



2011-2012 Cool Cash Program Impact Evaluation Report

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Rocky Mountain Power

The Cadmus Group, Inc.

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Glossary of Terms

Evaluated Gross Savings

Evaluated gross savings represent the total at meter savings resulting from a program, before adjusting for freeridership or spillover. They are most often calculated for a given measure, 'i,' as:

$$\text{Evaluated Gross Savings}_i = \text{Verified Participation}_i * \text{Unit Consumption}_i$$

Evaluated Net Savings

Evaluated net savings are the at meter savings net of what would not have occurred in the program's absence. These savings can be attributed to the program. Net savings are calculated as:

$$\text{Net Savings} = \text{Evaluated Gross Savings} * \text{Net-to-Gross}$$

Freeridership

Freeriders in energy-efficiency programs are participants who would have adopted the energy-efficient measure in the program's absence. This is often expressed as the freeridership rate, or the proportion of evaluated gross savings that can be classified as freeridership.

Net-to-Gross (NTG) Ratio

NTG is a ratio of net savings to gross savings. Analytically, NTG is defined as:

$$\text{NTG Ratio} = 1 - \text{Freeridership} + \text{Spillover}$$

Net Realization Rate

The net realization rate is a comparison of evaluated net savings to reported gross savings.

Spillover

Spillover is the adoption of an energy-efficiency measure that was induced by the program's presence, but was not directly funded by the program. As with freeridership, this is expressed as a proportion of evaluated gross savings (as the spillover rate).



Executive Summary

Rocky Mountain Power contracted Cadmus to conduct an impact evaluation of its Cool Cash Program in Utah for the 2011 and 2012 program years. For the impact evaluation, Cadmus conducted billing analyses and surveyed program participants to validate reported gross and net energy savings for the program.

Evaluation data consisted of:

- Customer billing data from January 2010, through May 2013, for 5,553 participant customer accounts;
- Customer billing data from January 2010, through May 2013, for 293 nonparticipant customer accounts; and
- Telephone surveys with 267 participant customers.

The Cool Cash Program was delivered on Rocky Mountain Power's behalf by Nexant, Inc. in 2011 and by Portland Energy Conservation, Inc. (PECI) in 2012. With the program, Rocky Mountain Power seeks to decrease electricity usage (kWh) by providing incentives to participating customers and contractors for the purchase, best-practice installation, and proper sizing of high-efficiency central air conditioning and evaporative cooling equipment.

Summary of Key Findings

Key Impact Findings

The key evaluation findings include:

- In the 2009-2010 program year evaluation, Cadmus recommended the program administrator and Rocky Mountain Power develop a method to improve reporting processes and reduce reporting discrepancies. Cadmus found program tracking has improved relative to previous evaluation findings, most notably in 2012.
- Analyses of customer billing data indicate that actual savings for evaporative cooling measures are higher than gross planning estimates (116%) and lower for central air conditioner measures (90%).
- Program freeridership levels are consistent with values observed in previous evaluations. Cadmus found overall freeridership for the 2011 and 2012 program years to be 30%.
- The program was cost-effective across the 2011-2012 evaluation period from all test perspectives except for the Rate Impact Test (RIM).

Table 1 summarizes program participation, gross savings (reported and evaluated), and evaluated net savings for 2011 and 2012. Table 2 and Table 3 report savings by program year.

Table 1. 2011 and 2012 Program Savings by Measure*

Measure	Evaluated Participation (units)	Savings (kWh)			Relative Precision at 90% Confidence**	Gross Realization Rate	Net Realization Rate
		Reported Gross	Evaluated Gross	Evaluated Net			
Evaporative Cooling							
Replacements	947	1,146,552	1,331,650	884,749	±11%	116%	77%
New	488	591,456	686,215	516,926	±11%	116%	87%
Premium only	1,104	1,338,048	1,552,420	1,225,946	±11%	116%	92%
Premium whole-house ducted system	55	66,660	77,340	66,071	±11%	116%	99%
Central Air Conditioning							
Sizing + TXV***	1,952	517,280	465,568	283,065	±24%	90%	55%
Proper installation	2,370	211,197	189,844	115,425	±24%	90%	55%
15+ SEER/12.5+ EER [†]	2,788	1,056,652	951,020	578,220	±24%	90%	55%
Total**	9,704	4,927,845	5,254,057	3,670,402	±11%	107%	75%

* Throughout the report, totals in tables may not add up exactly due to rounding.

** All precision with the exception of precision around spillover and freeridership estimates is expressed in relative terms. Precision estimates around gross and net savings are presented as weighted averages by equipment type.

*** TXV = thermal expansion valve.

[†] SEER = Seasonal Energy Efficiency Ratio, EER = Energy Efficiency Ratio

Table 2. 2011 Program Savings by Measure

Measure	Evaluated Participation (units)	Savings (kWh)			Relative Precision at 90% Confidence	Gross Realization Rate	Net Realization Rate
		Reported Gross	Evaluated Gross	Evaluated Net			
Evaporative Cooling							
Replacements	465	562,368	653,873	434,433	±11%	116%	77%
New	234	283,608	329,046	247,870	±11%	116%	87%
Premium only	485	587,820	681,996	538,572	±11%	116%	92%
Premium whole-house ducted system	29	35,148	40,779	34,838	±11%	116%	99%
Central Air Conditioning							
Sizing + TXV	983	260,495	234,454	142,548	±24%	90%	55%
Proper installation	1,179	105,198	94,441	57,420	±24%	90%	55%
15+ SEER/12.5+ EER	1,436	544,244	489,836	297,821	±24%	90%	55%
Total	4,811	2,378,881	2,524,425	1,753,502	±11%	106%	74%



Table 3. 2012 Program Savings by Measure

Measure	Evaluated Participation (units)	Savings (kWh)			Relative Precision at 90% Confidence	Gross Realization Rate	Net Realization Rate
		Reported Gross	Evaluated Gross	Evaluated Net			
Evaporative Cooling							
Replacements	482	584,184	677,778	450,316	±11%	116%	77%
New	254	307,848	357,169	269,056	±11%	116%	87%
Premium only	619	750,228	870,424	687,374	±11%	116%	92%
Premium whole-house ducted system	26	31,512	36,561	31,234	±11%	116%	99%
Central Air Conditioning							
Sizing + TXV	969	256,785	231,114	140,518	±24%	90%	55%
Proper installation	1,191	105,999	95,402	58,005	±24%	90%	55%
15+ SEER/12.5+ EER	1,352	512,408	461,183	280,399	±24%	90%	55%
Total	4,893	2,548,964	2,729,632	1,916,900	±11%	107%	75%

Cost-Effectiveness Results

As shown in Table 4, the program was cost-effective across the 2011-2012 evaluation period from all test perspectives except for the RIM test. Benefit / cost ratios could not be calculated from the PTRC, TRC, and PCT perspectives because net costs are negative. However, the program is considered cost-effective from these perspectives since net benefits are positive and net costs are negative.

The RIM test measures the impact of programs on customer rates. Many programs do not pass the RIM test because a utility’s avoided energy savings are usually less than the lost revenues and operating costs of the program. When this happens, program non-participants are paying for benefits accrued by the participants through higher rates. The RIM passes only if rates will go down as a result of the program, and this usually only happens in instances where the program targets the highest marginal cost hours (when marginal costs are greater than rates).

The potential for negative costs (column three in Table 4 through Table 6) is correlated with the number of evaporative cooler installations in a given year. Evaporative coolers are cheaper to purchase and install than standard cooling equipment (central air conditioners). Therefore, if enough evaporative coolers are incented through the program, the total negative costs for cost tests that include incremental costs (PTRC, TRC, and PCT) become greater than other positive program costs (administration costs, program management costs, costs of central air conditioning). This results in the negative costs displayed in Table 4 through Table 6.

Table 4. 2011 and 2012 Evaluated Program Cost-Effectiveness Summary

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	-\$1,158,442	\$6,028,702	\$7,187,145	N/A
Total Resource Cost Test (TRC) No Adder	N/A	-\$1,158,442	\$5,480,638	\$6,639,081	N/A
Utility Cost Test (UCT)	0.0725	\$2,678,877	\$5,480,638	\$2,801,761	2.05
Rate Impact Test (RIM)	N/A	\$6,218,675	\$5,480,638	-\$738,037	0.88
Participant Cost Test (PCT)	N/A	-\$2,244,777	\$6,863,571	\$9,108,348	N/A
Lifecycle Revenue Impact				-0.0000025	

Table 5 and Table 6 show the program’s cost-effectiveness for the 2011 and 2012 program years, respectively. The cost-effectiveness results were consistent across program years, with only the RIM test perspective not attaining cost-effectiveness in 2012.

Table 5. 2011 Evaluated Program Cost-Effectiveness Summary

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	-\$404,227	\$2,999,196	\$3,403,422	N/A
Total Resource Cost Test (TRC) No Adder	N/A	-\$404,227	\$2,726,541	\$3,130,768	N/A
Utility Cost Test (UCT)	0.0742	\$1,379,749	\$2,726,541	\$1,346,793	1.98
Rate Impact Test (RIM)	N/A	\$3,062,376	\$2,726,541	-\$335,835	0.89
Participant Cost Test (PCT)	N/A	-\$932,931	\$3,326,842	\$4,259,773	N/A
Lifecycle Revenue Impact				-0.0000012	

Table 6. 2012 Evaluated Program Cost-Effectiveness Summary

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	-\$808,293	\$3,246,722	\$4,055,015	N/A
Total Resource Cost Test (TRC) No Adder	N/A	-\$808,293	\$2,951,566	\$3,759,859	N/A
Utility Cost Test (UCT)	0.0707	\$1,392,276	\$2,951,566	\$1,559,290	2.12
Rate Impact Test (RIM)	N/A	\$3,382,606	\$2,951,566	-\$431,040	0.87
Participant Cost Test (PCT)	N/A	-\$1,405,905	\$3,790,313	\$5,196,218	N/A
Lifecycle Revenue Impact				-0.0000015	

Recommendations

Based on the evaluation findings, Cadmus offers the following recommendations:

- The program administrator and Rocky Mountain Power should adjust reported per-unit savings to reflect estimates calculated in this evaluation (Table 15). Billing analyses in this and previous



evaluations consistently show that planning estimates understate program savings for evaporative cooling measures, and overstate savings for central air conditioning measures.

- Continue the current program administrator’s data tracking process and documentation of how values presented in annual reports are derived as this approach supports more transparent data tracking and facilitates program evaluation.

Program Description

In March 2003, Rocky Mountain Power began incenting installations of high-efficiency evaporative cooling and central air-conditioning equipment through its Cool Cash Program.¹ The 2011 and 2012 programs offered incentives for:

- Replacement evaporative coolers;
- New evaporative coolers;
- Premium-efficiency evaporative coolers (premium systems use indirect, indirect/direct, or single-inlet direct evaporative technologies);
- Premium-efficiency evaporative coolers installed with whole-house ducting;
- Properly sized central air conditioners;
- Properly installed central air conditioners; and
- Central air conditioners meeting or exceeding SEER 15 and EER 12.5 efficiency ratings.

Program Incentives

Table 7 presents 2011 and 2012 program year incentives. For most measures, Rocky Mountain Power provided incentives for both end-use customers and dealers installing eligible equipment.

Table 7. 2011 and 2012 Program Incentive Amounts

Measure Name	End-User Incentive	Dealer Incentive
Evaporative Cooling		
Replacements	\$100	\$25
New	\$300	\$25
Premium only	\$500	\$150
Premium whole-house ducted system	\$1,000	\$300
Central Air Conditioning		
Sizing + TXV	\$50	\$25
Proper installation	\$50	\$75
15+ SEER/12.5+ EER	\$150	N/A

Program Eligibility Requirements

Rocky Mountain Power offered the program to all Utah residential customers who are served on rate schedule 1, 2, 3, or 25. Qualifying cooling equipment must have also met the equipment eligibility criteria outlined in Appendix B.

¹ Administration of the Cool Cash Program shifted to PECl on January 1, 2012. The Cool Cash Program tariff was canceled and the measures merged into the Home Energy Savings Program tariff on September 30, 2012. The program was formally merged with the Home Energy Savings Program on January 1, 2013. 2012 is the last year Cool Cash is recognized in program planning and reporting as a stand-alone program.



Program Participation

Program participation in residential HVAC incentive programs typically follows a seasonal pattern, with the highest participation during spring and summer, and declining in late fall and winter, when interest in cooling equipment falls. As shown in Figure 1, this usual pattern occurred for the 2011-2012 Cool Cash Program.

Figure 1. Program Participation by Reporting Month and Year

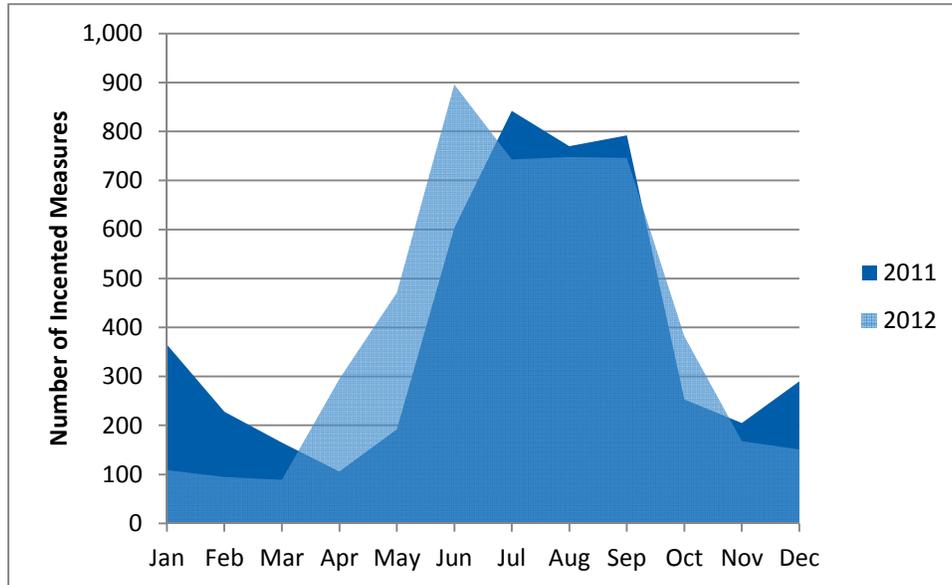


Figure 1 summarizes the total number of measures incented by application month, which was typically within a month of installing the incented equipment or receiving the incented services.

Overall reported program participation remained relatively stable in recent years, rising from a low of 2,385 measures incented in 2008 to 5,210 measures in 2010, then maintaining roughly the same level of participation in 2011 and 2012.

Table 8 provides a summary of program participation by year.

Table 8. 2007 Through 2012 Reported Participation by Measure*

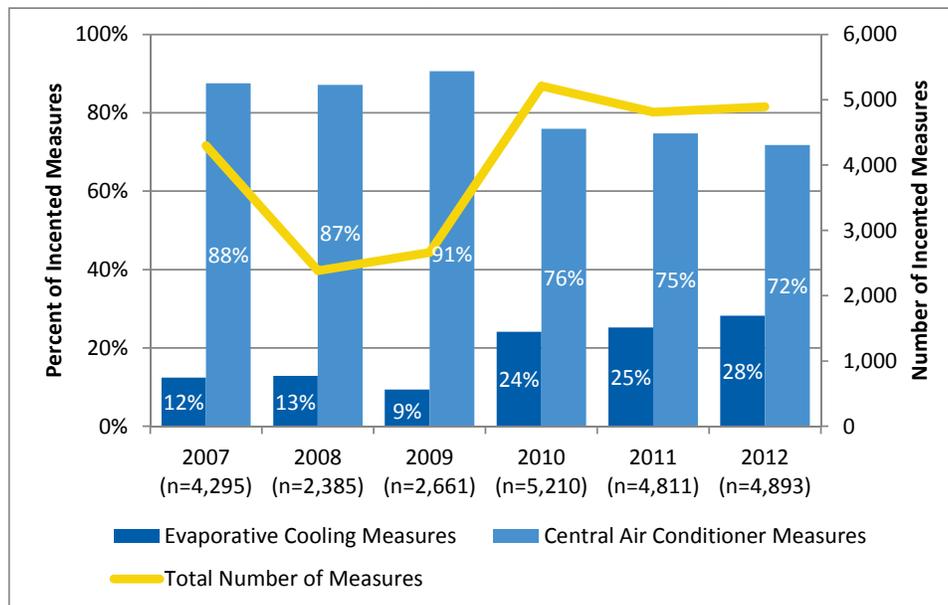
Measure Type	2007	2008	2009	2010	2011	2012
Evaporative Cooling						
Replacements	184	214	140	509	465	482
New	343	82	36	415	234	254
Premium only	7	11	67	310	485	619
Premium whole-house ducted system	N/A**		8	22	29	26
Central Air Conditioning						
Sizing + TXV	1,342	745	718	1,027	983	969
Proper installation	1,113	557	737	1,247	1,179	1,191
15+ SEER/12.5+ EER	1,306	776	955	1,680	1,436	1,352
Total	4,295	2,385	2,661	5,210	4,811	4,893

* These participant counts reflect the number of incentive payments, not unique participants. For example, a participant who received a 15+ SEER/12.5+ EER incentive was also eligible to receive incentives for proper installation and proper sizing. Customers were permitted to apply for multiple incentives for multiple pieces of equipment (e.g., landlords installing new cooling equipment at multiple properties).

** This measure was added in 2009.

As shown in Figure 2, the composition of the Cool Cash Program measures shifted from 88% central air conditioner measures (equipment, sizing, and installation) in 2007 to just 72% in 2012. Starting in 2010, evaporative cooling measures accounted for approximately one-quarter of all incented measures.

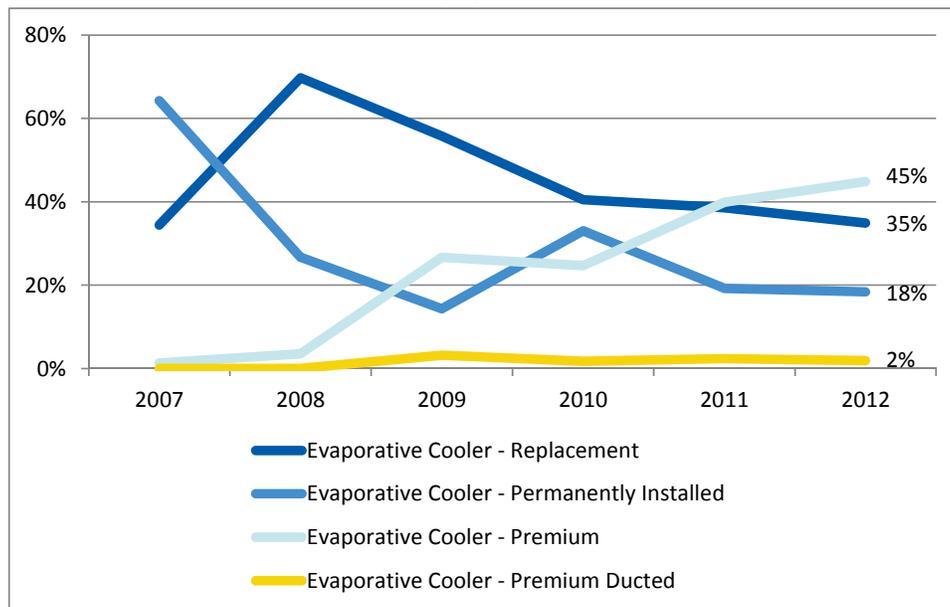
Figure 2. 2007 Through 2012 Reported Participation



In addition to the upward trend in the number of evaporative cooling units incented through the program, there was an appreciable increase in the observed efficiency of these measures. Indicated in Figure 3, premium efficiency evaporative cooling equipment made up an increasingly large percentage of all incented evaporative cooling equipment, while participation in the other evaporative cooling measure categories generally remained constant or declined.



Figure 3. Evaporative Cooling Measures as a Percentage of All Incented Evaporative Cooling Equipment



The population of central air conditioner measures has remained relatively constant over the past six years, with each measure category representing between 26% and 42% of the central air conditioner measure population.

Impact Evaluation

Methodology

The objective of the impact analysis was to determine the energy savings and cost-effectiveness of the program. This encompassed analyses of customer billing data and customer surveys, both of which are discussed in detail below.

This report presents two values for evaluated savings: evaluated gross savings and evaluated net savings. For this evaluation, Cadmus defined reported gross savings as the electricity savings (kWh) Rocky Mountain Power reported in its 2011 and 2012 annual program reports, which are available on PacifiCorp’s website.² To determine evaluated net savings, Cadmus made adjustments to reported gross program savings based on three activities, shown in Table 9.

Table 9. Impact Estimation Steps

Saving Estimate	Step	Action
Evaluated Gross Savings	1	Verify accuracy of data in program database
	2	Perform billing analysis to evaluate per-unit savings
Evaluated Net Savings	3	Apply net-to-gross adjustments

Step one (verifying the accuracy of data in the program database) included reviewing the program tracking database to ensure that participation and reported savings matched the 2011 and 2012 annual reports.

Step two (performing a billing analysis to evaluate per-unit savings) involved comparing reported program savings to energy savings observed through a customer billing regression analysis.

The first two steps resulted in evaluated gross savings. Step three (applying net-to-gross [NTG] adjustments) determined net savings. Using participant telephone surveys,³ Cadmus estimated the effects of freeridership, and participant spillover.

² <http://www.pacificorp.com/es/dsm/utah.html>

³ This report’s Net-To-Gross Analysis section and Appendix C provide detailed descriptions of the techniques Cadmus used to estimate these parameters.



Billing Analysis

With the billing analysis, Cadmus assessed energy savings associated with high-efficiency air conditioners and evaporative coolers. This required construction of three regression models:

1. A central air conditioners and sizing and installation measures (SEER 15+) model;⁴
2. An evaporative cooling model; and
3. A model of SEER 13 nonparticipant units (to serve as the baseline).⁵

The following equation was the final regression model used to predict consumption for all three groups:

$$ADC = \alpha + \beta_1 CDD + \beta_2 SQFT + \varepsilon$$

Where:

ADC	=	Average daily kWh consumption
CDD	=	Average daily cooling degree days
SQFT	=	Home square feet

This equation states that energy consumption, defined as average daily kWh consumption, is determined by average daily cooling degree days and home size.

Some estimation error (ε) exists in the regression relationship after accounting for weather and home size. The β_1 coefficient measures the energy consumption per CDD. Cadmus estimated the average savings for each of the participating groups (15+ SEER and evaporative cooling models) as the difference between their respective model coefficient of CDD and the estimated model coefficient of CDD for the 13 SEER group, multiplied by the average 10-year CDD for Utah.

The models estimated savings by isolating weather impacts from other factors contributing to energy consumption. The comparison was only based on months with cooling loads, in which Cadmus used billing data for participants in the 2012 months following their installation of the high-efficiency unit.⁶

⁴ This model contained sizing + TXV and proper installation central air-conditioning measures. The realization rate calculated with this model applied to these two measures.

⁵ A central assumption underlying this assessment was that participants would have installed a base-efficiency (13 SEER) unit, had they not participated in the program. Based on this assumption, Cadmus used a control group composed of 2005 Cool Cash Program participants who are known to have received a 13 SEER air-conditioning unit—without sizing + TXV or proper installation incentives—as their primary cooling system. SEER 13 air-conditioning equipment represents the federal minimum efficiency level for residential central air conditioners manufactured after January 2006.

⁶ Cadmus used the entire 2012 cooling season for the program nonparticipant control group.

For the analysis, Cadmus used key factors contributing to energy consumption, including:

- **Program data**, collected and provided by the Rocky Mountain Power evaluation manager. This included account numbers, unit types, and installation dates for the entire participant population.
- **Billing data**, including meter-read dates, days in billing cycle, and kWh consumption from January 2010 through March 2013 for all 2011 and 2012 Cool Cash participants and control group participants. Rocky Mountain Power only provided billing data for active residential customer accounts.
- **Utah weather data**, including daily minimum and maximum temperatures and CDDs from January 2002 to June 2013.
- **Square footage data**, collected by Cadmus using a real estate listing service.⁷

The billing analysis results provided realization rates for central air conditioners and evaporative cooler equipment types across both years. Then Cadmus applied the appropriate equipment-specific realization rate to reported savings to determine evaluated gross measure savings estimates.

End-User Surveys

Cadmus used data from participant end-user surveys to estimate net program savings. We developed survey samples of randomly selected 2011 and 2012 program participants, assuming a 0.5 coefficient of variation (CV) and seeking precision of $\pm 10\%$ at the 90% confidence level for each measure. Cadmus applied a finite population correction to determine the necessary sample size. Table 10 shows the planned and achieved sample sizes by measure.

Table 10. Survey Sample Sizes by Measure

Measures	Eligible Population*	Target Sample Size	Achieved Sample Size**	Percent of Population Surveyed
Evaporative Cooling				
Replacements	947	63	63	7%
New	488	59	59	12%
Premium only	1,104	61	64	6%
Premium whole-house ducted system	55	15	15	27%
Central Air Conditioning				
15+ SEER/12.5+ EER	2,788	64	66	2%
Total	5,382	262	267	5%

* This is the number of unique participant decision-makers with complete contact information identified in tracking data.

** Achieved surveys exceed targets for some categories, as Cadmus conducted multiple surveys simultaneously. These data were included in analysis as appropriate.

⁷ <http://www.zillow.com/>



For participant end-user surveys, Cadmus did not target customers who only received proper sizing or proper installation measures, because they may have difficulty differentiating their decision-making processes between selecting new standard or high-efficiency air-conditioning equipment, and the sizing or installation options they might have also received.

Cadmus randomly selected the 267 survey participants from the population of 5,382 eligible unique participants. We conducted four rounds of participant surveys, targeting program participants from the two preceding program quarters. Given the seasonal nature of Cool Cash Program participation (as was shown in Figure 1), the survey targets for quarters three and four were significantly higher than for quarters one and two in both 2011 and 2012. Table 11 provides the total quarterly survey targets and the approximate dates of survey data collection.

Table 11. Participant Survey Data Collection Calendar

Survey Effort and Target Sample		2011		2012												2013				
		N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
2011	Q1-Q2 (n=22)		X																	
	Q3-Q4 (n=125)										X									
2012	Q1-Q2 (n=19)														X					
	Q3-Q4 (n=101)																			X

This semi-annual survey data collection allowed Cadmus to provide Rocky Mountain Power with interim results. It also ensured that we contacted customers soon after they participated in the program when they could more clearly recall their experience and decision-making process. All results presented in this report, including freeridership and spillover estimates, were weighted to reflect the distribution of participants across the evaluation period. A summary of survey respondent demographics is provided in Appendix A.

Evaluated Gross Savings

Tracking Database Review

The 2011 and 2012 program administrators provided Cadmus with their Cool Cash Program tracking databases, which contained tracking information for all end-use customer and dealer incentives paid between January 2011, and December 2012. Cadmus compared measure quantities and energy savings reported in Rocky Mountain Power’s 2011 and 2012 *Demand-Side Management Annual Reports*⁸ to the administrator databases provided. We focused the review on:

- Number and type of measures incented;
- Number and value of incentives paid; and
- Reported savings estimates applied to incented measures.

Table 12 presents comparison results for the quantity of measures incented. Cadmus used verified measure quantities to calculate gross savings (reported later in Table 15).

Table 12. 2011 and 2012 Reporting Discrepancies

Measure	2011*		2012		Total	
	Reported	Verified	Reported	Verified	Reported	Verified
Evaporative Cooling						
Replacements	464	465	482	482	946	947
New	234	234	254	254	488	488
Premium only	485	485	619	619	1,104	1,104
Premium whole-house ducted system	29	29	26	26	55	55
Central Air Conditioning						
Sizing + TXV	983	983	969	969	1,952	1,952
Proper installation	1,182	1,179	1,191	1,191	2,373	2,370
15+ SEER/12.5+ EER	1,436	1,436	1,352	1,352	2,788	2,788
Total	4,813	4,811	4,893	4,893	9,706	9,704

* Cadmus identified measure quantity discrepancies when comparing the 2011 program tracking databases to quantities in the 2011 annual report. We reviewed the program tracking databases using the approach identified by the program administrator and determined that these discrepancies resulted from erroneous quantity adjustments made to the database during reconciliation of resubmitted applications.

Billing Analysis Results

Cadmus used three regression models to estimate program energy savings: SEER 13 (baseline), central air conditioners and sizing and installation measures (SEER 15+), and evaporative coolers. Cadmus

⁸ http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/UT_2011_Annual_Report.pdf
http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/UT2012AnnualReport_043013_FINAL.pdf



considered billing data from January 2010, through May 2013 to ensure adequate data was available for participants that received an incentive in the early months of 2011. Prior to model specification, we conducted a detailed quality-assurance review of all available data to determine if there were missing values or data quality issues, and found that few data points were missing. Following standard analytical practice, Cadmus screened data for extreme kWh values and eliminated outliers from the analysis.

The models revealed that several variables could be excluded, primarily those for groups with similar characteristics. For example, the evaporative coolers model did not incorporate home type and number of stories, as these variables correlate highly with square footage, which the model included. Further, to increase the number of customers that could be considered for analysis, Cadmus did not include variables such as whether the occupant had a recent renovation or added, changed out, or removed electric appliances in the home.

Table 13 shows the regression model results.⁹ SEER 13 units’ average consumption per CDD, estimated at 1.32 kWh, represents the baseline or consumption level occurring in the program’s absence.¹⁰ We used this baseline to estimate savings from each participating unit.

Table 13. Cool Cash Billing Data Regression Results

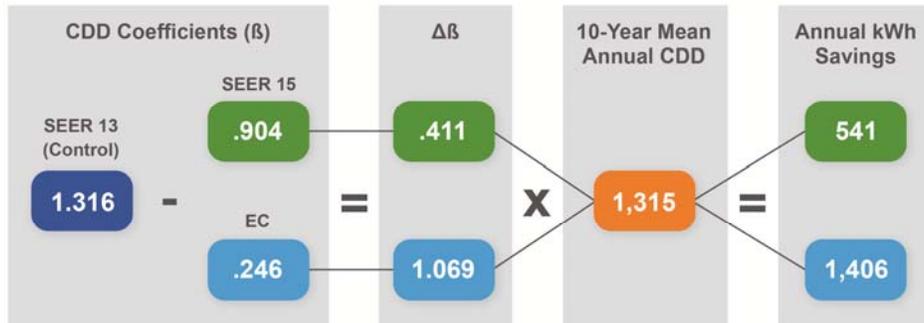
Group	Consumption per CDD (kWh)	Annual Consumption Based on 1,315 Average CDD (kWh)	Evaluated Gross Savings (kWh)
SEER 13 (Baseline)	1.32	1,730	N/A
Evaporative Cooling Measures	0.25	324	1,406
Central Air Conditioner Measures	0.90	1,189	541

Figure 4 illustrates the calculations we used to derive estimated annual kWh savings.

⁹ For all three models, the F-test proved statistically significant. In most instances, parameters for other independent variables were significant and had the correct signs. The F-test determines whether two population variances are equal by comparing the ratio of their variances. If the variances are equal, the variances’ ratio will be 1. This test is typically used to compare the validity of models. Appendix E presents complete results for the regression models.

¹⁰ Cadmus considered SEER 13 as the baseline, given that it was the federal minimum efficiency level for residential central air conditioners manufactured after January 2006, and could be assumed to represent the efficiency of cooling equipment that would have been purchased in the program’s absence.

Figure 4. Derivation of kWh Savings



Billing Analysis Realization Rate

The Cool Cash Program energy-savings planning estimates are based on past program evaluation findings and may not reflect recent program or market changes, or other factors that may impact energy usage. Cadmus calculated a program realization rate based on a ratio of actual to planning savings estimates for evaporative cooling and central air-conditioning measures. These realization rates are presented in Table 14, along with ratios from previous evaluations for context.

Table 14. Billing-Analysis-Determined Savings Relative to Planning Estimates

Measure Type	Realized Savings		
	2007 & 2008	2009 & 2010	2011 & 2012
Evaporative Coolers	110% (85% - 135%)	124% (96% - 152%)	116% (106% - 127%)
Central Air Conditioners	105% (54% - 156%)	91% (26% - 155%)	90% (69% - 111%)
All Measures	107% (68% - 146%)	108% (74% - 142%)	107% (97% - 117%)

These realization rates indicate that, on average, cooling equipment incented in the 2011 and 2012 Cool Cash Program saved 107% more energy than reported.

Table 15 presents the evaluated gross energy savings by measure.



Table 15. Report vs. Evaluated Gross Savings by Measure Type

Measure	Participation (units)		Gross Savings (kWh)				Precision at 90% Confidence
	R*	E*	Per-Unit		Total		
			R	E	R	E	
Evaporative Cooling							
Replacements	946	947	1,212	1,406	1,146,552	1,331,650	±9%
New	488	488	1,212	1,406	591,456	686,215	±9%
Premium only	1,104	1,104	1,212	1,406	1,338,048	1,552,420	±9%
Premium whole-house ducted system	55	55	1,212	1,406	66,660	77,340	±9%
Central Air Conditioning							
Sizing + TXV	1,952	1,952	265	239	517,280	465,568	±23%
Proper installation	2,373	2,370	89	80	211,197	189,844	±23%
15+ SEER/12.5+ EER	2,788	2,788	379	341	1,056,652	951,020	±23%
Total	9,706	9,704	N/A	N/A	4,927,845	5,254,057	±15%

* R = reported, E = evaluated.

Net-To-Gross Analysis

Freeridership

Freeridership, the percent of savings that are likely to have occurred in the program’s absence, traditionally refers to participants who would have undertaken an action promoted by a program had the incentive or other program activities not been available. Full freeriders would have undertaken exactly the same action at the same time (i.e., the program had no effect on the degree or timing of their actions). Partial freeriders would have taken some action, but would not have undertaken the action to the level promoted by the program, or would not have taken the action when they did.

For the 2011 and 2012 program evaluation, Cadmus estimated freeridership for the five Cool Cash equipment measures (shown in Table 16) using telephone surveys with participating customers. This customer self-report approach to estimating freeridership adheres to standard industry methodologies. However, the approach does present a potential shortcoming: it may not always be entirely appropriate for capturing the market transformation impacts of multiyear programs. For example, a multiyear program may alter the availability of higher-efficiency products in a region by influencing dealers’ and retailers’ stocking practices. In addition, by increasing dealer experience and comfort with more efficient products, or by impacting demand for efficient products, a program may influence the mix of products manufactured. Customers, when choosing between various makes and models of a given product, may not be aware that their efficiency selection was affected by a program.

Therefore, while a customer may correctly state that they would have chosen a particular product in the program’s absence, the availability of that product may have been a result of the program. While the customer would count as a freerider, they may have had less-efficient options without the program. A more thorough description of the NTG methodology is provided in Appendix C.

The freeridership results for the 2011 and 2012 program are shown in Table 16. Estimates from previous evaluations are also provided for context. The large decrease in freeridership from 2007-2008 evaluation and 2009-2010 were mainly impacted due to a change in freeridership scoring methodology. This evaluation adhered to the previous (2009-2010) evaluation methodology.

Table 16. Program Freeridership from 2007 – 2012

Measure	Freeridership			Absolute Precision at 90% Confidence
	2007 & 2008*	2009 & 2010*	2011 & 2012	
Evaporative Cooling				
Replacements	79%	46%	35%	±6%
New	55%	24%	25%	±5%
Premium only	25%	23%**	22%	±7%
Premium whole-house ducted system	N/A		15%	±14%
Central Air Conditioning				
15+ SEER/12.5+ EER	62%	29%***	39%***	±7%
Program Overall[†]	63%	31%	30%	±3%

* These values from: The Cadmus Group, Inc. *2009-2010 Utah Cool Cash Program Evaluation*. Prepared for Rocky Mountain Power. February 3, 2012.

The Cadmus Group, Inc. *2007 and 2008 Evaporative Cooling and Central Air Conditioning Incentive Program: Evaluation*. Prepared for Rocky Mountain Power. November 12, 2010.

** Cadmus combined the freeridership analysis for these two measures due to their small participation sample sizes.

*** This value includes sizing + TXV and proper installation measures.

[†] The program-level freeridership is an average of the equipment-specific estimates, weighted by evaluated gross savings.

Participant Spillover

Participant spillover refers to additional savings generated by program participants due to their program participation, but not captured by program records. Spillover occurs when participants choose to purchase energy-efficient measures or adopt energy-efficient practices due to a program, but choose not to participate (or are otherwise unable to participate) in an incentive program. These customers’ savings are not automatically credited to the utility program.

Spillover includes:

- Program participants adopting additional measures without incentives;
- Nonparticipants taking actions resulting from the program’s influence, due to changes in the available energy-using equipment; and
- Changes in nonparticipants’ behaviors resulting from direct marketing or changes in stocking practices.

Energy-efficiency programs’ spillover effects can be considered an additional impact that gets credited to program results. In contrast, freeriders’ impacts reduce the net savings attributable to a program.

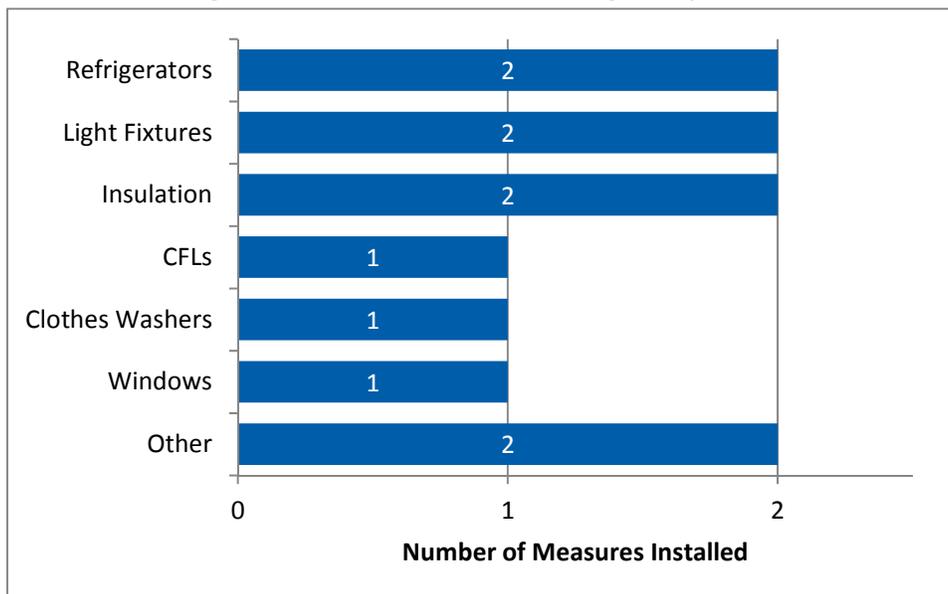
Participant Spillover Analysis

For the Cool Cash Program, Cadmus measured spillover through survey results from participant end-users. In the survey, we asked Cool Cash Program participants whether they had installed any other energy-efficient equipment or had services performed in their homes for which they did not receive an incentive from Rocky Mountain Power. If respondents answered in the affirmative, we asked specifically if they purchased any of the following Utah Home Energy Savings Program incented measures:

- Clothes washers
- Refrigerators
- Dishwashers
- Windows
- Light fixtures
- Heat pumps
- Ceiling fans
- Electric water heaters
- CFLs
- Insulation

We then cross-checked respondents against 2011 and 2012 Utah Home Energy Savings Program databases to confirm they had not received a utility incentive for the reported measure. From this subset, Cadmus removed participants who did not indicate the program was “somewhat” or “very important” to their decision(s) to purchase additional measures. Figure 5 summarizes the measures included in 2011 and 2012 program spillover.

Figure 5. Measures Included in Program Spillover



Finally, Cadmus estimated energy savings from additional measures installed, and matched those savings to evaluated gross savings calculated for the sample of survey respondents. This led to spillover ratios at the measure and program levels. The spillover results for the 2011 and 2012 program are shown in Table 17.

Table 17. 2011 and 2012 Survey Sample and Program Spillover

Measure	Spillover Savings (kWh)	Evaluated Gross Savings (kWh)	Spillover Ratio	Absolute Precision at 90% Confidence
Evaporative Cooling				
Replacements	1,201	88,589	1.4%	±1.8%
New	446	82,965	0.5%	±0.6%
Premium only	587	89,995	0.7%	±0.7%
Premium whole-house ducted system	91	21,093	0.4%	±0.7%
Central Air Conditioning				
15+ SEER/12.5+ EER*	0	22,513	0.0%	±0.1%
All Spillover Respondents**	2,324	305,155	0.8%	±0.6%

* This value includes sizing + TXV and proper installation measures.

** Cadmus averaged equipment-specific estimates, weighted by evaluated gross savings, to determine program-level spillover.

The program spillover calculated for 2011 and 2012 is lower than previous evaluation findings. This may be attributed to the biannual survey data collection approach, which limited the amount of time participants had to take additional action to conserve energy after participating in the program and before completing a survey. The 2011 and 2012 spillover is provided in Table 18, along with estimates from previous evaluations for context.

Table 18. Program Spillover from 2007 – 2012

Measure	Spillover		
	2007 & 2008*	2009 & 2010*	2011 & 2012
Evaporative Cooling			
Replacements	2.0%	4.8%	1.4%
New	2.2%	0.0%	0.5%
Premium only	0.0%	1.9%**	0.7%
Premium whole-house ducted system	N/A		0.4%
Central Air Conditioning			
15+ SEER/12.5+ EER***	8.1%	2.5%	0.0%
Program Overall	5.4%	2.3%	0.8%

* These values are from: Cadmus 2010 and Cadmus 2012.

** Cadmus combined the freeridership analysis for these two measures due to their small participation sample sizes.

*** This value includes sizing + TXV and proper installation measures.

Final Net-to-Gross

Summarized in Table 19, Cadmus determined the final program NTG as the sum of spillover (expressed as a proportion of total program savings) and one, minus freeridership:

$$NTG = 1 - \text{Freeridership} + \text{Spillover}$$

Table 19. 2011 and 2012 NTG Ratios

Measure	Freeridership	Spillover	NTG	Absolute Precision at 90% Confidence
Evaporative Cooling				
Replacements	34.9%	1.4%	66.4%	±6.6%
New	25.2%	0.5%	75.3%	±5.5%
Premium only	21.7%	0.7%	79.0%	±6.6%
Premium whole-house ducted system	15.0%	0.4%	85.4%	±14.2%
Central Air Conditioning				
15+ SEER/12.5+ EER*	39.2%	0.0%	60.8%	±6.8%
Program Overall**	30.2%	0.8%	70.6%	±3.5%

* This value includes sizing + TXV and proper installation measures.

** The program-level NTG is an average of the equipment-specific estimates, weighted by evaluated gross savings.

Summary of Impact Findings

Table 20 summarizes the 2011 and 2012 impact evaluation findings.

Table 20. 2011 and 2012 Program Savings by Measure

Measure	Evaluated Participation (units)	Savings (kWh)			Relative Precision at 90% Confidence
		Reported Gross	Evaluated Gross	Evaluated Net	
Evaporative Cooling					
Replacements	947	1,146,552	1,331,650	884,749	±11%
New	488	591,456	686,215	516,926	±11%
Premium only	1,104	1,338,048	1,552,420	1,225,946	±11%
Premium whole-house ducted system	55	66,660	77,340	66,071	±11%
Central Air Conditioning					
Sizing + TXV	1,952	517,280	465,568	283,065	±24%
Proper installation	2,370	211,197	189,844	115,425	±24%
15+ SEER/12.5+ EER	2,788	1,056,652	951,020	578,220	±24%
Total	9,704	4,927,845	5,254,057	3,670,402	±11%

Cost-Effectiveness

In assessing cost-effectiveness, Cadmus analyzed program costs and benefits from the five different perspectives listed below, using Cadmus' DSM Portfolio Pro¹¹ model. We based the benefit/cost ratios for these tests on methods described in the California Standard Practice Manual for assessing demand-side management (DSM) programs' cost-effectiveness.

1. ***PacifiCorp's Total Resource Cost (PTRC) Test:*** This test examined program benefits and costs from Rocky Mountain Power's and Rocky Mountain Power customers' perspectives, combined. On the benefit side, it included avoided energy costs, capacity costs, and line losses, plus a 10% adder to reflect non-quantified benefits. On the cost side, it included costs incurred by both the utility and participants.
2. ***Total Resource Cost (TRC) Test:*** This test also examined program benefits and costs from Rocky Mountain Power's and Rocky Mountain Power customers' perspectives, combined. On the benefit side, it included avoided energy costs, capacity costs, and line losses. On the cost side, it included costs incurred by both the utility and participants.
3. ***Utility Cost Test (UCT):*** This test examined program benefits and costs from Rocky Mountain Power's perspective only. The benefits included avoided energy, capacity costs, and line losses. The costs included program administration, implementation, and incentive costs associated with program funding.
4. ***Ratepayer Impact Measure (RIM) Test:*** All ratepayers (participants and nonparticipants) may experience rate increases designed to recover lost revenues. This test included all Rocky Mountain Power program costs and lost revenues. The benefits included avoided energy costs, capacity costs, and line losses.
5. ***Participant Cost Test (PCT):*** From this perspective, program benefits included bill reductions and incentives received. Costs included a measure's incremental cost (compared to the baseline measures), plus installation costs incurred by the customer.

Table 21 summarizes the five tests' components.

¹¹ DSM Portfolio Pro has been independently reviewed by various utilities, their consultants, and a number of regulatory bodies, including the Iowa Utility Board, the Public Service Commission of New York, the Colorado Public Utilities Commission, and the Nevada Public Utilities Commission.



Table 21. Benefits and Costs Included in Various Tests

Test	Benefits	Costs
PTRC	Present value of avoided energy and capacity costs* with 10% adder for non-quantified benefits	Program administrative and marketing costs to the utility, and incremental measure and installation costs to the customer
TRC	Present value of avoided energy and capacity costs*	Program administrative and marketing costs to the utility, and incremental measure and installation costs to the customer
UCT	Present value of avoided energy and capacity costs*	Program administrative, marketing, and incentive costs
RIM	Present value of avoided energy and capacity costs*	Program administrative, marketing, and incentive costs, plus the present value of lost revenues
PCT	Present value of bill savings and incentives received	Incremental measure and installation costs to the customer

* The present value of avoided energy and capacity costs includes avoided line losses occurring from reductions in customer electric use.

Table 22 provides selected cost analysis inputs, including the evaluated energy savings for each year, and the discount rate, line loss, and program costs. Rocky Mountain Power provided all of these values, except the evaluated energy savings and evaluated participation. Cadmus derived the discount rate and inflation rate from Rocky Mountain Power’s 2011 Integrated Resource Plan.

Table 22. Selected Cost Analysis Inputs

Input Description	2011	2012	Total
Participation			
Evaporative Cooling - Replacements	465	482	947
Evaporative Cooling - New	234	254	488
Evaporative Cooling - Premium only	485	619	1,104
Evaporative Cooling - Premium whole-house ducted system	29	26	55
Central Air Conditioning - Sizing + TXV	983	969	1,952
Central Air Conditioning - Proper installation	1,179	1,191	2,370
Central Air Conditioning - 15+ SEER/12.5+ EER	1,436	1,352	2,788
Measure Lives (years)			
Evaporative Cooling - Replacements	15	15	N/A
Evaporative Cooling - New	15	15	
Evaporative Cooling - Premium only	15	15	
Evaporative Cooling - Premium whole-house ducted system	15	15	
Central Air Conditioning - Sizing + TXV	15	15	
Central Air Conditioning - Proper installation	10	15	
Central Air Conditioning - 15+ SEER/12.5+ EER	15	10	
Program Savings (kWh/year)*	2,524,425	2,729,632	
Discount Rate	7.17%	7.17%	7.17%
Line Loss	9.85%	9.32%	N/A
Inflation Rate	1.8%	1.8%	1.8%
Total Program Costs (including incentives)	\$1,379,749	\$1,392,276	\$2,772,025
Incentives	\$923,875	\$992,650	\$1,916,525

* Savings reflect impacts at meter. Since per-unit savings and adjustments for spillover and freeridership are modeled as rounded values, the total savings shown here may differ from the total savings reported elsewhere by approximately 1%. However, the minor variation caused by rounding in the cost-effectiveness model does not have an appreciable effect on benefit/cost ratios.

The program benefits included energy savings and their associated avoided costs. For the cost-effectiveness analysis, Cadmus used energy savings derived from this study’s evaluated kWh. The measure lives we used were from annual report data provided by Rocky Mountain Power. For all of our analyses, we used the avoided costs associated with Rocky Mountain Power’s 2011 IRP 10% Load Factor Eastside Residential Cooling Decrement.¹²

As shown in Table 23, the program was cost-effective across the 2011-2012 evaluation period from all test perspectives except for the RIM test. Benefit / cost ratios could not be calculated from the PTRC, TRC, and PCT perspectives because net costs are negative. However, the program is considered cost-effective from these perspectives since net benefits are positive and net costs are negative.

The RIM test measures the impact of programs on customer rates. Many programs do not pass the RIM test because a utility’s avoided energy savings are usually less than the lost revenues and operating

¹² The IRP decrements are detailed in Appendix G, Volume II of PacifiCorp’s 2008 Integrated Resource Plan: http://www.pacificorp.com/content/dam/pacificorp/doc/Environment/Environmental_Concerns/Integrated_Resource_Planning_6.pdf.



costs of the program. When this happens, program non-participants are paying for benefits accrued by the participants through higher rates. The RIM passes only if rates will go down as a result of the program, and this usually only happens in instances where the program targets the highest marginal cost hours (when marginal costs are greater than rates).

The potential for negative costs (column three in Table 23 through Table 25) is correlated with the number of evaporative cooler installations in a given year. Evaporative coolers are cheaper to purchase and install than standard cooling equipment (central air conditioners). Therefore, if enough evaporative coolers are incented through the program, the total negative costs for cost tests that include incremental costs (PTRC, TRC, and PCT) become greater than other positive program costs (administration costs, program management costs, costs of central air conditioning). This results in the negative costs displayed in Table 23 through Table 25.

Table 23. 2011 and 2012 Evaluated Program Cost-Effectiveness Summary

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	-\$1,158,442	\$6,028,702	\$7,187,145	N/A
Total Resource Cost Test (TRC) No Adder	N/A	-\$1,158,442	\$5,480,638	\$6,639,081	N/A
Utility Cost Test (UCT)	0.0725	\$2,678,877	\$5,480,638	\$2,801,761	2.05
Rate Impact Test (RIM)	N/A	\$6,218,675	\$5,480,638	-\$738,037	0.88
Participant Cost Test (PCT)	N/A	-\$2,244,777	\$6,863,571	\$9,108,348	N/A
Lifecycle Revenue Impact				-0.000025	

Table 24 and Table 25 show the program’s cost-effectiveness for the 2011 and 2012 program years, respectively. Cost-effectiveness results were consistent across the program years.

Table 24. 2011 Evaluated Program Cost-Effectiveness Summary

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	-\$404,227	\$2,999,196	\$3,403,422	N/A
Total Resource Cost Test (TRC) No Adder	N/A	-\$404,227	\$2,726,541	\$3,130,768	N/A
Utility Cost Test (UCT)	0.0742	\$1,379,749	\$2,726,541	\$1,346,793	1.98
Rate Impact Test (RIM)	N/A	\$3,062,376	\$2,726,541	-\$335,835	0.89
Participant Cost Test (PCT)	N/A	-\$932,931	\$3,326,842	\$4,259,773	N/A
Lifecycle Revenue Impact				-0.000012	

Table 25. 2012 Evaluated Program Cost-Effectiveness Summary

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	N/A	-\$808,293	\$3,246,722	\$4,055,015	N/A
Total Resource Cost Test (TRC) No Adder	N/A	-\$808,293	\$2,951,566	\$3,759,859	N/A
Utility Cost Test (UCT)	0.0707	\$1,392,276	\$2,951,566	\$1,559,290	2.12
Rate Impact Test (RIM)	N/A	\$3,382,606	\$2,951,566	-\$431,040	0.87
Participant Cost Test (PCT)	N/A	-\$1,405,905	\$3,790,313	\$5,196,218	N/A
Lifecycle Revenue Impact				-0.0000015	



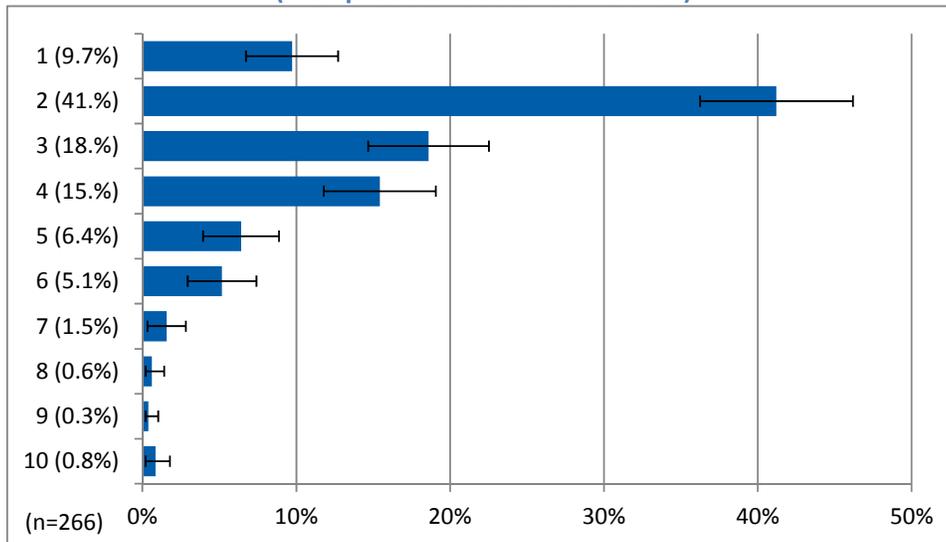
Appendix A: Participant Demographics

Table 26. Participant Home and Ownership Types

Home Characteristics	Percent of Respondents	Precision at 90% Confidence
Home Type (n=266)		
Single-family home	91.5%	±2.8%
Townhouse or duplex	4.1%	±2.0%
Mobile home or trailer	2.0%	±1.4%
Apartment building with four units or more	0.3%	±0.5%
Other	2.2%	±1.5%
Ownership Type (n=266)		
Own	99.2%	±0.9%
Rent	0.8%	±0.9%

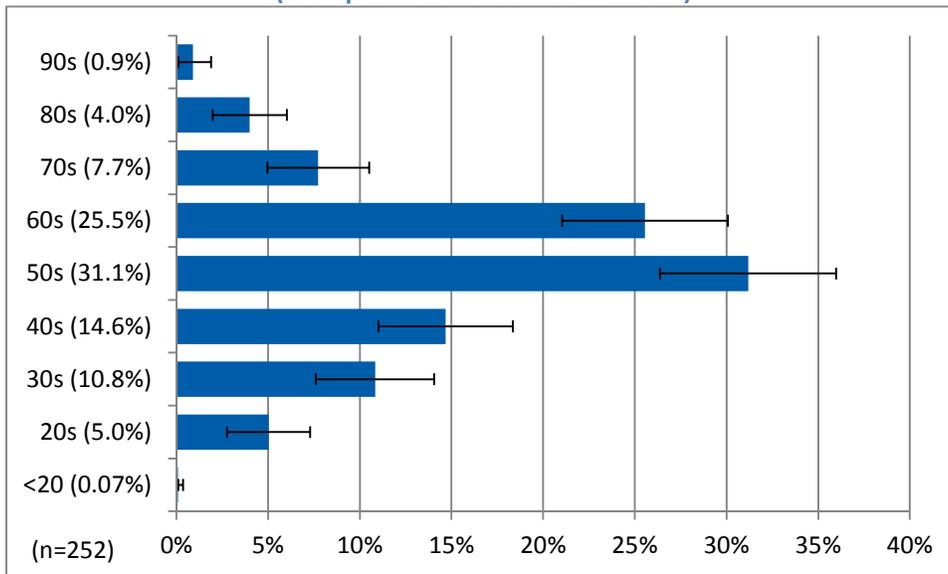
Source: Rocky Mountain Power Cool Cash Participant Survey—Questions D1 and D2

Figure 6. Number of Residents
(with precision at 90% confidence)



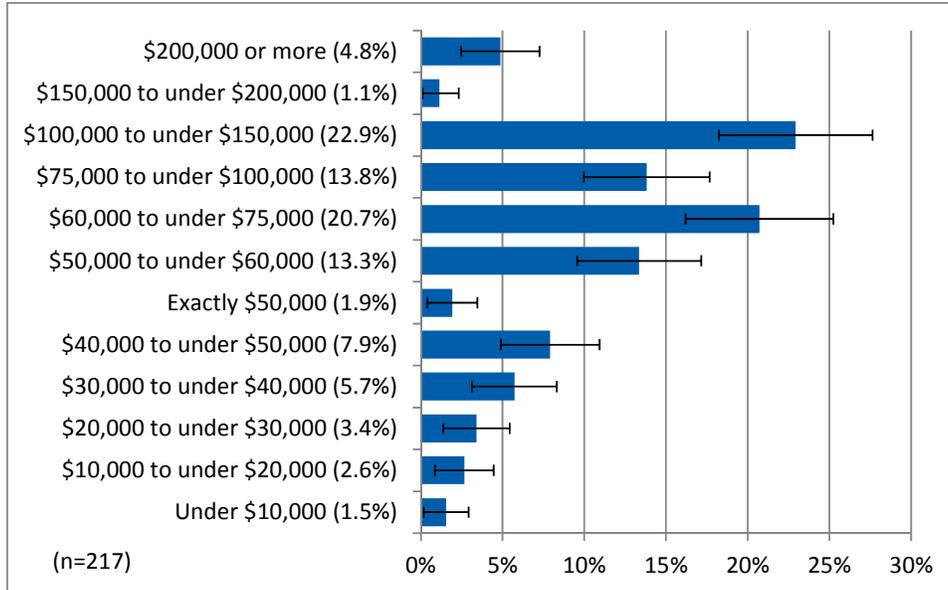
Source: Rocky Mountain Power Cool Cash Participant Survey—Question D3

**Figure 7. Age of Survey Respondents
(with precision at 90% confidence)**



Source: Rocky Mountain Power Cool Cash Participant Survey—Question D4

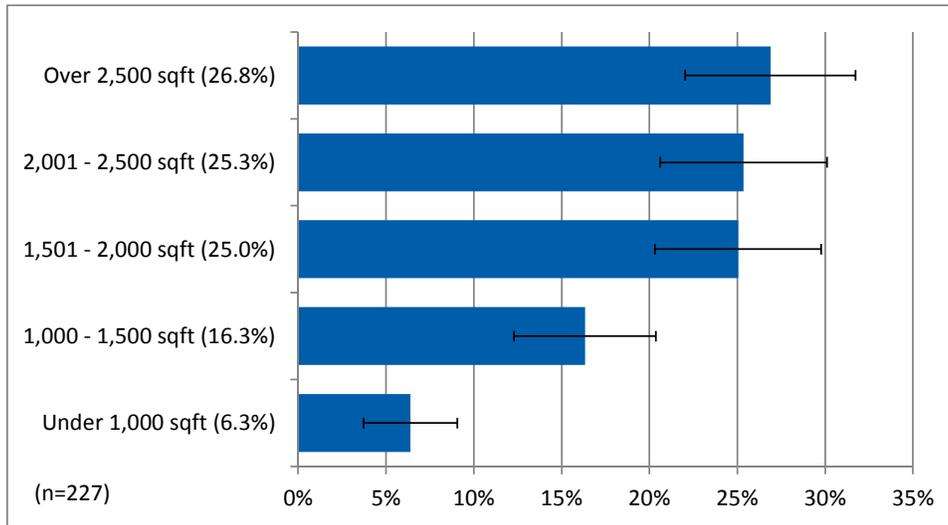
**Figure 8. Distribution of Household Income
(with precision at 90% confidence)**



Source: Rocky Mountain Power Cool Cash Participant Survey—Questions D5, D6, and D7



**Figure 9. Distribution of Home Size (square feet)
(with precision at 90% confidence)**



Source: Rocky Mountain Power Cool Cash Participant Survey—Question D8

Appendix B: Measure Eligibility Requirements

For the 2011 and 2012 Cool Cash Program, Rocky Mountain Power offered seven incentives. To qualify, end-users had to be Rocky Mountain Power residential electric customers, reside in the State of Utah, and be on rate schedule 1, 2, 3, or 25. In addition, the equipment had to adhere to the following requirements:

1. Evaporative Cooling - Replacements
 - a. Purchase and install new evaporative cooler from approved equipment list.
2. Evaporative Cooling - New
 - a. Purchase and install new evaporative cooler from approved equipment list for the first time in residence.
3. Evaporative Cooling - Premium only
 - a. Purchase and install new evaporative cooler from approved premium evaporative cooling equipment list.
4. Evaporative Cooling - Premium whole-house ducted system
 - a. Purchase and install new evaporative cooler from approved premium evaporative cooling equipment list.
 - b. Install a new air distribution duct system to accommodate most rooms on main home level.
5. Central Air Conditioning - Sizing + TXV¹³
 - a. System capacity must be within 6,000 Btu/hr of the cooling load calculation results.
 - b. Split systems must include a matched condensing unit and evaporative coil, with an overall efficiency rating as determined by the American Refrigeration Institute (ARI).
 - c. Equipment must contain either a factory—or field-installed—thermal expansion valve (TXV).
 - d. Load calculation must follow Manual J methodology.
6. Central Air Conditioning - Proper installation¹⁴
 - a. Technicians must be North American Technician Excellence, Inc. (NATE)-certified to receive the charge and airflow incentive.
 - b. Equipment must contain either a factory or field-installed TXV.
 - c. Technician must install unit per manufacturer and program guidelines, and report activities and results.

¹³ New central air conditioners are not required to be a SEER 15 unit. These incentives can be combined with incentives for a new SEER 15 central air conditioner and proper installation.

¹⁴ *ibid.*



7. Central Air Conditioning - 15+ SEER/12.5+ EER
 - a. Cooling capacity must be 65,000 Btu/hr (5.4 tons) or less.
 - b. Split systems must include a matched condensing unit and evaporative coil, with an overall efficiency rating as determined by the ARI.
 - c. Equipment must contain either a factory or field-installed TXV.
 - d. Equipment must be purchased from and installed by a participating dealer.

Appendix C: NTG Evaluation Methodology

Program Categorization

Prior to designing the NTG portion of the participant surveys, Cadmus worked with Rocky Mountain Power to thoroughly review its DSM programs, determining the following:

- ***Each program's unique characteristics.*** As each DSM program and measure operates differently, Cadmus had to clearly understand the unique characteristics of each program. This helped inform the survey design and question wording, assuring acknowledgement and accounting for nuances.
- ***The appropriate interviewees.*** This step proved critical, as survey questions had to reach the correct decision makers. For example, a review of an ENERGY STAR homes program may indicate the home builder as the decision maker, not the customer purchasing the home. Thus, survey questions would need to be worded to apply to home builders, not homeowners.

Following the programs' review, Cadmus aggregated the Cool Cash Program measures into five distinct categories:

1. Evaporative Cooling - Replacement
2. Evaporative Cooling – New
3. Evaporative Cooling – Premium only
4. Evaporative Cooling – Premium whole-house ducted system
5. Central Air Conditioning - 15+ SEER/12.5+ EER (including sizing + TXV and proper installation, where appropriate)

Survey Design

Direct questions (such as, "Would you have installed measure X without the program incentive?") tend to result in exaggerated "yes" responses. Surveyed participants tend to provide answers they believe surveyors seek; so the question example above becomes the equivalent of asking: "Would you have done the right thing on your own?" An effective solution for avoiding such bias involves asking a question in several different ways, then checking for consistent responses.

The Cool Cash survey's freeridership portion included six questions. The survey design included several skip patterns, allowing interviewers to confirm answers previously provided by respondents by asking the same question in a different format. Freeridership questions (as asked in the survey format) included:



1. At the time you first heard about the incentive from Rocky Mountain Power for the measure, had you already purchased or installed your new measure? (Rocky Mountain Power Cool Cash Participant Survey: Question I1)
2. *[Ask if question 1 is No]* If the incentive had not been available, would you have purchased or installed the same cooling system in your home? (Rocky Mountain Power Cool Cash Participant Survey: Question I2)
3. *[Ask if question 2 is No]* Just to confirm, when you say that without the incentive you would not have purchased or installed a new [measure], do you mean that you would not have purchased or installed the same new cooling system at all? (Rocky Mountain Power Cool Cash Participant Survey: Question I3)
4. *[Ask if question 2 is Yes, Don't Know, or Refused]* If the incentive had not been available, what would you have installed instead? (Rocky Mountain Power Cool Cash Participant Survey: Question I4)
5. *[Ask if question 4 is Same]* Would you have installed the cooling system at a different time if the incentive had not been available? (Rocky Mountain Power Cool Cash Participant Survey: Question I5)
6. Can you describe in your own words what role the incentive played in your decision to purchase your new measure? (Rocky Mountain Power Cool Cash Participant Survey: Question I6)

As noted, Cadmus used spillover questions to determine whether program participants installed additional energy-saving measures since participating in the program. We considered the savings participants received from the additional measures as spillover if the program significantly influenced their decisions to purchase additional measures, and if they did not receive additional incentives for those measures.

Through the surveys, Cadmus specifically asked residential participants whether they installed the following measures (Rocky Mountain Power Cool Cash Participant Survey: Questions F1 and F2):

- Clothes Washers
- Refrigerators
- Dishwashers
- Windows
- Light Fixtures
- Heat Pumps
- Ceiling Fans
- Electric Water Heaters
- CFLs
- Insulation

If the participant installed one or more of these measures, we asked additional questions about what year they purchased the measure (Rocky Mountain Power Cool Cash Participant Survey: Question F3), if they received an incentive for the measure (Rocky Mountain Power Cool Cash Participant Survey: Question F4), and how important the Cool Cash Program was on their purchasing decision on a scale of 1 to 5 where 1 indicated being not at all important and 5 indicated being very important (Rocky Mountain Power Cool Cash Participant Survey: Question F5).

Prior to beginning the live participant phone calls, Cadmus worked with the survey company to pretest the survey, ensuring that all appropriate prompts and skip patterns would be followed. Cadmus also monitored initial phone calls to verify that:

- The survey respondents understood the questions; and
- Adjustments were not required.

Freeridership Methodology

Cadmus developed a transparent, straightforward matrix for assigning scores to participants, based on their objective responses to targeted survey questions. We gave each question response pattern a freeridership score, calculating confidence and precision estimates based on the distribution of these scores.¹⁵

When assessing the survey freeridership results, Cadmus left the response patterns and scoring weights explicit, such that they could be discussed and changed, with results shown in real time. This approach provided other important features, including:

- Derivation of a partial freeridership score, based on the likelihood of a respondent taking similar actions in the incentive's absence.
- Use of a rules-based approach for consistency among multiple respondents.
- Use of open-ended questions to ensure quantitative scores matched respondents' more detailed explanations regarding program attribution.
- The ability to change weightings in a "what if" exercise, testing the response set's stability.

Cadmus' method to assessing freeridership offered a key advantage by including the concept of partial freeridership. Our experience has shown that program participants do not fall neatly into freerider and not-freerider categories. For example, we assigned partial freeridership scores to participants with plans to install the measure; although the program exerted some influence over their decisions, other market characteristics outside the program proved influential. Further, with partial freeridership, Cadmus could assign partial credit to "don't know" and "refused" responses, rather than entirely removing those respondents from the analysis.

¹⁵ This approach was cited in the *NAPEE Handbook on DSM Evaluation*, 2007 edition, page 5-1.



Cadmus assessed freeridership at three levels. First, we converted each participant survey response into freeridership matrix terminology. Then we gave each participant’s combination of responses a score from the matrix. Finally, we aggregated all participants into an average freeridership score for the entire program category.

Convert Responses to Matrix Terminology

Cadmus independently evaluated each survey question’s response, assessing participants’ freeridership levels for each question and converting each survey response option into values of:

- “Yes” (100% freerider);
- “No” (0% freerider); or
- “Partial” (50% freerider).

Table 27 lists the six freeridership survey questions, their corresponding response options, and the values they converted to (in parentheses). We converted “don’t know” and “refused” responses to “partial” for all but the first question. For the first question, if a participant was unsure whether they had already purchased or installed the measure before learning about the incentive, we considered them an unlikely freerider.

Table 27. Assignments of Cool Cash Survey Response Options into Matrix Terminology

Already purchased or installed?	Would have purchased without incentive?	Would not have purchased at all?	Would have installed other cooling system?	Installed equipment at same time?	Describe influence of incentive on purchase
Yes (Yes)	Yes (Yes)	Yes (Yes)	Same (Yes)	Yes, but later in the same year (Partial)	None / Just wanted the incentive (Yes)
No (No)	No (No)	No (No)	Air conditioner instead of evaporative cooler (No)	Yes, later in one or more years (No)	It made me buy sooner than I otherwise would have (No)
Don't know (No)	Don't know (Partial)	Don't know (Partial)	Evaporative cooler instead of Air Conditioner (Yes)	Yes, I would have installed the units at the same time or sooner (Yes)	It made me buy a more efficient unit (No)
Refused (No)	Refused (Partial)	Refused (Partial)	Different cooling system (No)	Don't know (Partial)	It made me buy both sooner and a more efficient unit (No)
			Less efficient cooling system (No)	Refused (Partial)	It made me buy an air conditioner instead of an evaporative cooler

Already purchased or installed?	Would have purchased without incentive?	Would not have purchased at all?	Would have installed other cooling system?	Installed equipment at same time?	Describe influence of incentive on purchase
					(Yes)
			Larger cooling system (No)		It made me buy an evaporative cooler instead of an air conditioner (No)
			Smaller cooling system (Partial)		Other (Partial)
			More efficient cooling system (Yes)		Don't know (Partial)
			Room air conditioner (No)		Refused (Partial)
			Other (No)		
			Don't know (Partial)		
			Refused (Partial)		

Participant Freeridership Scoring

After converting survey responses into matrix terminology, Cadmus created a freeridership matrix, allowing us to assign a freeridership score to each combination of participants' question responses. In creating the matrix, we considered every combination of possible survey question responses, then gave each combination a freeridership score between 0% and 100%. Using this matrix, we assigned every participant combination of responses a score between 0% and 100%.

Program Category Freeridership Scoring

After assigning a freeridership score to every survey respondent, Cadmus calculated a savings-weighted average freerider score for the program category. We individually weighted respondent freerider scores by the estimated savings of equipment installed.

$$\text{Savings Weighted Freeridership} = \frac{\sum [\text{Respondent Score}] \times [\text{Rebated Measure kWh Savings}]}{\sum [\text{Rebated Measure kWh Savings} - \text{All Respondents}]}$$

Freeridership Scoring Model

Cadmus developed an Excel-based model to assist with freeridership calculation and to improve the consistency and quality of results. The model translates raw survey responses into matrix terminology, and assigns a score to each participant's response pattern. Program participants in the sample can be then aggregated by program category to calculate the average freerider score.

The model incorporated the following inputs, described in this appendix:

- Raw survey responses from each participant, along with the program category for their incented measures and the energy savings from those measures, if applicable;
- Figures converting raw survey responses into matrix terminologies for each program category; and
- Custom freeridership scoring matrices for each unique survey type.

The model used a simple interface, allowing users to quickly reproduce a scoring analysis for any program category. It displayed each participant's combination of responses and corresponding freeridership score, and then produced a summary table with the average score and precision estimates for the program category. The model uses the sample size and a two-tailed test targeted at the 90% confidence interval to determine the average score's precision.

Table 28 shows a summary table example for the Cool Cash Program, with the final freeridership score listed in the lower right corner. The example shown averaged 30% freeridership, indicating that 30% of the gross program energy savings should be removed. Based on a 267 response sample size, the program had an absolute precision of 3.1%.

Table 28. Freerider Scoring Model Output

Category	Value	Category	Value
Unique Program Participants (P)	5,587	Finite Population Correction	1
Responses (n)	267	Adjusted Standard Error	0.019
Variance Of Mean	0.092	Adjusted Relative Precision	9.98%
Standard Deviation	0.304	Coefficient of Variation	1.001
Standard Error of Mean	0.019	Upper Bound Score	0.33
Relative Precision	.1013	Weighted Mean Score/Freeridership	0.30
Absolute Precision	0.031	Lower Bound Score	0.27

Participant Spillover Methodology

For the Cool Cash Program, Cadmus measured spillover by asking a sample of participants who purchased and received an incentive for a particular measure if, due to the program, they installed another efficient measure or undertook additional energy-efficiency activities. We asked respondents to rate the Cool Cash Program and incentive's relative influence (either highly, somewhat, or not at all influential) on their decisions to pursue additional savings.

Participant Spillover Analysis

To calculate spillover savings, Cadmus used the standard top-down approach. We started our analysis with a subset containing only survey respondents who indicated they installed additional energy-savings measures after participating in the Cool Cash Program. From this subset, we removed participants who indicated the program had little influence on their decisions to purchase additional measures, thus only retaining participants rating the incentive as highly influential. We also removed participants who applied for Utah Home Energy Savings Program incentives for the additional measures they installed.

For those remaining participants with spillover savings, Cadmus estimated energy savings for the additional measures installed. Cadmus matched the savings values we calculated to additional measures installed by survey participants.

We calculated the spillover percentage per program category by dividing the sum of additional spillover savings reported by respondents for a given program category by the total incentivized gross savings achieved by all respondents in that program category:

$$\text{Spillover \%} = \frac{\sum [\text{Spillover Measure kWh Savings for All Survey Respondents}]}{\sum [\text{Program Measure kWh Savings for All Survey Respondents}]}$$



Appendix D: Precision Calculations

To determine the uncertainty level of savings results, Cadmus considered the effect of sampling error on all estimates presented in the report. Sampling error refers to uncertainty introduced by the use of sampled data to infer characteristics of the overall population. These data include survey results, meter data, and data from secondary sources. Cadmus used sampled data to estimate the parameters of per-unit savings calculations (such as installation rates) and to estimate the consumption of specific equipment types (such as in billing analysis).

Sampling error has been reflected in estimated confidence intervals. Unless otherwise noted, Cadmus estimated intervals at 90% confidence, indicating a 90% confidence that the true population value fell within the given interval. Cadmus calculated confidence intervals for means, proportions, regression estimates, and any calculated values using sample estimates as an input. Cadmus calculated all confidence intervals using the following standard formula for estimating uncertainty for proportions and means:

$$Confidence\ Interval_{mean} = mean \pm 1.645 * \sqrt{\frac{s^2}{n}}$$

Where:

- 1.645 = The z-score for a 90% confidence interval, and
- s² = The sample variance.

In some cases, the uncertainty of estimates came from multiple sources. For example, for summed estimates, such as those for total program savings, Cadmus calculated the root of the sum of the squared standard errors to estimate the confidence interval:¹⁶

$$Confidence\ Interval_{\bar{X}+\bar{Y}} = (\bar{X} + \bar{Y}) \pm 1.645 * \sqrt{\left(\frac{s^2_{\bar{X}}}{n_{\bar{X}}}\right) + \left(\frac{s^2_{\bar{Y}}}{n_{\bar{Y}}}\right)}$$

In some cases, Cadmus multiplied estimates. For instance, net savings calculations involved combining gross estimates with an in-service rate and/or NTG estimated from participant surveys. For these results, Cadmus calculated combined standard errors for the final estimates. In cases where the relationship was multiplicative, Cadmus used the following formula:¹⁷

$$Confidence\ Interval_{\bar{X}*\bar{Y}} = (\bar{X} + \bar{Y}) \pm 1.645 * \sqrt{\bar{Y}^2 \left(\frac{s^2_{\bar{X}}}{n_{\bar{X}}}\right) + \bar{X}^2 \left(\frac{s^2_{\bar{Y}}}{n_{\bar{Y}}}\right) + \left(\frac{s^2_{\bar{X}}}{n_{\bar{X}}}\right) \left(\frac{s^2_{\bar{Y}}}{n_{\bar{Y}}}\right)}$$

¹⁶ This approach to aggregating errors follows methods outlined in: Schiller, Steven, et al. "National Action Plan for Energy Efficiency." Appendix D. 2007. Available online: www.epa.gov/eeactionplan.

¹⁷ Cadmus derived this formula from: Goodman, Leo. "The Variance of the Product of K Random Variables." Journal of the American Statistical Association (1962).

To ensure transparency of the error aggregation process, Cadmus reported precision for both individual and combined estimates, where relevant.



Appendix E: Energy-Savings Regression Model Outputs

Table 29. SEER 13 Central Air Conditioner Nonparticipant Regression Model Output

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	122,953	61,477.0000	364.2200	<.0001
Error	1,413	238,498	168.7881		
Corrected Total	1,415	361,451			
Root MSE		12.9919	R-Square	0.3402	
Dependent Mean		33.2144	Adj R-Sq	0.3392	
Coeff Var		39.1151			
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	12.4536	1.0109	12.3200	<.0001
Avgcdd	1	1.3155	0.0548	24.0100	<.0001
Sqft	1	0.0069	0.0005	12.9900	<.0001

Table 30. Evaporative Cooling Equipment Participant Regression Model Output

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	38,760	19,380.0000	303.3800	<.0001
Error	6,511	415,933	63.8816		
Corrected Total	6,513	454,693			
Root MSE		7.9926	R-Square	0.0852	
Dependent Mean		21.5200	Adj R-Sq	0.085	
Coeff Var		37.1403			
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	15.3107	0.2758	55.5200	<.0001
Avgcdd	1	0.2461	0.0154	15.9800	<.0001
Sqft	1	0.0027	0.0001	19.1700	<.0001

Table 31. SEER 15 Central Air Conditioner Participant Regression Model Output

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	394,401	197,200.0000	1,781.1200	<.0001
Error	10,137	1,122,339	110.7170		
Corrected Total	10,139	1,516,740			
Root MSE		10.5222	R-Square	0.2600	
Dependent Mean		30.4723	Adj R-Sq	0.2599	
Coeff Var		34.5305			
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	17.1670	0.2886	59.4900	<.0001
Avgcdd	1	0.9042	0.0167	54.0200	<.0001
Sqft	1	0.0036	0.0001	28.9000	<.0001



Appendix F: Cool Cash Semi-Annual Participant Survey Instrument

CODING

FIRM = DISCOVERY RESEARCH / RDD FIELD SERVICES

UNIT = MEASURES BELOW

EQUIPMENT = AIR CONDITIONER/EVAPORATIVE COOLER

[PREPOPULATE – DO NOT ASK] FOR WHICH OF THE FOLLOWING MEASURES DID THE CUSTOMER RECEIVE AN INCENTIVE? [INCLUDE ALL THAT APPLY]

1. Evaporative Cooling - Replacements
2. Evaporative Cooling - New
3. Evaporative Cooling - Premium only
4. Evaporative Cooling - Premium whole-house ducted system
5. Central Air Conditioning - Sizing + TXV
6. Central Air Conditioning - Proper installation
7. Central Air Conditioning - 15+ SEER/12.5+ EER

INTRODUCTION

Hello, my name is _____ and I am calling from **[FIRM]** on behalf of Rocky Mountain Power. We are exploring the impacts of energy-efficiency programs offered in your area. I'm not selling anything; I just want to ask you a few questions about your energy use and the impact of the Cool Cash Program that is currently being offered by Rocky Mountain Power.

B1. May I speak with **[CONTACT NAME]**?

1. Yes
2. No **[ATTEMPT TO CONVERT; IF [CONTACT NAME] IS NOT AVAILABLE, ASK FOR AN ADULT WHO MAKES DECISIONS ON HOW HOUSEHOLD USES ENERGY] [SKIP TO B2]**
- 98. DON'T KNOW **[SKIP TO B3]**
- 99. REFUSED **[SKIP TO B3]**

Response to Customer Questions

(TIMING: This survey should take about 15 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)**

(WHO ARE YOU WITH: I'm with **[FIRM]**, an independent research firm that was hired by Rocky Mountain Power to conduct this research. I am calling to learn about your experience with the cooling unit you received through Rocky Mountain Power's Cool Cash incentive program).

(SALES CONCERN: I am not selling anything; we would simply like to learn about your experience with the **[EQUIPMENT]** you installed through the program. Your responses will be kept confidential. If you would like to talk with someone from Rocky Mountain Power about this study, feel free to call 1-800-942-0266, or visit their website: <http://www.rockymountainpower.net>).

(WHO IS DOING THIS STUDY: Rocky Mountain Power, your electric utility, is conducting evaluations of several of its efficiency programs).

(WHY ARE YOU CONDUCTING THIS STUDY: Studies like this help Rocky Mountain Power better understand customers' need and interest in energy programs and services).

B2. To confirm, you received an incentive or incentive check for the purchase of **[EQUIPMENT]** on **[INSERT DATE]**, correct?

1. Yes **[SKIP TO B4]**
 2. No **[SKIP TO B4]**
- 98. DON'T KNOW **[SKIP TO B4]**
 -99. REFUSED **[SKIP TO B4]**

B3. Are you familiar with the incentive that was received by **[FIRST AND LAST NAME]** for the purchase of the **[EQUIPMENT]** in **[PURCHASE DATE]** for **[STREET ADDRESS, CITY]**?

1. Yes
 2. No **[SCHEDULE TIME TO CALL BACK TO REACH CONTACT]**
- 98. DON'T KNOW **[SCHEDULE TIME TO CALL BACK TO REACH CONTACT]**
 -99. REFUSED **[THANK THEN TERMINATE]**

B4. Have you ever been employed in the market research field?

1. Yes **[THANK AND TERMINATE]**
 2. No **[CONTINUE]**
- 98. DON'T KNOW **[THANK AND TERMINATE]**
 -99. REFUSED **[THANK AND TERMINATE]**



BACKGROUND

C1. Do you recall how you first learned about the Rocky Mountain Power Cool Cash incentive?

1. Newspaper/Magazine/Print Media
2. Bill Inserts
3. Rocky Mountain Power website
4. Other website
5. Internet Advertising/Online Ad
6. Family/Friends/Word-of-Mouth
7. Contractor
8. Radio
9. TV
10. Billboard/Outdoor Ad
11. Retailer/Store
12. Sporting Event
13. Other Community Event
14. Home Shows/Trade Shows (Home and Garden Shows)
15. Social Media (Facebook, Twitter)
16. Other **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

C2. **[ASK IF C1=7]** Before your contractor discussed the availability of Rocky Mountain Power Cool Cash incentives, were you aware Rocky Mountain Power offers incentives for cooling equipment and other high-efficiency appliances?

1. Yes
2. No
- 98. DON'T KNOW
- 99. REFUSED

C3. **[ASK IF C1<>7]** Did the contractor that installed your **[EQUIPMENT]** explain that Rocky Mountain Power incentives were available to help you purchase and install energy-efficient cooling for your home?

1. Yes
2. No
- 98. DON'T KNOW
- 99. REFUSED

C4. How did you find the contractor that installed the [EQUIPMENT]?

1. Online ad or website
2. Phonebook search
3. Internet search
4. Recommendation from a friend, family-member, co-worker, etc.
5. Other [RECORD]
- 98. DON'T KNOW
- 99. REFUSED

C5. What was your primary reason for buying a [EQUIPMENT] that qualified for the Cool Cash incentive? [DO NOT READ, MARK ALL THAT APPLY]

1. Old equipment didn't work
2. Old equipment working poorly
3. The program incentive
4. The program technical assistance
5. Wanted to save energy
6. Wanted to reduce energy costs
7. Environmental concerns
8. Recommendation from other utility [PROBE: "WHAT UTILITY?" RECORD]
9. Recommendation of dealer/retailer [PROBE: "FROM WHICH STORE?" RECORD]
10. Recommendation from friend, family member, or colleague
11. Recommendation from a contractor
12. Advertisement in newspaper [PROBE: "FOR WHAT PROGRAM?" RECORD]
13. Radio advertisement [PROBE: "FOR WHAT PROGRAM?" RECORD]
14. Health or medical reasons
15. To maintain or increase home comfort
16. Other [RECORD]
- 98. DON'T KNOW
- 99. REFUSED

FREERIDERSHIP

11. At the time that you first heard about the incentive from Rocky Mountain Power for the [EQUIPMENT], had you already purchased or installed your new [EQUIPMENT]?

1. Yes [SKIP TO I6]
2. No
- 98. DON'T KNOW [SKIP TO I6]
- 99. REFUSED [SKIP TO I6]



12. If the incentive had not been available, would you have purchased or installed the same cooling system in your home?
1. Yes
 2. No
 - 98. DON'T KNOW
 - 99. REFUSED
13. **[ASK IF I2=2]** Just to confirm, when you say that without the incentive you would not have purchased or installed a new **[EQUIPMENT]**, do you mean that that you would not have purchased or installed the same new cooling system at all?
1. Yes **[SKIP TO I6]**
 2. No
 - 98. DON'T KNOW
 - 99. REFUSED
14. If the incentive had not been available, what would you have installed instead? **[PROMPT AS NEEDED ON RESPONSES, CHOOSE ALL RESPONSES THAT APPLY]**
1. Same
 2. Air conditioner instead of evaporative cooler
 3. Evaporative cooler instead of air conditioner
 4. Different cooling system
 5. Less efficient cooling system without the program
 6. Larger cooling system without the program
 7. Smaller cooling system without the program
 8. More efficient cooling system without the program **[PRESUMED TO BE AN UNLIKELY RESPONSE, SO CONFIRM AND RECORD RESPONSE]**
 9. Room air conditioner(s)
 10. Other **[RECORD]**
 - 98. DON'T KNOW
 - 99. REFUSED
15. **[ASK IF I4=1]** Ok, would you have installed the cooling system at a different time if the incentive had not been available?
1. Yes, but later in the same year
 2. Yes, in one or more years
 3. Yes, I would have installed the unit at the same time or sooner
 98. DON'T KNOW
 99. REFUSED

16. Can you describe in your own words what role the incentive played in your decision to purchase your new **[EQUIPMENT]**?
1. None/Just wanted the incentive
 2. It made me buy sooner than I otherwise would have
 3. It made me buy a more efficient unit
 4. It made me buy both sooner and a more efficient unit
 5. It made me buy an air conditioner instead of an evaporative cooler
 6. It made me buy an evaporative cooler instead of an air conditioner
 7. Other **[RECORD]**
 98. DON'T KNOW
 99. REFUSED

DECISION MAKING FOR SIZING AND INSTALLATION

[IF EQUIPMENT TYPE = AIR CONDITIONER, ASK E1 THROUGH E10. IF EQUIPMENT TYPE = EVAPORATIVE COOLER, ASK E5, THEN SKIP TO E10].

- E1. **[ASK IF EQUIPMENT=5 OR 7]** Do you recall receiving an additional incentive for proper sizing of your air conditioning unit?

1. Yes
2. No **[SKIP TO E3]**
- 98. DON'T KNOW **[SKIP TO E3]**
- 99. REFUSED **[SKIP TO E3]**

- E2. **[ASK IF EQUIPMENT=5 OR 7 AND E1=1]** How likely were you to have purchased a unit of the same or smaller size without the incentive for sizing? Would you say... **[READ LIST]**

1. Not at all likely
2. Moderately likely
3. Likely
4. Extremely likely
- 98. **[DO NOT READ]** DON'T KNOW
- 99. **[DO NOT READ]** REFUSED

- E3. Did your dealer or installer provide you with different sizing options for your air conditioner?

1. Yes
2. No **[SKIP TO E5]**
- 98. DON'T KNOW **[SKIP TO E5]**
- 99. REFUSED **[SKIP TO E5]**



- E4. **[ASK IF E3=1]** Why did you select the size of unit that you did?
1. **[RECORD]**
 - 98. DON'T KNOW
 - 99. REFUSED
- E5. How satisfied have you been with the ability of your **[EQUIPMENT]** to cool your house on very hot days? Have you been... **[READ RESPONSES, SELECT ONE RESPONSE ONLY]**
1. Extremely satisfied
 2. Somewhat satisfied
 3. Somewhat dissatisfied
 4. Extremely dissatisfied
 5. There were too few hot days this past summer to tell
 - 98. **[DO NOT READ]** DON'T KNOW
 - 99. **[DO NOT READ]** REFUSED
- E6. **[ASK IF EQUIPMENT=6 OR 7]** Do you recall receiving an incentive for proper installation of your air conditioning unit by a NATE-certified contractor?
1. Yes
 2. No **[SKIP TO E8]**
 - 98. DON'T KNOW **[SKIP TO E8]**
 - 99. REFUSED **[SKIP TO E8]**
- E7. **[ASK IF EQUIPMENT=6 OR 7 AND E6=1]** How likely were you to have the air conditioning unit installed by the same NATE-certified contractor without the incentive for proper installation? Would you say... **[READ LIST]**
1. Not at all likely
 2. Moderately likely
 3. Likely
 4. Extremely likely
 - 98. **[DO NOT READ]** DON'T KNOW
 - 99. **[DO NOT READ]** REFUSED
- E8. Did your dealer or installer provide you with different installation options?
1. Yes
 2. No **[SKIP TO E10]**
 - 98. DON'T KNOW **[SKIP TO E10]**
 - 99. REFUSED **[SKIP TO E10]**

E9. **[ASK IF E8=1]** Why did you select the installation option that you did?

- 1. **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

E10. Did you receive any other incentives for your purchase of **[EQUIPMENT]**?

- 1. Yes **[PROBE: FROM WHOM DID YOU RECEIVE THE INCENTIVE?]**
- 2. No
- 98. DON'T KNOW
- 99. REFUSED

SPILOVER

F1. Since participating in the program, have you added any other energy-efficient equipment or had any energy-efficiency services performed in your home for which you did not receive an incentive from Rocky Mountain Power?

- 1. Yes
- 2. No **[SKIP TO D1]**
- 98. DON'T KNOW **[SKIP TO D1]**
- 99. REFUSED **[SKIP TO D1]**

F2. **[ASK IF F1=1]** Have you purchased any of the following items since you purchased the **[EQUIPMENT]**? **[ANSWER CAN INCLUDE ELIGIBLE APPLIANCES AND MEASURES OTHER THAN THOSE LISTED IN PROGRAM RECORDS. PROMPT IF NEEDED.]**

- 1. Clothes Washers
- 2. Refrigerators
- 3. Dishwashers
- 4. Windows
- 5. Light Fixtures
- 6. Heat Pumps
- 7. Ceiling Fans
- 8. Electric Water Heaters
- 9. CFLs
- 10. Insulation
- 11. Other **[RECORD]**
- 12. None
- 98. **[DO NOT READ]** DON'T KNOW
- 99. **[DO NOT READ]** REFUSED



[REPEAT F3 THROUGH F5 FOR ALL RESPONSES TO F2]

F3. **[ASK IF F2=1]** When did you purchase **[EQUIPMENT]**?

- 1. 2009
- 2. 2010
- 3. 2011
- 4. 2012
- 5. 2013
- 98. DON'T KNOW
- 99. REFUSED

F4. **[ASK IF F2=1]** You mentioned that you did not receive an incentive for **[EQUIPMENT]** from Rocky Mountain Power, is that correct?

- 1. Yes
- 2. No **[SKIP TO D1]**
- 98. DON'T KNOW **[SKIP TO D1]**
- 99. REFUSED **[SKIP TO D1]**

F5. **[ASK IF F4=1]** On a scale of 1 to 5, where 1 indicates being not at all important and 5 indicates being very important, how important was your participation in the program on your decision to install additional energy-efficiency measures at your home?

- 1. 1 (Not at all important)
- 2. 2
- 3. 3
- 4. 4
- 5. 5 (Very important)
- 98. DON'T KNOW
- 99. REFUSED

DEMOGRAPHICS

These next questions are about household characteristics. They allow us to make sure we're contacting a representative group of customers.

D1. Which of the following best describes your house? **[READ LIST]**

1. Single-family home
2. Townhouse or duplex
3. Mobile home or trailer
4. Apartment building with four or more units
5. Other **[RECORD]**
- 98. **[DO NOT READ]** DON'T KNOW
- 99. **[DO NOT READ]** REFUSED

D2. Do you rent or own your home?

1. Own
2. Rent
3. OTHER **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

D3. Including yourself and any children, how many people currently live in your home?

1. **[RECORD]:**
- 98. DON'T KNOW
- 99. REFUSED

D4. Can you please tell me in what year you were born?

1. **[RECORD]:**
- 98. DON'T KNOW
- 99. REFUSED

D5. In 2010, was your pre-tax household income above or below \$50,000?

1. Below \$50,000
2. Above \$50,000 **[SKIP TO D7]**
3. Exactly \$50,000 **[SKIP TO D8]**
- 98. REFUSED **[SKIP TO D8]**
- 99. DON'T KNOW **[SKIP TO D8]**



- D6. **[ASK IF D5=1]** Which of the following categories best represents your household income in **[2011/2012]**? Please stop me when I read your category:
1. Under \$10,000
 2. \$10,000 to under \$20,000
 3. \$20,000 to under \$30,000
 4. \$30,000 to under \$40,000
 5. \$40,000 to under \$50,000
 - 98. **[DO NOT READ]** DON'T KNOW
 - 99. **[DO NOT READ]** REFUSED
- D7. **[ASK IF D5=2]** Which of the following categories best represents your household income in **[2011/2012]**? Please stop me when I read your category:
1. \$50,000 to under \$60,000
 2. \$60,000 to under \$75,000
 3. \$75,000 to under \$100,000
 4. \$100,000 to under \$150,000
 5. \$150,000 to under \$200,000
 6. \$200,000 or more
 - 98. **[DO NOT READ]** DON'T KNOW
 - 99. **[DO NOT READ]** REFUSED
- D8. Approximately how many square feet is the home in which the **[EQUIPMENT]** was installed? **[READ LIST. MARK ONLY ONE]**
1. Under 1,000 square feet
 2. 1,000-1,500 square feet
 3. 1,501-2,000 square feet
 4. 2,001-2,500 square feet
 5. Over 2,500 square feet
 - 98. **[DO NOT READ]** DON'T KNOW
 - 99. **[DO NOT READ]** REFUSED
- D9. Did you do any remodeling, renovating, or made additions since **[INSERT DATE 12 MONTHS PRIOR TO TIME OF PARTICIPATION]**?
1. Yes
 2. No **[SKIP TO G12]**
 - 98. DON'T KNOW **[SKIP TO G12]**
 - 99. REFUSED **[SKIP TO G12]**

D10. **[ASK IF G9=1]** How many remodels, renovations, or additions have you done since then?

1. **[RECORD: REMODELS, RENOVATIONS, AND ADDITIONS]**
- 98. DON'T KNOW
- 99. REFUSED

D11. **[ASK IF D9=1]** I'm going to ask you several questions regarding the timeframe of your remodels, renovations, or additions. I will try to get through them quickly. **[ASK A-C FOR EACH REMODEL THAT TOOK PLACE SINCE {INSERT DATE 12 MONTHS PRIOR TO TIME OF PARTICIPATION}]**.

- a. In what month and year did it start? **[RECORD]**
- b. Did this increase or decrease your home's square footage, not counting unfinished storage spaces, porches, or garages? **[RECORD]**
- c. In what month and year did it finish? **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSE

D12. Since **[INSERT DATE 12 MONTHS PRIOR TO TIME OF PARTICIPATION]**, have you made any other changes to the appliances, equipment, or other characteristics of your home that would affect how much energy you are using?

1. Yes
2. No **[SKIP TO D21]**
- 98. DON'T KNOW **[SKIP TO D21]**
- 99. REFUSE **[SKIP TO D21]**



D13. [ASK IF D12=1] What types of changes did you make?

1. Yes [DO NOT READ. RECORD EACH TYPE OF CHANGE MADE. PROBE: ANYTHING ELSE?]

Heating and air conditioning measures

- D13a. Additional central air conditioner
- D13b. Room/wall air conditioner
- D13c. Additional evaporative cooler
- D13d. Furnace
- D13e. Programmable thermostat

Laundry measures

- D13f. Clothes washer
- D13g. Clothes dryer

Kitchen appliances

- D13h. Refrigerator
- D13i. Freezer
- D13j. Range/oven
- D13k. Dishwasher

Pool/spa/Jacuzzi

- D13l. Swimming pool
- D13m. Swimming pool pump
- D13n. Swimming pool cover
- D13o. Spa/Jacuzzi

Windows

- D13p. Windows
- D13q. Other [RECORD]

-98. DON'T KNOW [SKIP TO D21]

-99. REFUSED [SKIP TO D21]

[ASK D14 THROUGH D17 FOR EACH MEASURE SELECTED IN D13]

D14. Did this [D13 MEASURE] replace (an) existing [D13 MEASURE] or was it new to your home?

- 1. Replaced existing equipment
- 2. New to home

-98. DON'T KNOW [SKIP TO D16]

-99. REFUSED [SKIP TO D16]

D15. [ASK IF D14=1 OR 2] When did this occur?

1. [RECORD MONTH AND YEAR: MM/YY]

-98. DON'T KNOW

-99. REFUSED

D16. **[ASK IF D15=-98 OR -99]** Was this before or after you purchased the **[EQUIPMENT]**?

- 1. Before
- 2. After
- 98. DON'T KNOW
- 99. REFUSED

[ASK D17 AND D18 IF D13=D13D, D13G, D13J, AND/OR D13O]

D17. What type of fuel does the new **[D13 MEASURE]** use?

- 1. Gas
- 2. Electric
- 3. Other **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

D18. **[ASK IF D13=1]** What was the fuel type of the **[D13 MEASURE]** you replaced?

- 1. Gas **[SKIP TO NEXT D13 MEASURE, IF NONE SKIP TO D21]**
- 2. Electric
- 3. Other **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

D19. Did you receive an incentive for this **[D13 MEASURE]** through a utility program?

- 1. Yes **[SKIP TO NEXT D13 MEASURE, IF NONE SKIP TO D21]**
- 2. No **[SKIP TO NEXT D13 MEASURE, IF NONE SKIP TO D21]**
- 98. DON'T KNOW **[SKIP TO NEXT D13 MEASURE, IF NONE SKIP TO D21]**
- 99. REFUSED **[SKIP TO NEXT D13 MEASURE, IF NONE SKIP TO D21]**

D20. **[ASK IF D13=D13D]** Previously you mentioned you replaced your furnace. Is this furnace the primary heat source for your home?

- 1. Yes
- 2. No
- 98. DON'T KNOW
- 99. REFUSED



D21. **[ASK IF D12≠1 OR D20=2 OR D13≠D13D]** What is the primary heating source for your home?

1. Forced air natural gas furnace
2. Forced air propane furnace
3. Heat pump
4. Electric baseboard heat
5. Gas fired boiler/radiant heat
6. Oil fired boiler/radiant heat
7. Passive solar
8. Pellet stove
9. Wood stove
10. Other **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

D22. What type of fuel does your water heater use?

1. Gas
2. Electric
3. Gas and Electric
4. Solar
5. Other **[RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

D23. **[ASK IF D13≠D13G]** What type of fuel does your clothes dryer use?

1. Gas
2. Electric
3. Gas and Electric
4. Other **[RECORD]**
5. None
- 98. DON'T KNOW
- 99. REFUSED

D24. **[ASK IF D13≠D13J]** What type of fuel does your range or oven use?

1. Gas
2. Electric
3. Gas and Electric
4. Other **[RECORD]**
5. None
- 98. DON'T KNOW
- 99. REFUSED

SATISFACTION

H1. Overall, how satisfied are you with your **[EQUIPMENT]**? Would you say you are...? **[READ CATEGORIES; RECORD FIRST RESPONSE ONLY]**

1. Very Satisfied
2. Somewhat Satisfied
3. Not Very Satisfied **[PROBE FOR REASON AND RECORD]**
4. Not At All Satisfied **[PROBE FOR REASON AND RECORD]**
- 98. **[DO NOT READ]** DON'T KNOW
- 99. **[DO NOT READ]** REFUSED

H2. How satisfied were you with the contractor that installed the **[EQUIPMENT]** for you? **[READ CATEGORIES; RECORD FIRST RESPONSE ONLY]**

1. Very Satisfied
2. Somewhat Satisfied
3. Not Very Satisfied **[PROBE FOR REASON AND RECORD]**
4. Not At All Satisfied **[PROBE FOR REASON AND RECORD]**
- 98. **[DO NOT READ]** DON'T KNOW
- 99. **[DO NOT READ]** REFUSED

H3. How satisfied were you with the amount of the incentive you received for the **[EQUIPMENT]**? **[READ CATEGORIES, RECORD FIRST RESPONSE ONLY]**

1. Very Satisfied
2. Somewhat Satisfied
3. Not Very Satisfied **[PROBE FOR REASON AND RECORD]**
4. Not At All Satisfied **[PROBE FOR REASON AND RECORD]**
- 98. DON'T KNOW
- 99. REFUSED



H4. After you submitted the incentive application for the **[EQUIPMENT]**, do you recall how long it took to receive the incentive check from Rocky Mountain Power? Was it... **[READ CATEGORIES IF NEEDED, RECORD ONLY FIRST RESPONSE]**

- 1. Less than four weeks
- 2. Between four and six weeks
- 3. Between seven and eight weeks
- 4. More than eight weeks
- 98. **[DO NOT READ] DON'T KNOW [SKIP TO H7]**
- 99. **[DO NOT READ] REFUSED [SKIP TO H7]**

H5. Were you satisfied with how long it took to receive the incentive?

- 1. Yes
- 2. No **[PROBE FOR REASON AND RECORD]**
- 98. DON'T KNOW
- 99. REFUSED

H6. How satisfied were you with the application process? **[READ CATEGORIES]**

- 1. Very Satisfied
- 2. Somewhat Satisfied
- 3. Not Very Satisfied **[PROBE FOR REASON AND RECORD]**
- 4. Not At All Satisfied **[PROBE FOR REASON AND RECORD]**
- 98. **[DO NOT READ] DON'T KNOW**
- 99. **[DO NOT READ] REFUSED**

H7. Overall, how satisfied are you with the Cool Cash incentive program? **[READ CATEGORIES; RECORD ONLY FIRST RESPONSE]**

- 1. Very Satisfied
- 2. Somewhat Satisfied
- 3. Not Very Satisfied **[PROBE FOR REASON AND RECORD]**
- 4. Not At All Satisfied **[PROBE FOR REASON AND RECORD]**
- 98. **[DO NOT READ] DON'T KNOW**
- 99. **[DO NOT READ] REFUSED**

H8. Did your participation in Rocky Mountain Power's Cool Cash Program cause your satisfaction with Rocky Mountain Power to... **[READ CATEGORIES]**

1. Increase
2. Stay the same
2. Decrease
- 98. **[DO NOT READ]** DON'T KNOW
- 99. **[DO NOT READ]** REFUSED

CONCLUSION

J1. Do you have any additional feedback or comments that you would like me to include at this point?

1. Yes **[RECORD VERBATIM]**
2. No
- 98. DON'T KNOW
- 99. REFUSED

J2. Gender of respondent **[DO NOT ASK, JUST RECORD]**

1. Female
2. Male
- 98. DON'T KNOW

That concludes the survey. Thank you very much for your time and feedback.