



# 2020 Wyoming Wattsmart Business Program Evaluation

**FINAL REPORT**

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## Table of Contents

<b>Introduction .....</b>	<b>1</b>
Evaluation Objectives .....	2
Methods .....	2
<b>Evaluation Findings.....</b>	<b>4</b>
Impact Evaluation.....	4
Net-to-Gross .....	8
Process Evaluation.....	9
Cost-Effectiveness .....	17
<b>Conclusions and Recommendations.....</b>	<b>18</b>
Conclusions and Recommendations .....	18
<b>Appendix A. Gross Engineering Analysis Methodology .....</b>	<b>A-1</b>
<b>Appendix B. Net-to-Gross Analysis Methodology .....</b>	<b>B-1</b>
<b>Appendix C. Cost-Effectiveness Methodology .....</b>	<b>C-1</b>

## Table

Table 1. Evaluation Objectives and Activities .....	2
Table 2. Impact Steps to Determine Evaluated Gross and Net Savings.....	2
Table 3. Wyoming 2020 Wattsmart Business Program Impact Sampling Summary .....	4
Table 4. 2020 Wattsmart Business Program Savings.....	5
Table 5. 2020 Wyoming Wattsmart Business Program NTG Results.....	9
Table 6. Wyoming 2020 Wattsmart Business Program Process Activity Sampling .....	10
Table 7. 2020 Participant Survey Sample by Measure Type.....	10
Table 8. 2020 Evaluated Net Wattsmart Business Program Cost-Effectiveness Summary .....	17
Table A-1. Impact Steps to Determine Evaluated Gross and Net Savings .....	A-1
Table B-1. Wattsmart Freeridership Calculation Approach .....	B-3
Table B-2. Wattsmart Participant Spillover Calculation Approach .....	B-5
Table B-3. Wattsmart NPSO Analysis Method .....	B-7
Table C-1. Wattsmart Benefits and Costs Included in Various Cost-Effectiveness Tests .....	C-2
Table C-2. Wattsmart Selected Cost-Effectiveness Analysis Inputs.....	C-2
Table C-3. Wyoming Wattsmart Business Measure Stratum Cost-Effectiveness Inputs.....	C-3

Table C-4. 2020 Wyoming Energy Management Cost-Effectiveness..... C-4

Table C-5. 2020 Wyoming HVAC Cost-Effectiveness ..... C-4

Table C-6. 2020 Wyoming Lighting Cost-Effectiveness..... C-4

Table C-7. 2020 Wyoming Midstream Cost-Effectiveness..... C-5

Table C-8. 2020 Wyoming Motors Cost-Effectiveness..... C-5

Table C-9. 2020 Wyoming Oil and Gas Cost-Effectiveness ..... C-6

Table C-10. 2020 Wyoming Other Cost-Effectiveness ..... C-6

Figures

Figure 1. Process Evaluation Research Areas and Questions ..... 3

Figure 2 Awareness Sources ..... 11

Figure 3. Who Completed the Application ..... 12

Figure 4. Most Important Reason for Participation..... 12

Figure 5. Satisfaction with Program Components ..... 13

Figure 6. Project Benefits ..... 14

Figure B-1. Freeridership Calculation Approach ..... B-4

## Introduction

This 2020 Wyoming Wattsmart Business report presents the major evaluation findings and a discussion of the Cadmus team's conclusions and recommendations. This report is intended to be viewed in conjunction with the Wyoming Wattsmart Business Evaluation Dashboard,<sup>1</sup> which provides further information on project-level results, trends, and historical performance.

Through its Wattsmart Business program, Rocky Mountain Power (RMP) offers services and incentives to help commercial, industrial, and irrigation customers maximize the energy efficiency of their equipment and operations through midstream (distributors/suppliers) and downstream (customer) incentive mechanisms.

The 2020 Wyoming Wattsmart Business program reported gross electricity savings 42,897,555 kWh. RMP uses an outsourced delivery model for all demand-side management (DSM) services, and contracted with two program administrators—Cascade Energy and Resource Innovations—to implement all program offerings.

RMP contracted with the Cadmus team (comprising Cadmus and VuPoint Research) to conduct impact and process evaluations of the 2020 Wyoming Wattsmart Business program. At RMP's request, we evaluated program effectiveness and reported the 2020 evaluation findings.

Cadmus evaluated the following 2020 offerings:

- **Wattsmart Business (typical upgrades and custom analysis):** RMP offered customers prescriptive incentives (typical upgrades) for measures such as agricultural, compressed air, HVAC, lighting, motors, building shell, food service equipment, and irrigation. RMP also offered custom incentives (custom analysis) for verified first-year energy savings resulting from installation of qualifying capital equipment upgrades not covered by typical upgrades incentives or other Wattsmart Business program offerings.
- **Lighting Instant Incentive (midstream):** Through this offering, RMP targeted the lighting maintenance market by providing customers instant point-of-purchase incentives on qualified LEDs, occupancy sensors, and retrofit kits purchased through a participating lighting distributor. Customers who purchased through a nonparticipating distributor did not receive an instant discount, but could apply to RMP for incentives after the purchase.
- **Energy Management:** RMP provided expertise and custom incentives for verified savings achieved through improved operations, including maintenance and management practices. If eligible, customers could receive incentives for capital improvements through the other Wattsmart Business program offerings.

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<sup>1</sup> The Wyoming Wattsmart Business Evaluation Dashboard is available on the website: <https://www.pacificorp.com/environment/demand-side-management.html>

## Evaluation Objectives

Table 1 lists the study objectives and the evaluation activities.

**Table 1. Evaluation Objectives and Activities**

Rocky Mountain Power Evaluation Objectives	Participant Surveys	Partial Participant Surveys	Trade Ally Interviews	Desk Review	Phone Verification	Net-to-Gross Analysis	Cost-Effectiveness	Reporting
Document and measure program effects	✓	✓	✓	✓	✓	✓		
Verify installation and savings	✓			✓	✓	✓		
Evaluate the program’s process and the effectiveness of delivery and efficiency	✓	✓	✓					
Understand the motivations of participants, nonparticipants, and trade allies <sup>a</sup>	✓	✓	✓					
Provide data support for program cost-effectiveness assessments	✓			✓	✓	✓	✓	
Identify areas for potential improvements	✓	✓	✓	✓	✓	✓	✓	✓
Document compliance with regulatory requirements								✓

<sup>a</sup> Nonparticipant survey results and trade ally interview results will be included in 2021 report.

## Methods

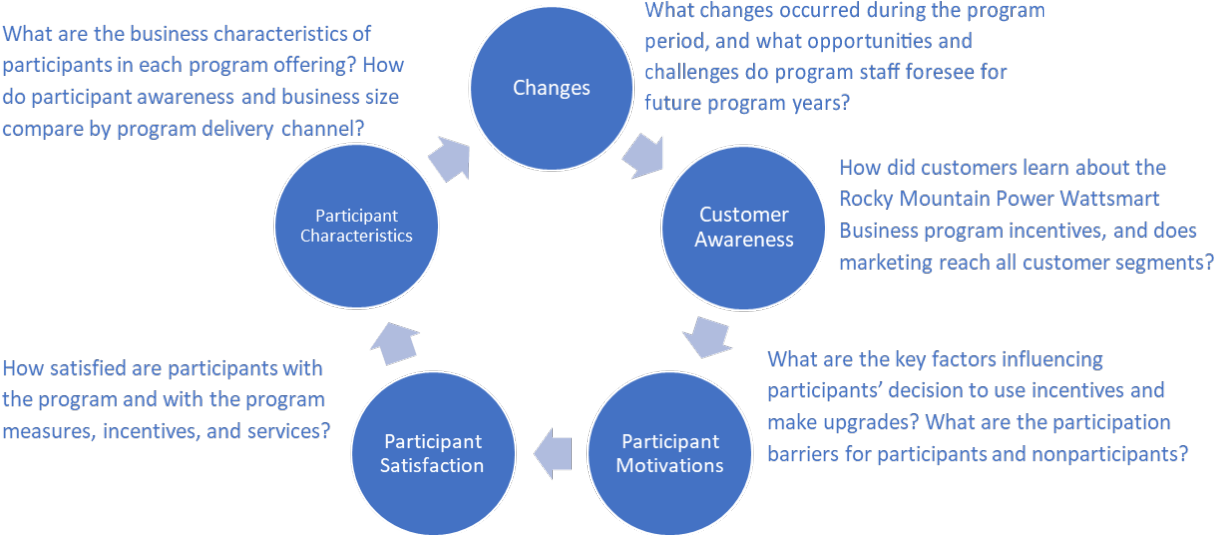
To evaluate energy impacts, the Cadmus team used desk reviews, phone verification, and surveys to inform the engineering analyses, net-to-gross (NTG) analysis, and program cost-effectiveness analysis. Table 2 summarizes these activities.

**Table 2. Impact Steps to Determine Evaluated Gross and Net Savings**

Savings Estimate	Step	Action
Evaluated Gross Savings	1	Tracking Database Review: Validate the accuracy of data in the participant database and verify that savings match annual reports
	2	Verification: Adjust savings based on actual installation rates
	3	Unit Energy Savings: Validate saving calculations (i.e., engineering review, analysis, meter data)
	4	Realization Rates: Extrapolate realization rates to the population, if applicable
Evaluated Net Savings	5	Attribution: Apply NTG adjustments

Figure 1 shows the research objectives that the process evaluation addressed. The process evaluation relied on the participant surveys, as well as partial participant surveys, to assess program delivery and efficacy, bottlenecks, barriers, and opportunities for improvements. The Cadmus team administered participant surveys online. VuPoint Research performed the partial participant telephone surveys.

Figure 1. Process Evaluation Research Areas and Questions



## Evaluation Findings

### Impact Evaluation

To determine gross savings, the Cadmus team conducted verification and engineering analyses on a sample of 2020 projects (see *Appendix A. Gross Engineering Analysis Methodology* for information on the impact evaluation methodology). To calculate net savings, the Cadmus team conducted a survey of participants to inform freeridership and spillover and a survey of nonparticipating businesses to inform nonparticipant spillover. Please see the Evaluation Dashboard for additional detail on project level results and across several years.

### Impact Sampling

Table 3 shows total projects, total projects sampled, sample distribution, associated energy savings, and the sample’s percentage of the savings. Out of 730 total projects, the Cadmus team analyzed 48 projects, which contributed 72% of the 2020 program savings.

**Table 3. Wyoming 2020 Wattsmart Business Program Impact Sampling Summary**

Strata	Projects	Total Reported Savings (kWh)	Unique Sampled Projects		Sample Reported Savings (kWh)	Percent of Reported Savings Sampled
			Random	Selected		
Energy Management	16	9,516,866	4	3	8,253,387	87%
Lighting	302	4,766,308	8	2	1,360,286	29%
Midstream	299	1,996,481	8	0	56,619	3%
Motors	42	21,349,000	5	2	19,054,471	89%
Oil and Gas	17	3,864,280	5	0	941,712	24%
HVAC	14	663,153	3	1	662,825	100%
Other	40	741,467	5	2	642,676	87%
<b>Total</b>	<b>730</b>	<b>42,897,555</b>	<b>38</b>	<b>10</b>	<b>30,971,976</b>	<b>72%</b>

Table 4 lists the evaluation findings, including number of projects, gross savings, precision, and net savings. Overall, the Wattsmart Business program achieved 98.7% gross realization rate for the program year, though some variability occurred between measure categories. The impact evaluation achieved ±8.0% precision with 90% confidence overall. The Cadmus team calculated NTG of 89.2%, yielding evaluated net savings of 37,777,515 kWh. The *Measure Strata Findings* section describes specific details and findings per strata.



**Table 4. 2020 Wattsmart Business Program Savings**

Strata	Projects	Reported Savings (kWh) <sup>a</sup>	Evaluated Gross Savings (kWh) <sup>a</sup>	Gross Realization Rate	Precision <sup>b</sup>	NTG	Evaluated Net Savings (kWh) <sup>a</sup>
Energy Management	16	9,516,866	9,516,866	100.0%	0.00%	75%	7,137,650
Lighting	302	4,766,308	4,871,064	102.2%	2.48%	57%	2,776,506
Midstream	299	1,996,481	1,702,759	85.3%	20.37%	98%	1,668,704
Motors	42	21,349,000	21,217,742	99.4%	1.03%	100%	21,217,742
Oil and Gas	17	3,864,280	3,864,280	100.0%	0.00%	100%	3,864,280
HVAC	14	663,153	643,065	97.0%	0.16%	89% <sup>c</sup>	573,622
Other	40	741,467	729,873	98.4%	1.65%	100%	729,873
<b>Total</b>	<b>730</b>	<b>42,897,555</b>	<b>42,545,649</b>	<b>99.2%</b>	<b>1.11%</b>	<b>89.2%</b>	<b>37,968,639</b>

<sup>a</sup> Totals in tables may not sum due to rounding.

<sup>b</sup> The measure category precision is based on 80% confidence; the Portfolio precision is based on 90% confidence.

<sup>c</sup> Applied the overall savings weighted NTG for measures due to survey respondents not informing a specific measure-strata estimate. The overall NTG estimate was the savings-weighted average of measure strata with survey respondents.

### Measure Strata Findings

The following sections provide a high-level summary of the findings in each measure strata. PacifiCorp defines a measure as a specific measure type within a category. For example, one lighting project may have three different lighting measures, such as high-bay, linear LEDs, and wall sconces. Within each of these three measure types, there will be several unit counts. The Cadmus team mapped the measure categories within RMP’s measure database to strata used in the evaluation. Table 7 describes the measure mapping strategy.

**Table 7. Measure Mapping**

Measure Category	Program Name	Evaluation Strata	Projects
Energy Management	Wattsmart Business - WY	Energy Management	16
Energy Project Co-Funding	Energy Project Manager – WY		
Lighting	Wattsmart Business – WY	Lighting	302
Midstream Lighting	Midstream Lighting – WY	Midstream	299
Motors	Wattsmart Business - WY	Motors	42
Oil and Gas	Wattsmart Business - WY	Oil and Gas	17
HVAC	Wattsmart Business - WY	HVAC	14
Building Shell	Wattsmart Business - WY	Other	40
Irrigation	Wattsmart Business - WY		
Additional Measures	Wattsmart Business - WY		
Building Shell	Wattsmart Business - WY		
Refrigeration	Wattsmart Business - WY		
Vendor Promotion	Wattsmart Business - WY		
Custom	Wattsmart Business - WY		
<b>Total</b>			

## *Energy Management*

During 2020, RMP provided incentives for 16 energy management measures and reported 9,516,866 kWh in energy savings, which accounted for 22% of all reported energy savings. The Cadmus team evaluated seven sampled projects and extrapolated results to the population for a realization rate of 100% for the energy management stratum. All energy management measures involved retro-commissioning projects. The Cadmus team found that all projects were appropriately documented and savings calculations matched best practices for the associated measure types. We interviewed facility staff and reviewed trend data and supporting documentation. All measures implemented through the retro-commissioning process were in place and performing as described in the reported documentation.

## *Lighting*

During 2020, RMP provided incentives for 302 lighting measures. RMP reported 4,766,308 kWh in energy savings, which accounted for 11% of all reported program energy savings. The Cadmus team evaluated seven sampled projects and extrapolated results to the population for a realization rate of 102.2% for the lighting stratum. Most of the traditional lighting projects exhibited minimal deviations in realization rates, mainly due to differences in installed bulbs and installed bulb wattages. We interviewed customers for two projects and found one customer had removed a portion of the high-efficiency lighting related to a hair salon. The customer did not explain why the lighting fixtures were removed. One evaluated project with higher savings than initially reported resulted from the waste heat factor used to calculate evaluated savings.

## *Midstream*

During 2020, RMP provided incentives for 299 midstream measures. RMP reported 1,996,481 kWh in energy savings, which accounted for 5% of all reported program energy savings. The Cadmus team evaluated eight sampled projects and extrapolated results to the population for a realization rate of 75.5% for the midstream stratum. RMP utilized deemed savings (kWh/year/unit) by measure type to report savings for midstream lighting projects. Cadmus utilized the methodology and values outlined in the RTF's Non-Residential Lighting Midstream v3.1 measure to evaluate savings. In some cases, the incentivized measure did not exist in the RTF Midstream measure. In these cases, Cadmus utilized the manufacturer's published equivalent wattage to determine the baseline wattage for evaluated savings calculations. Cadmus found the manufacturers for high-bay lighting measures often reported lower equivalent wattages for the incentivized midstream lighting measures than were used by RMP. As such, lower savings were realized.

## *Motors*

During 2020, RMP provided incentives for 42 motors measures and reported 21,349,000 kWh in energy savings, which accounted for 50% of all reported energy savings. The Cadmus team evaluated seven sampled projects and extrapolated results to the population for a realization rate 99.4% for the motors stratum.

Three sampled projects included green motor rewind measures. RMP utilized deemed savings based on the RTF's green motor rewind measure. However, the RTF updated the green motor rewind measure in 2017 and the savings values per motor are lower than prior versions. We used the 2017 RTF measure,

which resulted in an average realization rate of 74% across the three measures. RMP used custom calculations and historical trend data to calculate savings for the other four sampled projects. We interviewed two of these customers and found no discrepancies in the assumptions used for the custom calculations. The four non-green motor rewind projects all realized 100% of the reported savings.

## *Oil and Gas*

During 2020, RMP provided incentives for 17 measures in the oil and gas category and reported 3,864,280 kWh, which accounted for 9% of all RMP's reported energy savings. The Cadmus team evaluated five sampled projects and extrapolated results to the population for a realization rate of 100% for the oil and gas stratum. All projects involved the installation of electric submersible pumps with improved controls or water shutoff opportunities. Identical calculation methodology and documentation processes were used for all projects. We found that the implementer followed best practices to calculate and appropriately document savings with supporting trend data. All projects realized 100% of reported savings.

## *HVAC*

During 2020, RMP provided incentives for 14 HVAC measures and reported 663,153 kWh in energy savings, which accounted for 2% of all reported energy savings. The Cadmus team evaluated four sampled projects and extrapolated results to the population for a realization rate of 97% for the HVAC stratum. Two projects involved a chiller and air conditioner. We found the reported savings closely matched the evaluated savings calculations from the Idaho Power TRM v2.2. One sampled project involved the installation of a variable frequency drive (VFD) at a hospital. RMP utilized deemed savings values for VFDs. The Cadmus team evaluated VFD performance using the VFD measure from the Idaho Power TRM v2.2 and found lower realized energy savings than reported. The last sampled project involved an air conditioner. We evaluated air conditioner savings based on the Idaho Power TRM v2.2, which resulted in a 59% realization rate.

## *Other*

During 2020, RMP provided incentives for 40 measures in the "other" category and reported 741,467 kWh in energy savings, which accounted for 2% of all reported energy savings. The Cadmus team evaluated seven sampled projects (custom refrigeration, custom controls, irrigation hardware) and extrapolated results to the population for a realization rate of 98.4% for the stratum. Five sampled projects involved implementation of custom refrigeration and custom controls. For these projects, RMP utilized custom calculations and trend data to determine load profiles. The Cadmus team found the calculation methodology and supporting documentation were appropriate and the reported savings were accurate. Two projects involved irrigation hardware measures. We calculated savings based on the RTF's irrigation hardware measure v4.1 (approved in 2017). Similar to Idaho and Utah, the irrigation hardware measures realized lower energy savings than reported due to RMP's use of deemed savings per measure.

## Net-to-Gross

NTG estimates are a critical part of DSM program impact evaluations because they allow utilities to determine portions of gross energy savings that were influenced by and are attributable to their DSM programs. The Cadmus team evaluated net savings by conducting a freeridership and spillover analysis using self-reported responses from participating and nonparticipating customers. The evaluation includes three NTG components:

- **Freeridership** – freeridership refers to energy savings that would have occurred in the absence of the program and results in a reduction to program savings.
- **Participant Spillover** – participant spillover refers to additional energy savings obtained by customers who invested in additional energy-efficient projects due to program participation when no rebates or incentives were paid and are added to program savings.
- **Nonparticipant Spillover** – nonparticipant spillover refers to energy savings generated by customers who were motivated by information about energy efficiency provided by RMP, and/or past RMP program participation, to invest in energy efficiency projects for which they did not receive an incentive and are added to program savings.

We used self-report surveys from participants to estimate freeridership and participant spillover ratios by measure strata. The Cadmus team determined the percentage of nonparticipant spillover for the 2020 program based on the responses to questions in the 2020 general population survey of RMP businesses customers. See *Appendix B. Net-to-Gross Analysis Methodology* for more information on NTG calculation methodology.

The Cadmus team used the following formula to determine the final NTG ratio for each measure strata:

$$\text{Net-to-gross ratio} = 100\% - \text{Freeridership Percentage} + \text{Participant Spillover Percentage} + \text{Nonparticipant Spillover Percentage}$$

Table 5 summarizes the NTG evaluation results, shown as NTG and evaluated gross savings by program-measure strata. The program achieved 89.2% NTG overall.

**Table 5. 2020 Wyoming Wattsmart Business Program NTG Results**

Strata	Measure Responses (n)	Freeridership Ratio	Spillover Ratio <sup>a</sup>	Nonparticipant Spillover	NTG	Evaluated Net Program Population Savings (kWh)
Energy Management	1	25%	0%	0%	75%	7,137,650
Lighting	8	43%	0%	0%	57%	2,776,506
Midstream	4	2%	0%	0%	98%	1,668,704
Motors	1	0%	0%	0%	100%	21,217,742
Oil and Gas	1	0%	0%	0%	100%	3,864,280
HVAC	N/A	N/A	N/A	N/A	89% <sup>c</sup>	573,622
Other	3	0%	0%	0%	100%	729,873
<b>Total</b>	<b>18</b>	<b>10.8%<sup>b</sup></b>	<b>0.0%<sup>b</sup></b>	<b>0.0%</b>	<b>89.2%</b>	<b>37,968,639<sup>d</sup></b>

<sup>a</sup> Weighted by evaluated gross program savings.

<sup>b</sup> Weighted by evaluated gross program population savings.

<sup>c</sup> Applied the overall savings' weighted NTG for measures with survey respondents due to an insufficient number of survey respondents to inform the specific measure-strata estimate. The overall NTG estimate is the savings-weighted average of measure strata with survey respondents.

<sup>d</sup> Totals in tables may not sum due to rounding.

### Process Evaluation

The Cadmus team collected primary data collection from the typical upgrades and custom analysis and lighting instant incentive participants and partial participants in the Wattsmart Business program. These survey efforts sought to capture insights about how the program is meeting its objectives and serving RMP customers, and where there may be opportunities to strengthen or expand the program. Due to a small sample size, the following findings are based on a small number of completes and should be reviewed as qualitative rather than quantitative.

### Process Sampling

The Cadmus team surveyed participants and partial participants for the 2020 evaluation, as shown in Table 6. The surveys were split into two different waves, one for Q1 and Q2 participants and a second wave for Q3 and Q4 participants. Among the two participant groups surveyed, the response rates were 14 of 102 program participants for typical upgrades and custom analysis, four of 67 program participants for lighting instant incentives, and 3 of 21 for partial participants.

**Table 6. Wyoming 2020 Wattsmart Business Program Process Activity Sampling**

Program Name/Measure Category	Sampling Frame <sup>a</sup>	Target Completes	Achieved Completes
Additional Measures	1	Census	0
Agriculture	0		0
Compressed Air	0		0
Custom	0		0
Energy Management Retro-commissioning	10		1
Farm and Dairy	0		0
HVAC	3		0
Irrigation	6		2
Lighting (other than SBDI or Lighting Instant Incentives)	62		8
Other <sup>b</sup>	20		3
SBDI	0		0
<b>Typical Upgrades and Custom Analysis Total</b>	<b>102</b>		<b>14</b>
<b>Lighting Instant Incentives Total</b>	<b>67</b>		<b>4</b>
<b>Participant Subtotal</b>	<b>169</b>		<b>Census</b>
<b>Partial Participants Total</b>	<b>21</b>	<b>Census</b>	<b>3</b>

<sup>a</sup> Sampling frame based on unique customers with contact information after removing duplicates.

<sup>b</sup> Other includes appliances, building shell, food service, food service equipment, motors, oil and gas, refrigeration.

<sup>c</sup> Total completes across all programs and measures (typical upgrades/custom analysis, SBDI, lighting instant incentives).

### Participant Experience

The Cadmus team received completed surveys with Wattsmart Business and Lighting Instant Incentive program participants.

#### *Wattsmart Business Typical Upgrades and Custom Analysis*

The Cadmus team completed surveys with 14 participants from the measure categories shown below.

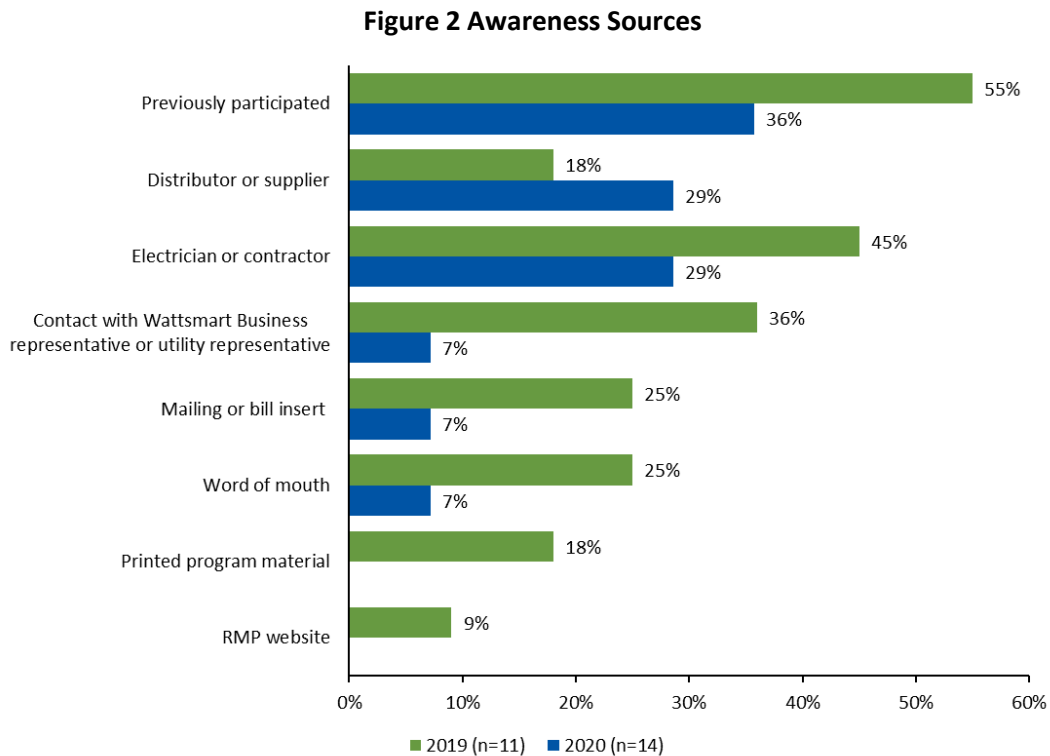
**Table 7. 2020 Participant Survey Sample by Measure Type**

Measure Category	Typical Upgrades	Custom Analysis
Lighting	8	0
Irrigation	2	0
Oil and Gas	1	0
Energy Management	0	1
Motors	0	1
Refrigeration	0	1
<b>Total</b>	<b>11</b>	<b>3</b>

Surveys with participants in the Wattsmart Business program asked about their program experience, satisfaction with various aspects of the program, perceived benefits of participating, and firmographic information

**Participant Experience**

Respondents (n=14) reported that they most often learned about the incentives available for their project through the previously participating in the program (36%), through the distributor or supplier where they buy their equipment (29%), or through their electrician or contractor (29%). This was similar in order of importance to the 2019 survey results, as shown in Figure 2.

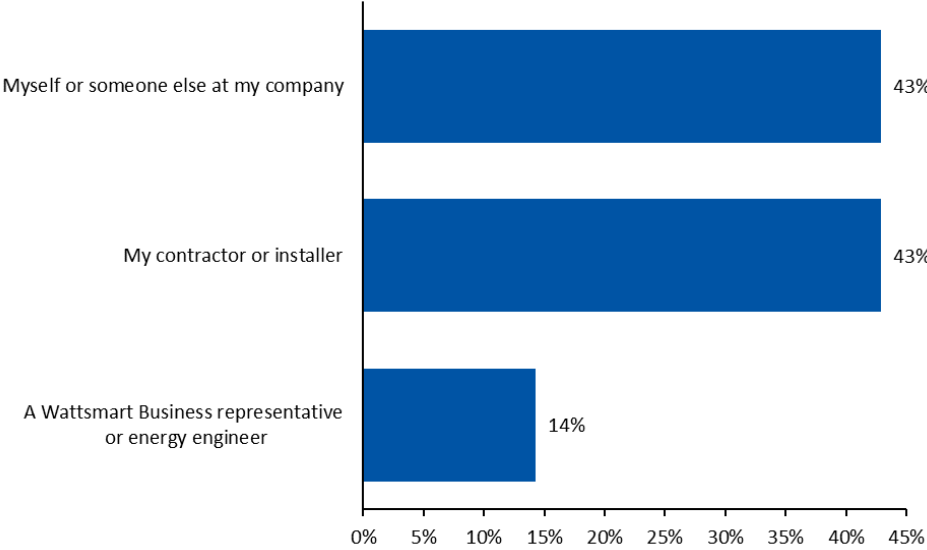


Source: RMP Wattsmart Business Program 2020-2021 Wattsmart Business Participant Survey QA3. Don't know and refused responses removed. (n=14).

Respondents who completed lighting projects reported (n=8), on average, that the incentive they received covered 29% of their project cost, while respondents who completed non-lighting projects reported (n=6), on average, the incentive covered 50% of their project cost.

Regarding the application process, 43% of non-lighting respondents reported that they or someone else at their company filled out their application for the program while 43% lighting respondents indicated that their contractor or installer filled out the application. Figure 3 shows the response breakdown by category.

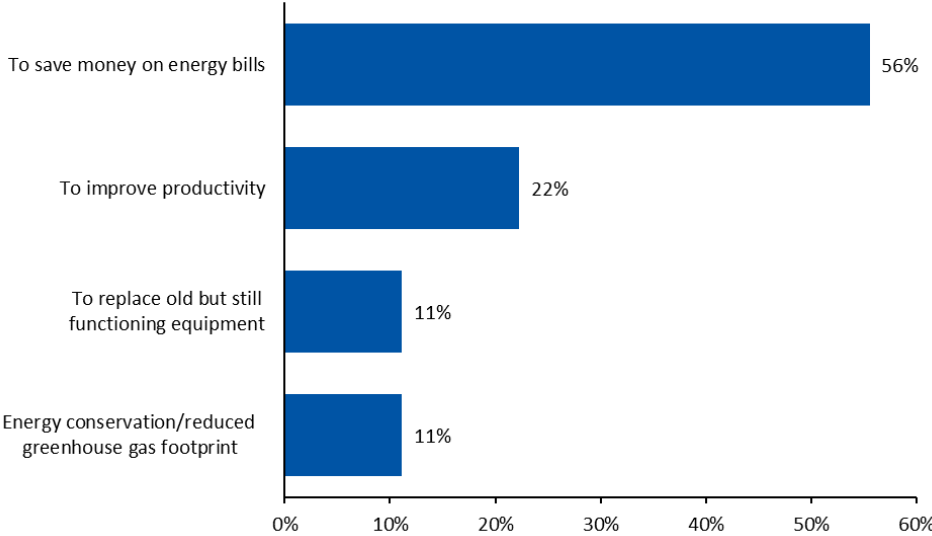
**Figure 3. Who Completed the Application**



Source: RMP Wattsmart Business Program 2020 Wattsmart Business Participant Survey QB2. Don't know and refused responses removed. (n=14).

As part of the second wave of surveys (Q3 and Q4), the Cadmus team asked Wattsmart Business participants (n=9) what the most important reason was their company participating in the program. As shown in Figure 4, 56% of the respondents reported that the most important reason was to save money on energy bills, followed by improving lighting quality (22%), to replace old but still functioning equipment (11%), and energy conservation (11%).

**Figure 4. Most Important Reason for Participation**



Source: RMP Wattsmart Business Program 2020 Wattsmart Business Participant Survey QB1. Don't know and refused responses removed. (n=9).

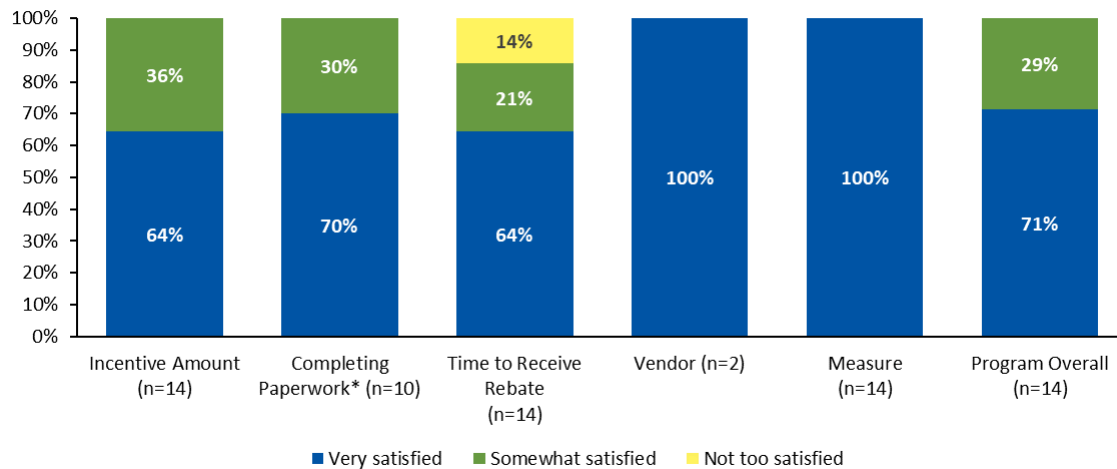


**Participant Satisfaction**

As shown in Figure 5, respondents reported high levels of satisfaction. All (n=14) respondents reported they were either *very satisfied* or *somewhat satisfied* with the program overall, the amount of their incentive, and with completing the paperwork. Two of the respondents indicated that they were *very satisfied* with the vendor.<sup>2</sup> Eighty-five percent of respondents indicated they were *very* or *somewhat* satisfied with the time to receive the rebate; however, 14% of respondents noted they were *not too satisfied*. However, those who said that they were not too satisfied with the time it took to receive the rebate, did identify an acceptable number of weeks from then they submitted their application to when they receive the incentive.

Overall, the 2020 results were similar with the 2019 results with two minor changes: a slight increase in satisfaction with the incentive amount (100% in 2020 vs. 75% in 2019) and a slight decrease in satisfaction with the time it took to receive a rebate (85% in 2020 vs. 100% in 2019)

**Figure 5. Satisfaction with Program Components**



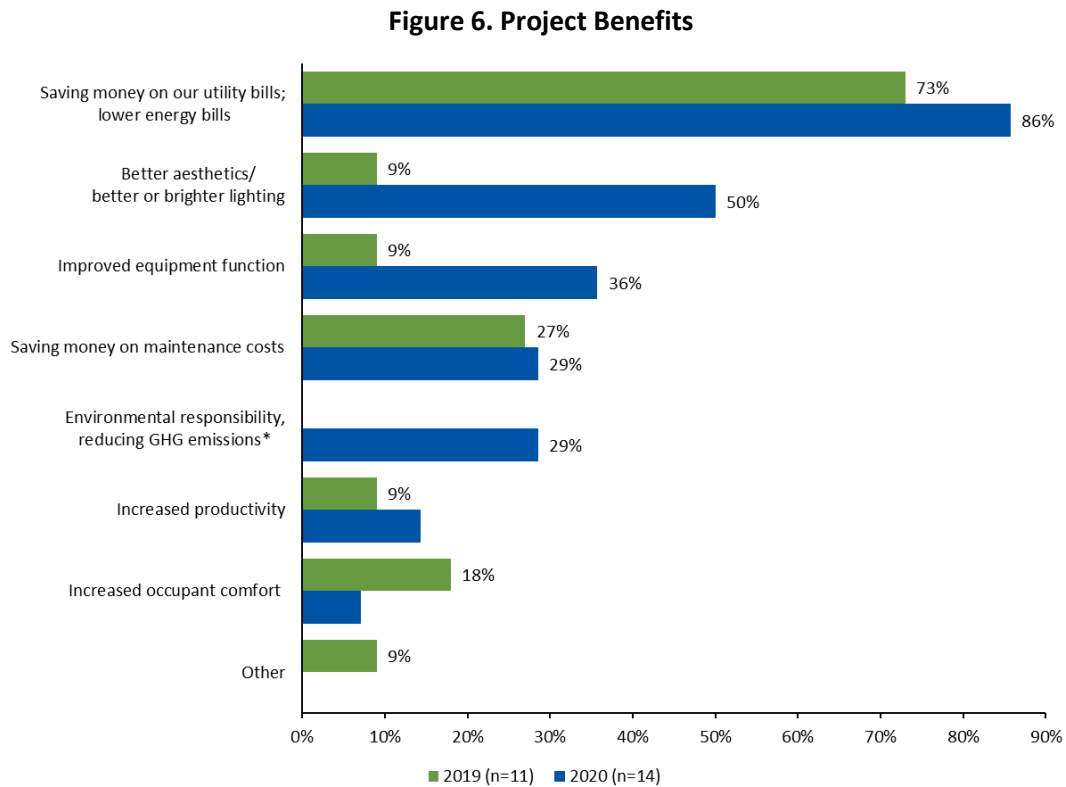
Source: RMP Wattsmart Business Program 2020 Wattsmart Business Participant Survey QB3, QB5, QB6, QB11, QB13, QB15. Don't know and refused responses removed. (n=14). \*Question was asked on a scale using "easy" rather than "satisfied."

**Project Benefits**

Typical upgrades or custom analysis participants reported one or more benefits that their companies experienced from the project they completed. Most respondents said benefits included lower energy bills (86%) or better or brighter lighting (50%). This was similar to the 2019 responses, in which majority

<sup>2</sup> Only two respondents provided responses when asked how satisfied participants were with the work provided by the participating vendor.

of the respondents indicated lower energy bills as a main benefit experienced (73%, n=11). Figure 6 shows the complete breakdown of responses.



Source: RMP Wattsmart Business Program 2020 Wattsmart Business Participant Survey QB14. Don't know and refused responses removed. (n=14). \*Response option only in 2020 survey.

## Firmographics

Ten respondents said their companies own the facility where the improvements were made, while two said they rent the facility (n=12). Respondents also reported on the number of employees their company's employ (n=12):

- Five said 1 to 10 people
- Two said 11 to 25 people
- One said 26 to 50 people
- One said 76 to 100 people
- Two said 101 to 200 people
- One said 500-plus people

Respondents also identified what type of fuel source their facilities use for space and water heating. For space heating, seven respondents said their facility uses gas, four said they use electric sources, and one said they use additional sources (n=13). For water heating, six of respondents said they use gas sources, five said they use electric, and one said they use additional sources (n=12).

### *Lighting Instant Incentives*

The Cadmus team completed surveys with four lighting instant incentives participants. Surveys with participants in the lighting program asked about their program experience, satisfaction, and firmographic information.

#### **Program Experience**

Two respondents learned about the program incentives from their contractor, distributor, or lighting supplier, which is similar to the 2019 responses, in which half of the respondents, three of six, said that their organization learned about the incentives available through the contractor, distributor, or supplier. Another learned about the program through the RMP website, and the other learned about the program through the mailing or bill inserts, or word of mouth.

All four respondents purchased their equipment through a vendor they had worked with previously, compared to the 2019 respondents in which most (80%, n=5) indicated that they had purchased equipment from a contractor, distributor, or supplier they've worked with in the past. When asked if they purchased from the vendor primarily because they offered the instant incentive, three respondents said yes, and one said no. Three of the respondents said it was *very easy* to find a program discount on the equipment they wanted to purchase, and one respondent said it was *somewhat easy*.

Three respondents said they were re-lamping an area of their facility as part of ongoing maintenance when they made their purchase, while one respondent said they were replacing a burned-out lamp.

#### **Program Satisfaction**

Three respondents said they were *very satisfied* with the amount of the incentive they received, while one respondent said they were *somewhat satisfied*. This aligns with the 2019 respondents, in which four respondents were *very satisfied* (67%), while the other two respondents were *somewhat satisfied* (33%, n=6). None of the respondents indicated that they encountered any challenges participating in the Instant Incentives program. Additionally, three respondents said they were *very satisfied* with the Instant Incentives program overall, while one said that they were *somewhat satisfied*. Again, this aligns with the 2019 respondents' satisfaction with the Instant Incentive program, where five of six respondents were *very satisfied* (83%, n=6) and one respondent was *somewhat satisfied* (17%, n=6). None of the respondents had any recommendations to improve the program.

#### **Firmographics**

One respondent's company was in the nonprofit and religious organization industry, one was in the health care industry, one was in the repair and maintenance services industry, and one was in the construction industry. All four respondents said their companies own the facility where the improvements were made. Three respondents said their company employs 1 to 10 people, and one said 101 to 200 people. Two out of three respondents said gas space heating was used at the facility where the improvements were made, while the other respondent said electric space heating was used. Additionally, three respondents said that gas water heating was used at the facility, while the other one respondent said that they used electric water heating.

## Partial Participants

The Cadmus team received results from three partial participants: two who considered (or began) an energy efficiency upgrade and one who considered (or began) a lighting retrofit. Surveys with partial participants asked about program awareness, participation motivation and perceived barriers, satisfaction, and collected firmographic information.

### *Awareness*

One respondent learned about the program through contact with a Wattsmart Business or RMP representative, one learned through an electrician or contractor, while the other learned about the program by previously participating in the program and through a vendor, distributor, or supplier. Two respondents indicated their companies had received a Wattsmart Business program incentive in the past for lighting improvements. All three respondents said the best way for RMP to keep them informed about incentives for energy efficiency improvements was through utility mailings, emails, newsletters with bills, or bill inserts. This differs from the typical upgrades and custom analysis participants only 25% (n=14) indicated that they learned about the program through mailing or bill inserts, whereas 55% (n=14) indicated that they had previously participated.

### *Motivation and Barriers*

Two respondents reported that their companies' most important motivating factor when making decisions about energy-efficient upgrades was saving money on energy bills, similar to the typical upgrades and custom analysis participant responses, while the other respondent said that obtaining program incentives was most important.

Additionally, two respondents said they were *very likely* to request an incentive for a project in the next six months, while the other respondent said was *somewhat likely* to request an incentive for a project in the next six months.

Two respondents reported that their companies did not complete the project they initiated through the Wattsmart Business program, while the other respondent's company did complete the project. Two respondents who did not complete the projects they initiated through the Wattsmart Business program were further asked to explain why the projects were not completed. One respondent's company did not complete the project because the project site was still under construction. The other respondent did not complete the project because it was not economical to continue with it. The third partial respondent, who indicated that their company did complete the project, said that the ESP insulation was not worth the hassle and therefore they did not apply for a rebate.

The Cadmus team also asked respondents about how the COVID-19 pandemic and related economic impacts had affected their companies' investments in building and equipment improvements. Two respondents said their companies were investing about the same amount as usual in building and equipment improvements, while the other respondent's company was investing less than normal.

## Satisfaction

One of two respondents reported being *very satisfied* with the program overall and the other respondent was *somewhat satisfied*. When asked what RMP could do to improve their experiences with the program, one said a larger selection of eligible equipment, one said to simplify the application process, and one said there was nothing to improve.

## Firmographics

Two respondents were from the oil and gas industry, while the other respondent was from educational services. All three respondents said their companies own the facilities their business is located in. One respondent's company employs 11 to 25 people, one said 201 to 500 people, and one said more than 500 people. None of the respondents said they consider their company to face barriers as a result of the sex, race, primary language, nation or origin, or other characteristics of the company owners, employees, or customer base. Additionally, none of the respondents were from a company owned by someone in a disadvantaged group. Two respondents said their facilities use gas space heating, while the other respondent's facility uses electric space heating. One respondent's facilities use gas water heating, one respondent's facilities use electric water heating, and the other's facilities use both.

## Cost-Effectiveness

As shown in Table 8, the Wattsmart Business program proved cost-effective for the 2020 evaluation period from the PacifiCorp Total Resource Cost (PTRC) test with a benefit/cost (B/C) ratio of 1.20, the Total Resource Cost (TRC) test with a B/C ratio of 1.09, the Utility Cost Test (UCT) perspective with a B/C ratio of 1.39, and the Participant Cost Test (PCT) perspective with a B/C ratio of 3.86. It was not cost-effective according to the Ratepayer Impact Measure (RIM) test perspective. Please see *Appendix C. Cost-Effectiveness Methodology* for more information on cost-effectiveness.

**Table 8. 2020 Evaluated Net Wattsmart Business Program Cost-Effectiveness Summary**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PacifiCorp Total Resource Cost Test (TRC + 10% Conservation Adder)	\$0.0397	\$13,620,576	\$16,338,427	\$2,717,851	1.20
Total Resource Cost Test (TRC No Adder)	\$0.0397	\$13,620,576	\$14,853,116	\$1,232,540	1.09
Utility Cost Test	\$0.0311	\$10,666,735	\$14,853,116	\$4,186,381	1.39
Ratepayer Impact Measure Test		\$33,330,335	\$14,853,116	(\$18,477,220)	0.45
Participant Cost Test		\$7,463,860	\$28,806,445	\$21,342,585	3.86
Life Cycle Revenue Impacts (\$/kWh)					\$0.000188215
Discounted Participant Payback (years)					1.40

## Conclusions and Recommendations

This section provides the Cadmus team's conclusions, along with key findings and associated recommendations.

### *Conclusions and Recommendations*

**RMP realized 98.7% of reported energy savings.** The Cadmus team evaluated 48 projects accounting for 72% of all reported energy savings in Wyoming. Among the sampled projects, we evaluated energy savings for 33 projects within 5% of reported energy savings. We found that RMP followed best practices to calculate savings and were appropriately documenting energy savings for these 33 projects. The Cadmus team evaluated 15 projects with realization rates greater than 105% or less than 95%. Among these projects, Midstream lighting measures, accounting for 5% of all reported program energy savings, realized the lowest energy savings (kWh/year/unit) by measure. Cadmus utilized the methodology and values outlined in the RTF's Non-Residential Lighting Midstream v3.1 measure to evaluate savings. In some cases, the incentivized measure did not exist in the RTF Midstream measure. In these cases, Cadmus utilized the manufacturer's published equivalent wattage to determine the baseline wattage for evaluated savings calculations. Cadmus found the manufacturers for high-bay lighting measures often reported lower equivalent wattages for the incentivized midstream lighting measures than were used by RMP. As such, lower savings were realized.

**Recommendation:** Cadmus recommends RMP review and update the baseline wattages for high-bay lighting measures included in the Midstream program to more closely match the manufacturer's published equivalent wattages.

**Saving money on energy bills continues to be a key motivation to program participation.** Across custom analysis, typical upgrades, and partial participants, respondents identified saving money on their energy bills as the most important reason for participating. Among custom analysis and typical upgrades respondents, over half (56%) said their key motivation was to save money on energy bills and 22% said to improve productivity (n=14). Two partial participants said that the most important motivating factor was to save money on energy bills, while one respondent said the incentive was the most important motivating factor to participate (n=2).

**Implementation of the Wattsmart Business program resulted in high levels of satisfaction throughout the different components offered among all participants.** Custom analysis and typical upgrades participants reported 100% satisfaction with nearly all aspects of the program, except for the time it took to receive the rebate (which received an 85% satisfaction rating). These ratings were consistent with the previous round of surveys conducted in 2019, with two exceptions. 2020 respondents reported higher satisfaction with the incentive amount and lower satisfaction with the number of weeks it took to receive the rebate. Additionally, participants of the instant incentives and partial participants gave the program a 100% satisfaction rating overall, indicating the process worked well for them overall, despite some partial participants not completing projects. These overall satisfaction ratings were consistent with the 2019 survey responses.

## Appendix A. Gross Engineering Analysis Methodology

The Wattsmart Business program’s impact evaluation data analysis incorporated the following activities:

- Customer interviews
- Engineering analysis
- Site-level billing analysis

This section addresses reported gross evaluated savings. Reported gross savings are electricity savings (kWh) that Rocky Mountain Power (RMP) reported in its *Rocky Mountain Power Energy Efficiency and Peak Reduction Annual Reports* (annual reports).<sup>3</sup> Gross evaluated savings are the savings achieved after engineering analysis. Net savings are program savings, net of what would have occurred in the program’s absence. These savings provide observed impacts attributable to the program.

To determine evaluated gross savings, the Cadmus team applied Steps 1 through 4, as shown in Table A-1. To determine evaluated net savings, the team applied the fifth step (discussed in *Appendix B. Net-to-Gross Analysis Methodology*).

**Table A-1. Impact Steps to Determine Evaluated Gross and Net Savings**

Savings Estimate	Step	Action
Evaluated Gross Savings	1	Tracking Database Review: Validate the accuracy of data in the participant database and verify that savings match annual reports
	2	Verification: Adjust gross savings based on actual installation rates
	3	Unit Energy Savings: Validate saving calculations (i.e., engineering review, analysis, meter data)
	4	Realization Rates: Extrapolate realization rates to the population
Evaluated Net Savings	5	Attribution: Apply net-to-gross adjustments

**Step 1:** To verify the accuracy of data in the participant database, the Cadmus team reviewed the program tracking database to ensure that participants and reported savings matched annual reports.

**Step 2:** The team selected a sample of sites from the RMP program database then stratified the distribution of measures among sampled sites, primarily by end-use type. The team evaluated sampled projects as part of the program evaluation using phone interviews and customer-provided photos and site documentation to verify measure installations.

**Step 3:** The team reviewed all project documentation; developed an evaluation, measurement, and verification plan; and in a few instances performed virtual site assessments to verify the installation, specifications, and operations of incented measures. The team also collected trend data for nine projects to document historical performance.

<sup>3</sup> These reports are available online: <https://www.pacificorp.com/environment/demand-side-management.html>

**Step 4:** This step involved reviewing measure savings assumptions, equations, and inputs, which included conducting a billing analysis for selected measures. For complicated or custom measures, the team conducted an engineering analysis using the appropriate measurement and verification options in the International Performance Measurement and Verification Protocol.<sup>4</sup> The team used interviews and other operational data to determine hours of use or power consumption for metered equipment types. In some instances, customers provided trend data from their building management systems, which the team used to determine equipment load profiles, hours of use, and performance characteristics.

**Step 5:** The team used the participant survey to calculate freeridership using an industry-standard self-report methodology. In addition, the team surveyed nonparticipants to determine if nonparticipant spillover could be credited to the program (for projects that were otherwise not provided incentives).

## Project Review

Cadmus reviewed all project documentation available from RMP. Documentation included project applications, equipment invoices, reports published by the pre-contracted group of energy engineering consultants, and savings calculation spreadsheets.

The Cadmus team performed the following tasks for each site:

- Reviewed the reported documentation to verify the quantity and specifications of equipment receiving incentives matched the associated reported energy savings calculations and confirmed that installed equipment met program eligibility requirements
- Performed a detailed review of site project files to collect additional necessary data for each site savings analyses
- Where applicable, the team conducted a phone interview with facility personnel to gather information such as equipment types replaced, and hours of operation

## Engineering Analysis

In general, the Cadmus team referenced current measure workbooks and saving estimation methodologies from the Idaho Power Technical Reference Manual and the Regional Technical Forum.<sup>5,6</sup> The Idaho Power Technical Reference Manual was updated in 2018 and relies on sources such as the Northwest Power and Conservation Council, Northwest Energy Efficiency Alliance, the Database for Energy Efficiency Resources, the Energy Trust of Oregon, the Bonneville Power Administration, third-party consultants, and other regional utilities.

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<sup>4</sup> Efficiency Valuation Organization. January 2012. *International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water Savings, Volume 1*. Page 25. (EVO 10000 – 1:2012) <http://www.evo-world.org/>

<sup>5</sup> ADM Associates. October 15, 2018. *Technical Reference Manual 2.2*. Prepared for Idaho Power Company. <https://docs.idahopower.com/pdfs/EnergyEfficiency/Reports/2018TRM.pdf>

<sup>6</sup> Regional Technical Forum. “UES Measures.” Accessed January 2021. <https://rtf.nwcouncil.org/measures>



## Appendix B. Net-to-Gross Analysis Methodology

Net-to-gross (NTG) estimates are a critical part of demand-side management (DSM) program impact evaluations because they indicate the portions of gross energy savings that were influenced by and are attributable to DSM programs. The following sections describe the NTG methodology used by the Cadmus team for the Wattsmart Business program.

### Overview

This section presents an overview of the Cadmus team's NTG methodology. To determine net savings, the team used a self-report approach and analyzed the collected survey data to estimate freeridership and spillover—this approach is typically considered the most cost-effective, transparent, and flexible method for estimating NTG and, consequently, the NTG methodology most frequently employed in the industry.

$$\text{Net-to-gross ratio} = 100\% - \text{Freeridership Percentage} + \text{Participant Spillover Percentage} + \text{Nonparticipant Spillover Percentage}$$

Using self-reported responses, the Cadmus team estimated net savings first by assessing the program's influence on the participant's decision to implement an energy efficiency project and what would have occurred absent the program's intervention. This estimation includes an examination of the program's influence on three key characteristics of the project: its timing, its level of efficiency, and its scope (i.e., size of the project). This estimate represents the amount of gross savings that would have occurred without program intervention and is often referred to as freeridership.

The Cadmus team then estimated program influence on the broader market as a result of the indirect effects of the program's activities. This estimate, often referred to as spillover, represents the amount of savings that occurred because of the program's intervention and influence but that is not currently claimed by the program. Spillover savings can be broken into two categories—participant and nonparticipant. Participant spillover savings occur directly (i.e., program participants install additional energy-efficient equipment). Nonparticipant spillover (NPSO) savings occur when market allies influenced by the program install or influence nonparticipants to install energy-efficient equipment (i.e., trade allies promote energy-efficient equipment to all customers as a result of the program training).

### Freeridership Estimation

To determine freeridership, the interviewer presented respondents with a series of questions regarding their decision to install the equipment promoted by the program. The Cadmus team then scored the responses to these questions to determine the level of freeridership. A score of 1 indicates the respondent is a complete freerider; they would have installed the exact same equipment at the same time and in the same quantity without the program's assistance. A score of 0 (zero) indicates the respondent is not a freerider; that is, without the program they either would not have installed any equipment within 12 months of when they did or they would have installed baseline efficient equipment.

As the first step in scoring, the Cadmus team reviewed the responses to determine if the exact same project (in terms of scope and efficiency level) would have occurred at the same time without the program. If so, the respondent is scored as a complete freerider. If not, the team reviewed the responses to determine whether the project would have occurred at all within the same 12-month period. If not, the respondent is scored as a nonfreerider. If the project would have occurred within the same 12-month period but was altered in respect to its size or efficiency level, the respondent is scored as a partial freerider. To assess the level of partial freeridership, the Cadmus team used the respondents' estimates of the percentage of the installed equipment that would have been high-efficiency equipment (the efficiency score) and the percentage of high-efficiency equipment that would have been installed within 12 months without the program (the quantity score). If the project would have occurred with some changes absent the program, the product of these two estimates is the initial freeridership ratio, as shown here:

$$\text{Initial Freeridership Ratio} = \text{Efficiency Score} \times \text{Quantity Score}$$

The initial freeridership score is then adjusted to account for the influence of prior program participation, which the respondent ranked on a scale of 1 to 5, with 5 being extremely important. Given Rocky Mountain Power's (RMP's) efforts to cross-promote its entire portfolio of energy efficiency programs, a respondent's prior participation in a RMP program may have been influential in the decision to participate in the current program. Ideally, this influence would be attributed to the prior program as spillover savings since that program was responsible for the influence. However, given the portfolio-level marketing approach that RMP implements, respondents are unlikely to be able to identify the prior program by name. Therefore, the Cadmus team attributed the savings credit to the current program. To calculate this credit, the team reviewed the respondents' rating of the influence of the prior program. If the respondent rated previous participation as a 4 or 5, the respondent's adjusted freeridership was reduced by either 50% or 75%, respectively.

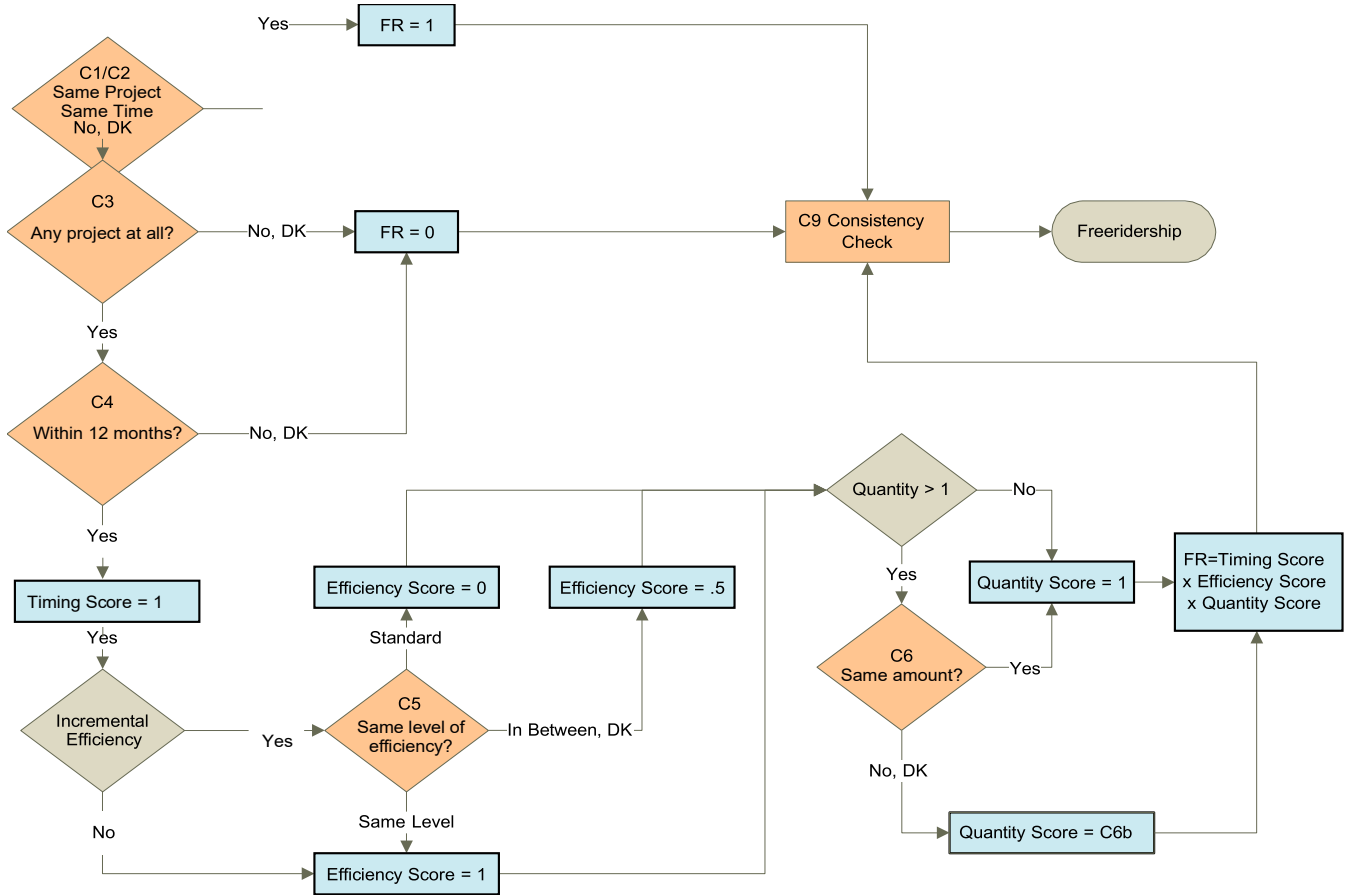
After adjusting the initial freeridership ratio for past program participation, a series of consistency check questions were reviewed. These questions asked about the influence of the program's interventions (e.g., financial incentives, technical assistance) and addressed the counter-factual (e.g., what would have happened without the program). For example, if the respondent stated that the financial incentive was extremely important to their decision (question C9.2 = 5 – extremely important) but that they would have installed the exact same equipment at the same time without the program (question C2 = Yes and question C1 = Yes), the interviewer asked the respondent to describe in their own words what impact the program had on their decision (C8). During the scoring process, these responses were reviewed by analysts to determine which scenario is correct and scored accordingly to create an adjusted freeridership score. Table B-1 provides detailed scoring and descriptions of each question.

**Table B-1. Wattsmart Freeridership Calculation Approach**

Question	Question Text	Scoring
C1	Without the program, meaning without either the technical assistance or the financial incentive, would you have still completed the exact same [MEASURE] project?	None; qualifying question
C2	Without the program, meaning without either the technical assistance or the financial incentive, would you have still installed the [MEASURE] at the same time?	If C2=yes and C1=yes then freeridership = 1
C3	Without the program, would you have installed any [MEASURE] equipment?	If C4=no, freeridership = 0
C4	Without the program, in terms of timing, when would you have installed the [MEASURE]?	If not within 12 months of original purchase date, freeridership = 0
C5	Relative to the energy efficiency of [MEASURE] installed through the program, how would you characterize the efficiency of equipment you would have installed without the program?	If high efficiency, efficiency score = 1
		If between high efficiency and baseline, efficiency score = 0.5
		If baseline efficiency, efficiency score = 0
C6	Would you have installed more, less, or the same amount of [MEASURE] without the program?	If same or more, quantity score = 1
		If less, quantity score =
		percentage of equipment not installed
C9.6	On a scale from 1 to 5, with 1 being not important at all and 5 being extremely important, how important was each of the following factors in deciding which equipment to install: Previous participation with a RMP program	If C9.6 = 5, reduce adjusted free-ridership by 75%
		If C9.6 = 4, reduce adjusted free-ridership by 50%
C9.2	On a scale from 1 to 5, with 1 being not important at all and 5 being extremely important, how important was each of the following factors in deciding which equipment to install: information provided by RMP on energy saving opportunities	Consistency Check
C9.4	On a scale from 1 to 5, with 1 being not important at all and 5 being extremely important, how important was each of the following factors in deciding which equipment to install: The RMP incentive or discount	Consistency Check
C8	In your own words, can you please describe what impact the program had on your decision to complete these energy efficiency improvements for [MEASURE]?	Considered if '4' or '5-extremely important' rating from C9.2 or C9.4 Initial freeridership score is reduced by 50% if C8 response merits an adjustment free-ridership by 50%

Figure B-1 shows the freeridership calculation approach.

**Figure B-1. Freeridership Calculation Approach**



## Participant Spillover Estimation

Participant spillover occurs when a program influences participants to install additional energy-efficient equipment without a program incentive. The Cadmus team asked a sample of participants whether they completed any subsequent energy saving projects and whether they received an incentive for that project. The team also asked these respondents to rate the relative importance of the Wattsmart Business program (and incentives) on their decisions to pursue additional energy-efficient activities.

The analysis only included survey respondents who did the following:

- Installed additional energy-savings measure(s) after participating in the Wattsmart Business program.
- Rated the program as highly important in the decision to install the additional measure(s)
- Did not obtain a Wattsmart Business program incentive for the additional measure(s)

The Cadmus team used evaluated program savings as a proxy to estimate the savings associated with “like” spillover projects. Like spillover is associated with equipment that is similar to the equipment

offered through the program. Table B-2 provides detailed scoring and descriptions of each like spillover question.

**Table B-2. Wattsmart Participant Spillover Calculation Approach**

Question	Question Text	Scoring
D8	Since participating in this program, have you purchased and installed any other energy efficiency improvements on your own without any assistance from a utility or other organization?	If no, potential spillover savings = 0
D9	What type of equipment did you install?	N/A
D10.# Series	Measure specific efficiency, capacity, fuel-type questions	If responses indicated non-program qualifying unit, potential spillover savings = 0
D10.b	How many did you purchase and install?	D10.b x program-evaluated per-unit savings = potential spillover savings
D11	Did you receive an incentive from RMP or another organization for this equipment?	If yes, potential spillover savings = 0.
D14	On a scale from 1 to 5, with 1 being not important at all and 5 being extremely important, please rate how important your experience with the [UTILITY] [CATEGORY] program was in your decision to install [this/these] energy efficient product(s).	"5" rating results in potential spillover savings attributed to program.

As it has no comparative program savings data, “unlike” spillover can often be characterized only qualitatively. The Cadmus team asked detailed follow-up questions for unlike spillover responses that could be credited to the program as participant spillover if adequate information was provided to estimate savings by an engineer on the team.

The Cadmus team calculated the measure stratum-level spillover percentages by dividing the sum of additional spillover savings by the total incentivized gross savings achieved for all respondents in the measure stratum:

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

### *Nonparticipant Spillover Estimation*

Effective program marketing and outreach generates program participation and increases general energy efficiency awareness among customers. The cumulative effect of sustained utility program marketing can affect customers’ perceptions of their energy usage and, in some cases, motivate customers to take efficiency actions outside of the utility’s program. This is generally called NPSO, and it results in energy savings caused by, but not rebated through, utilities’ demand-side management activities.

To understand whether RMP’s general and program marketing efforts generated energy efficiency improvements outside of the company’s incentive programs, the Cadmus team collected spillover data

through a nonparticipant survey, conducted with randomly selected nonresidential, nonparticipating customers.

## Methodology

Effective program marketing and outreach generates program participation and increases general energy efficiency awareness among customers. The cumulative effect of sustained utility program marketing can affect perceptions of their energy usage and motivate customers to take efficiency actions outside of the utility's program. This is generally called NPSO, and it results in energy savings caused by, but not rebated through, utilities' demand-side management activities.

To understand whether RMP's general and program marketing efforts generated energy efficiency improvements outside of the company's incentive programs, the Cadmus team collected spillover data through a nonparticipant survey, conducted with randomly selected nonresidential, nonparticipating customers.

## Methodology

The Cadmus team randomly selected and surveyed 200 nonparticipating customers from a sample of randomly generated nonresidential nonparticipant accounts provided by RMP.

Using a 1 to 5 scale, with 1 meaning *not important at all* and 5 meaning *very important*, the survey asked customers to rate the importance of several factors on their decisions to install energy-efficient equipment without receiving an incentive from RMP. This question determined whether RMP's energy efficiency initiatives motivated energy-efficient purchases. The surveys asked respondents to address the following factors:

- General information about energy efficiency provided by RMP
- Information from RMP program staff or contractors
- Past participation experience participating in a RMP energy efficiency program

The Cadmus team estimated NPSO savings from respondents who rated any of the above factors as *very important* for any energy-efficient actions or installations reported.

The Cadmus Team used estimated gross savings for the reported measures from the Wattsmart Business program evaluation activities.

Using the variables shown in Table B-3, the Cadmus team determined total NPSO generated by RMP's marketing and outreach efforts.

**Table B-3. Wattsmart NPSO Analysis Method**

Variable	Metric	Source
A	Total kWh Spillover Savings from Survey Respondents	Survey data / Engineering Analysis
B	Total Nonparticipant Customers Surveyed	Survey disposition
C	Sample Usage	RMP Customer Database
D	Sample NPSO	$A \div C$
E	Total Population Usage kWh	RMP Customer Database
F	NPSO kWh Savings Applied to Population	$D \times E$
G	Total Gross Program Evaluated kWh Savings	Wattsmart Business Evaluation
H	NPSO as a Percentage of Total Wattsmart Business Evaluated kWh Savings	$F \div G$

## Appendix C. Cost-Effectiveness Methodology

In assessing the Wattsmart Business program’s cost-effectiveness, the Cadmus team analyzed program benefits and costs from five different perspectives (summarized below in Table C-1), using Cadmus’ DSM Portfolio Pro model.<sup>7</sup> The California Standard Practice Manual for assessing demand-side management (DSM) program cost-effectiveness describes the benefit/cost ratios for the following five tests:

- **PacifiCorp Total Resource Cost (PTRC) Test:** This test examines program benefits and costs from Rocky Mountain Power (RMP) and from RMP customers’ perspectives (combined). On the benefit side, it includes avoided energy costs, capacity costs, and line losses, plus a 10% adder to reflect non-quantified benefits. On the cost side, it includes costs incurred by both the utility and participants.
- **Total Resource Cost (TRC) Test:** This test also examines program benefits and costs from RMP’s and from RMP customers’ perspectives (combined). On the benefit side, it includes avoided energy costs, capacity costs, and line losses. On the cost side, it includes costs incurred by both the utility and participants.
- **Utility Cost Test (UCT):** This test examines program benefits and costs solely from RMP’s perspective. The benefits include avoided energy, capacity costs, and line losses. Costs include program administration, implementation, and incentive costs associated with program funding.
- **Ratepayer Impact Measure (RIM) Test:** All ratepayers (participants and nonparticipants) may experience rate increases due to decreased kilowatt-hour sales. The benefits include avoided energy costs, capacity costs, and line losses. Costs include all RMP program costs and decreased revenues.
  - The RIM test measures program impacts on customers’ rates. Most energy efficiency programs do not pass the RIM test. Although energy efficiency programs reduce energy delivery costs, they also reduce energy sales. As a result, average rates per energy unit may increase. A RIM benefit/cost ratio greater than 1.0 indicates that rates—as well as costs—will fall due to the program. Typically, this happens only for demand response programs or programs targeting the highest marginal cost hours (when marginal costs exceed rates).
- **Participant Cost Test (PCT):** From this perspective, program benefits include bill reductions and incentives received. Costs include the measure incremental cost (compared to the baseline measures), plus installation costs incurred by the customer.

Table C-1 summarizes the five tests’ components.

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<sup>7</sup> 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 C-1. Wattsmart Benefits and Costs Included in Various Cost-Effectiveness Tests**

Test	Benefits	Costs
PTRC	Present value of avoided energy and capacity costs, <sup>a</sup> with a 10% adder for non-quantified benefits	Program administrative and marketing costs, and costs incurred by participants
TRC	Present value of avoided energy and capacity costs <sup>a</sup>	Program administrative and marketing costs, and costs incurred by participants
UCT	Present value of avoided energy and capacity costs <sup>a</sup>	Program administrative, marketing, and incentive costs
RIM	Present value of avoided energy and capacity costs <sup>a</sup>	Program administrative, marketing, and incentive costs, plus the present value of decreased revenues
PCT	Present value of bill savings and incentives received	Incremental measure and installation costs

<sup>a</sup> These tests include avoided line losses.

Table C-2 shows needed cost-effectiveness inputs for each year, all of which RMP provided to Cadmus for its analysis.

**Table C-2. Wattsmart Selected Cost-Effectiveness Analysis Inputs**

Input Description	2020
Discount Rate	6.92%
Commercial Line Loss	10.00%
Industrial Line Loss	5.85%
Irrigation Line Loss	10.21%
Commercial Retail Rate (\$/kWh)	\$0.0850
Industrial Retail Rate (\$/kWh)	\$0.0638
Irrigation Retail Rate (\$/kWh)	\$0.0792
Inflation/Escalation Rate	2.28%

The Wattsmart Business program benefits included energy savings and their associated avoided costs. For the cost-effectiveness analysis, the Cadmus team used this study’s evaluated net energy savings (incorporating freeridership and spillover) and measure lives documented in the program’s tracking data. Table C-3 shows cost-effectiveness inputs for each measure stratum in Wyoming’s Wattsmart Business program.

**Table C-3. Wyoming Wattsmart Business Measure Stratum Cost-Effectiveness Inputs**

Input Description	Input Value
<b>Average Measure Life (EUL) <sup>a</sup></b>	
Energy Management	3.0
HVAC	18.1
Lighting	12.4
Midstream	12.0
Motors	14.9
Oil and Gas	7.0
Other	13.8
<b>Evaluated Net Energy Savings (kWh/year) <sup>b</sup></b>	
Energy Management	7,137,650
HVAC	573,885
Lighting	2,776,506
Midstream	1,668,704
Motors	21,217,742
Oil and Gas	3,864,280
Other	729,873
<b>Total Utility Cost (including incentives) <sup>c</sup></b>	
Energy Management	\$1,707,934
HVAC	\$203,148
Lighting	\$1,277,424
Midstream	\$456,412
Motors	\$5,673,466
Oil and Gas	\$793,193
Other	\$555,157
<b>Incentives</b>	
Energy Management	\$190,337
HVAC	\$100,603
Lighting	\$500,665
Midstream	\$184,884
Motors	\$2,290,001
Oil and Gas	\$176,979
Other	\$438,769

<sup>a</sup> Measure stratum EULs are based on individual measure EULs and weighted by reported gross savings in the program tracking data.

<sup>b</sup> Evaluated net energy savings reflect impacts at the customer meter.

<sup>c</sup> RMP provided program costs and incentives in annual report data, allocating program costs by weighted savings.

### *Energy Management*

As shown in Table C-4, the energy management measure stratum proved cost-effective according to all test perspectives except the RIM test.

**Table C-4. 2020 Wyoming Energy Management Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0281	\$549,185	\$767,920	\$218,735	1.40
TRC	\$0.0281	\$549,185	\$698,109	\$148,924	1.27
UCT	\$0.0260	\$509,214	\$698,109	\$188,895	1.37
RIM		\$1,823,946	\$698,109	(\$1,125,837)	0.38
PCT		\$243,632	\$1,943,313	\$1,699,681	7.98
Lifecycle Revenue Impacts (\$/kWh)					\$0.000118337
Discounted Participant Payback (years)					0.11

### HVAC

As shown in Table C-5, the HVAC measure stratum proved cost-effective according to the UCT and PCT test perspectives.

**Table C-5. 2020 Wyoming HVAC Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0918	\$633,612	\$398,196	(\$235,416)	0.63
TRC	\$0.0918	\$633,612	\$361,996	(\$271,615)	0.57
UCT	\$0.0385	\$265,953	\$361,996	\$96,044	1.36
RIM		\$887,133	\$361,996	(\$525,136)	0.41
PCT		\$512,582	\$796,664	\$284,082	1.55
Lifecycle Revenue Impacts (\$/kWh)					\$0.000003282
Discounted Participant Payback (years)					10.01

### Lighting

As shown in Table C-6, the lighting measure stratum proved cost-effective according to the UCT and PCT test perspectives.

**Table C-6. 2020 Wyoming Lighting Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0708	\$1,777,543	\$1,253,677	(\$523,866)	0.71
TRC	\$0.0708	\$1,777,543	\$1,139,706	(\$637,836)	0.64
UCT	\$0.0407	\$1,021,252	\$1,139,706	\$118,454	1.12
RIM		\$3,301,528	\$1,139,706	(\$2,161,822)	0.35
PCT		\$1,827,491	\$4,501,150	\$2,673,658	2.46
Lifecycle Revenue Impacts (\$/kWh)					\$0.000022021
Discounted Participant Payback (years)					6.22

*Midstream*

As shown in Table C-7, the midstream measure stratum proved cost-effective according to all test perspectives except the RIM test.

**Table C-7. 2020 Wyoming Midstream Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0311	\$469,584	\$732,652	\$263,068	1.56
TRC	\$0.0311	\$469,584	\$666,047	\$196,464	1.42
UCT	\$0.0324	\$489,116	\$666,047	\$176,932	1.36
RIM		\$1,825,472	\$666,047	(\$1,159,424)	0.36
PCT		\$164,953	\$1,548,512	\$1,383,559	9.39
Lifecycle Revenue Impacts (\$/kWh)					\$0.000011810
Discounted Participant Payback (years)					N/A

*Motors*

As shown in Table C-8, the motors measure stratum proved cost-effective according to all test perspectives except the RIM test.

**Table C-8. 2020 Wyoming Motors Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0391	\$8,822,577	\$11,707,403	\$2,884,825	1.33
TRC	\$0.0391	\$8,822,577	\$10,643,093	\$1,820,516	1.21
UCT	\$0.0317	\$7,151,475	\$10,643,093	\$3,491,618	1.49
RIM		\$22,222,732	\$10,643,093	(\$11,579,639)	0.48
PCT		\$3,961,103	\$17,361,259	\$13,400,155	4.38
Lifecycle Revenue Impacts (\$/kWh)					\$0.000089895
Discounted Participant Payback (years)					1.22

*Oil and Gas*

As shown in Table C-9, the oil and gas measure stratum proved cost-effective according to all test perspectives except the RIM test.

**Table C-9. 2020 Wyoming Oil and Gas Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0406	\$918,816	\$1,090,448	\$171,631	1.19
TRC	\$0.0406	\$918,816	\$991,316	\$72,500	1.08
UCT	\$0.0278	\$629,785	\$991,316	\$361,531	1.57
RIM		\$2,146,455	\$991,316	(\$1,155,139)	0.46
PCT		\$466,010	\$1,693,649	\$1,227,638	3.63
Lifecycle Revenue Impacts (\$/kWh)					\$0.000023927
Discounted Participant Payback (years)					1.15

*Other*

As shown in Table C-10, the “other” measure stratum proved cost-effective according to the PCT test perspective.

**Table C-10. 2020 Wyoming Other Cost-Effectiveness**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0608	\$449,259	\$388,132	(\$61,126)	0.86
TRC	\$0.0608	\$449,259	\$352,847	(\$96,411)	0.79
UCT	\$0.0811	\$599,940	\$352,847	(\$247,092)	0.59
RIM		\$1,123,070	\$352,847	(\$770,223)	0.31
PCT		\$288,088	\$961,899	\$673,811	3.34
Lifecycle Revenue Impacts (\$/kWh)					\$0.000006497
Discounted Participant Payback (years)					N/A