility and were going to purchase the equipment with or without the incentive, which decreased the overall rating average for that decision making factor.

Table 74. Factors Important to Installing Program Equipment¹¹

	Mean	Participants
Recommendation from an equipment vendor or contractor	9.0	2
Information provided through the technical assistance or energy assessment report received from Black Hills Energy	8.7	3
Availability of the program incentive	8.3	4
The payback on the investment	8.3	4
Concerns about the environment, global warming or energy independence	3.5	4

4.4.3 Program Satisfaction

Overall, satisfaction was high among participants in the Commercial Direct Install program. Seven participants said they were very satisfied, and the other two were satisfied with the program. In addition to comments such as “everything was great” and “we were really happy with the process,” two participants said the following:

“It was extremely nice having the availability for the person doing the evaluation to be able to go ahead and install the low flow on all the faucets and the low flow showerheads. It was extremely helpful; he had everything there with him.” (BHGD-CO participant)

“A great service and communication. They came in and took care of all that for us.” (BHCOC participant)

Some participants, however, expressed running into some challenges. Two participants reported experiencing delays in getting their rebates:

¹¹ On a scale of 0 to 10 where 0 is “not at all important” and 10 is “extremely important”.

“The only thing that we were not very happy with was the time it took to receive the check for the furnace and tune-up. It took almost six weeks.” (BHGD-CO participant)

“We had a little bit of issue trying to get everything set up for automatic pay. Took a little more time than I hoped.” (BHCOC participant)

Two gas participants faced issues with the installed direct install equipment. One participant who had the measures installed at a hotel noted that the aerators and showerheads did not fit properly. They had to remove most of the aerators and half of the showerheads. The other participant who works for a travel stop center (hotel and restaurants) indicated that the aerators worked out very well, but the showerheads had to be changed. He added:

“We had low flow issues with the showerheads resulting in customer complaints, so we had to replace and change out all the showerheads.”

When asked what they would change about the program, most of the participants said “nothing” and expressed satisfaction with the program overall. One participant suggested adding more measures to the direct install measures, such as door sealing. The two respondents who experienced issues with the direct install equipment suggested a follow-up visit to check if the direct install equipment is still working. One of them specifically recommended the following:

“The only thing I would say if we would be able to have a follow up shortly after the installation to see how the equipment is working. Because that would have helped us identify the showerhead issue earlier on. If we have that follow up that would be the best thing we could have moving forward, 2 to 3 weeks follow up on that program installation.”

4.5 IMPACT RESULTS

This section presents the net-to-gross as well as engineering review findings conducted for the Commercial Direct Install program.

4.5.1 Net-to-Gross

The NTG research for the Commercial Direct Install program included an assessment of free-ridership and participant spillover indicators through customer self-reports from the participant interviews. NTG is calculated as follows:

$$NTG \text{ ratio} = (1 - \text{free-ridership}) + \text{spillover}$$

4.5.1.1 Free-ridership

The participant interviews, targeted at decision-makers, asked a limited series of structured questions about actions that would have been taken in the absence of the program to assess free-ridership. Free-ridership was evaluated at the project level. Participants were first asked questions to establish project context and verify the installation of direct install equipment left as well as the equipment from customers who went on to install additional follow-up measures through the program. Those who confirmed installation were then asked a series of questions to assess the impact the program had on the installation and timing of the measures installed. A preliminary free-ridership rate was calculated for each participant, following the scoring algorithm presented in Appendix A.

Overall, the participant self-reports resulted in an average free-ridership rate of 31 percent for the direct install equipment as part of the assessment and 28 percent for the follow-up equipment recommended by the assessment.

Table 75. Self-Report Free-Ridership Results—Commercial Direct Install Program

	Respondents (n)	Free-ridership estimate
Direct install equipment	9	31%
Follow-up equipment	8	28%

4.5.1.2 Participant Spillover

In addition to free-ridership, the participant interviews included a series of questions designed to measure spillover. Spillover refers to purchases of energy-efficient equipment since participation that were made *without* any financial assistance from Black Hills Energy because of the customer's participation in the Commercial Direct Install program. A participant spillover estimate is computed based on energy savings from energy-efficient equipment the customer installed on their own since participating because of their 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 quantified only measures installed outside the program that were of the same type and efficiency as the ones installed through the program (referred to as "like-spillover"). This approach makes it possible to use the estimated program savings for that measure (multiplied by the ratio of the quantity of equipment installed on their own versus through the program) to calculate the customer's like-spillover savings. The algorithm used to calculate individual spillover rates is documented in Appendix A.

The participant customer self-reports resulted in an overall like-spillover rate of 0 percent. No participants mentioned installing any additional equipment on their own, without a rebate from Black Hills Energy, since participating in the program. All of their current project work has been a result of the energy assessment.

Table 76. Self-Report Participant Spillover Results—Commercial Direct Install Program

	Respondents (n)	Spillover estimate
Commercial Direct Install program	8	0%

4.5.2 Engineering Review

The evaluation team completed an engineering review to estimate energy savings for the direct install measures. The evaluation team was not able to review and replicate the follow-up measures using the methodology in the savings calculator tool due to a lack of documentation. The tracking data from Vision provided the measure type, quantity of each measure type installed and claimed energy savings for each facility. As discussed later, the evaluation team was unable to calculate savings using the data tracked in Vision alone but was able to calculate evaluated savings using the additional documentation provided by Franklin Energy, mainly the savings calculator tool.

4.5.3 Tracking Data

Franklin Energy tracks customer and facility information in its own internal software. The software tracks customer contact information and details on the facility. Each project was assigned a Franklin specific project number based on the project specifications. A customer may be assigned multiple project numbers. Once the information was finalized, Franklin Energy uploaded relevant participation data to Black Hills Energy's Vision tracking system, which does not include all the information collected in Franklin Energy's internal software.

As part of the program evaluation activities, Tetra Tech requested program documentation for 15 sampled projects (12 BHGD-CO and 3 BHCOG). Franklin Energy provided documentation on January 29, 2020, with a savings calculator tool (excel-based tool). The documentation included energy assessment reports for each project and a final application form for participants who installed follow-up measures. The energy assessment report for each project contained customer information (name, address including the site street address, city, state, and zip code where the work was conducted), square footage, direct install measures that were installed, quantity installed, recommended follow-up measures with quantities and incentives, and annual energy and cost savings summary for each measure type (direct install and recommended follow-up measures).

In some cases, information downloaded from Vision was slightly different from what was provided in the scope of work documentation. The download from Vision contained a project number, reference id, and account number. Unfortunately, none of these IDs or numbers were used in the documentation provided by Franklin Energy. The team also identified some discrepancies in the tracked measures. For one project, the measures Caulking and Weatherstripping and Furnace were entered in Vision, although documentation showed that a boiler and a programmable thermostat were installed at that location.

Other discrepancies were identified for the claimed savings. Table 77 shows unit-level claimed savings for each direct install measure. Based on the current calculation methodology utilized by Franklin Energy, the savings are expected to be the same (see the following section). The evaluation team learned from Franklin Energy that the discrepancies we see in the first three listed measures in Table 77 are due to user entry errors. The discrepancy in the pre-rinse spray valve savings value is due to a change in the savings calculation methodology, which will be discussed below).

Table 77. Unit-Level Claimed Savings in Vision for Direct Install Measures

Direct install measure	Unit-level claimed savings in Vision (dth)
Aerator 1.0 GPM	0.86, 0.9, 3.3
Aerator 1.5 GPM	0.82, 1.9
Showerhead 1.5 GPM	1.518, 6.3
Handheld showerhead	1.518
Pre-rinse spray valve	1.19, 11.3
Water heater temp setback	0.341

The evaluation team found that Vision does not adequately track savings parameters to match the level of customization for savings calculation. Baseline information and building type were not tracked in Vision or documented in the energy assessment report. The building type was only documented in the final application of the follow-up measures, but that information was not

entered into Vision. It is unclear if this information was not entered into Vision, and therefore not available in the download, or entered into a different location.

Table 78 illustrates the different parameters needed to calculate savings for the direct install measure Aerator 1.0. Although some assumptions can be made for the last three parameters, tracking building type and baseline information will lead to accurate savings calculations with a higher level of quality assurance.

In the case of the restaurant kit, the evaluation team found that the several measures included in the kit were tracked together instead of being calculated separately using the appropriate building type information. Proper tracking of the different measures included in the kit will provide a more accurate and detailed savings calculation.

Table 78. Comparison of Tracked Parameters for the Direct Install Measure Aerator 1.0

Parameters	Iowa TRM	Franklin Energy	Vision
Quantity	•	•	•
Building type	•		
Usage	•	• Average	
Baseline (GPM _{base} , gallons per minute)	•	•	
Used water temperature	•	•	
Supplied water temperature	•	•	
Recovery efficiency of gas water heater	•	•	

4.5.3.1 Savings Evaluation

Both tracking data and project documentation did not provide information on the baseline, the building type, and other parameters needed to estimate savings, such as water temperatures. The evaluation team found minimal project-level documentation collected for the direct install measures. Although additional documentation for calculations was collected for the follow-up measures, the information was not sufficient to evaluate and replicate those savings calculations.

In addition, the calculator used to estimate savings was not up-to-date. The evaluation team was informed that the savings calculator tool initially provided had undergone mid-year changes and was no longer accurate. The savings estimation methodology for the direct install measures was embedded in the original tool and, for the most part, has not been changed in the updated calculation tool (except for measures like the pre-rinse spray valve discussed in the following section). The team found that the calculation algorithms and assumptions are mostly based on the Iowa TRM. Although assumptions seemed reasonable for most of the parameters used to calculate savings (e.g., baseline and water temperatures), the evaluation team found that average values were utilized instead of building type-specific values. This can have a drastic impact on savings calculations as outlined by the example in Table 78 for the direct install measure, Aerator 1.0. The annual water usage is the only parameter in the savings calculation algorithm that is building-specific:

$$\Delta Therms = \%FossilDHW * \frac{GPM_{base} - GPM_{low}}{GPM_{base}} * Usage * EPG_{gas} \text{ (Iowa TRM)}$$

%FossilDHW proportion of water heating supplied by fossil fuel heating

GPM_{base} Faucet baseline flow in gallons per minute

GPM_{low} Faucet low flow in gallons per minute

Usage Annual gallons mixed water per faucet

EPG_{gas} Energy per gallon of mixed water used by faucet (gas water heater)

The table below shows a wide range of annual water usage estimates across different building types. Since some of the common building types participating in the Commercial Direct Install program are either restaurants or hotels and those have very different annual water usages, the evaluation team recommends the use of building specific usages to accurately estimate the savings, especially since the building type can be easily documented during the energy assessment. For example, on average, savings were overestimated for the sampled 15 projects, which had a variety of building types (mainly hotels and restaurants). Our savings estimations resulted in an average realization rate of 71 percent for the 11 BHGD-CO projects sampled and 42 percent for the four BHCOC projects sampled.

Table 79. Annual Water Usage for the Direct Install Measure Aerator 1.0 by Building Type (Iowa TRM)

Building type	Annual water usage
Small office	2,500
Large office	11,250
Fast food restaurant	9,588
Sit-down restaurant	15,779
Retail	3,653
Grocery	3,653
Warehouse	2,500
Elementary school	3,000
Jr. high/high school	9,000
Health	16,436
Motel	1,826
Hotel	1,278
Other	5,000
Average	6,574

4.5.3.2 Use of TRMs

The evaluation team utilized the savings calculation methodology embedded in the original tool provided by Franklin Energy. Although some of the assumptions were not clear, the team was able to verify the key parameters. The evaluation team found that the Iowa TRM was utilized in the updated savings calculator tool for most of the direct install measures. However, the savings estimation has drastically changed from the original tool for at least one measure, the pre-rinse spray valve. When asked about this change, Franklin energy reported that the savings for this measure were originally conservatively estimated using the Iowa TRM and were updated to the Illinois TRM.

Franklin Energy originally used the showerhead algorithm in the Iowa TRM to calculate savings for the pre-rinse spray valve (V2 3.2.2) and switched to the pre-rinse spray valve algorithm in the Illinois TRM (V6 4.2.11). This drastically increased the savings estimate (10-fold, from 1.19 to 11.3 dth), as outlined in Table 80. It is not clear to the evaluation why Franklin Energy decided to use the showerhead algorithm instead of the pre-rinse spray valve algorithm from the Iowa TRM (the deemed value for this measure is 4.5 dth).

The use of a TRM requires that choices be made about implementing assumptions or collecting site information. The remaining measures within this program have used the assumption either from the Iowa TRM or another TRM to calculate savings. Since they are not documented, it is difficult for the program to ensure consistency and a high level of quality assurance. The evaluation team recommends the use of a single TRM for all measures, such as the Iowa TRM.

Table 80. Comparison of Claimed Savings for the Direct Install Measure Pre-Rinse Spray Valve

	Building type	Energy savings (dth)
Illinois TRM V6 4.2.11 pre-rinse spray valve	Commercial – employee shower	11.3
Iowa TRM V2 3.2.2 showerhead	Small, quick-service restaurant	1.19
Iowa TRM V2 3.6.3 pre-rinse spray valve	<i>Deemed</i>	4.5

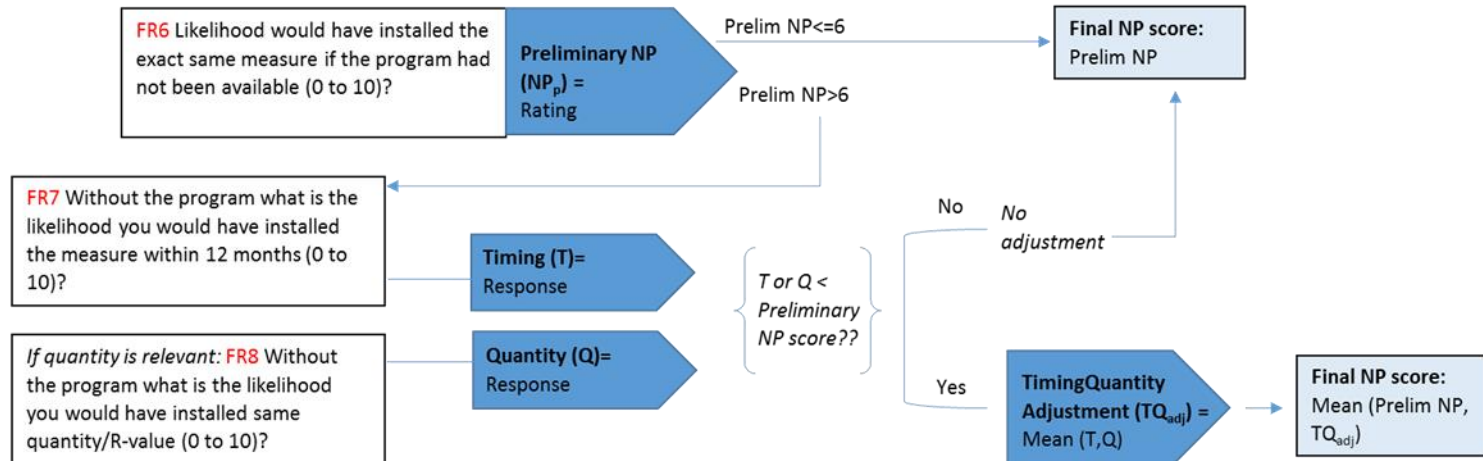
APPENDIX A: NET-TO-GROSS FLOWCHARTS

Figure 9. Residential Rebate Self-Report Free-Ridership Methodology Flowchart

Calculate Program Influence (PI) Score



Calculate No Program (NP) Score



Calculate Free-ridership



Consistency Checks

FR15 and FR16 are consistency check questions:

- If indicate substantially higher attribution than calculated FR, reduce FR by (FR/2).
- If indicate substantially lower attribution than calculated FR, increase FR by (1-FR/2)

Figure 10. Residential Evaluation Self-Report Free-Ridership Methodology Flowchart

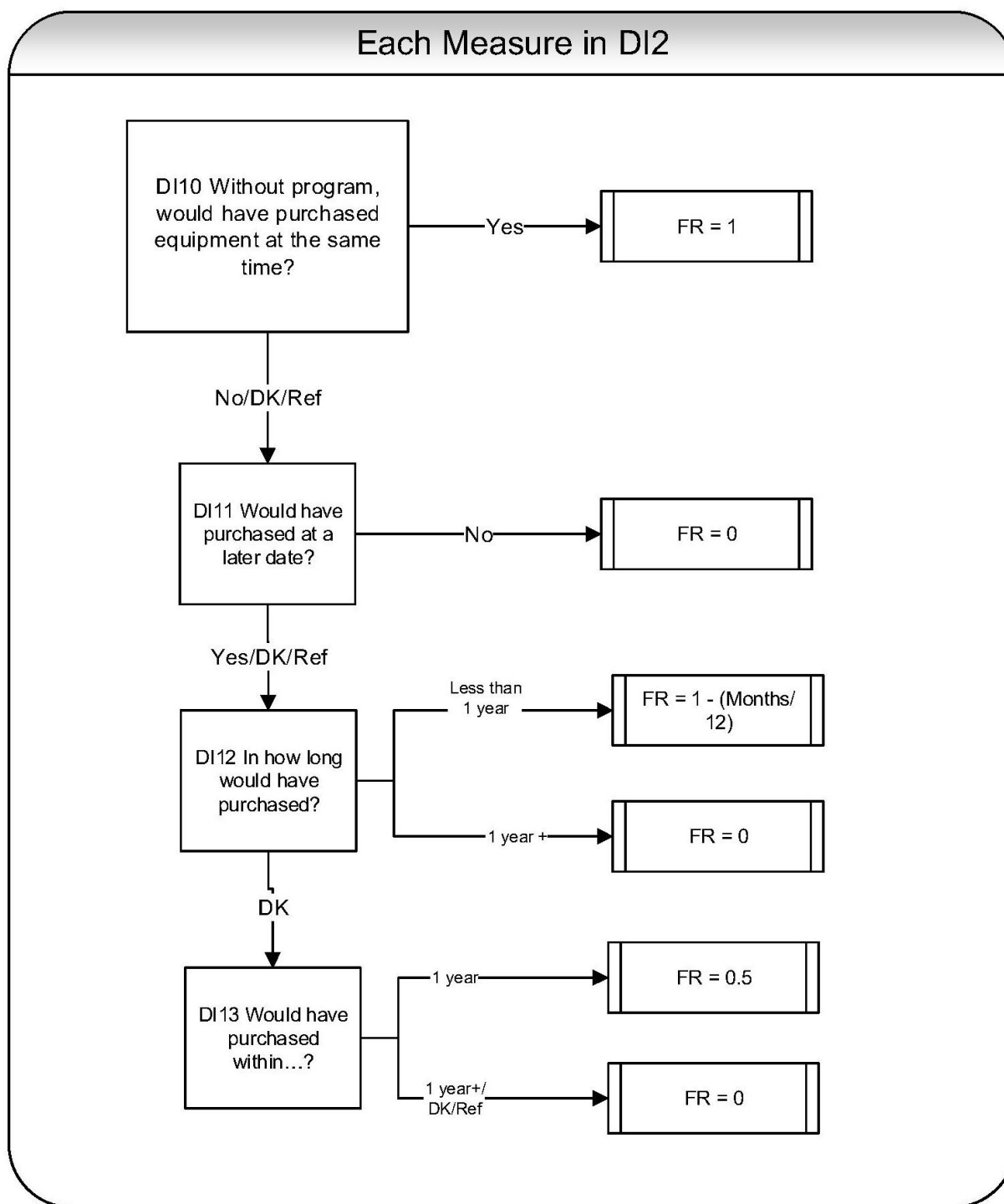
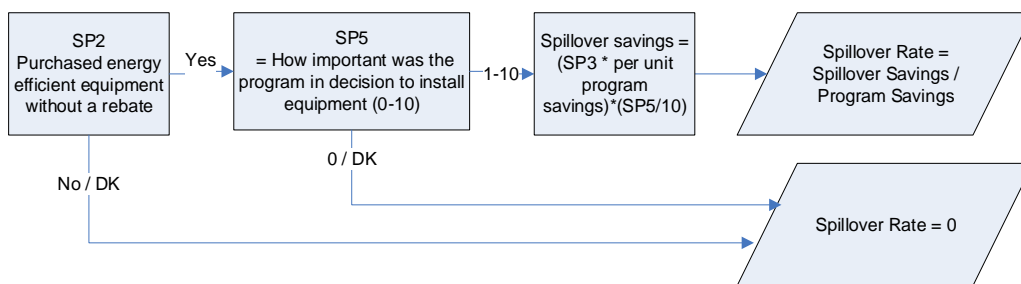


Figure 11. Participant Spillover Methodology Flowchart



APPENDIX B: SMALL BUSINESS DIRECT INSTALL INTERVIEW GUIDE



BLACK HILLS ENERGY COLORADO 2019 DSM EVALUATIONS: PARTICIPANT INTERVIEW GUIDE SMALL BUSINESS DIRECT INSTALL (SBDI) PROGRAM

Interviewee Name:

Company:

Phone/Email:

Interviewer Name:

Interview Date:

This topic guide will be used for in-depth interviews with participants to support the evaluation of the Colorado Small Business Direct Install program (SBDI). Interviews will be conducted by senior staff and will be semi-structured. This guide serves to offer consistent direction 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. As a result, not all questions will be asked of all interviewees and interviews may explore other topics specific to each interviewee.

Sample Information:

PROGRAM Small Business Direct Install

FIRM

NAME

ADDRESS

DATE

PHONE

EMAIL

RECOMMENDED MEASURES

INSTALLED MEASURES (measures from recommendations that were installed and received a rebate according to program records)

Introduction

My name is _____, with Tetra Tech. Black Hills Energy has hired us to evaluate their Small Business Direct Install program in Colorado. I would like to ask you some questions about your experience with the program. Your feedback on the program is extremely valuable to Black Hills Energy in helping them improve experiences and satisfaction with the program. This interview should take approximately 20 minutes of your time.

[IF NEEDED: This program is implemented by Franklin Energy.]

Before we begin, is it okay if I record our call for my notetaking purposes?

INT1 According to our records, around <DATE> your business received an energy assessment and <INSTALLED EQUIPMENT> were installed. In addition, you have been recommended to install <RECOMMENDED MEASURES>. Is this correct?

Yes No [IF NO, "What is incorrect about the records?"]

Customer Awareness

CA1 How did you hear about Black Hills Energy's Small Business Direct Install program?

CA2 How would you prefer to receive information from Black Hills Energy about their energy efficiency programs for businesses?

CA3 Prior to participating in the program, had you previously participated in any Black Hills Energy energy efficiency programs? [IF YES] Which program did you participate in?

Customer Experience

CE1 What is the main reason your company was interested in obtaining an energy assessment? Did you learn what you hoped to?

CE2 On a scale of 1 to 5, where 1 is 'not at all satisfied' and 5 is 'very satisfied,' how satisfied are you with the following...

- a. The scheduling of your assessment
- b. The knowledge of the evaluator
- c. The information given to you during the assessment process
- d. The level of detail provided in the assessment report [IF APPLICABLE]
- e. The assessment overall
- f. The installed equipment [IF NEEDED, referring to <INSTALLED MEASURES>]

[IF ANY IN AE2 < 3, ASK] What could the program do to increase your satisfaction with the assessment?

DI Are the <INSTALLED EQUIPMENT> currently still installed at <ADDRESS>?

IF YES [SKIP TO FR1]

IF NO

- a. What equipment is no longer installed?
- b. Why is the equipment not installed anymore?

Free-Ridership – Assessment

FR1 You received a free energy assessment as part of your participation in the program. If Black Hills Energy had not paid for the energy assessment, on a scale of 0 to 10 where 0 is 'not at all likely' and 10 is 'extremely likely,' how likely is it you would paid to have a similar assessment performed at your facility?

Free-Ridership – Direct Install

- FR10 Were you planning to install the <INSTALLED EQUIPMENT> on your own before you learned about the program?
- FR11 If you had not received the <INSTALLED EQUIPMENT> from Black Hills Energy, on a scale of 0 to 10 where 0 is not at all likely and 10 is extremely likely, how likely is it that your company would have purchased/installed <INSTALLED EQUIPMENT> in the next 6 months?
- FR12 If you had not received the free items during the assessment, what is the likelihood that you would have purchased/installed the **exact same items**? 0-10 scale
- FR13 [if Quantity is relevant] If you had not received the <INSTALLED EQUIPMENT> during the assessment, what is the likelihood you would have purchased/installed fewer energy efficient items? 0-10 scale

Recommended (Follow-up) Measures

- AE3 [IF PARTICIPANT DID NOT INSTALL ANY OF THE RECOMMENDED MEASURES OR JUST INSTALLED SOME OF THE MEASURES, ASK] According to program records, you did not make all of the upgrades recommended to you during the assessment.
- Why did you decide not to make all of the upgrades?
 - Will you make the recommended improvements at some point?
- AE4 [IF PARTICIPANT DID NOT INSTALL ANY OF THE RECOMMENDED MEASURES, SKIP TO N1] According to program records you received incentives for <INSTALLED MEASURES> as part of the program. Are all of these measures currently installed and operating at <ADDRESS>?
- IF YES [SKIP TO AE5]
IF NO
- What measures or upgrades are no longer installed?
 - Why are the measures not currently installed and operating?
- AE5 Did these measures replace existing measures? [ASK ABOUT EACH MEASURE]
- IF YES: What was the condition of the old measures?
IF NO [CONTINUE]
- AE6 I am going to read another list to you. Please rate your level of satisfaction for each item using a scale of 1 to 5 where 1 is 'not at all satisfied' and 5 is 'very satisfied.'
- How satisfied were you with...?
- The type of measures or upgrades eligible through the program
 - The financial assistance provided by the program
 - The amount of energy savings you have seen since project completion
 - The amount of time it took to complete the installation
 - The contractor who installed the measures
- [IF ANY IN AE6 < 3, ASK] You gave a less than satisfied rating. Why was that?

3

Free-Ridership – Installed (Follow-up) Measures

For the next series of questions, I would like to focus on the improvements you purchased or implemented through the program that included <INSTALLED MEASURES>.

N1 Did you learn about the program BEFORE or AFTER you finalized your project specifications?

Before After

N2INT Using a 0 to 10 scale where 0 is "not at all important" and 10 is "very important," please rate the importance of each of the following in your decision to implement the <INSTALLED MEASURES> project. [ASK ABOUT EACH MEASURE]
[IF NEEDED: How important in your DECISION to implement the project was...]

N2b The availability of the program incentive?

N2c The information provided through the technical assistance or energy assessment report you received from Black Hills or other program staff?

N2d The recommendation from an equipment vendor or contractor that helped you with the choice of the equipment?

N2e Your previous experience with a Black Hills Energy program?

N2f The information from the program or Black Hills marketing materials?

N2g The endorsement or recommendation by a Black Hills staff or key account manager?

N2h Your corporate policy or guidelines?

N2i The payback on the investment?

N2j General concerns about the environment, global warming, or energy independence?

N2kask Were there any other factors we haven't discussed that were influential in your decision to install this <INSTALLED MEASURES> project? [SELECT ONE]

01 Yes (specify)
02 No

N2k [IF N2kask = 1] Using the same 0 to 10 scale, how would you rate the influence of this factor?

— [RECORD 0 – 10]

N3 [IF N2i >= 8] Did you consider the incentive when determining the <INSTALLED MEASURES> project's payback on investment? Yes/No

N6 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 purchased or implemented the exact same measures had the program not been available?

— [RECORD 0 – 10]

4

N8 [IF N6 > 0 AND N6 < 8, ELSE SKIP TO CC1] Without the program, when do you think you would have installed these measures? Would you say...

- 00 At the same time
- 01 Within 6 months?
- 02 Between 6 months and 1 year later?
- 03 Between 1 - 2 years later?
- 04 2 or more years later?

Consistency Check

CC1 Could you please tell me in your own words what influence the program had in your decision to purchase or implement the <INSTALLED MEASURES>?

Spillover

SP1 Since participating in the program, have you installed or implemented any of the exact same energy efficient <INSTALLED MEASURES> on your own without any financial assistance from a Black Hills Energy program at this facility or at other locations served by Black Hills?

- 01 Yes [RECORD WHICH MEASURES]
- 02 No [SKIP TO SAT1]

SP2a Thinking of the <INSTALLED MEASURES> that you installed on your own, how does the additional quantity compare to what you installed through the program at <ADDRESS>? Did you install more, less or the same amount of <INSTALLED MEASURES>?

(PROBE: We're looking for a percent compared to the amount installed through the program. For example, was it about 25% of what you installed through the program, 50% of what you installed through the program, the same (100%) amount as you installed through the program, twice as much as what you installed through the program (200%) or some other amount?) [SELECT ONE]

- 01 More [SKIP TO SP2aM]
- 02 Less [SKIP TO SP2aL]
- 03 Same amount (100%) [SKIP TO SP3]
- 88 Don't know [SKIP TO SP3]

SP2aM Compared to the amount of <INSTALLED MEASURES> that you installed through the program at <ADDRESS>, how much <INSTALLED MEASURES> did you install on your own?

We're looking for a percent compared to the amount installed through the program. For example, if it was about twice as much as what you installed through the program you would say 200%. (Enter whole number)

___ [RECORD PERCENTAGE AS 101% - 900%]

SP2aL Compared to the amount of <INSTALLED MEASURES> that you installed through the program at <ADDRESS>, how much <INSTALLED MEASURES> did you install on your own?

We're looking for a percent compared to the amount installed through the program. For example, if it was about half as much as what you installed through the program you would say 50%. (Enter whole number)

___ [RECORD PERCENTAGE AS 1% - 99%]

SP2aa [SKIP IF INSTALLED MEASURES = 1] Just to make sure we understand and interpret that correctly, would you be able to tell me the quantity you installed outside the program? [PROBE: We are looking for a number as opposed to a percentage.]

___ [1-50] [RECORD NUMBER/QUANTITY]

SP2b [IF SP2a = 1 OR 2] So the amount of additional energy efficient equipment you bought on your own was [PERCENTAGE FROM SP2a] of what you got through the program at <ADDRESS>? [SELECT ONE]

01 Yes
02 No [SKIP BACK TO CORRECT S2a]

SP3 On a scale from 0 to 10 where 0 is "not at all important" and 10 is "extremely important," how important was your participation in the program on your decision to make additional energy efficiency improvements on your own?

___ [RECORD 0 – 10]

SP12 If you had not participated in the program, how likely is it that you would still have implemented these measures, using a 0 to 10, scale where 0 means you definitely WOULD NOT have implemented these measures and 10 means you definitely WOULD have implemented these measures?

___ [RECORD 0 – 10]

SP13 Why did you purchase or implement this energy efficiency measures without going through a Black Hills Energy program?

Satisfaction

SA1 Thinking about all aspects of the program, using a scale of 1 to 5 where 1 is 'not at all satisfied' and 5 is 'very satisfied,' how satisfied are you with the program overall?

SA2 What benefits, if any, has your business realized as a result of installing energy efficient measures or upgrades through the program?

SA3 What barriers did you face, either inside or outside of your company, when deciding whether or not to install measures through the program?

SA4 Which aspects of the program, if any, would you change?

6

SA5 Have you participated in any other Black Hills Energy energy efficiency programs since receiving your assessment?

IF YES: Which ones?

Business Characteristics

BC1 To wrap up, I just have a few more questions about your business. What is the main business activity performed at this facility?

BC2 Approximately how many employees does the business have at this location, including any volunteers or unpaid employees?

Wrap-Up

WU1 Do you have any additional comments about the Small Business Direct Install program?

WU2 If needed, would it be alright if someone followed up with you if we need additional clarification to your interview responses?

APPENDIX C: RESIDENTIAL EVALUATION AUDITOR INTERVIEW PROTOCOL

BLACK HILLS ENERGY COLORADO RESIDENTIAL EVALUATION PROGRAM PROCESS EVALUATION AUDITOR INTERVIEW PROTOCOL

1.1 INTRODUCTION

Note: 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.

NAME: _____

COMPANY: _____

PHONE: _____

INTERVIEWER: _____

DATE COMPLETED: _____ **LENGTH:** _____

My name is _____, with Tetra Tech. Black Hills Energy has hired us to evaluate their Energy Efficiency Programs in Colorado. We understand you completed projects in 2019 through contract with Energy Smart Colorado for the Residential Evaluation program and I'd like to ask you some questions about your experience with the program. The information you provide will assist us in assessing these program(s) and finding ways for the program to serve the residential market most effectively. This interview should take approximately 20 minutes of your time. Would it be alright for notetaking purposes if I recorded this call?

1.2 PROGRAM AWARENESS

P1. When did you first get involved with the program? What is your relationship with Energy Smart Colorado?

P2. Could you describe for me your role in the program? (Probe for marketing, audit, install, and follow-up services)

P3. About how many audits/projects did you complete in 2019 (program and nonprogram)? How many were basic walk-through versus Tier 2 or 3? What other types of projects do you work on?

ENERGY AUDITORS

RA1. Could you describe a typical audit to me? (typical direct install measures, tests completed, education provided, recommendations made, follow-up)?
What is the key difference between the gas and electric audit process?

RA2. How does the scheduling process work? Are there any issues with distance between audit appointments or timing?

RA3. How long are the audits? Does this give you enough time to cover the items required? Does it allow for enough discussion with the customer? How do customers typically respond to the recommendations?

RA4. Is the audit form well laid out and easy to use? Does it have areas to record all relevant information? Is it missing anything? Any areas not used?

RA5. Is there any automation that could take place with the audit form or the process?

RA6. What QA/QC issues have you identified when performing the audit, and in particular, the test-out? Are there things that contractors need to address with their installation practices or Black Hills should be aware of?

RA7. How could the program be more effective at getting customers to install equipment with even higher efficiencies through a Black Hills program or participate in the Black Hills residential programs?

1.3 PROGRAM INVOLVEMENT

P1. On a scale of 1 to 5 where 1 is 'not at all difficult' and 5 is 'very difficult,' how would you rate the program's administrative burden (e.g., requirements, paperwork) for you? Why do you give this ranking? What would you do to improve the administration of the program?

P2. Are there types of workshops or training events you would like to see Black Hills Energy or Energy Smart sponsor to help you in your work in the program?

P3. Do you feel adequately informed of program changes? How would you like to be better informed of program changes?

P4. How would you describe your interactions with Energy Smart program staff (minimal, helpful, very involved, probe to characterize)?

P5. What do you think is working best with the program?

P6. What do you think is most in need of improvement?

P16. Are you aware of other utilities that offer Energy Efficiency Audit programs? Which ones? Do you have any involvement with these programs – why or why not? Is there anything that Black Hills could learn from these other programs?

Those are all the questions I have. Thank you very much for your time today.

APPENDIX D: RESIDENTIAL PROGRAM EVALUATION CONTRACTOR INTERVIEW PROTOCOL

BLACK HILLS ENERGY RESIDENTIAL PROGRAM EVALUATION RESIDENTIAL INSTALLATION CONTRACTOR INTERVIEW PROTOCOL

1.1 INTRODUCTION

Note: 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.

NAME: _____

COMPANY: _____

TITLE: _____

PHONE: _____

INTERVIEWER: _____

DATE COMPLETED: _____ LENGTH: _____

Conduct quick website search of contractor if possible to understand basic background.

My name is _____, with Tetra Tech. Black Hills Energy has hired us to evaluate their Energy Efficiency Programs in Colorado. I would like to ask you some questions about your experience with their residential rebates. The information you provide will assist us in assessing rebate programs and finding ways to serve the residential market most effectively. This interview should take approximately 30 minutes of your time.

1.2 FIRMOGRAPHICS

F1. To get us started, could you briefly tell me a little bit about your business and position? What types of services do you offer? Probe for number of projects completed or equipment installed by type in 2019.

F1A. What percent of your 2019 projects/equipment sold are in Black Hills' service territory? What percent qualified for Black Hills rebates?

F2. In what parts of Colorado / Wyoming do you primarily conduct residential work?

F3. How many employees (full-time equivalents) does your company employ?

F4. Are you a subsidiary or branch of a bigger company?
(Other options: franchise, dealer, manufacturers rep).

1.3 PROGRAM AWARENESS

P1. Could you describe for me your involvement projects receiving residential rebates from Black Hills?

P2. On a scale of 1 to 5 where 1 is 'not at all active' and 5 is 'very active,' how would you characterize your participation level in the program in the past 12 months?

P2b. Probe for reasons trade ally participates at the reported level of activity.

P3. How did you first hear about the program or rebates? Why did you decide to apply for rebates?

P4. Are you registered with Black Hills as a trade ally, or with any of the companies implementing programs? Do you see any advantage to being registered?

1.4 ENVELOPE CONTRACTORS ONLY

RE1. What was the process for completing work through the program?

RE2. How does this process work for you? What would you like to see improved?

RE3. What percent of those you follow-up with complete the job with you? What do you think are reasons customers do or do not move forward with a job?

RE4. How are you involved with the rebate portion of the program? What is working well about these options from your point of view? How would you like to see the rebate option improved?

1.5 PROGRAM INVOLVEMENT

P5. What percent of your total work in the residential sector does work through the program represent?

P6. Has your participation in (or involvement with) the program affected your business practices? How?

P6a. Probe specifically about changes in sales practices as well as technical techniques and practices.

P7. What are your plans for future participation in the program (increase/decrease/remain the same?) Why?

P8. What could Black Hills Energy do to make you more involved in the program?

P9. On a scale of 1 to 5 where 1 is 'not at all difficult' and 5 is 'very difficult,' how would you rate the program's administrative burden (e.g., requirements, paperwork) for you? Why do you give this ranking?

P10. Are there types of workshops or training events you would like to see Black Hills Energy sponsor to help you in your work in the program? Probe to characterize current state of on-the-job training.

P11. Do you feel adequately informed of program changes? How would you like to be better informed of program changes?

P12. How would you describe your interactions with Black Hills program staff (minimal, helpful, very involved, probe to characterize)?

P13. What do you think is working best with the program?

P14. What do you think is most in need of improvement?

P15. What is the primary benefit(s) you receive from participating in the program?

P16. Are there other types of residential energy efficiency programs you wish Black Hills sponsored?

1.6 CUSTOMER INTERACTIONS

C1. What are the primary reasons why customers typically want to participate in the program?

C2. What are the primary reasons why customers typically do not want to participate in the program?

C3. On a scale of 1 to 5 where 1 is not at all difficult and 5 is very difficult, how difficult do you find it to motivate customers to participate in the program? Probe to understand why the program is easy or difficult to sell for respondent. Characterize customer participation barriers to the extent possible.

C4. What is the most valuable sales tool you have for getting your customers to participate in the program? What additional tools could Black Hills provide you to better motivate participation by your customers?

C5. What do you think are the main benefits your customers receive by participating in the program?

C6. What can be done to increase the number of participating projects in the program?

Those are all the questions I have. Thank you very much for your time today.

APPENDIX E: RESIDENTIAL PROGRAMS PARTICIPANT SURVEY

2019 Black Hills Energy Residential Programs Participant Survey Heating and Cooling, Envelope Measure Retrofit, Evaluation,

Sample variables

CaseID	Unique survey identification number
AccountNum	Unique utility identification number Proxy account numbers added for Online Evaluation participants
Programyear	Year of participation in the program 2019 for most programs 2018 records included for Online Evaluation kits
Contact_Name	Name of participating customer
Address	Address where equipment was installed or service was performed
City	City where equipment was installed or service was performed
State	State where equipment was installed or service was performed
Zip	Zip where equipment was installed or service was performed
Phone_num	Phone number of participating customer
Email	Email address of participating customer (Online Evaluations only)
Date	Installation date for Envelope and Appliances (use date installed or application date) or Audit date for Evaluation program (use program qualification date)
Rebate	Rebate dollar amount per measure
Territory	Black Hills Service territory CE Colorado Electric CG Colorado Gas
PROGRAM_CD	Program Name code 1 Residential In-home Evaluation 2 Residential Equipment 3 Residential Heating and Cooling 4 Residential Appliance and Electronics 5 Residential Envelope Measure Retrofit 6 Residential Appliance Recycling 7 Low Income Assistance 8 Online Evaluation

Page 1

Audit	Residential Audit Codes
	0 No audit
	1 Level 1 In-home Energy Evaluation
	2 Level 2 Whole Home Evaluation with blower door test
RefQty	Quantity of refrigerators recycled
FreQty	Quantity of freezers recycled
ACqty	Quantity of air conditioners recycled
EE_MEAS	Numeric version of sampled energy efficiency measure use for FR section
	01 air conditioning
	02 air sealing
	03 ceiling insulation
	04 energy efficient doors
	05 energy efficient windows
	06 floor insulation
	07 furnace
	08 heat pump
	programmable
	09 thermostat
	10 tune up
	11 wall insulation
	12 water heater
EE_MEAS_TXT	String version for sampled measure for FR section

MEASTYPE	Numeric code for measure
01	air conditioning
02	air sealing
03	attic insulation
04	audit
05	ceiling insulation
06	custom
07	energy efficient doors
08	energy efficient windows
09	evaporative cooler
10	faucet aerator
11	floor insulation
12	freezer recycling
13	furnace
14	heat pump
15	LED
16	low flow showerhead
17	online energy assessment and free energy kit
18	pipe wrap
19	programmable thermostat
20	refrigerator
21	refrigerator recycling
22	tune up
23	wall insulation
24	water heater
25	water heater blanket

MEASTYPE_TXT Text version of sampled energy efficiency measure used for Non FR questions

GasSavdth Gas savings associated with measure

ElecSavkW Electric savings associated with measure

ElecSavkWh Electric savings associated with measure

Utility_Contact Utility Contact's name and number
 CE Patti Olenick at (719) 546 6452
 CG Amy Fiala at (719) 208-3513

Participant Introduction

[ASK OF ALL PROGRAMS]

INTRO [INTERVIEWER INSTRUCTION: Please dial the phone number <PHONE> and enter the call result.]

- | | | |
|---|-----------------|------------------|
| 1 | Connected | [PROCEED] |
| 2 | Did not connect | [DISPO CASE OUT] |

INT01 Hello, my name is <_____,> and I am calling from Tetra Tech on behalf of Black Hills Energy. We are conducting a study about Black Hills Energy's rebate and energy efficiency programs. This is not a sales call, and responses will be used to inform Black Hills Energy about your experience with the program.

May I speak with <CONTACT_NAME>?

- | | | |
|---|----------------------------------|---------------------|
| 1 | Yes | |
| 2 | No, R not knowledgeable | [SKIP TO OTHER_R] |
| 3 | No, R is not currently available | [SCHEDULE CALLBACK] |
| 4 | Did not connect | [DISPO CASE OUT] |

PREAMBLE I'd like to assure you that your responses will be kept confidential and your name will not be revealed to anyone.
For quality and training purposes this call will be recorded.

- | | |
|---|----------|
| 1 | Continue |
|---|----------|

FAQ

[THE FOLLOWING IS AVAILABLE ONLY IF NEEDED]

Who is doing this study: Black Hills 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 with the program.

Why are you conducting this study: Studies like this help Black Hills Energy better understand household's satisfaction with and need for energy efficiency programs.

Timing: This survey should take approximately 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> program. This information will help Black Hills Energy best design and deliver energy efficiency programs to assist residential customers. Your responses will be kept confidential by our firm. If you would like to talk with someone about this study, feel free to call <UTILITY_CONTACT>.

[ENERGY EVALUATIONS DESCRIPTIONS:

Free walk-through evaluation where auditors install or instruct you on how to install a number of low-cost energy-saving measure. They also educate you on how to manage your energy usage and costs and refer customers to Black Hills programs.

Level 2 evaluation which is more comprehensive than a walk through and includes diagnostic testing and costs \$100.

Level 3 evaluation which incorporates more of a whole house approach and rewards you for installing energy efficiency measures recommended during the evaluation. It includes a test in visit to assess home performance and a test out visit after three of the top five recommended measures are installed and costs \$200.]

S2 Our records indicate that around <DATE>. . . <S2_TXT>. Is that correct?

PROGRAM_CD S2_TXT

- 1 you had an energy specialist visit your home on behalf of Black Hills Energy for a Home Audit
 - 2 you received rebates for equipment through Black Hills Energy's Residential Equipment program
 - 3 you received rebates through Black Hills Energy's Residential Heating and Cooling program
 - 4 your household received an appliance rebate from Black Hills
 - 5 you received rebates through Black Hills Energy's Residential Envelope program
 - 6 you received a rebate for recycling your appliance
 - 7 you had an energy specialist visit your home on behalf of Black Hills Energy and install energy saving equipment
 - 8 you went online and answered questions about your home and requested an energy saving kit.
-
- | | | |
|----|---|-------------------|
| 01 | Yes, that is correct | |
| 02 | Yes, we participated but that information is incorrect [SPECIFY What is incorrect?] | |
| 03 | No, I don't recall participating / Didn't do these projects | [SKIP TO OTHER_R] |
| 88 | Don't know | [SKIP TO OTHER_R] |
| 99 | Refused | [SKIP TO OTHER_R] |

S20 [ASK IF S2=2] What is incorrect specified.

S1 Could you please confirm that your address is <ADDRESS>?

- | | | |
|----|--|--------------------------|
| 1 | Yes, address is correct | [SKIP TO P11] |
| 2 | No, that information is mostly correct [SPECIFY: what 's incorrect?] | |
| 3 | No, address is incorrect | [THANK AND TERMINATE 86] |
| 88 | Don't know | |
| 99 | Refused | |

S10 [ASK IF S1=2] What is incorrect specified.

OTHER_R Is there someone else in your household who is knowledgeable about your household's participation in the <PROGRAM_CD> program?

- | | | |
|----|--------------------------------|------------------------|
| 1 | Yes, there's somebody else | |
| 2 | No | [THANK & TERMINATE 81] |
| 88 | Don't know | [THANK & TERMINATE 81] |
| 99 | Refused / Prefer not to answer | [THANK & TERMINATE 91] |

AVAILABLE_R May I please speak with that person?

- | | | |
|----|---------------------------------------|--------------------------|
| 1 | Yes | [SKIP TO INT01] |
| 2 | Yes, but R is not currently available | [SCHEDULE CALLBACK] |
| 3 | No | [THANK AND TERMINATE 91] |
| 88 | Don't know | [THANK AND TERMINATE 81] |
| 99 | Refused / Prefer not to answer | [THANK AND TERMINATE 91] |

Program Information

[ASK FOR ALL PROGRAMS]

P11 You may have received rebates or services for several projects or pieces of equipment.
[IF EE_MEAS IS NOT BLANK SHOW: Throughout the survey, we will focus on one, the <EE_MEAS> as part of the <PROGRAM_CD> program unless otherwise indicated.]
[IF EE_MEAS IS BLANK SHOW: Throughout the survey, we will focus on the <PROGRAM_CD> program.]

I would like to first ask you some questions about how you heard of the program and why you decided to participate.

How did you learn about the <PROGRAM_CD> program offered by Black Hills Energy?
[DO NOT READ; SELECT ALL THAT APPLY]

- | | |
|----|--|
| 01 | Utility |
| 02 | Radio Advertising |
| 03 | Newspaper Ad |
| 04 | General website / Online |
| 05 | TV Advertising |
| 06 | Landlord / Home association |
| 07 | Local government, community or non-profit agency |
| 08 | School, classes, energy center, meeting, or other event |
| 09 | Word of mouth (Friend / Relative / Neighbor / Co-worker) |
| 10 | Contractor |
| 11 | In store display or signage |
| 12 | Salesperson |
| 13 | Home builder, developer, real estate agent |
| 14 | Previous participation in BHE program |
| 15 | Other [SPECIFY: PROBE for utility or other source] |
| 88 | Don't know |
| 99 | Refused |

P11C150 Other source specified.

PI1A [ASK IF PI1=7] From which organization did you learn about the program?

[RECORD RESPONSE VERBATIM]

PI2 [ASK IF PI1=1] Can you specify how you learned about the program from Black Hills?
Was it a... [READ LIST; SELECT ALL THAT APPLY]

For PI2C01 through PI2C99

0 Not mentioned
1 Mentioned

01 Bill insert
02 Newsletter or direct mailing
03 Call center or program staff
04 Website
05 Email
06 or something else [SPECIFY]
88 Don't know
99 Refused

PI2C06O Something other utility communications specified.

PI3 [ASK IF PROGRAM_CD = 2,3,4,5 AND MAINT=0 ELSE SKIP TO PI12]
[IF PI1=10 SHOW "Just to confirm,"] For the purchase or installation of the <MEASTYPE>
through the program, did you work directly with a contractor or install it yourself? [SELECT ALL
THAT APPLY]

1 Contractor
2 Installed myself / Family member installed
3 Other [SPECIFY]
88 Don't know
99 Refused

PI3C03O Other person you worked with

CONTRACTOR [SET TO 1 IF PI3=1 OTHERWISE = 0]

PI5 [ASK IF PI3=1] Did the program provide you with a list of recommended contractors?

1 Yes
2 No
88 Don't know

PI5A [ASK IF PI5 = 2, 88] How did you select your contractor?

[RECORD RESPONSE VERBATIM]

PI6 [ASK IF PI5=1] Did you select the contractor you hired from the list of contractors provided?

- 1 Yes
- 2 No
- 88 Don't know

PI12 [ASK ALL PARTICIPANTS] Why were you interested in the <PROGRAM> program?
[IF R SAYS, SOUNDED LIKE A GOOD PROGRAM, PROBE: what specific part of the program sounded good?] [DO NOT READ; SELECT ALL THAT APPLY]

- 1 The financial incentive (rebate or payment for participating)
- 2 Energy savings
- 3 Reduced energy bill
- 4 Protecting the environment
- 5 Improved home comfort
- 6 The program was recommended to me by a contractor I trust
- 7 Curious about home's efficiency
- 8 Needed new equipment
- 9 Other [SPECIFY]
- 88 Don't know
- 99 Refused

PI12C090 Other reasons for interest specified.

PI13 [ASK IF PROGRAM_CD = 2,3,4,5,6] Where did you get your rebate application?
[DO NOT READ]

- 01 Black Hills (in office or sent via mail)
- 02 In home audit staff
- 03 In store – at customer service desk/from salesperson
- 04 Website/on-line
- 05 Contractor
- 06 Other [SPECIFY]
- 88 Don't know
- 99 Refused

PI130 Other place specified.

C_PI14_SKIP1 [SKIP TO NEXT SECTION IF PROGRAM_CD=1,7]

C_PI14_SKIP2 [SKIP TO PI19 IF PROGRAM_CD=8]

PI14 [SKIP IF PI13=4] Did you know that rebate applications were available online?

- 1 Yes
- 2 No
- 3 Does not use internet / No internet access
- 88 Don't know
- 99 Refused

PI15 Who completed your rebate application?

- 1 Me / The respondent / Somebody in my household
- 2 Retailer or contractor
- 3 Both myself and contractor or retailer
- 88 Don't know

PI16 On a scale of 0 to 10, where 0 is very difficult and 10 is very easy how difficult or easy did you find it to...

- 16a** understand the program requirements?
- 16b** complete the required program application and paperwork?
- 16c** interact with the program staff?
- 16d** participate in the program?

- ___ [RECORD 0-10]
- 77 Not applicable
- 88 Don't know

PI17 [ASK IF ANY IN PI16 < 4] What could the program have done differently to make it easier for you?

[RECORD RESPONSE VERBATIM]

PI18a [ASK IF PROGRAM_CD <> 8 AND Territory=CG ELSE SKIP TO PI19]
Are you familiar with the free online home energy evaluation offered by Black Hills Energy?

- 1 Yes
- 2 No
- 3 Does not use internet/no internet access [SKIP TO PI19]
- 88 Don't know
- 99 Refused

PI18b [ASK IF PI18a=1] Have you completed a free online home energy evaluation through Black Hills Energy?

- 1 Yes
- 2 No
- 3 Does not use internet/no internet access [SKIP TO PI19]
- 88 Don't know
- 99 Refused

PI18c [SKIP IF PI18a=1] On a scale of 0 to 10, where 0 is not at all interested and 10 is extremely interested, how interested would you be in the free online home energy evaluation through Black Hills Energy?

[IF NEEDED: An online home energy evaluation allows you to answer a few questions about your household online at Black Hills' website and receive tips on how to save energy]

____ [RECORD 0-10]
77 Not applicable
88 Don't know

[SHOW PI19 and PI20 on one screen in a table]

PI19 [ASK IF AUDIT=0 ELSE SKIP TO NEXT SECTION] Are you familiar with any of the following energy evaluations offered by Black Hills Energy? The... [READ LIST]

FOR PI19a through PI19c

- 1 Aware**
- 2 Not aware

PI19a the free walk-through home energy evaluation

PI19b the level 2 comprehensive evaluation that includes diagnostic testing and costs \$100

PI19c the level 3 includes test in and test out visits to assess home performance after measure installation and costs \$100

PI20 [**ASK FOR EACH PI19=1] Have you participated in the <FILL FROM PI19>?

FOR PI20a through PI20c

- 1 Have participated
- 2 Has not participated

PI20a [ASK IF PI19a=1] the free walk-through home energy evaluation?

PI20b [ASK IF PI19b=1] the level 2 comprehensive evaluation that includes diagnostic testing and costs \$100?

PI20c [ASK IF PI19c=1] the level 3 includes test in and test out visits to assess home performance after measure installation and costs \$100?

PI21 [SKIP IF PI20=1] Black Hills offers a <FILL FROM descriptions below>
On a scale of 0 to 10, where 0 is not at all interested and 10 is extremely interested, how interested would you be in the...?

FOR PI21a through PI21c

____ [RECORD 0-10]
77 Not applicable
88 Don't know

PI21a [SKIP IF PI20a=1] free walk-through home energy evaluation

PI21b [SKIP IF PI20b=1] level 2 whole home evaluation with blower door test

PI21c [SKIP IF PI20c=1] level 3 whole home evaluation with test-out verification

<DESCRIPTIONS:

Free walk-through evaluation where auditors install a number of low-cost energy-saving measure. They also educate you on how to manage your energy usage and costs and refer customers to Black Hills programs.

Level 2 evaluation which is more comprehensive than a walk through and includes diagnostic testing and costs \$100 after Black Hills rebate.

Level 3 evaluation which incorporates more of a whole house approach and rewards you for installing energy efficiency measures recommended during the evaluation. It includes a test in visit to assess home performance and a test out visit after three of the top five recommended measures are installed and costs \$100 after Black Hills rebate.>

Residential Online Evaluation

RO0 [ASK IF PROGRAM_CD=8 ELSE SKIP TO NEXT SECTION]

As part of the online evaluation, you requested a kit that contained energy savings equipment. Do you recall receiving this kit?

- | | | |
|----|------------|------------------------|
| 1 | Yes | |
| 2 | No | [SKIP TO NEXT SECTION] |
| 88 | Don't know | [SKIP TO NEXT SECTION] |
| 99 | Refused | [SKIP TO NEXT SECTION] |

[SHOW RO1, RO2, and RO3 in one table]

RO1 Which of the following kit items did you install or use? [READ LIST, RANDOMIZE LIST, ANSWER Yes/No FOR ALL]

For RO1a through RO1g

- | | |
|----|--------|
| 01 | Yes ** |
| 02 | No |

- RO1a Kitchen aerator
- RO1b Bath aerator
- RO1c Low-flow showerhead
- RO1d Furnace filter alarm
- RO1e Digital thermometer
- RO1f LEDs
- RO1g Weatherstripping or caulk

RO2 [****ASK IF RO1=1**] Is <item from RO1> still installed? [READ LIST OF THOSE INSTALLED]

For RO2a through RO2g

01 Yes

02 No (removed) ***

RO2a Kitchen aerator

RO2b Bath aerator

RO2c Low-flow showerhead

RO2d Furnace filter alarm

RO2e Digital thermometer

RO2f LEDs

RO2g Weatherstripping or caulk

RO3 [*****ASK OF EACH IF "Yes" IN RO1 AND "No" TO RO2**] Why did you remove the <item from RO1>? [READ LIST OF THOSE INSTALLED BUT REMOVED]

For RO3a through RO3g

[RECORD RESPONSE VERBATIM]

RO4 [ASK IF ALL RO1=2 ELSE SKIP TO NEXT SECTION] Why have you not used or installed any of the kit items?

[RECORD RESPONSE VERBATIM]

RO5 Do you plan to use or install any of the items within the next 6 months?

1 Yes

2 No

88 Don't know

99 Refused

Residential Evaluation – Level1

RE1 [ASK IF PROGRAM_CD=1 ELSE SKIP TO NEXT SECTION]

Which of the following services did the energy evaluator provide while at your home? [READ LIST; SELECT ALL THAT APPLY]

1 Inspected the home

2 Performed a blower door test

3 Installed energy efficient items

4 Provided a written report with recommended energy saving improvements

5 Told me about Black Hills Energy rebates

6 Any other services provided by the energy evaluator I didn't already mention? [SPECIFY]

77 None of these

RE1C060 Other specified.

RE3 What motivated you to call for the in-home energy evaluation?

[RECORD RESPONSE VERBATIM]

RE2 Did the in-home energy evaluation address the issues that motivated you to participate in the first place?

- 1 Yes
- 2 No
- 3 Somewhat or partially
- 88 Don't know
- 99 Refused

RE4 [ASK IF RE2=2 OR 3] How could the program have better met your needs?

[RECORD RESPONSE VERBATIM]

Audit Measures (non-Low-income)

DI2 [ASK IF PROGRAM_CD=1 ELSE SKIP TO NEXT SECTION]
The energy evaluator may have installed various energy saving devices. Which of the following energy saving devices were installed by the energy evaluator?
[READ LIST; SELECT ALL THAT APPLY]

- 1 Faucet aerators
- 2 Low-flow showerheads
- 3 Pipe insulation
- 4 LED lightbulbs
- 5 Air sealing
- 6 Weather stripping
- 77 None [SKIP TO NEXT SECTION]
- 88 Don't know [SKIP TO NEXT SECTION]
- 99 Refused [SKIP TO NEXT SECTION]

DI2C08O Other energy saving devices specified.

[ROSTER D14a THROUGH DI13 FOR EACH 1 to 6 EQUIPMENT SELECTED IN DI2]

DI4a [ASK IF DI2=1, 2, 4, ELSE SKIP TO DI4d] How many <DI2EQUIPMENT> that you received are currently installed?

- ___ Record number measures [0775]
- 88 Don't know
- 99 Refused

DI4b How many <DI2EQUIPMENT> were installed but have since been removed?

- ___ Record number measures [0775]
- 88 Don't know
- 99 Refused

DI4c How many <DI2EQUIPMENT> did you receive that were never installed?

Record number measures [0775]
 88 Don't know
 99 Refused

DI4d [ASK IF DI2=3, 5, 6, ELSE SKIP TO DI4] Is the <DI2EQUIPMENT> **still** installed?

1 Yes
 2 No
 88 Don't know
 99 Refused

DI4e [ASK IF DI4d=2, 88] Was the <DI2EQUIPMENT> **ever** installed?

1 Yes
 2 No [SKIP TO DI8]
 88 Don't know
 99 Refused

DI4 Who installed the <DI2EQUIPMENT>? Was it installed by you or someone in your household or the auditor? [READ LIST]

1 Myself / Someone in your household
 2 Auditor
 3 Combination of both
 4 [DO NOT READ] Something else [SPECIFY]
 88 Don't know

DI4O Something else specified.

DI8 [ASK IF (DI4b>=1 AND DI4b<>88 AND DI4b<>99) OR (DI4d=2 AND DI4e=1)] Why was the <DI2EQUIPMENT> removed?

[RECORD RESPONSE VERBATIM]

DI9 [ASK IF (DI4c>=1 AND DI4c<>88 AND DI4c<>99) OR DI4e=2] Why have you not installed the <DI4c> <DI2EQUIPMENT>?

[RECORD RESPONSE VERBATIM]

DI10 If the free <DI2EQUIPMENT> had not been available through the <PROGRAM> program, would you have purchased any <DI2EQUIPMENT> on your own at the exact same time?

1 Yes [SKIP TO DI10a]
 2 No
 88 Don't know
 99 Refused

DI11 Would you have purchased it at a later date?

- | | | |
|----|------------|--------------------------------|
| 1 | Yes | |
| 2 | No | [SKIP TO NEXT SECTION/MEASURE] |
| 88 | Don't know | |
| 99 | Refused | |

DI12 [ASK IF DI11=1] When do you think you would have purchased it?

- | | | |
|-------------------|-----|---------------|
| DI12_MONTH | ___ | Months [0-11] |
| DI12_YEAR | ___ | Years [0-75] |
| | 88 | Don't know |
| | 99 | Refused |

DI13 [ASK IF DI12=88] Do you think you would have purchased it within . . . ? [READ LIST]

- | | |
|----|-------------------|
| 1 | 1 year |
| 2 | 1 to 2 years |
| 3 | 3 to 4 years |
| 4 | More than 4 years |
| 5 | Never |
| 88 | Don't know |
| 99 | Refused |

DI10a [ASK IF DI10=1 OR DI11=1] If the free <DI2EQUIPMENT> had not been available through the <PROGRAM_CD> program, would you have purchased the same quantity you received, more, or fewer on your own?

- | | |
|----|-----------------|
| 01 | The same amount |
| 02 | More |
| 03 | Less |
| 88 | Don't know |
| 99 | Refused |

[END ROSTER; SKIP TO NEXT SECTION/MEASURE]

Residential Evaluation – All Levels

RE10a [ASK IF PROGRAM_CD=1 ELSE SKIP SECTION] Using a 0 to 10 scale, where 0 is not at all useful and 10 is very useful, how useful did you find the type of information provided by the energy specialist during the visit?

- | | |
|-----|--------------------------|
| ___ | Record usefulness [0-10] |
| 88 | Don't know |
| 99 | Refused |

RE10b Using the same 0 to 10 scale, where 0 is not at all useful and 10 is very useful, how useful did you find the type of information provided in the written report?

	Record usefulness [0-10]
77	Not applicable
88	Don't know
99	Refused

RE11 Based on the evaluation, which of the following types of changes or improvements **did the auditor recommend you make?** [READ LIST; SELECT ALL THAT APPLY]

Space heating and cooling

- 1 Increase insulation or air sealing (infiltration and attic bypass)
- 2 Install new windows or doors
- 3 Install or use a setback programmable thermostat
- 4 Upgrade furnace or boiler
- 5 Conduct maintenance on furnace or boiler
- 6 Use drapes or shades to stay cool in summer or warm in winter
- 7 Close off rooms when not in use
- 8 Clean furnace filter regularly
- 9 Replace air conditioning system
- 10 Sign up for a rebate program that allows the utility to control air condition use

Water Heating and saving

- 11 Install water saving devices such as low flow showerheads and faucet aerators
- 12 Upgrade water heater
- 13 Lower water heater temperature
- 14 Wash clothes in cold water or take shorter showers

Electricity savings

- 15 Change out incandescent lighting to LEDs
- 16 Install ENERGY STAR Clothes washer
- 17 Install ENERGY STAR Dishwasher
- 18 Turn off lights when not in use
- 19 Look for ENERGY STAR labels on appliances
- 20 Unplug electronics when not in use or use power strips
- 77 None of the above [SKIP TO NEXT SECTION]
- 88 Don't know [SKIP TO NEXT SECTION]

RE12 Did you follow through with any of the improvements or recommendations?

1	Yes	
2	No	[SKIP TO RE16]
88	Don't know	[SKIP TO RE16]

RE13 Which of those recommendations or improvements did you follow through with?
[SHOW ALL SELECTED IN RE11; SELECT ALL THAT APPLY] [READ LIST IF NEEDED]

- Space heating and cooling
- 1 Increase insulation or air sealing
 - 2 Install new windows or doors
 - 3 Install or use a setback programmable thermostat
 - 4 Upgrade furnace/boiler
 - 5 Conduct maintenance on furnace or boiler
 - 6 Use drapes or shades to stay cool in summer/warm in winter
 - 7 Close off rooms when not in use
 - 8 Clean furnace filter regularly
 - 9 Replace air conditioning system
 - 10 Sign up for a rebate program that allows the utility to control air condition use
- Water Heating and saving
- 11 Install water saving devices such as low flow showerheads and faucet aerators
 - 12 Upgrade water heater
 - 13 Lower water heater temperature
 - 14 Wash clothes in cold water or take shorter showers
- Electricity savings
- 15 Change out incandescent lighting to LEDs
 - 16 Install ENERGY STAR Clothes washer
 - 17 Install ENERGY STAR Dishwasher
 - 18 Turn off lights when not in use
 - 19 Look for ENERGY STAR labels on appliances
 - 20 Unplug electronics when not in use or use power strips
 - 77 None of the above [SKIP TO RE16]
 - 88 Don't know [SKIP TO RE16]

RE14 What was the primary reason you decided to take these actions? [DO NOT READ; SELECT ALL THAT APPLY]

- 01 Rebate was available
- 02 Energy savings
- 03 Reduced energy bill
- 04 Protecting the environment
- 05 Improved home comfort
- 06 The auditor recommended that it be done
- 07 Other [SPECIFY]
- 88 Don't know
- 99 Refused

RE14C070 Other reason specified.

RE15 [IF ANY SELECTED IN RE13] Using a 0 to 10 scale, where 0 is not at all influential and 10 is very influential, how influential was the information provided by the evaluator in your decision to make the change(s) you made?

- INFLUENCE RATING [0-10]
- 88 Don't know
 - 99 Refused

RE16 [FOR RECOMMENDATIONS OR IMPROVEMENTS NOT ACTED ON – Yes TO RE11 BUT NOT SELECTED IN RE13] On a scale of 0 to 10 where 0 is not at all likely and 10 is very likely, how likely do you think you will be to <FILL WITH RECOMMENDATION> within the next 12 months? [RANDOMIZE ORDER]

For RE16_01 through RE16_20

____ [RECORD 0-10]
88 Don't know

RE17 [ASK IF ANY RE16=0,1,2,3] What could the program do to make it more likely for you to act on the recommendations or improvements?

[RECORD RESPONSE VERBATIM]

RE18 [ASK IF ENVELOPE=0] Residential Envelope rebates are available for air sealing, insulation, doors and windows recommended through residential energy evaluations.

Did you hear about the Residential Envelope rebates offered by Black Hills Energy from the energy specialist who visited your home, someone else, or have you not heard of the rebates?

[IF YES: Did you hear about it from the auditor?]

1 No, Have not heard of the Building Envelope rebates [SKIP TO NEXT SECTION]
2 Yes, Heard of them from the auditor
3 Yes, Heard of them someplace other than the auditor

RE19 Did you apply for insulation rebates from Black Hills Energy?

01 Yes
02 No
88 Don't know

RE19a [ASK IF RE19=1] Did you receive a rebate from Black Hills Energy?

01 Yes
02 No
88 Don't know

RE19b [ASK IF RE19=2] Why haven't you applied for a rebate from Black Hills Energy?

[RECORD RESPONSE VERBATIM]

Equipment Options

EO2 [ASK IF PROGRAM_CD=2,3,4 AND MAINT=0 AND ENVELOPE=0 AND TSTAT=0 AND MEASTYPE<> 02 (air sealing) ELSE SKIP TO NEXT SECTION]
You may have received a rebate for more than one type of equipment, but for the rest of the survey, we would like to focus on the <MEASTYPE>. I'm going to first ask a few questions about your old and new <MEASTYPE>.

Did the <MEASTYPE> you purchase replace an existing <MEASTYPE>?

- | | | |
|----|------------|----------------|
| 1 | Yes | [SKIP TO EO4] |
| 2 | No | |
| 88 | Don't know | [SKIP TO EO10] |

EO3 Was this part of a newly constructed home?

- | | | |
|----|------------|------------------------|
| 1 | Yes | [SKIP TO NEXT SECTION] |
| 2 | No | |
| 88 | Don't know | |
| 99 | Refused | |

EO4 [ASK IF EO2=1] About how old was your existing <MEASTYPE>?

- | | |
|----|-----------------------|
| | [Record years] [0-75] |
| 88 | Don't know |
| 99 | Refused |

EO5 [ASK IF EO2=1] What condition was your existing <MEASTYPE> unit in when you decided to purchase a new one? [READ LIST]

- | | | |
|----|------------------------------------|----------------|
| 1 | Running with no performance issues | |
| 2 | Running but in need of repair | [SKIP TO EO7] |
| 3 | Broken – did not work | [SKIP TO EO7] |
| 88 | Don't know | [SKIP TO EO10] |
| 99 | Refused | [SKIP TO EO10] |

EO6C06O Other reason for purchase specified.

EO7 [ASK IF EO2=1 AND EO5=2,3] Did you consider a repair of your old equipment?

- | | |
|----|------------|
| 1 | Yes |
| 2 | No |
| 88 | Don't know |
| 99 | Refused |

EO8 [ASK IF EO2=1 AND EO5=2,3] What made you decide to purchase new equipment rather than repairing your old?

[RECORD RESPONSE VERBATIM]

EO9 [ASK IF EO2=1 AND EO5=1,2,3 and PI3=1] Do you remember the contractor telling you anything that really made a difference in your decision to retire your old unit and purchase a new high efficient one?

- 1 Yes [SPECIFY: what did the contractor say?]
- 2 No
- 3 Did not work with a contractor
- 88 Don't know

EO90 What did the contractor say specified.

EO10 Is the new <MEASTYPE> still installed and operating?

- 1 Yes [SKIP TO EO12]
- 2 No
- 88 Don't know
- 99 Refused

EO11 Why is it no longer installed and operating? [DO NOT READ; SELECT ALL THAT APPLY]

- 1 Never installed [SPECIFY: Why wasn't it installed?]
- 2 Equipment didn't work properly
- 3 Equipment failed/broke
- 4 Didn't provide enough hot water
- 5 Didn't like how it operated
- 6 Other [SPECIFY]
- 88 Don't know
- 99 Refused

EO11C010 [ASK IF EO11=1] Reason it was never installed [SPECIFY]

EO11C060 [ASK IF EO11=6] Other reason no longer installed and operating [SPECIFY]

EO12 [ASK IF MAINT=0 ELSE SKIP TO NEXT SECTION] In the last 5 years, which of the following categories best describes how often you have had your heating equipment inspected: annually or more often, every other year, only when needed, or something else? [SELECT ONE]

- 1 Annually or more often
- 2 Every other year
- 3 Only when needed
- 4 or something else [SPECIFY]
- 77 Never
- 88 Don't know
- 99 Refused

EO13 [ASK IF TERRITORY=CG ELSE SKIP TO NEXT SECTION] Before your recent <MEASTYPE> purchase did you have a heating and cooling maintenance contract?

- | | | |
|----|------------|-------------------------|
| 1 | Yes | |
| 2 | No | [SKIP TO NEXT SECTION] |
| 88 | Don't know | [SKIP TO NEXT SECTION] |
| 99 | Refused | [SKIP TO NEXT SECTION] |

EO14 Did the contract include inspections for your <MEASTYPE>?

- | | |
|----|------------|
| 1 | Yes |
| 2 | No |
| 88 | Don't know |
| 99 | Refused |

EO15 Was this contract through Black Hills Energy's Service Guard or through some other contractor?
[SELECT ONE]

- | | |
|----|-----------------------------------|
| 1 | Black Hill Energy's Service Guard |
| 2 | Other contractor |
| 88 | Don't know |
| 99 | Refused |

EO16 [ASK IF EO15=1] If you did not have a Service Guard offering, how likely would you have been to schedule furnace maintenance with a contract if it was not offered through Black Hills Energy? Would you say ... [READ LIST]

- | | |
|----|-------------------|
| 1 | Very likely |
| 2 | Somewhat likely |
| 3 | Somewhat unlikely |
| 4 | Not at all likely |
| 88 | Don't know |

Setback Thermostat

ST2 [ASK IF TSTAT=1 ELSE SKIP TO NEXT SECTION]
These next questions ask about how you used your old thermostat and your current use of your new programmable thermostat.

Which option best describes how you used your **old** thermostat? Did you manually adjust the temperature throughout the week, keep it at a constant temperature, have the thermostat

programmed to change temperature during the day and days of the week or was it something else? [SELECT ONE]

- 1 Manually adjust throughout the week
- 2 Kept at a constant temperature
- 3 Thermostat programmed to change temperature at different times of the day and days of the week
- 4 or something else [SPECIFY]
- 88 Don't know
- 99 Refused

ST20 Some other setting specified.

ST3 [ASK IF ST2=1] How often did you change the settings? [SELECT ONE]

- 1 Never
- 2 Once per month
- 3 Several times per month
- 4 Several times per week
- 5 Once per day
- 6 Several times per day
- 88 Don't know
- 99 Refused

ST4 Which option best describes how you use your **new** programmable thermostat? Do you manually adjust the temperature throughout the week, keep it at a constant temperature, have the thermostat programmed to change temperature during the day and days of the week or is it something else? [SELECT ONE]

- 1 Manually adjust throughout the week
- 2 Kept at a constant temperature
- 3 Thermostat programmed to change temperature at different times of the day and days of the week
- 4 or something else [SPECIFY]
- 88 Don't know
- 99 Refused

ST40 Some other setting specified.

ST5 [ASK IF ST4=3] How easy or difficult was it to program your new thermostat to change temperatures during different times of the day and days of the week? Would you say it was very easy, somewhat easy, somewhat difficult or very difficult? [SELECT ONE]

- 1 Very easy
- 2 Somewhat easy
- 3 Somewhat difficult
- 4 Very difficult
- 5 Contractor programmed
- 88 Don't know
- 99 Refused

ST6 [SKIP IF ST4=3] What is the main reason why your thermostat is not programmed to change temperatures at different times of the day and days of the week?? [SELECT ONE]

- 1 Wasn't programmed when installed
- 2 Wasn't programmed how I prefer
- 3 Too difficult or complicated to program/understand
- 4 Other [SPECIFY]
- 88 Don't know
- 99 Refused

ST6O Some other reason specified.

Furnace/Boiler Maintenance

FM1 [ASK IF MAINT=1 ELSE SKIP TO NEXT SECTION]

These next questions ask about your furnace or boiler maintenance or inspection.

Was the rebated inspection performed by Service Guard as part of a maintenance contract or by another contractor? [SELECT ONE]

- 1 Service Guard
- 2 Another contractor
- 88 Don't know
- 99 Refused

FM2 In the last 5 years, which of the following categories best describes how often you have had your heating equipment inspected: annually or more often, every other year, only when needed, or something else? [SELECT ONE]

- 1 Annually or more often
- 2 Every other year
- 3 Only when needed
- 4 or something else [SPECIFY]
- 88 Don't know
- 99 Refused

FM2O Something else specified.

FM3 On a scale of 0 to 10, with 0 being "not at all likely" and 10 being "very likely," how likely is it that you will have your equipment inspected next year?

- ___ [Record 0-10]
- 88 Don't know
- 99 Refused

FM4 On a scale of 0 to 10, with 0 being "not at all likely" and 10 being "very likely," how likely is it that you will submit an application for a Black Hills Energy rebate, if one is available?

- ___ [Record 0-10]
- 88 Don't know
- 99 Refused

Envelope Measure Retrofit

[ASK IF PROGRAM_CD=5 ELSE SKIP TO NEXT SECTION]

EM1 Our records show that you received rebates for installation of ... [READ LIST]

[IF AIRSEALING=1 SHOW] air sealing
 [IF WEATHERSTRIP=1 SHOW] weatherstripping
 [IF PIPEWRAP=1 SHOW] pipe wrapping
 [IF ATTICINSUL=1 SHOW] attic insulation
 [IF CEILINGINSUL=1 SHOW] ceiling insulation
 [IF DUCTINSUL=1 SHOW] duct insulation
 [IF EXTERIORINS=1 SHOW] exterior insulation
 [IF FLOORINSUL=1 SHOW] floor insulation
 [IF RIMJOIINSUL=1 SHOW] rim/joist insulation
 [IF WALLINSUL=1 SHOW] wall insulation
 [IF EEDOOR=1 SHOW] energy efficient doors
 [IF EEWINDOW=1 SHOW] energy efficient windows

Were all, some, or none of these installed, some of them installed?

1 All were installed [SKIP TO EM3]
 2 Some were installed and some were not installed
 3 None were installed [SKIP TO NEXT SECTION]
 88 Don't know / No Answer [SKIP TO NEXT SECTION]

EM2 Please confirm which parts of the project were completed. [READ LIST; SELECT ALL THAT R HAD COMPLETED] [SHOW ONLY THOSE THAT APPEAR IN EM1;]

1 air sealing
 2 weatherstripping
 3 pipe wrapping
 4 attic insulation
 5 ceiling insulation
 6 duct insulation
 7 exterior insulation
 8 floor insulation
 9 rim/joist insulation
 10 wall insulation
 11 energy efficient doors
 12 energy efficient windows
 88 Don't know
 99 Refused

EM3 [ASK IF PI3=1 ELSE SKIP TO NEXT SECTION] Earlier you indicated that you worked with a contractor to install the improvements rebated through the <PROGRAM_CD> program?

1 Yes, Used contractor [CONTINUE]
 2 No, did not use contractor [SKIP TO NEXT SECTION]
 88 Don't know / No Answer [SKIP TO NEXT SECTION]

EM4 Had you worked with this contractor before participating in this program?

- 1 Yes
- 2 No
- 88 Don't know
- 99 Refused

EM5 How important was the input from the contractor you worked with in deciding which specific improvements to install? Was it ... [READ LIST]

- 1 Very important
- 2 Somewhat important
- 3 Not at all important
- 77 They did not have any input.
- 88 Don't know
- 99 Refused

Free-ridership

[ASK IF PROGRAM_CD=2,3,5 ELSE SKIP SECTION]

RR5 Please think back to the time when you decided to purchase the [IF MAINT=1 SHOW "service" ELSE SHOW "equipment you installed"] through the program, perhaps recalling things that occurred in your household shortly before and after <DATE>. What factors motivated you to purchase this [IF MAINT=1 SHOW "service" ELSE SHOW "equipment you installed"]?

[DO NOT READ; SELECT ALL THAT APPLY]

[ONCE THEY RESPONDENT HAS FINISHED, PROBE: Are there any other factors?]

- 01 Old equipment didn't work
- 02 Old equipment working poorly
- 03 Wanted to save energy
- 04 Wanted to reduce energy costs
- 05 The information provided by the auditor
- 06 Recommendation from other utility program
- 07 Recommendation of someone else
- 08 Part of a remodeling project
- 09 Other [SPECIFY]
- 88 Don't know
- 99 Refused

RR5C060 [ASK IF RR5=6] What was the other utility program?

[RECORD RESPONSE VERBATIM]

RR5C090 Other factors specified.

[SAMPLE ONE MEASURE PER PARTICIPANT]
[ASKING ONLY FOR REBATED MEASURES (NO DI MEASURES)]

FR1 Now, I'd like to ask you about your decision to [MAINT=1 SHOW: "receive" ELSE "install"] the <EE_MEAS> through the <PROGRAM_CD> program.
Who, if anyone, recommended you [MAINT=1 SHOW: "receive" ELSE "install"] the <EE_MEAS> rebated through the <PROGRAM>? [SELECT ONE]

[IF NEED: What is the source of the primary recommendation?]

- 1 Trade ally / contractor
- 2 Retailer
- 3 Auditor / Energy specialist
- 4 Family / friends / neighbor
- 5 No one
- 6 Other [SPECIFY]
- 88 Don't know
- 99 Refused

FR10 Other person's recommendation specified.

FR14 I'm going to ask you to rate how various factors might have influenced your decision to [IF MAINT=1 SHOW: "receive" ELSE "install"] the <EE_MEAS>. Please rate the influence of each of the following using a scale of 0 to 10, where 0 is "not at all influential" and 10 is "very influential." How influential was... [ROTATE OPTIONS]

FR14A [ASK IF FR1<>5, 88, 99] The [FR1]'s recommendation on your decision to [IF MAINT=1 SHOW: "receive" ELSE "install"] the <EE_MEAS> [USED IN PRELIMINARY PROGRAM INFLUENCE SCORE]

FR14B [ASK IF ENVELOPE = 0] The age or condition of the old equipment?

FR14C [ASK IF ENVELOPE = 1 AND TERRITORY = CG, WY] The information provided an audit? [USED IN PRELIMINARY PROGRAM INFLUENCE SCORE]

FR14D The availability of the program rebate? [USED IN PRELIMINARY PROGRAM INFLUENCE SCORE]

FR14E Previous experience with any Black Hills Energy program?

- [RECORD 0-10]
- 77 Not applicable (FR14E and FR14C only)
- 88 Don't know
- 99 Refused

FR6 The <PROGRAM> provided to you a rebate of \$<REBATE> for the <EE_MEAS>. If the program had not been available, what is the likelihood you would have purchased the **exact same** <EE_MEAS>? Please rate on a 0 to 10 scale, where 0 is "not at all likely" and 10 is "completely likely".

[INTERNAL NOTE: BY EXACT SAME MEASURE WE'RE INCLUDING EXACT SAME EFFICIENCY]
USED FOR PRELIMINARY NO-PROGRAM SCORE

—	[Record 0-10]	
0		[SKIP TO FR10b]
88	Don't know	[SKIP TO FR10b]
99	Refused	[SKIP TO FR10b]

FR7 Without the program, what is the likelihood you would have purchased the <EE_MEAS> within 12 months? Please rate on a 0 to 10 scale, where 0 is not at all likely and 10 is completely likely.

USED TO CALCULATE TIMING SCORE FOR NO-PROGRAM SCORE.

—	[Record 0-10]
88	Don't know
99	Refused

C_FR8_SKP1 [SKIP TO FR10B IF ENVELOPE=0 AND QTY=1]
C_FR8_SKP2 [SKIP TO FR10B IF ENVELOPE=1 AND QTY=1 AND EE_MEAS=1,4,5,7,8,9,10,12]

FR8 Without the program, what is the likelihood you would have
[IF QTY>1 SHOW "purchased the same quantity of <EE_MEAS>";
[IF ENVELOPE = 1 and QTY=1 AND EE_MEAS=02,03,06,11] SHOW "purchased the same amount of <EE_MEAS>";
ELSE SHOW "***purchased the same quantity of <EE_MEAS>"]
Again, please use a 0 to 10 scale, where 0 is not at all likely and 10 is completely likely.

USED TO CALCULATE QUANTITY SCORE FOR NO-PROGRAM SCORE

—	[Record 0-10]
88	Don't know
99	Refused

FR10b Had you already been planning to [MAINT=1 SHOW: "receive" ELSE "install"] the [EE_MEAS] before you learned about the rebate available through the [PROGRAM_CD] program?

USED TO ADJUST THE PROGRAM INFLUENCE SCORE. IF RESPOND YES, ADJUST PROGRAM INFLUENCE SCORE BY 0.5 (50%).

1	Yes
2	No
88	Don't know
99	Refused

FR15 On a scale of 0 to 10, with 0 being "not at all likely" and 10 being "very likely," how likely is it that you would have paid the additional \$<REBATE> on top of the amount you already paid, for the [IF TSTAT=1 OR MAINT=1 SHOW "<EE_MEAS>" ELSE SHOW "same quantity and efficiency of <EE_MEAS>"] at the same time as when you participated in the program?

____ [RECORD 0-10]
 88 Don't know
 99 Refused

FR16 Could you please tell me what influence, if any, the <PROGRAM_CD> program had in your decision to [IF EE_MEAS=1,7,12 SHOW "install the high efficiency <EE_MEAS> instead of the standard efficiency"] ELSE SHOW "get the <EE_MEAS>"

[RECORD RESPONSE VERBATIM]
 88 None / No influence

Other Equipment Purchases

[ASK FOR ALL PROGRAMS]

SP1 Since your participation in the <PROGRAM> program, have you purchased any other type of energy efficient or ENERGY STAR equipment that did not receive a rebate from Black Hills Energy?

1 Yes
 2 No [SKIP TO NEXT SECTION]
 88 Don't know [SKIP TO NEXT SECTION]

SP2 What energy efficient equipment have you purchased that did not receive a rebate from Black Hills Energy? [DO NOT READ] [SELECT ALL THAT APPLY]

Lighting

- 01 CFLs
- 02 LEDs
- 03 Lighting other than CFLs and LEDs

Appliances

- 04 ENERGY STAR electronics
- 05 Refrigerator
- 06 Water heater
- 07 Freezer
- 08 Clothes washer

HVAC

- 09 Room air conditioner
- 10 Central air conditioner
- 11 Furnace
- 12 Heat pump
- 13 Programmable thermostat

Water saving devices

- 14 Low flow showerhead
- 15 Faucet aerator

Building shell

- 16 Insulation
- 17 Windows
- 18 Doors
- 19 Other1 (SPECIFY)
- 20 Other2 (SPECIFY)
- 88 Don't know [SKIP TO NEXT SECTION]
- 99 Refused [SKIP TO NEXT SECTION]

SP2C030 [ASK IF SP2=3] Can you describe what type of lighting other than CFLs and LEDs?
[RECORD RESPONSE VERBATIM]

SP2C040 [ASK IF SP2=4] Can you describe what type of ENERGY STAR electronics?
[RECORD RESPONSE VERBATIM]

SP2C190 [ASK IF SP2=19] Other type (1) of equipment specified.

SP2C200 [ASK IF SP2=20] Other type (2) of equipment specified.

SPD1 [ASK IF SP2=6] What type of high efficiency water heater was installed?

- 1 Gas Storage
- 2 Electric Storage
- 3 Gas Tankless
- 4 Electric Tankless
- 5 Heat Pump Water Heater
- 6 Other [SPECIFY]
- 88 Don't know

SPD10 Other type of water heater specified.

SPD3 [ASK IF SP2=12] What type of equipment did the new energy efficient heat pump replace?
[READ IF NEEDED]

- 1 Existing Heat Pump
- 2 Central Air Conditioner w/ Gas Heating
- 3 Central Air Conditioner w/ Electric Heating
- 4 Other [SPECIFY]
- 88 Don't know

SPD30 Other type of heat pump specified.

SPD6 [ASK IF SP2=16] Where was insulation installed?
[SELECT ALL THAT APPLY] [READ LIST IF NEEDED]

- 1 Attic Insulation
- 2 Wall Insulation
- 3 Floor Insulation
- 4 Basement Insulation
- 5 Crawlspace Insulation
- 6 Rim Joist Insulation
- 7 Some other place [SPECIFY]
- 88 Don't know
- 99 Refused

SPD6C070 Other place specified.

SPD7 [ASK FOR EACH SPD6 SELECTED] What was the total area of installed <RESPONSES FROM SPD6>?

For SPD7_1 through SPD7_7

- _____ Total area (in square feet) [077500]
- 88 Don't know
- 99 Refused

SP3 [SKIP IF SP2=16; INSULATION] How many <SP2_EQUIP> did you purchase?

____ [RECORD RESPONSE] 1775
 88 Don't know
 99 Refused

SP5 On a scale of 0 to 10, with 0 being "not at all important" and 10 being "extremely important," how important was your participation in the Black Hills Energy <PROGRAM> program on your decision to purchase <SP2_Equip> on your own?

____ [Record 0-10]
 88 Don't know
 99 Refused

SP6 If you had not participated in Black Hills' program, how likely is it you would have still purchased <SP2_Equip>, using a 0 to 10 scale, where 0 means you "definitely WOULD NOT have purchased" and 10 means you "definitely WOULD have purchased"?

____ [Record 0-10]
 88 Don't know
 99 Refused

[END ROSTER; SKIP TO NEXT SECTION/MEASURE]

Satisfaction Series

[ASK FOR ALL PROGRAMS]

SAT2_INT [ASK IF PROGRAM_CD=1 ELSE SKIP TO SAT3_INT] On a scale of 0 to 10, where 0 is not at all satisfied and 10 is very satisfied, I would like to ask you how satisfied you were with different aspects of the in-home energy evaluation. [READ LIST; ROTATE LIST]

- a. [ASK IF AUDIT=1] The scheduling of your free energy evaluation
- b. The number of days you had to wait before an auditor came to your house
- c. The friendliness and helpfulness of the auditor
- d. The knowledge of the auditor
- e. The information the auditor gave you throughout the evaluation process
- f. The equipment left with you or installed in your home
- g. [ASK IF AUDIT=2] The scheduling of your comprehensive test-in evaluation
- h. [ASK IF AUDIT=2] The availability of scheduling a test-out evaluation

____ [RECORD 0-10]
 77 Not applicable
 88 Don't know
 99 Refused

SAT2x [ASK IF ANY IN SAT2=0,1,2,3] What could the program have done differently to increase your satisfaction with the program?

[RECORD RESPONSE VERBATIM]

SAT3_INT [ASK IF PROGRAM_CD = 8 ELSE SKIP TO SAT4_INT] On a scale of 0 to 10, where 0 is "not at all satisfied" and 10 is "very satisfied", I would like to ask you how satisfied you were with different aspects of the online energy evaluation. [READ LIST; ROTATE LIST]

- a. [ASK IF RO0=1] The time you had to wait to receive your kit
- b. The information provided through the evaluation process
- c. [ASK IF RO0=1]The equipment provided as part of the kit

____ [RECORD 0-10]
 77 Not applicable
 88 Don't know
 99 Refused

SAT3x [ASK IF ANY IN SAT3=0,1,2,3] What could the program have done differently to increase your satisfaction with the program?

[RECORD RESPONSE VERBATIM]

SAT4_INT [ASK IF equipment programs, PROGRAM_CD = 2, 3 or 4 AND ENVELOPE = 0 ELSE SKIP TO SAT5_INT] Please rate your level of satisfaction for each of the following items using a scale of 0 to 10 where 0 is not at all satisfied and 10 is very satisfied. How satisfied were you with the...? [READ LIST; ROTATE LIST]

- a. The type of equipment eligible for the program
- b. The rebate amount
- c. The rebate application process
- d. Amount of time it took to receive the rebate
- g. [ASK IF MAINT=0] The performance of the new equipment
- i. Information provided about the rebate program
- j. [ASK IF PI3=01] Assistance from the contractor who you worked with

____ [RECORD 0-10]
 77 Not applicable
 88 Don't know
 99 Refused

SAT4x [ASK IF ANY IN SAT4=0,1,2,3] What could the program have done differently to increase your satisfaction with the program?

[RECORD RESPONSE VERBATIM]

SAT6_INT [ASK IF envelope retrofit measures, if PROGRAM_CD = 5 or ENVELOPE = 1 ELSE SKIP TO SAT7] On a scale of 0 to 10, where 0 is not at all satisfied and 10 is very satisfied, I would like to ask you how satisfied you were with the following aspects of the program. [READ LIST; ROTATE LIST]

- a. Your interaction with the contractor
- b. The improvements you received as part of this program
- c. The amount of the rebate you received
- d. The time it took you to receive your rebate
- e. The accuracy of your rebate check
- f. The quality of the installation
- g. The quality of the energy saving improvements installed

____ [RECORD 0-10]
 77 Not applicable
 88 Don't know
 99 Refused

SAT6x [ASK IF ANY IN SAT6=0,1,2,3] What could the program have done differently to increase your satisfaction with the program?

[RECORD RESPONSE VERBATIM]

SAT7 [ASK OF ALL PROGRAMS] On a scale of 0 to 10, where 0 is not at all satisfied and 10 is very satisfied, how satisfied are you with the <PROGRAM_CD> program overall?

____ [RECORD 0-10]
 77 Not applicable
 88 Don't know
 99 Refused

SAT9 Have you recommended the <PROGRAM> program to others?

- 1 Yes [SKIP TO SAT15]
- 2 No
- 88 Don't know

SAT10 If provided the opportunity, would you recommend the <PROGRAM> program to others?

- 1 Yes
- 2 No [SPECIFY: Why not?]
- 88 Don't know

SAT100 Why not specified.

SAT15 What did you like best about the program?

[RECORD RESPONSE VERBATIM]
 88 Don't know / Nothing

SAT16 If you could change *one* thing about <PROGRAM>, what would it be?

[RECORD RESPONSE VERBATIM]

88 Don't know / Nothing

SAT11 The next question asks about your experience with Black Hills Energy in general as your energy provider, not just the <PROGRAM> program. How would you rate the service provided by Black Hills Energy? Would you say you are not at all satisfied, somewhat satisfied, very satisfied, or extremely satisfied?

- 1 Not at all satisfied
- 2 Somewhat satisfied
- 3 Very satisfied
- 4 Extremely satisfied
- 88 Don't know
- 99 Refused

SAT12 [ASK IF SAT11=1,2,3,4] Why did you rate your satisfaction with Black Hills Energy as <FILL RATING FROM SAT11>?

[RECORD RESPONSE VERBATIM]

88 Don't know

Black Hills Energy Questions

[ASK FOR ALL PROGRAMS]

BHE1 Have you ever visited the Black Hills Energy website for energy efficiency information?

- 1 Yes
- 2 No [SKIP TO BHE5]
- 3 Do not have internet access [SKIP TO BHE5]
- 88 Don't know [SKIP TO BHE5]

BHE2 Please rate the usefulness of the energy efficiency information provided on the Black Hills Energy website using a scale of 0 to 10, where 0 is "not at all useful" and 10 is "very useful".

____ [RECORD 0-10]
88 Don't know

BHE3 What types of additional energy efficiency information would you like on the Black Hills Energy website?

[RECORD RESPONSE VERBATIM]

- 77 Nothing / No suggestions
- 88 Don't know

BHE5 Since participating in the <PROGRAM> program would you say that you now have more control, about the same control, or less control, over how your household uses energy?

- 1 More control
- 2 About the same
- 3 Less control
- 88 Don't know

Home Characteristics

[ASK FOR ALL PROGRAMS]

HC1 Finally, I would like to ask you a few questions to better understand your household. Do you own your home or are you renting?

- 1 Own
- 2 Rent/Lease
- 99 Refused

HC2 [ASK IF HC1=2] Which of the following best describes how you pay the electric and/or gas utility bill? Would you say... [READ LIST]

- 1 You pay Black Hills directly
- 2 You pay a fee to your landlord that varies according to the size of the total utility bill
- 3 You pay a fixed fee to your landlord
- 4 You do not pay for electric and gas utilities
- 5 You have some other arrangement [SPECIFY]
- 88 Don't know
- 99 Refused

HC20 Other arrangement specified.

HC3 Which of the following best describes your home? Would you say...[READ LIST]

- 1 Single-family detached house
- 2 Single-family attached house (townhouse, row house, or duplex)
- 3 Apartment building with 2-4 units
- 4 Apartment building with 5 or more units
- 5 Mobile home or house trailer
- 6 Something else [SPECIFY]
- 88 Don't know/Not sure
- 99 Refused

HC30 Other home type specified.

HC4 What is the main fuel used for **heating** this residence? Is it electricity, natural gas, bottled or propane gas, fuel oil, wood, or something else?

- 1 Electricity
- 2 Natural gas
- 3 Bottled gas (propane)
- 4 Fuel oil
- 5 Wood
- 6 or something else [SPECIFY]
- 7 Gas – unsure of type
- 88 Don't know
- 99 Refused

HC4O Other heating fuel specified.

HC5 [ASK IF HC4=7] Natural gas is typically delivered through pipes by your utility, propane or bottled gas may be coming from a large storage tank on or near your property. Can you clarify which type of gas you're using?

- 1 Natural gas
- 2 Bottled gas (propane)
- 88 Still unsure of type

HC6 What is the main fuel used for **heating water** for this residence? Is it electricity, natural gas, bottled or propane gas, fuel oil, wood, or something else?

- 1 Electricity
- 2 Natural gas
- 3 Bottled gas (propane)
- 4 Fuel oil
- 5 Wood
- 6 or something else [SPECIFY]
- 7 Gas – unsure of type
- 88 Don't know
- 99 Refused

HC6O Other water heating fuel specified.

HC7 [ASK IF HC6=7] Natural gas is typically delivered through pipes by your utility, propane or bottled gas may be coming from a large storage tank on or near your property. Can you clarify which type of gas you're using?

- 1 Natural gas
- 2 Bottled gas (propane)
- 88 Still unsure of type

HC8 What is the main fuel used for your clothes dryer? [READ LIST IF NEEDED]

- 1 Electricity
- 2 Natural gas
- 3 Bottled gas (propane)
- 6 or something else [SPECIFY]
- 7 Gas – unsure of type
- 77 No dryer
- 88 Don't know
- 99 Refused

HC8O Other clothes dryer fuel specified.

HC8b What is the main type of cooling for this residence? Central air conditioning, central evaporative cooler, room evaporative cooler, window AC, no cooling, or something else?

- 1 Central air conditioning
- 2 Central evaporative cooler
- 3 Room evaporative cooler
- 4 Window AC
- 5 No cooling
- 6 Something else (Specify)
- 7 Fans / Open windows
- 88 Don't know
- 99 Refused

HC8bO Other cooling type specified.

HC9 In what year was your home built?

- _____ Year [1800 – 2020]
- 88 Don't know
- 99 Refused

HC10 [IF HC9=8888] Would you say it was... [READ LIST]

- 1 After 2010
- 2 2000-2010
- 3 in the 1990's
- 4 1980s
- 5 1970s
- 6 1960s
- 7 1950s
- 8 Before 1950
- 88 Don't know
- 99 Refused

DEM4 How many years have you lived in your home? [ENTER 0 IF LESS THAN ONE FULL YEAR]

____ [RECORD YEARS]
 88 Don't know
 99 Refused

HC11 Not including unfinished basements or crawlspaces, which of the following best describes the square footage of your home? Is it... [READ LIST; CHECK ONE]

1 Less than 1,000 square feet
 2 1,000 to 1,500 square feet
 3 1,501 to 2,000 square feet
 4 2,001 to 3,000 square feet
 5 More than 3,000 square feet
 88 Don't know
 99 Refused

HC12 Including yourself, how many people normally live in this household on a full time basis?

____ [RECORD RESPONSE 0-20]
 88 Don't know
 99 Refused

Demographics

[ASK FOR ALL PROGRAMS]

DEM1 How old were you on your last birthday? Were you... [READ LIST UNTIL RESPONDENT ANSWERS]

1 Under 25
 2 25 to 34
 3 35 to 44
 4 45 to 54
 5 55 to 64
 6 65 to 74
 7 75 or over
 88 Don't know
 99 Refused

DEM2 What is the highest level of education you have completed? [READ LIST IF NEEDED]

1 8th grade or less
 2 Some high school
 3 Completed high school
 4 Some college
 5 Completed college
 6 Graduate studies or advanced degree
 88 Don't know
 99 Refused

DEM5 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
- 2 No

COM Those are all the questions I have for today.

Thank you for your time and participation. Do you have any comments you'd like to share?

- 1 Yes [RECORD COMMENTS]
- 2 No

COMO Comments recorded.