



2018-2019 Wyoming Wattsmart Business Program Evaluation

FINAL REPORT

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Glossary of Terms

Custom Energy Savings Calculation Methodology

Energy savings calculated using a custom methodology require project and site-specific inputs, such as operating hours, average load, and equipment performance. These projects typically do not meet requirements for deemed or prescriptive calculations, described below, and are commonly industrial/process-related. Metered and/or trend data are typically collected during the analysis and/or post-inspection phase of custom projects.

Deemed Energy Savings Calculation Methodology

Energy savings calculated using deemed values refer to one savings factor per measure unit for all projects, regardless of facility type, equipment end use, or operating hours.

Demand Side Management Central

Demand Side Management Central (DSMC) is Rocky Mountain Power's project management and reporting database, which provides project management tools, validation check on each project, and a data warehouse with reporting capability.

Evaluated Gross Savings

Evaluated gross savings represent the total program savings, based on the validated savings and installations, before adjusting for behavioral effects such as freeridership or spillover. They are most often calculated for a given measure 'i' as:

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

Evaluated Net Savings

Evaluated net savings are program savings, net of what would have occurred in the program's absence. These savings are the observed impacts attributable to the program. Net savings are calculated as the product of evaluated gross savings and the net-to-gross (NTG) ratio:

$$\text{Net Savings} = \text{Evaluated Gross Savings} * \text{NTG}$$

Freeridership

Freeridership in energy efficiency programs is represented by 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.

Gross Realization Rate

The gross realization rate is the ratio of evaluated gross savings to savings reported (or claimed) by the program administrator.

In-Service Rate

The in-service rate (also known as the installation rate) is the proportion of incented measures actually installed.

Net-to-Gross

NTG is the ratio of net savings to evaluated gross savings:

$$NTG = (1 - \textit{Freeridership Rate}) + \textit{Spillover Rate}$$

Prescriptive Energy Savings Calculation Methodology

Energy savings calculated using a prescriptive methodology or calculator require more than one input to determine energy savings (e.g., HVAC equipment performance, operating hours, and capacity).

Spillover

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

Technical Resource Library

The Technical Resource Library is the official database repository of measure definitions, which is linked to the DSMC.

Trade Ally

For the purposes of the process evaluation, trade allies include any market actors that provide design services as well as contractors, distributors, manufacturers, and vendors that provide facility evaluations and/or supply or install energy-efficient measures incented through the program.

Verification Engineer

Verification engineers are third parties hired to verify project savings.

Executive Summary

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.

During the 2018 and 2019 Wattsmart Business program, RMP outsourced all demand-side management (DSM) services. Previously, RMP offered DSM for managed accounts directly and outsourced DSM services only for non-managed accounts. RMP contracted with three program administrators—Cascade Energy, Willdan, and Nexant—to implement all program offerings.

RMP contracted with the Cadmus team (comprising Cadmus and VuPoint Research) to conduct impact and process evaluations of the 2018 and 2019 Wyoming Wattsmart Business program. Cadmus administered an online participant survey and conducted phone interviews. VuPoint Research administered a nonparticipant process evaluation telephone survey. For the process evaluation, the team assessed program delivery and efficacy, bottlenecks, barriers, and opportunities for possible improvements. For the impact evaluation, the team evaluated energy impacts using virtual assessments and engineering analyses, net-to-gross (NTG), and program cost-effectiveness.

At RMP's request, Cadmus evaluated program effectiveness and reported the 2018-2019 evaluation findings under the following categories:¹

- **Wattsmart Business (Typical Upgrades and Custom Analysis):** RMP offers customers prescriptive incentives (Typical Upgrades) for measures such as agricultural, compressed air, HVAC, lighting, motors, building shell, food service equipment, and irrigation. It also offers 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 targets 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 purchasing through a nonparticipating distributor do not receive an instant discount, but they may apply to RMP for incentives after the purchase.
- **Small Business Direct Install (SBDI):** RMP provides a free energy assessment, instant incentives, and turnkey installations for geotargeted, eligible, small business customers making recommended interior and/or exterior lighting upgrades within a designated offer window. Beginning in June 2018, RMP restructured the Small Business Lighting (SBL) offering to an SBDI offering for retrofits, with 2019 as its first full year of operation.

¹ To report net-to-gross (NTG), Cadmus surveyed Wattsmart Business Typical Upgrades and Custom Analysis participants using the same measure strata used by the Impact team.

- Energy Management:** RMP provided expertise and custom incentives for verified savings achieved through improved operations and through maintenance and management practices. Capital improvements, if eligible, were provided incentives through the other Wattsmart Business program offerings.

Key Findings

Key Impact Evaluation Findings

For the impact evaluation, the Cadmus team analyzed 77 projects that contributed 39% of the total 2018 and 2019 program savings. Table 1 summarizes the evaluation findings and shows the number of unique projects, gross savings, net savings, and precision.

Table 1. 2018-2019 Wyoming Wattsmart Business Program Savings^a

Strata	Unique Projects	Reported Savings (kWh)	Evaluated Gross Savings (kWh)	Gross Realization Rate	Precision ^b	NTG	Evaluated Net Savings (kWh)
Lighting	491	20,321,695	22,695,332	112%	16.7%	76%	17,248,452
Energy Management	13	14,446,939	16,072,910	111%	1.7%	76%	12,215,412
Oil & Gas	56	15,660,966	15,660,966	100%	0%	101%	15,817,576
Motors	82	15,236,285	13,762,449	90%	1.0%	101%	13,900,073
Direct Install	642	4,883,524	5,867,734	120%	4.2%	105%	6,161,120
Other	40	1,944,085	2,094,607	108%	1.7%	88%	1,843,254
HVAC	23	2,159,786	2,725,093	126%	0.2%	88%	2,398,082
Total	1,347	74,653,281	78,879,090	106%	6.5%	88%	69,583,969

^aTotals may not sum due to rounding.
^bPrecision at the stratum level targeted 20% at 80% confidence, and the overall total at 10% precision at 90% confidence.

The Wattsmart program had a 106% gross realization rate over the two program years, though the rate varied between measure categories. The team calculated NTG as 88%, yielding evaluated net savings of 69,583,969 kWh, at a ±6.5% precision with 90% confidence.

Five strata—lighting, energy management, oil and gas, motors, and direct install—accounted for 95% of energy savings. The following bullet points describe the key findings for these strata:

- Lighting projects.** Lighting projects made up 27% of all reported energy savings with a realization rate of 112%. The Cadmus team evaluated 17 lighting projects, accounting for 5% of reported energy savings in the lighting stratum. Typical Wattsmart business lighting projects had only minimal discrepancies. Cadmus determined that savings were calculated appropriately and found few deviations between reported calculation inputs and data collected from customers. Realization rates for midstream lighting projects varied because RMP calculated the savings using baseline wattages and assumed hours of use by facility type. However, Cadmus used the lumens equivalency method from the Energy Independence and Security Act of 2007 (EISA) for baseline wattage and used hours of use based on facility type from the Regional Technical Forum’s midstream lighting measure. In some cases, hours of use by facility type varied between the values used by RMP and the values referenced by Cadmus in the RTF. These two factors drove the bulk of savings differences in lighting measures.

- **Energy management projects.** Thirteen energy management projects accounted for 19% of all reported energy savings, and were evaluated with a 111% realization rate. Cadmus evaluated six projects. Most of these projects reported energy savings based on post-implementation trend data of equipment performance. Cadmus collected meter or trend data from customers, where available, and found the reported savings to be accurate in four of six projects. Evaluated savings for one project was higher than reported because Cadmus had access to longer and more recent trend data of equipment performance. Evaluated savings for the other project were lower than reported due to errors in the reported savings calculation inputs and assumptions.
- **Oil and gas projects.** Oil and gas projects accounted for 21% of energy savings. Cadmus sampled 11 projects that received incentives for electric submersible pumps. All projects were found to be calculated appropriately with sufficient documentation to justify the reported energy savings.
- **Motors projects.** Motors projects accounted for 20% of energy savings with an evaluated realization rate of 90%. Cadmus evaluated 18 projects. Reported savings for green motor rewind projects were based on out-of-date measure savings from the RTF. Cadmus' evaluation used the recent, updated measure savings, and most sampled projects realized 76% to 77% in energy savings. For one large project that reported energy savings of 7,122,541 kWh, Cadmus collected six months of hourly trend data from the customer. The large set of trend data indicated a difference in load shape for equipment performance, resulting in lower realized energy savings.
- **Direct install.** Direct install account for 7% of energy savings. Cadmus found that the facility type identified for four projects did not represent the actual customer type and the associated reported hours of use did not provide sufficient source documentation. Cadmus evaluated savings by using the savings calculation methodology and hours of use described in the RTF.² Due to the differences in hours of use by facility type selection and waste heat factor, most projects realized greater energy savings than reported.

Table 2 and Table 3 show impact evaluation findings by program year for 2018 and 2019, respectively. To perform the analysis, the Cadmus team combined the 2018 and 2019 program years and applied the overall realization rates to each year.

² Regional Technical Forum. Accessed January 2021. "Non-Residential Lighting Midstream."
<https://rtf.nwcouncil.org/measure/non-residential-lighting-midstream>

Table 2. 2018 Wyoming Wattsmart Business Program Savings^a

Strata	Unique Projects	Reported Savings (kWh)	Evaluated Gross Savings (kWh)	Gross Realization Rate	NTG	Evaluated Net Savings (kWh)
Lighting	276	12,517,368	13,979,436	112%	76%	10,624,371
Energy Management	4	4,520,161	5,028,895	111%	76%	3,821,960
Oil & Gas	15	3,905,090	3,905,090	100%	101%	3,944,141
Motors	43	12,465,398	11,259,595	90%	101%	11,372,191
Direct Install	335	2,407,840	2,893,108	120%	105%	3,037,763
Other	26	1,106,976	1,192,684	108%	88%	1,049,562
HVAC	16	1,204,198	1,519,387	126%	88%	1,337,061
Total	715	38,127,031	39,778,195	104%	88%	35,187,050

^a Totals may not sum due to rounding.

Table 3. 2019 Wyoming Wattsmart Business Program Savings^a

Strata	Unique Projects	Reported Savings (kWh)	Evaluated Gross Savings (kWh)	Gross Realization Rate	NTG	Evaluated Net Savings (kWh)
Lighting	215	7,804,327	8,715,896	112%	76%	6,624,081
Energy Management	9	9,926,778	11,044,015	111%	76%	8,393,451
Oil & Gas	41	11,755,876	11,755,876	100%	101%	11,873,435
Motors	39	2,770,887	2,502,854	90%	101%	2,527,882
Direct Install	307	2,475,685	2,974,626	120%	105%	3,123,357
Other	14	837,109	901,923	108%	88%	793,692
HVAC	7	955,588	1,205,706	126%	88%	1,061,021
Total	632	36,526,249	39,100,895	107%	88%	34,396,919

^a Totals may not sum due to rounding.

Key Process Evaluation Findings

This section presents the key process evaluation findings. The *Process Evaluation* section provides more detailed descriptions.

Participant Experience

Typical Upgrades and Custom Analysis

- Previous participation in a RMP program was identified as the primary information source of the Typical Upgrade and Custom Analysis incentives among respondents (55%, n=11).
- Six of eight respondents said their projects were primarily installed by an independent contractor rather than by a Wattsmart Business program participating vendor (one respondent) or by themselves (one respondent).
- Satisfaction was high for the program overall and for certain program components such as the measure that was installed, work provided by a trade ally, and time it took to receive the rebate. Respondents were still likely to be satisfied with incentive amounts and the ease of filling out their paperwork, but a few were less than satisfied.

- Participants reported one or more benefits resulting from completing their projects (n=11):
 - 73% reported saving money on their utility bills; lower energy bills
 - 55% reported using less energy, reducing energy consumption or energy demand
 - 27% reported saving money on maintenance costs
 - 18% reported increased occupant comfort

Small Business Direct Install

- Most respondents (91%, n =22) work for organizations that employed 50 or fewer people, while two respondents said their organizations employ more than 500 people.
- Nearly half the respondents cited saving energy or saving money on energy bills as the most significant factor in their decision to participate in the program (48%, n=23).
- 26% of respondents said they wanted to install other lighting equipment that was not offered in their project proposal (n=23).
- SBDI participant satisfaction levels were high among program components and the program overall.
- 74% of respondents identified more than one benefit from participating in the SBDI program (n=23). The two most commonly identified benefits were “Saving money, reducing energy consumption or demand” and “Better aesthetics/better or brighter lighting” (74% and 65%, respectively, n=23).
- Three respondents identified challenges—contractors not installing all the intended equipment (one respondent), contractors not cleaning the work area (one respondent), and communication issues (one respondent).

Lighting Instant Incentives:

- Respondents reported high levels of satisfaction with the program overall and each of the components that were asked about (n=6).
- One respondent said a challenge was having to reach out to program staff to confirm which lights applied to the program and thought this was “a little time-consuming.”

Partial Participants

- Three of five partial participants reported not completing projects due to cost or needing more information about their project. One partial participant did complete the project but not through the Wattsmart Business program.

Nonparticipants

- Nearly three-quarters of nonparticipants were not aware of the Wattsmart Business program (73%, n=198); of those who were aware, 68% were *not too likely* or *not likely at all* to participate in the next six months (n=50).

- Nonparticipants said energy efficiency was not worth the required upfront investment. Over half *somewhat agreed* or *strongly agreed* with the statement that making energy efficiency upgrades to their facility is too costly (61%, n=152).

Cost-Effectiveness Results

As shown in Table 4, the program proved cost-effective in the 2018 and 2019 evaluation years from the PacifiCorp Total Resource Cost (PTRC), Utility Cost Test (UCT), and Participant Cost Test (PCT) perspectives but not according to the Total Resource Cost (TRC) and Ratepayer Impact Measure (RIM) tests. The primary criterion for assessing cost-effectiveness in Wyoming is the TRC; from this perspective, the program was not cost-effective using net evaluated energy savings in 2018 and 2019 combined, achieving a benefit/cost ratio of 0.94.

Table 4. 2018-2019 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 (PTRC) (TRC + 10% Conservation Adder)	\$0.0419	\$23,203,097	\$23,893,645	\$690,548	1.03
Total Resource Cost Test (TRC) No Adder	\$0.0419	\$23,203,097	\$21,721,496	(\$1,481,601)	0.94
Utility Cost Test (UCT)	\$0.0301	\$16,675,833	\$21,721,496	\$5,045,662	1.30
Ratepayer Impact Measure (RIM) Test		\$31,318,679	\$21,721,496	(\$9,597,183)	0.69
Participant Cost Test (PCT)		\$14,387,162	\$49,426,595	\$35,039,434	3.44
Lifecycle Revenue Impacts (\$/kWh)					\$0.000105781
Discounted Participant Payback (years)					1.23

Recommendations

Based on the impact and process evaluation interviews, surveys, site assessments, and other analyses, the Cadmus team prepared the following recommendations (this report's *Conclusions and Recommendations* section provides a more complete discussion of the findings and associated recommendations).

Savings Considerations

Recommendation: Cadmus recommends RMP adopt the lighting tables defining HOU by facility type from the Regional Technical Forum (RTF). Adopting the lighting tables from the RTF will ensure consistency with reported lighting savings among other regional utility energy efficiency programs.

Recommendation: Cadmus recommends using the methodology outlined in the RTF to calculate midstream savings, which includes accounting for HVAC interactive effects through applying a WHF. In addition, Cadmus recommends using the lumen equivalence method to calculate baseline wattage for midstream lighting projects.

Recommendation: Cadmus recommends RMP adopt the energy savings specified by motor size from the newest version of the green motor rewind measure from the RTF, version 3.1 (December 2017).

Recommendation: Cadmus recommends increasing deemed savings for prescriptive VFD projects to match the Cadmus 2014 *Variable Speed Drive Loadshape Project* report for HVAC fan projects (with savings shown in Table 5).

Table 5. Deemed Energy Savings for HVAC Fan Projects

HVAC Fan Motor Type	Deemed Energy Savings (kWh/year/hp) ^a
Supply Fan Motor	2,033
Return Fan Motor	1,788
Exhaust Fan Motor	1,788

^a Deemed savings based on the Cadmus 2014 *Variable Speed Drive Loadshape Project* report, created for NEEP. Available online: <http://www.neep.org/variable-speed-drive-loadshape-study-final-report>

For central equipment (e.g., hot/chilled water pumps, condenser water pumps, cooling tower fans), the team recommends using average savings from the 2018 PA TRM. Using average energy-savings factors, operating hours, and a default load factor of 75% from the PA TRM, and assuming a motor full-load efficiency of 93% (i.e., the National Electrical Manufacturers Association’s premium efficiency for a horsepower motor), a deemed savings factor results: 1,191 kWh per year, per horsepower.

Small Business Direct Install

Recommendation: The implementer of the Small Business Direct install offering should update the assessment template to include an estimate of Wattsmart Business prescriptive incentives available for any lighting the customer requests that does not qualify for the SBDI incentives. SBDI customers should also receive literature and an explanation of the Typical Incentives and Instant Incentives offerings.

Recommendation: Consider a modified threshold for identifying a small business, such as considering electricity usage at the company level rather than the meter level.

Nonparticipants

Recommendation: In addition to broadly distributing program marketing, the implementer should develop case studies and other materials that can be targeted to specific customer segments through trusted messengers such as industry associations, professional groups, or community organizations.

Introduction

Rocky Mountain Power offered several Wattsmart Business technical assistance and incentive options in the 2018-2019 cycle³:

- Typical Upgrades incentive
- Custom Analysis incentive
- Small Business Direct Install
- Lighting Instant incentive
- Energy Management

Typical Upgrades incentive. Through this offering, Rocky Mountain Power (RMP) provides prescriptive incentives primarily for small and midsize customers, but large customers may also receive these incentives. These incentives are available to customers who submit an application directly or work with a RMP trade ally.

Custom Analysis incentive. For large energy users or customers with projects that require custom analysis, RMP has designed incentives that offer multiple opportunities for energy efficiency upgrades. Midsize and smaller customers may also participate in Custom Analysis incentives. RMP's program administrators work with account managers and trade allies and directly with interested customers to help identify energy efficiency opportunities and provide analysis and verification of custom savings. The incentive is based on the expected project savings.

Small Business Direct Install (SBDI). The SBDI offering provides an energy assessment and instant incentive (as a discount of project cost) for eligible retrofits at geotargeted small business customers.

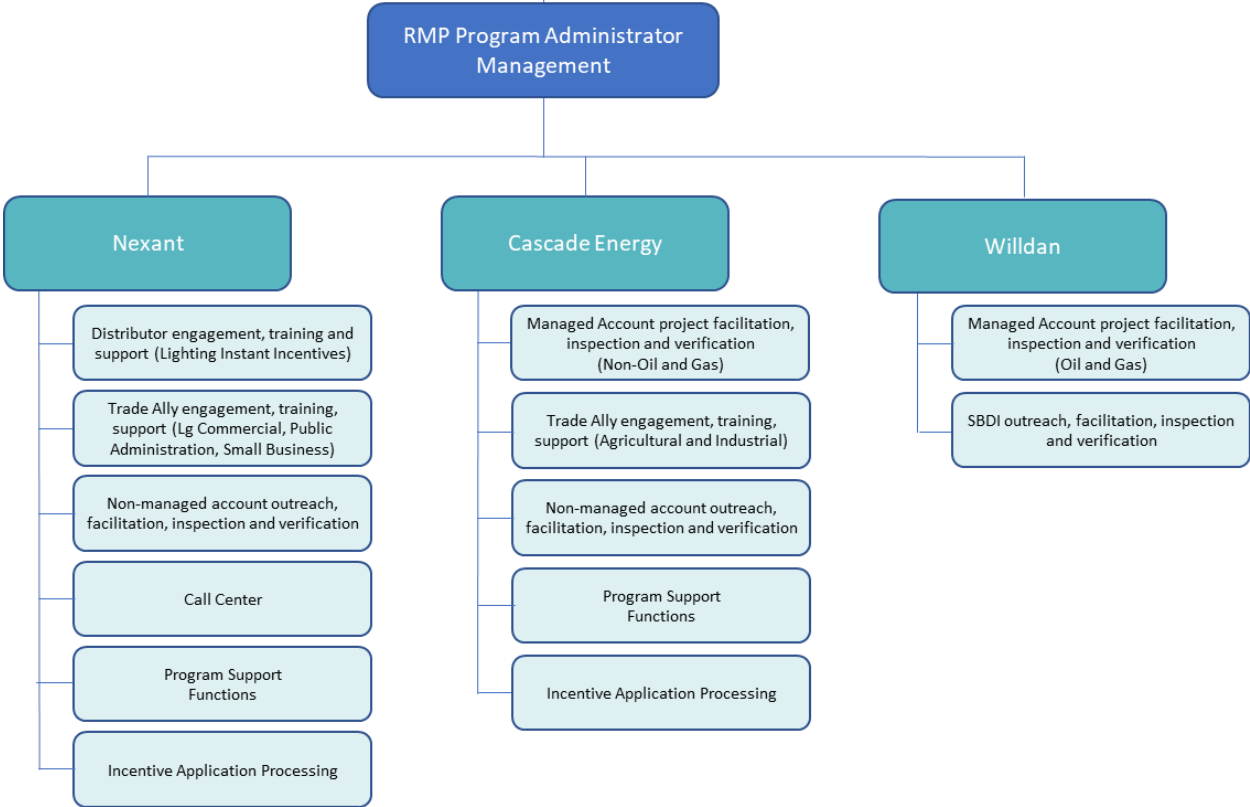
Lighting Instant incentive (Midstream). Through this offering, RMP targets the lighting maintenance market by offering customers instant point-of-purchase incentives on qualified LEDs, occupancy sensors, and retrofit kits purchased through a participating lighting distributor. Customers purchasing through a nonparticipating distributor do not receive an instant discount, but they may apply to RMP for incentives after the purchase.

Energy Management. Through this offering (e.g., recommissioning, industrial recommissioning, persistent commissioning), participating customers may receive expertise and custom incentives for verified savings achieved through improved operations, maintenance, and management practices. Through this offering, RMP also offers strategic energy management, using a cohort model. Participants are recruited to participate in a year of training on strategic energy management concepts, with most sessions delivered to the group as a whole, so participants can benefit from each others' questions and issues.

Figure 1 provides an overview of the program management responsibilities.

³ RMP offered the Small Business Enhanced Incentive through May of 2018, when it was suspended and replaced by the Small Business Direct Install (SBDI) offering. Because the Business Enhanced Incentive was available for only a limited time during the cycle, this report does not address it.

Figure 1. Wattsmart Business Program Delivery Roles



Evaluation Objectives

The Cadmus team assessed the Wattsmart Business program to determine gross and net savings achievements, assess cost-effectiveness, and, where applicable, identify areas that could help improve program delivery as well as customer involvement and satisfaction. Table 6 lists evaluation goals, along with corresponding evaluation activities employed to achieve those goals.

Table 6. 2018-2019 Wyoming Wattsmart Evaluation Objectives and Activities

RMP Evaluation Objectives	Management Interviews	Participant Survey	Partial Participant and Nonparticipant Surveys	Trade Ally Interviews	Site Assessments	Engineering Measurements	Site-Level Billing Analysis	Net-to-Gross Analysis	Reporting
Document and measure program effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Verify installation and savings		✓			✓	✓	✓	✓	
Evaluate the program process and the effectiveness of delivery and efficiency	✓	✓	✓	✓					
Understand motivations of participants, nonparticipants, and partial participants		✓	✓						
Provide data support for program cost-effectiveness assessments		✓			✓	✓	✓	✓	
Identify areas for potential improvements	✓	✓	✓	✓	✓	✓	✓	✓	
Document compliance with regulatory requirements									✓

Data Collection and Evaluation Activities

The Cadmus team performed site assessments and engineering analysis for 77 projects, seeking to achieve 90% confidence and ±10% precision at the portfolio level. The process evaluation focused on assessing changes to program design since the 2016-2017 cycle and on monitoring trade ally and participant response to program design and delivery. Primary data collection included interviews with program managers, administrators, and trade allies. The team also conducted surveys with participant and nonparticipant customers.⁴

Impact Sampling and Extrapolation Methodology

Through the Wyoming Wattsmart Business program, RMP provides incentives for 25 measure types. As shown in Table 7, the Cadmus team stratified these 25 measure types into seven strata. The team designed the sampling plan for the 2018-2019 combined participation, seeking to achieve approximately ±20% precision at 80% confidence per stratum and to meet ±10% precision at 90% confidence at the nonresidential portfolio level. To account for the wide range of project sizes, the team divided each end-use stratum into a selected group, from which the team hand-selected a few very large sites then combined these with a random selection from the remaining projects.

⁴ Participants are customers who completed a project through the program during the 2018 and/or 2019 evaluation period. Partial participants are customers who initiated a project through the program in 2018 or 2019 but did not complete that project. Nonparticipants are customers who have never initiated or completed a project through the program (or at least not in 2018 or 2019).

Table 7 shows total project counts and energy savings reported in the tracking database as well as total reported energy savings and sampled projects.

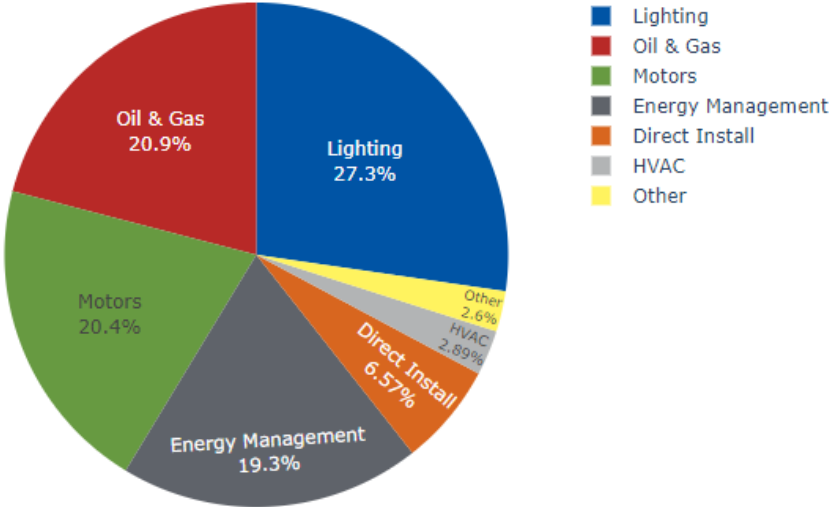
Table 7. 2018-2019 Wyoming Wattsmart Business Program Impact Sampling

Strata	Measure Type	Incentivized Projects	Reported Energy Savings (kWh)	Unique Sampled Projects
Direct Install	Custom	642	4,883,524	11
Energy Management	Custom	13	14,446,939	6
HVAC	Controls and Thermostats	2	77,274	6
	Cooling	31	591,377	
	Custom	7	189,932	
	Heat Pump	1	1,415	
	Motors	41	1,299,788	
Lighting	Controls	13	175,698	17
	Exterior Lighting	33	303,265	
	General Illuminance	665	17,898,884	
	Lighting	349	1,916,157	
	Non-General Illuminance	9	27,691	
Motors	Capped	1	1,203,982	18
	Custom	40	13,463,490	
	Electronically Commutated Motor	15	147,603	
	Green Motor Rewinds	52	374,767	
	Motors	1	46,443	
Oil & Gas	Pumps	56	15,660,966	11
Other	Compressed Air	2	67,345	8
	Cooking Equipment	2	20,724	
	Custom	22	1,501,245	
	Dishwashers	1	27,408	
	Ice Machine	1	3,876	
	Insulation	1	1,565	
	Irrigation Pumps	1	4,791	
	Payment	3	-	
	Roof	6	22,243	
	Ventilation	1	204,261	
	Water Distribution Equipment	28	58,667	
Windows	6	31,960		
Total		2,045	74,653,281	77

^a Totals may not sum due to rounding.

Figure 2. Distribution of 2018-2019 Strata Savings

Total Population in 2018 & 2019 (kWh)



The team divided sampled projects into two categories: selected and random. Random projects were chosen randomly, with evaluated results extrapolated to the rest of the stratum’s population. The team also selected projects with the highest claimed energy savings per stratum. These projects were evaluated individually, with the results included within each stratum; however, the team did not extrapolate associated realization rates to the population. Figure 3 shows how the team applied realization rates for selected and random sites in the motors stratum to the population. This methodology was applied to each stratum.

Figure 3. Realization Rate Extrapolation HVAC Example

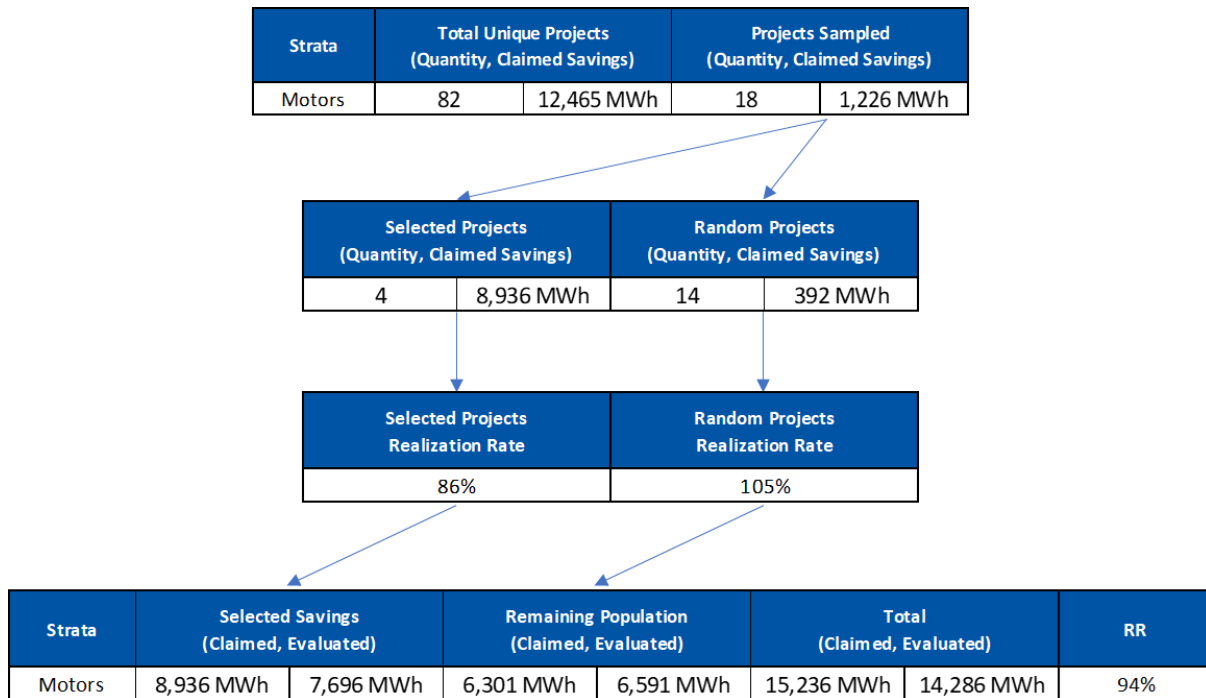


Table 8 shows the total quantity of projects sampled, the associated reported energy savings, and the percentage that these samples represented from the population.

Table 8. 2018-2019 Wyoming Wattsmart Business Program Impact Sampling Summary

Strata	Sample Type	Unique Projects Sampled	Reported Energy Savings (kWh)		Percentage kWh Sampled
			Sampled Projects	All Projects	
Lighting	Selected	0	0	20,321,695	5%
	Random	17	919,812		
Energy Management	Selected	2	8,066,496	14,446,939	74%
	Random	4	2,693,719		
Oil & Gas	Selected	3	1,894,713	15,660,966	34%
	Random	8	3,495,440		
Motors	Selected	4	8,935,799	15,236,285	61%
	Random	14	391,958		
Direct Install	Selected	0	0	4,883,524	2%
	Random	11	97,274		
Other	Selected	5	1,182,781	1,944,085	63%
	Random	3	34,036		
HVAC	Selected	3	879,591	2,159,786	49%
	Random	3	189,088		
Total		77	28,780,707	74,653,281	39%

Process Sample Design and Data Collection Methods

The team developed survey samples for participants, partial participants, and nonparticipants using simple random sampling. After removing measures with duplicate or missing contact information, the team stratified the participant sample based on the program offering and further stratified the Typical Upgrades and Custom Analysis participants by the measures they installed. Partial participants and nonparticipants were defined by their actions during the 2018-2019 period, regardless of whether they had completed an incented project before 2018 or in 2020.

Table 9 shows the final sample disposition for survey activities. The participant survey was delivered online, and the partial and nonparticipant surveys were delivered by phone. The *Surveys* section of the *Process Evaluation* chapter provides a detailed methodology for each surveyed population.

Table 9. 2018-2019 Wyoming Wattsmart Business Program Process Survey Sampling

Data Collection Activity	Project Population	Sampling Frame ^a	Target Completes	Achieved Completes
Typical Upgrades and Custom Analysis				
Lighting	276	60	48	7
Oil & Gas	22	4		2
Motors	51	9		1
Energy Management	12	5		1
HVAC	21	5		0
Other	35	9		0
SBDI	629	189		Census
Lighting Instant Incentive (Midstream)	107	53	Census	6
Participant Subtotal	1,153	334	48	40
Partial Participants	59	54	Census	5
Nonparticipants	9,115	8,876	200	200
Total	10,327	9,264	248	245

^a Sampling frame based on unique customers with contact information after removing duplicates.

Impact Evaluation

This section provides the Wattsmart Business program’s impact evaluation findings, resulting from the Cadmus team’s data analysis. This analysis incorporated the following activities:

- Participant survey
- Nonparticipant survey
- Net-to-gross analysis
- Customer interviews
- Engineering analysis
- Site-level billing analysis

This section addresses reported gross and net evaluated savings. Reported gross savings are electricity savings (kWh) that RMP reported in its 2018 and 2019 *Rocky Mountain Power Energy Efficiency and Peak Reduction Annual Reports* (annual reports).⁵ 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 10. To determine evaluated net savings, the team applied the fifth step.

Table 10. 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: lighting, energy management, oil and gas, motors, direct install, other, and HVAC measures. The team evaluated 77 sampled projects as part of the 2018 and 2019 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,

⁵ These reports are available online: https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/wyoming/Energy_Efficiency_and_Peak_Reduction_Report_WY_2019.pdf; and https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/environment/dsm/wyoming/2018_WY_Annual_DSM_Report_8-1-19.pdf

specifications, and operations of incented measures. The team also collected trend data for nine projects to document historical performance.

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.⁶ 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 (NPSO) could be credited to the program (for projects that were otherwise not provided incentives).

Project Review

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

The 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

⁶ 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/>

Engineering Analysis

In general, Cadmus referenced current measure workbooks and saving estimation methodologies from the Idaho Power Technical Reference Manual (TRM) and the Regional Technical Forum (RTF).^{7,8} The Idaho Power TRM was updated in 2018 and relies on sources such as the Northwest Power and Conservation Council (NWPCC), Northwest Energy Efficiency Alliance (NEEA), the Database for Energy Efficiency Resources (DEER), the Energy Trust of Oregon, the Bonneville Power Administration (BPA), third-party consultants, and other regional utilities.

Overall Evaluated Gross Savings Results

Table 11 presents reported and evaluated gross savings for the 2018 and 2019 program years, indicating a 105% overall realization rate.

Table 11. 2018-2019 Wyoming Wattsmart Reported and Evaluated Gross Savings by Program Year

Program Year	Program Savings (kWh) ^a		Gross Program Realization Rate
	Reported	Evaluated Gross	
2018	38,127,031	39,778,195	104.3%
2019	36,526,249	39,100,895	107.0%
Total	74,653,281	78,879,090	105.7%

^a Values may not sum due to rounding.

Table 12 provides evaluation results for reported and evaluated gross savings, along with realization rates and precision by measure type.

Table 12. 2018-2019 Reported and Evaluated Gross Wattsmart Business Program Savings by Measure Category

Strata	Program Savings (kWh)		Realization Rate	Precision ^a
	Reported	Evaluated Gross		
Lighting	20,321,695	22,695,332	111.7%	16.7%
Energy Management	14,446,939	16,072,910	111.3%	1.7%
Oil & Gas	15,660,966	15,660,966	100.0%	0%
Motors	15,236,285	13,762,449	90.3%	1.0%
Direct Install	4,883,524	5,867,734	120.2%	4.2%
Other	1,944,085	2,094,607	107.7%	1.2%
HVAC	2,159,786	2,725,093	126.2%	0.2%
Total	74,653,281	78,879,090	105.7%	6.8%

^a Precision at the stratum level targeted 20% at 80% confidence, and the overall total at 10% precision at 90% confidence.

⁷ ADM Associates. October 15, 2018. *Technical Reference Manual 2.2*. Prepared for Idaho Power Company. <https://docs.idahopower.com/pdfs/EnergyEfficiency/Reports/2018TRM.pdf>

⁸ Regional Technical Forum. "UES Measures." Accessed January 2021. <https://rtf.nwcouncil.org/measures>

Evaluated Gross Savings Results by Stratum

Lighting

RMP provides incentives for five types of lighting projects: controls, exterior lighting, general illuminance, lighting, and non-general illuminance. These projects apply to renovations or new construction, and involve high-efficiency lighting technologies (e.g., CFLs, LEDs, induction fixtures, occupancy sensors).

For the 2018 and 2019 years, RMP provided incentives for 1,069 lighting measures in 490 unique projects, reporting 20,321,695 kWh in energy savings. These lighting projects accounted for 27% of all of RMP's reported energy savings in Wyoming. Evaluated energy savings for the lighting stratum were 22,695,332 kWh, with a 112% realization rate.

Methodology

The Cadmus team evaluated 17 lighting projects, accounting for 5% of all reported energy savings in the lighting stratum. RMP used prescriptive calculations for all evaluated projects and used the Wattsmart prescriptive lighting calculator to determine the amount of incentives for all of the lighting projects. The Wattsmart calculator documents customer information, project locations, light fixture specifications, energy-saving calculations, and financial information. Critical inputs used to calculate energy savings included the following:

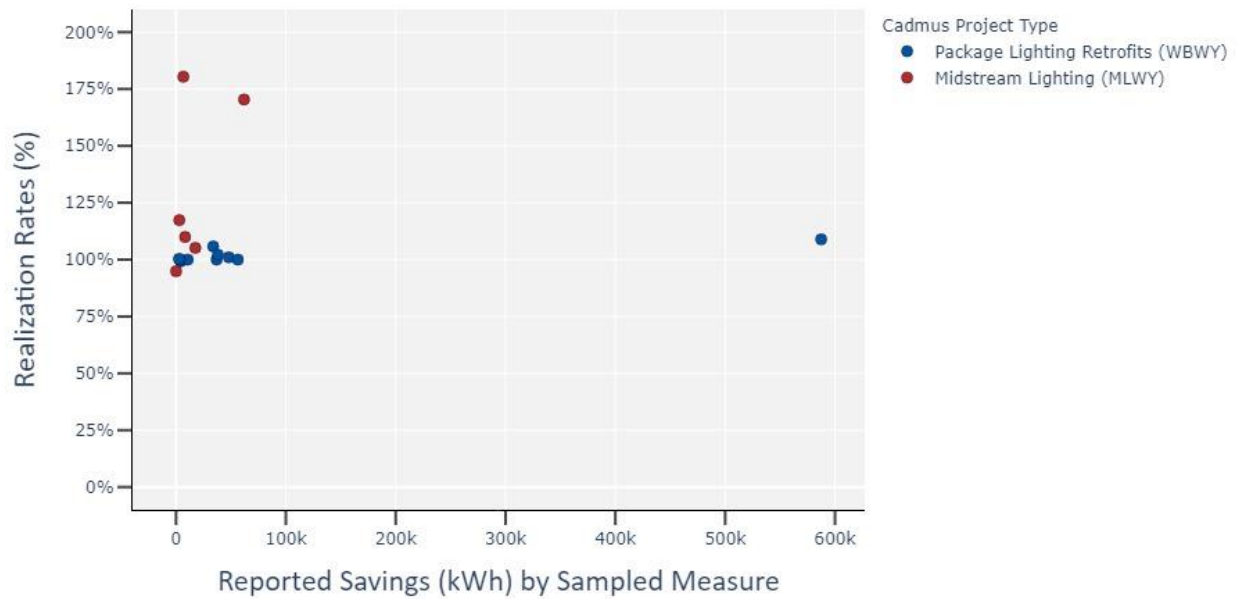
- Lighting operation schedule
- Space name, type, area, and condition
- Baseline lighting fixture location, type, quantity, controls, and wattage
- Proposed lighting fixture location, type, quantity, controls, and wattage

The Cadmus team reviewed the Wattsmart calculator methodology and assumptions to determine the applicability for each sampled project.

Findings

Figure 4 shows realization rates and associated claimed energy savings for each sampled lighting project.

Figure 4. Lighting Sample Results



Three sites exhibited realization rates greater than 120%. Table 13 provides specific details for these sites achieving greater than 120%. For remaining sites, the Cadmus team did not find (or found nominal) differences between calculated savings and evaluated savings.

Table 13. 2018-2019 Wyoming Wattsmart Lighting Sample Detailed Findings

Project	Project Measures	Reported kWh	Evaluated kWh	Site Realization Rate	Notes
MLWY_259545	Midstream lighting	6,670	11,711	176%	Baseline wattage and HOU used RMP assumed values based on facility type. Evaluated savings use EISA lumens equivalency method to determine baseline wattage and HOU by facility from the RTF Midstream measure
MLWY_262316	Midstream lighting	283	874	309%	Baseline wattage and HOU used RMP assumed values based on facility type. Evaluated savings use EISA lumens equivalency method to determine baseline wattage and HOU by facility from the RTF Midstream measure
MLWY_228205	Midstream lighting	61,915	107,709	174%	Baseline wattage and HOU used RMP assumed values based on facility type. Evaluated savings use EISA lumens equivalency method to determine baseline wattage and HOU by facility from the RTF Midstream measure

Minimal differences were found with the typical Wattsmart business lighting projects. The most common difference between reported and evaluated energy savings is the application of waste heat

factor (WHF). WHF refers to the HVAC cooling energy required in conditioned spaces to match the heat load from lighting. When high efficiency lighting is installed, less HVAC cooling energy is used to satisfy the reduced heating load. Evaluated savings include the WHF when determining total energy savings. Reported savings use WHF, but the reported value did not always agree with the RTF by facility type. Otherwise, Cadmus found that the lighting projects used appropriate calculation methodologies and fixture specifications in the baseline and installed conditions matched the supporting documentation. Hours of use were self-reported.

Calculating savings for midstream lighting projects followed the same methodology as for the typical Wattsmart business lighting projects except that hours of use and baseline fixture wattage were not based on as-found conditions. Instead, RMP based hours of use on the customer's facility type and used an internally developed lookup table for the baseline wattage of the installed fixture. Cadmus evaluated savings by using the savings calculation methodology and hours of use in the RTF as well as the EISA lumens equivalency method for determining the baseline fixture wattage.⁹ Realization rates for midstream lighting projects varied between 83% and 309% due to these differences in savings calculations.

Energy Management

RMP provided incentives for 13 recommissioning and industrial recommissioning projects in the energy management stratum and reported 14,446,939 kWh in energy savings for the 2018-2019 program. These projects accounted for 19% of all RMP's reported energy savings in Wyoming. Cadmus sampled six of these projects that accounted for 74% of the strata savings.

Methodology

RMP used custom spreadsheet calculation workbooks to determine energy savings for the energy management projects. These workbooks simulate equipment performance based on control strategies and setpoints observed during site visits and analyzed through trend data. Initial energy savings are predicted based on updated control strategies, setpoints, and proposed performance modifications. Savings were verified based on trend data collected after the energy efficiency measures were implemented.

The Cadmus team evaluated energy management measures by reviewing the energy analysis and savings verification reports and identifying equipment quantity, capacity, efficiency, performance characteristics, control strategies, and proposed changes for each measure. Where possible, the team contacted the customers and collected supplemental post-implementation data, including screen captures from the customer's building management system to verify control setpoints, control strategies, or trend data to verify the success of the implementation.

⁹ Regional Technical Forum. "Non-Residential Lighting Midstream." Accessed January 2021. <https://rtf.nwcouncil.org/measure/non-residential-lighting-midstream>

Findings

Cadmus evaluated six energy management recommissioning projects from the 2018 and 2019 program years. The Cadmus team found that four of the six evaluated projects had sufficient documentation and justification for the savings calculations and equipment performance and received a 100% realization rate. For these, Cadmus verified equipment performance by interviewing customers and collecting data through email. Figure 5 shows realization rates and associated energy savings for each sampled energy management project.

Figure 5. Energy Management Sample Results



One project exhibited a realization rate below 80% and one project above 120%. Table 14 provides specific details for these projects. Further description for these two projects follows the table.

Table 14. 2018-2019 Wyoming Wattsmart Energy Management Sample Detailed Findings

Project	Project Measures	Reported kWh	Evaluated kWh	Site Realization Rate	Notes
WBWY_284339	Retrocommissioning	229,222	115,159	50%	Reported savings calculations included errors in energy simulation setpoints and inaccurate cooling load calculation methodology
WBWY_283473	Retrocommissioning	6,744,402	8,640,547	128%	Evaluated savings based on a longer period (6 months) of post-implementation data to provide greater confidence in actual first-year energy savings

One sampled project realized lower energy savings than reported. This project involved implementation of temperature setpoint optimization and airflow control on multiple HVAC systems. The changes impacted total cooling load at the facility due to the use of constant volume systems in the baseline and inaccurately reported savings based on the change in cooling load. Cadmus simulated the HVAC system

performance based on the implemented changes and an equivalent cooling load between the baseline and post-implementation conditions and found that evaluated savings were 50% lower than reported.

The other sampled project realized higher energy savings than reported. This project involved the implementation of improved control methodology and configuration to a process facility. Reported savings were based on five weeks of metered data before and after the project was implemented. Cadmus collected six months of post-implementation data from the customer and recreated the savings calculations based on the updated load profile. Cadmus found greater energy savings were realized than reported due to the updated trend data and associated equipment load profiles.

Oil and Gas

RMP provides incentives for unique projects in the oil and gas category and reported 15,660,966 kWh in energy savings for the 2018 and 2019 program years. All projects involved the installation of electric submersible pumps (ESPs) with improved controls or water shutoff opportunities. These oil and gas projects accounted for 21% of all RMP’s reported energy savings. The oil and gas stratum achieved 15,660,966 kWh in evaluated savings, with a 100% realization rate.

Methodology

The Cadmus team evaluated 11 projects, accounting for 34% of reported energy savings in the oil and gas stratum. RMP used a prescriptive calculation tool for all sampled projects.

Findings

Figure 6 shows realization rates and associated energy savings for each sampled project.

Figure 6. Oil and Gas Sample Results



All sampled projects exhibited 100% realization rates. All projects implemented in the oil and gas stratum were identical in terms of the data collected from the customer, calculation methodology, input assumptions, and reported documentation. Cadmus reviewed the assumptions with the program administrator and collected backup documentation to justify the baseline for customer decisions that may have occurred in the absence of an incentive. RMP had implemented all recommendations from the 2016-2017 RMP evaluation related to these project types.¹⁰ Cadmus found that the 2018-2019 projects were calculated appropriately and sufficiently documented to justify the reported energy savings.

Motors

RMP provides incentives for five types of motor systems projects—capped, custom, electronically commutated motors (ECMs), green motor rewinds (GMRs), and motor upgrades. RMP provided incentives for 109 measures in 81 unique projects and reported 15,236,285 kWh in energy savings for the 2018 and 2019 program years. These motor systems projects accounted for 20% of all of RMP's reported energy savings. Evaluated energy savings for the motor systems stratum were 13,762,449 kWh, with a 90% realization rate.

Methodology

The Cadmus team evaluated 18 motor system projects, accounting for 61% of all reported energy savings in the motor systems stratum. Of these projects, RMP determined claimed savings using deemed savings for 12 projects and custom calculations for six projects.

For projects where RMP's implementation contractor used custom calculations to determine energy savings, the Cadmus team reviewed energy analysis reports and savings verification reports for the energy savings methodology, inputs, assumptions, and accuracy. If site findings deviated from claimed equipment quantities, performance specifications, or hours of use, the team recreated the custom calculations with updated information. Cadmus used savings calculation methodologies from green motor rewind measures in the RTF, variable frequency drive (VFD) measures from the Idaho Power TRM, or custom calculations. For all motor measures, the following were the critical inputs used to calculate energy savings:

- Manufacturer make/model
- Motor horsepower
- Motor efficiency
- Load factor
- Operation schedule (daily run hours, VFD speed)

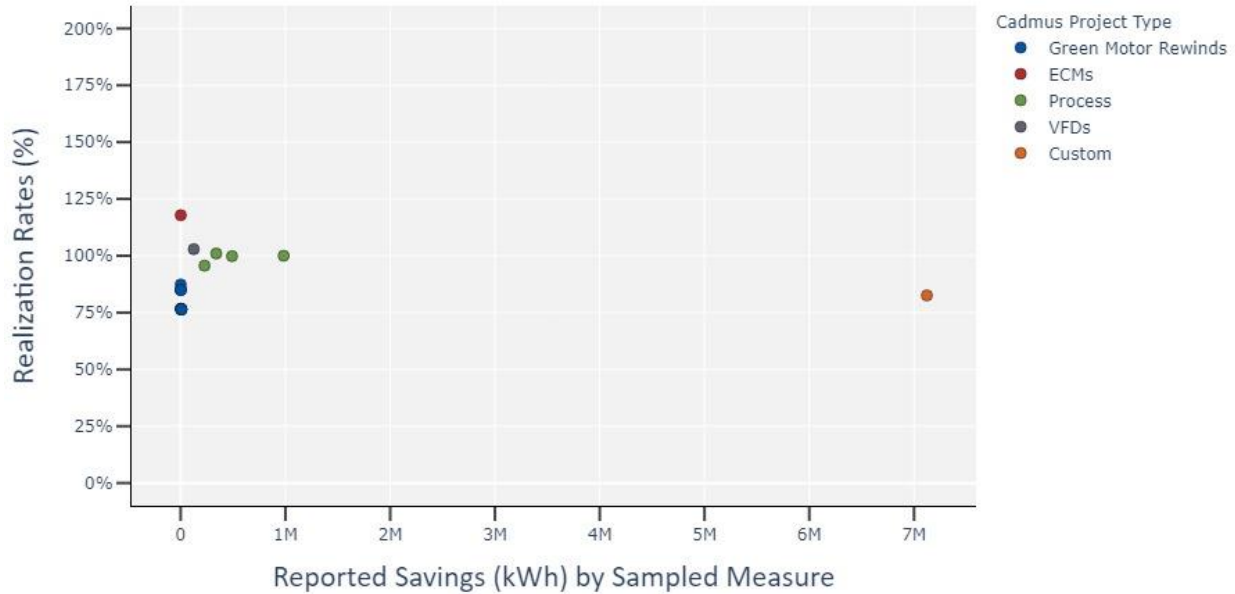
¹⁰ Rocky Mountain Power. December 21, 2018. *2016-2017 Wyoming wattsmart Business Program Evaluation*. Prepared by Cadmus and ADM Associates.

https://www.pacificorp.com/content/dam/pacorp/documents/en/pacificorp/environment/dsm/wyoming/2016-2017_Wyoming_WSB_Evaluation.pdf

Findings

Figure 7 shows realization rates and associated energy savings for each sampled project.

Figure 7. Motor Systems Sample Results



Seven sites achieved realization rates below 80%. Table 15 provides specific details for these sites. The team found no (or nominal) differences in reported savings for the remaining sites.

Table 15. 2018-2019 Wyoming Wattsmart Motor System Sample Results

Project	Project Measure	Reported kWh	Evaluated kWh	Site Realization Rate	Notes
WBWY_304525	150 hp green motor rewind at mining plant	3,089.00	2,366.02	77%	Difference in savings because Cadmus used the RTF calculator (v3.1), which has lower deemed savings than older calculator used by program administrator.
WBWY_259995	150 hp green motor rewind at a mining plant	3,089.00	2,366.02	77%	Difference in savings because Cadmus use RTF calculator (v3.1), which has lower deemed savings than older calculator used by program administrator.
WBWY_299865	300 hp green motor rewind at mining plant	5,935.00	4,535	76%	Savings match old version of RTF. New version of RTF indicates lower savings. Cadmus used the newer version approved December 2017.
WBWY_259994	Green motor rewind	7,848.00	5,994	76%	Savings match old version of RTF. New version of RTF indicates lower savings. Cadmus used the newer version approved December 2017.
WBWY_289906	Green motor rewind	2,598.00	1,990	77%	Savings match old version of RTF. New version of RTF indicates lower savings. Cadmus used the newer version approved December 2017.

Project	Project Measure	Reported kWh	Evaluated kWh	Site Realization Rate	Notes
WBWY_289907	Green motor rewind	2,598.00	1,990	77%	Savings match old version of RTF. New version of RTF indicates lower savings. Cadmus used the newer version approved December 2017.
WBWY_252009	400 hp green motor rewind	7,848	5994.15	76%	Savings match old version of RTF. New version of RTF indicates lower savings. Cadmus used the newer version approved December 2017.

The following is further explanation for a few of the more atypical measure-level realization rates of the evaluated projects:

- Green motor rewind projects comprise the majority of sampled projects exhibiting realization rates below 100%. RMP reported savings based on the RTF green motor rewind measure. After RMP filed its energy efficiency program plan, the RTF updated the green motor rewind measure based on additional studies and available data. The new energy savings, implemented on December 28, 2017, show reduced savings for most motor sizes. Cadmus used the current version of the RTF green motor rewind measure, which resulted in lower evaluated savings for all sampled projects.
- One large project that reported 7,122,541 kWh energy savings was evaluated with a 83% realization rate. This project involved a number of modifications and control changes at a process facility. Reported savings were based on three weeks of meter data before and after project implementation. Cadmus collected six months of hourly trend data from the customer on the equipment performance impacted by the implemented measures. The updated load profiles indicates less efficient performance than expected, resulting in lower realized energy savings.

Small Business Direct Install

RMP provides incentives for five types of lighting projects: controls, exterior lighting, general illuminance, lighting, and non-general illuminance. These projects apply to renovations or new construction and involve high-efficiency lighting technologies (e.g., CFLs, LEDs, induction fixtures, occupancy sensors).

For the 2018 and 2019 years, RMP provided incentives for 642 unique direct install projects and reported 4,883,524 kWh in energy savings. These lighting projects accounted for 6.5% of all of RMP's reported energy savings. Evaluated energy savings for the direct install stratum were 5,867,734 kWh, with a 120% realization rate.

Methodology

The Cadmus team evaluated 11 SBDI projects, accounting for 2% of all reported energy savings in the SBDI stratum. RMP used the Rocky Mountain Power Wattsmart SBDI prescriptive calculation for all evaluated projects. This calculator documents customer information, project location, light fixture

specifications, energy-saving calculations, and financial information. Critical inputs used to calculate energy savings include the following:

- Facility type
- Space name, type, area, and condition
- Baseline lighting fixture location, type, quantity, controls, and wattage
- Proposed lighting fixture location, type, quantity, controls, and wattage

The Cadmus team reviewed the RMP Wattsmart SBDI calculator methodology and assumptions to determine the applicability for each sampled project.

Findings

Figure 8 shows realization rates and associated claimed energy savings for each sampled lighting project. Four projects exhibited realization rates greater than 120%. The remaining sites exhibited similar discrepancies but with less impact to the evaluated savings.

Figure 8. Lighting Sample Results



The RMP Wattsmart SBDI calculator follows the same methodology as in the typical Wattsmart business lighting projects except that hours of use were based on the customer facility type instead of using customer reported hours. Cadmus found that the facility type identified for four projects did not represent the actual customer type and the associated hours of use did not provide sufficient source documentation. For example, one midstream project used hours of use based on a retail building type. Retail facilities range in size from less than 5,000 sqft to over 50,000 sqft. The hours of use vary by building type and the average value for all retail building types was higher than the boutique retail building type associated with this project. Similar to the typical Wattsmart business lighting projects, the reported savings also did not account for a waste heat factor. Cadmus evaluated savings by using the

savings calculation methodology and hours of use described in the RTF.¹¹ Due to the differences in hours of use by facility type selection and waste heat factor, most projects realized greater energy savings than reported.

Other

RMP provides incentives for projects in the “other” category (e.g., compressed air, cooking equipment, custom, dishwashers, ice machines, insulation, irrigation pumps, roof, ventilation, water distribution equipment, and windows). RMP provided incentives for 74 measures in 39 unique projects and reported 1,944,085 kWh in energy savings for the 2018 and 2019 program years. Custom projects accounted for 77% of the savings in the other stratum. Projects in the other stratum accounted for 2.6% of all RMP’s reported energy savings in Wyoming. Evaluated energy savings were 2,094,607 kWh, with an 108% realization rate.

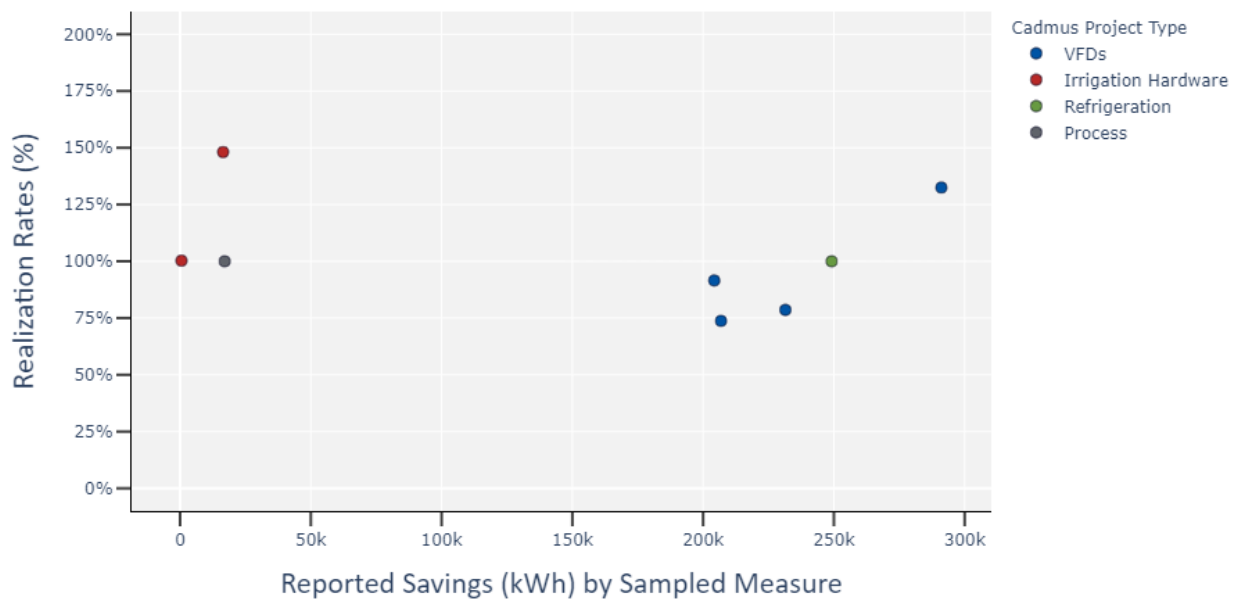
Methodology

The Cadmus team evaluated eight projects, accounting for 63% of the reported energy savings in the other stratum. Of the evaluated projects, RMP used deemed savings for two projects, custom calculations for five projects, and prescriptive calculations for one project. The team use the RTF irrigation hardware measure for incentivized irrigation hardware measures and used custom calculations for the remaining measures.

Findings

Figure 9 shows realization rates and associated energy savings for each sampled project.

Figure 9. Other Sample Results



¹¹ Regional Technical Forum. Accessed January 2021. “Non-Residential Lighting Midstream.” <https://rtf.nwcouncil.org/measure/non-residential-lighting-midstream>

Two projects exhibited realization rates below 80%, and one project exhibited a realization rate above 120%. Table 16 provides specific details related to those projects.

Table 16. 2018-2019 Wyoming Wattsmart Other Sample Detailed Findings

Project	Project Measures	Reported kWh	Evaluated kWh	Site Realization Rate	Notes
WBWY_14235	VFDs	291,098	385,712	133%	Reported savings based on assumed load profile for process equipment. Cadmus collected metered equipment performance data and evaluated savings based on the measure load profile.
WBWY_234638	VFDs	206,843	152,569	74%	Reported savings based on assumed load profile for condensing fan VFDs. Cadmus collected fan meter data and evaluated savings based on the actual load profile.
WBWY_239228	VFDs	231,451	181,908	79%	Reported savings based on assumed load profile for condensing fan VFDs. Cadmus collected fan meter data and evaluated savings based on the actual load profile.

Three projects with realization rates greater than 120% or less than 80% involved installation of VFDs serving process equipment or refrigeration condenser fans. Each project reported savings based on an assumed load profile or limited post-implementation meter data. Cadmus collected meter data from all three customers and found the load profile differed from the assumed reported value. Because energy savings for VFDs are a function of the associated equipment load profile, evaluated energy savings were higher or lower than reported.

HVAC

RMP provided incentives for 82 HVAC measures in 24 unique projects. These projects consisted of controls and thermostats, cooling, custom, heat pumps, and motors. RMP reported 2,159,786 kWh in energy savings, accounting for 3% of all reported energy savings during the 2018-2019 program. Evaluated energy savings for the HVAC stratum were 2,725,093 kWh, with a 126% realization rate.

Methodology

The Cadmus team evaluated six HVAC projects, accounting for 1,068,679 kWh and 49% of all reported energy savings in the HVAC stratum. The sampled projects included VFDs, chiller plant upgrades, packaged air conditioner, and custom projects.

Prescriptive calculation workbooks were used to report savings for the chiller and packaged air conditioner projects. These calculators documented customer information, project locations, equipment specifications, and energy savings calculations. The Cadmus team reviewed the methodology and assumptions for each prescriptive calculator and contacted customers to verify calculation inputs. In some cases, the customer provided photos or meter data to support the verification process. The team then used the collected data to update the prescriptive calculators and determine evaluated savings.

For the project where the program administrator used custom calculations, the team reviewed the energy analysis report and savings verification report for the energy savings methodology, inputs, assumptions, and accuracy. Where documentation collected from the customer (including analyses of building management trend data) deviated from claimed equipment quantities, performance specifications, or operation characteristics, the team recreated the custom calculations using the updated information.

For VFDs installed on HVAC ventilation equipment (e.g., supply fans, return fans, exhaust fans), the Cadmus team’s evaluation used deemed savings from the variable speed drive (VSD) load shape study.¹²

Findings

Figure 10 shows realization rates and associated energy savings for each sampled project.

Figure 10. HVAC Sample Results



Two sites exhibited realization rates less than 80%, and two sites exhibited realization rates greater than 120%. Table 17 provides specific details for sites achieving realization rates greater than 120% or less than 80%. For the remaining sites, the Cadmus team found no differences between savings and calculated savings.

¹² Deemed savings were based on the *Variable Speed Drive Loadshape Project Report* for the Northeast Energy Efficiency Partnership (NEEP). August 2014. Prepared by Cadmus. <http://www.neep.org/variable-speed-drive-loadshape-study-final-report>

Table 17. 2018-2019 Wyoming Wattsmart HVAC Sample Detailed Findings

Project	Project Measures	Reported kWh	Evaluated kWh	Site Realization Rate	Notes
WBWY_305897	Chiller, VFDs	488,133	234,133	48%	Reported savings used the average deemed savings for all pumps from the 2010 Wyoming market characterization study. Evaluated savings used VFD savings specific to chilled water pumps based on the 2018 Idaho Power TRM.
WBWY_263729	VFDs	111,360	171,648	154%	Reported savings used the average deemed savings for fans from the 2010 Wyoming market characterization study. Evaluated savings were based on deemed savings for supply fans serving HVAC units in the 2014 VSD load shape project report for NEEP.
WBWY_294964	Air conditioner	1,476	1,010	68%	Reported calculations used baseline efficiency from a split-system A/C unit. The installed system is a packaged A/C unit with a higher baseline efficiency, resulting in lower realized savings.
WBWY_252008	VFDs	174,000	286,575	165%	Reported savings used the average deemed savings for fans from the 2010 Wyoming market characterization study. Evaluated savings were based on deemed savings for supply fans serving HVAC units in the 2014 VSD load shape project report for NEEP.

The following is further explanation for some of the more atypical measure-level realization rates in the evaluated HVAC projects:

- RMP uses deemed savings for VFDs serving pumps and fans based on a 2010 Wyoming market characterization study. Cadmus evaluated VFD projects using deemed savings specific to the installed equipment. Because the load shapes vary between heating water plant pumps, chilled water plant pumps, HVAC supply, and return and exhaust fans, realized energy savings are expected to deviate from reported values. Cadmus evaluated VFD projects serving HVAC fans by referencing the 2014 VSD load shape study and applying the deemed savings specific to HVAC supply fans, return fans, and exhaust fans.¹³ Deemed savings from the NEEP load shape study are based on 13 months of hourly metered data from 191 supply and return fans in the Northeast. The study represents the most recent and applicable study of the energy savings impact of variable speed drives on HVAC fans. Cadmus evaluated VFDs serving pumps by applying deemed energy savings specific to heating water plant pumps or chilled water plant pumps from the 2018 Idaho Power TRM.
- One project involved installation of a five-ton packaged air conditioning unit. Cadmus found that the reported savings calculation methodology was appropriate but the baseline efficiency value

¹³ Northeast Energy Efficiency Partnership (NEEP). August 2014. *Variable Speed Drive Loadshape Project Report*. Prepared by Cadmus. <http://www.neep.org/variable-speed-drive-loadshape-study-final-report>

was based on split-system air conditioning units from the 2015 IECC. Packaged air conditioning units from the 2015 IECC have a higher baseline efficiency than split-system air conditioning units. Because the installed equipment is a packaged unit, lower energy savings are realized.

Evaluated Net Savings

The Cadmus team evaluated net savings by conducting a freeridership and spillover analysis using responses from surveys. *Appendix A. Self-Report Net-to-Gross Methodology* provides details about the net savings methodology, which aligns with industry best practices as summarized in the Uniform Methods Project (UMP).¹⁴

Further, in estimating nonparticipant spillover (NPSO), Cadmus asked a series of questions in the 2018-2019 general population survey of RMP customers in Wyoming. The questions addressed savings generated by customers who, motivated by the program’s reputation and marketing, conducted energy efficiency installations without receiving incentives.

Table 18 presents net savings evaluation results, shown as evaluated gross savings and NTG by program-measure strata. Cadmus weighted estimates of measure strata freeridership by their evaluated program energy savings and added spillover values to arrive at the program’s overall 88% NTG estimate.

Table 18. 2018-2019 Wyoming Wattsmart Business Program NTG Results

Program Delivery Channel	Measure Responses (n)	Evaluated Gross Program Population Savings (kWh)	NTG	Evaluated Net Program Population Savings (kWh)
Lighting	13	22,695,332	76%	17,248,452
Energy Management	1	16,072,910	76%	12,215,412
Oil & Gas	2	15,660,966	101%	15,817,576
Motors	1	13,762,449	101%	13,900,073
Direct Install	23	5,867,734	105%	6,161,120
Other	N/A	2,094,607	88%	1,843,254
HVAC	N/A	2,725,093	88% ^a	2,398,082
Overall	40	78,879,090	88%^b	69,583,969

^a Applied overall savings-weighted NTG of measures with survey respondents because there were no survey respondents to inform a specific measure stratum estimate. The overall NTG estimate is the savings-weighted average of measure strata with survey respondents.

^b Weighted by evaluated gross program population savings.

The following sections describe the NTG methodology used by the Cadmus team and the results for the 2018-2019 Wattsmart Business program.

¹⁴ National Renewable Energy Laboratory. October 2017. “Chapter 21: Estimating Net Savings – Common Practices” in *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. <https://www.nrel.gov/docs/fy17osti/68578.pdf>

Methodology

This section presents a brief overview of the Cadmus team’s NTG methodology (*Appendix A. Self-Report Net-to-Gross Methodology* provides a more detailed explanation). To determine net savings, the team used a self-report approach and analyzed the collected 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.

Freeridership and spillover constituted the NTG. The Cadmus team used the following formula to determine the final NTG ratio for all 2018 and 2019 participants:

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

Freeridership Estimation

The Cadmus team determined freeridership based on an approach previously developed for RMP, which used responses from a series of survey questions. These questions asked whether participants would have installed the same equipment in the program’s absence at the same time, in the same amount, and at the same efficiency level.

To score freeridership, the team first reviewed participant survey responses to determine whether the exact same project (in terms of scope and efficiency level) would have occurred at the same time in the program’s absence. If so, the team scored the respondent 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.

Those not fitting these criteria were scored as non-freeriders. If the project would have occurred within the same 12-month period, but at differing sizes or efficiency levels, the team scored the respondent as a partial freerider. The team then weighted program-measure, stratum-specific freeridership estimates by evaluated energy savings achieved by sample respondents to calculate the weighted freeridership estimate for each measure stratum.

Spillover Estimation

The Cadmus team also estimated the indirect influence of program activities on the broader market. This estimate of program spillover represented energy savings attributable to the program’s intervention and influence but not currently reported in program tracking data. Spillover savings can derive from participants and nonparticipants, but participant spillover occurs when a program influences participants to install additional energy-efficient equipment beyond what that program offers incentives for. NPSO savings occur when market allies influenced by the program install or influence nonparticipants to install energy-efficient equipment.

The team determined participant spillover by estimating savings derived from additional measures installed and by determining whether respondents credited RMP with influencing their decisions to install additional measures. The team included measures eligible for program incentives, provided the respondent did not request or receive the incentive.

Freeridership Findings

After conducting a survey with 40 participants, the Cadmus team converted the freeridership question responses into a freeridership estimate for each participant, using the approach described in *Appendix A. Self-Report Net-to-Gross Methodology*.

To determine the extent that the Wattsmart Business program affected installation decisions, the team asked respondents what would have differed about their installations had the program not been an option. Table 19 summarizes participant measure responses, along with an initial freeridership estimate calculated for each respondent.

Table 19. 2018-2019 Wyoming Wattsmart Measure Installations in Absence of Program (n=40)

Respondent Category	n*	Percentage of Total ^a	Initial Freeridership Estimate
Would have been installed at the same efficiency and scope within the same year	7	18%	100%
Would have installed 75% of the equipment at the same level of efficiency within the same year	1	3%	75%
Would have installed 100% of the equipment at a lower efficiency than installed through the program (but better than standard efficiency) within the same year	1	3%	50%
Would not have been installed at all	20	50%	0%
Would have been installed more than 12 months later	11	28%	0%

^aTotal may not sum to 100% due to rounding.

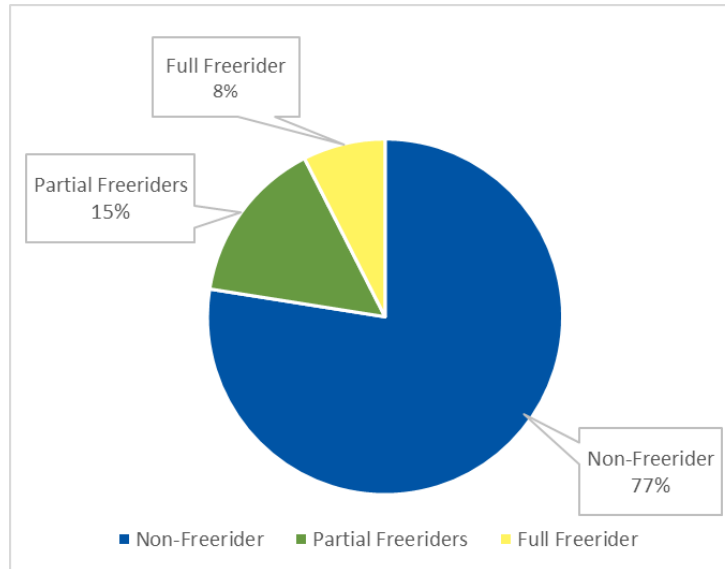
The Cadmus team reduced freeridership if the respondent indicated that past program participation played an important role in their decisions. This approach credits RMP’s efforts to cross-promote its entire portfolio of energy efficiency programs.

To calculate this credit, the Cadmus team reviewed respondents’ ratings of the prior program’s influence on a scale of 1 to 5, where 1 indicated *not important at all* and 5 indicated *extremely important*. For those rating their previous participation as a 4 or 5, the team reduced their freeridership score by 50% or 75%, respectively. This affected five projects that initially received a 100% freeridership estimate, reducing four freeridership estimates by 75% and reducing one by 50%. This also affected a project that initially received a 75% freeridership estimate and another that initially received a 50% freeridership estimate, reducing both 75%.

In addition, the team compared participants’ statements about what they would have done in the program’s absence to their statements regarding factors influencing their projects. The measure-specific responses for two participants indicated that they found the program incentive or program assistance important in their decisions, but they also said they would have installed a similar project at the same time. The team considered these responses inconsistent and requested that the participants explain the program’s influence on their projects in their own words. One respondent’s description warranted a freeridership adjustment from 100% to 50%. When asked about the program’s impact on the decisions to complete energy efficiency improvements, one participant stated: “It really helped financially as mine was a new business on a shoestring.”

Based on participants’ responses and after adjusting for inconsistencies and prior program experience, the team determined freeridership by respondent, as shown in Figure 11. Overall, the team identified 8% of participants as full freeriders, 77% as non-freeriders, and 15% as partial freeriders.

Figure 11. Freeridership by Respondent



Participant Spillover Findings

After participating in the Wattsmart Business program, some participants installed additional, energy-efficient measures. The Cadmus team attributed program spillover only to additional purchases that were significantly influenced by participation in the Wattsmart Business program but that were not reported through the program. Respondents indicated influence on a scale of 1 to 5, where 1 indicated *not important at all* and 5 indicated *extremely important* in response to this request: “Please rate how important your experience with the RMP program was in your decision to install this energy-efficient product.” If a respondent rated a measure as a 5, the team considered the spillover measure attributable to the RMP program. Two lighting stratum respondents and one direct install stratum respondent responded with a 5.

The Cadmus team used evaluated savings from the engineering gross savings analysis to estimate spillover measure savings. This involved estimating the spillover percentage for a stratum by dividing the sum of additional spillover savings by total gross program savings achieved by measure stratum respondents. This produced the results shown in Table 20.

Table 20. 2018-2019 Wyoming Wattsmart Participant Spillover

Strata	Spillover Measures Installed	Spillover Measure Quantity	Total Spillover Energy Savings (kWh)	Surveyed Program Measure Strata Savings (kWh)	Spillover Percentage
Lighting	Pin-based LEDs & recessed downlights	108	6,076	215,028	3%
Direct Install	Exterior LED wall packs	8	10,162	231,708	4%

Nonparticipant Spillover

The Cadmus team asked a series of questions in the nonparticipant survey to estimate NPSO, which refers to savings generated by customers motivated by the RMP program’s reputation, past RMP program participation, and/or the RMP program’s marketing to install energy efficiency equipment despite not receiving an incentive. The team estimated NPSO as 1% of total 2018-2019 Wattsmart Business program savings. *Appendix B. Nonparticipant Spillover* provides detailed NPSO analysis methods and results.

NTG Findings

As shown in Table 21, the Cadmus team calculated a program-weighted NTG of 88% by weighting each measure stratum freeridership percentage by the evaluated gross population’s energy savings for each measure stratum then adding participant spillover and NPSO.

Table 21. 2018-2019 Wyoming Wattsmart NTG Results

Strata	Measure Responses (n)	Freeridership Ratio	Spillover Ratio	NPSO	NTG	Evaluated Gross Program Population Savings (kWh)
Lighting	13	28% ^a	3%	1%	76%	22,695,332
Energy Management	1	25% ^a	0%	1%	76%	16,072,910
Oil & Gas	2	0% ^a	0%	1%	101%	15,660,966
Motors	1	0% ^a	0%	1%	101%	13,762,449
Direct Install	23	0% ^a	4%	1%	105%	5,867,734
Other	NA	N/A	NA	NA	88% ^c	2,094,607
HVAC	NA	N/A	NA	NA	88% ^c	2,725,093
Total	40	14%^b	1%	1%	88%	78,879,090

^a Weighted by evaluated gross program savings.

^b Weighted by evaluated gross program population savings.

^c Applied the overall savings’ weighted NTG for measures with survey respondents 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.

Benchmarking NTG

The Cadmus team benchmarked the Wattsmart Business program against similar nonresidential programs. Table 22 shows freeridership, spillover, and NTG estimates reported for prior RMP program years and for two other utilities offering similar programs and measures.

Table 22. Wyoming Wattsmart NTG Benchmarking Comparisons

Utility/Region	Reported Year	Responses (n)	Freeridership %	Spillover %	NPSO	NTG
Rocky Mountain Power Wyoming 2018-2019 Wattsmart Business Program	2021	40	14%	1%	1%	88%
Rocky Mountain Power Wyoming 2016-2017 wattsmart Business Program	2018	81	7%	0%	0%	93%
Rocky Mountain Power Wyoming 2014-2015 wattsmart Business Program	2017	56	34%	4%	N/A	70%
Rocky Mountain Power Wyoming 2011-2013	2015	189	24%	0%	N/A	76%

Utility/Region	Reported Year	Responses (n)	Freeridership %	Spillover %	NPSO	NTG
FinAnswer Express Evaluation						
Northeast Utility—C&I Prescriptive	2019	89	26%	0%	N/A	74%
CY2019 Wisconsin Focus on Energy Nonresidential Evaluation Report—Wisconsin Statewide	2019	80	30%	1%	N/A	71%

The 2018-2019 Wattsmart Business program freeridership estimate (14%) was higher than the 2016-2017 *wattsmart* Business program freeridership estimate (7%). These RMP program evaluations were completed using the same NTG methodology used for this evaluation.

The methodology used for the Northeast utility C&I Prescriptive and the CY2018 Wisconsin Focus on Energy Nonresidential evaluations was comparable to that used for the 2018-2019 Wattsmart Business program, though the designs differed.

Process Evaluation

Cadmus conducted an intensive process evaluation for the 2016-2017 cycle that included detailed documentation of administrative structures, marketing, data storage, and reporting. For the 2018-2019 cycle, Cadmus conducted a more limited process evaluation that focused on recent changes to program design or implementation and on the response to those changes from trade allies and participants.

Findings for the 2018-2019 cycle are based on an analysis of data collected through interviews with program and implementer staff and trade allies and through surveys of participants, partial participants, and nonparticipants. For these research tasks, the team assessed the following:

- Effectiveness of the program’s design and processes
- Participant’s customer experience and satisfaction
- Barriers to customer participation

Table 23 lists the questions asked in the primary research areas. Although data were collected during the COVID-19 pandemic, survey and interview instruments tried to focus respondents on their experiences with the program in 2019 and did not address events or situations occurring in 2020.

Table 23. 2018-2019 Wyoming Wattsmart Research Areas and Questions

Research Areas	Researchable Questions and Topics
Program Status	How did the program perform in 2018 and 2019, and what opportunities and challenges do program staff foresee for future program years?
Awareness	How did customers learn about the Rocky Mountain Power Wattsmart Business program incentives?
Participation/Motivations and Barriers	What are the key factors influencing participants’ decision to participate in the program? What are the key factors in any customer’s decision to install energy efficiency improvements? What are the participation barriers for participants and nonparticipants?
Satisfaction	How satisfied are participants with the program and with the program measures, incentives, and services?
Firmographics	What are the business characteristics of participants in each program offering? How do participant awareness and business size compare by program delivery channel?

Methodology

The following sections provide an overview of the methodology the Cadmus team used in the process evaluation to examine program years 2018 and 2019.

Materials and Database Review

The Cadmus team reviewed several program documents and files to inform development of data collection instruments, survey samples, and data analysis:

- Wyoming Energy Efficiency and Peak Reduction Annual Reports for 2018 and 2019
- Wattsmart Business program website
- Participant and partial participant databases
- RMP’s nonresidential customer database

Utility and Administrator Staff Interviews

The Cadmus team developed stakeholder interview guides and collected information about key topics from program management staff. The team conducted four interviews—one each with program staff at Rocky Mountain Power, Willdan, Nexant, and Cascade Energy—that focused on changes during 2018 and 2019 and covered these topics:

- Program goals and performance
- Program design and implementation changes
- Marketing and outreach
- Program delivery and management
- Data management and quality assurance
- Barriers and areas for improvement

Surveys

The Cadmus team surveyed three customer populations: participants, partial participants, and nonparticipants.

Participant Survey

The team conducted an online survey with 40 participants who installed measures through the Wattsmart Business program. The survey involved nine participants in Typical Upgrades, two in Custom Analysis, 23 in SBDI, and six in Lighting Instant Incentive (Midstream). The team designed survey instruments for each participant group, collecting data about the following process evaluation topics:

- Customer perceptions and motivations:
 - Program awareness
 - Reasons and motivations for participation
 - Perceived value of the program
- Customer experience:
 - Effectiveness of the program delivery, including marketing, outreach, and delivery channels
 - Customer interactions with trade allies, distributors, program staff, and program-funded, third-party technical service providers
 - Customer satisfaction regarding specific program elements and the Wattsmart Business program overall
 - Customers' participation challenges
- Program influence: freeridership and savings spillover
- Customer information: firmographic information

Participant Sample Detail

Cadmus included only 2019 participants in the sample frame, considering that participants would no longer accurately remember the circumstances of projects completed in 2018 by the time of the survey.

To prepare the sample frame, the team first removed records with no email address. Next, the team selected an individual record for each email contact in the participant tracking data. Where a group of records had the same contact information, the team first identified the measure category in the group that had the lowest representation in the sample frame then randomly selected one record from that measure category.

The sample frame contained these measure categories, from highest priority (smallest population) to lowest priority (largest population):

- | | |
|---------------------------|--|
| 1. Food Service Equipment | 7. Irrigation |
| 2. Refrigeration | 8. Motors |
| 3. Other | 9. Lighting (Lighting Instant Incentive) |
| 4. Oil & Gas | 10. Lighting (Typical) |
| 5. Energy Management | 11. Lighting (SBDI) |
| 6. HVAC | |

Survey invitations were sent to the entire sample to collect as many responses as possible. The online survey achieved a response rate of 12% (11 completes) for Typical Upgrades and Custom Analysis incentives, 11% (6 completes) for Lighting Instant Incentives, and 12% (23 completes) for SBDI.

Nonparticipant and Partial Participant Telephone Surveys

VuPoint conducted a telephone survey with 200 nonparticipants and five partial participants. The survey addressed the following process evaluation topics:

- Customer perceptions and motivations:
 - Program awareness
 - Reasons for and barriers to making energy-efficient improvements
 - Likelihood of requesting an incentive in the future
- Customer experience: Reasons partial participants did not complete specific projects
- Program influence: savings spillover
- Customer information: firmographic information and fuels used for space and water heating

The team removed participants and partial participants from the master list of nonresidential customers provided by RMP. From the remaining population, VuPoint randomly called nonparticipants until the quota of 200 was reached.

RMP, Nexant, Cascade, and Willdan provided the Cadmus team with lists of 2018 and 2019 partial participants from each of their respective program responsibility areas. The team checked this list against a list of program participants, removing any customers who, within that same timeframe, appeared on the participant list for another project. This eliminated the possibility of double-sampling these individuals.

The team also removed any accounts designated as on hold and any managed accounts identified by RMP. For partial participants who began but did not complete multiple projects during the evaluation period, the team included projects with the greatest estimated kWh savings and randomly selected partial participants from that sampling frame for surveys.

Trade Ally Interviews

Cadmus interviewed two participating RMP Wattsmart Business trade allies from Wyoming to collect feedback about their experience and gather insights about improving the experience for customers and vendors. Interviews sought to answer specific research questions regarding program function and how changes have impacted trade ally use.

The Cadmus team targeted active participating contractors and installers (defined as participating trade allies who had completed jobs in 2018-2019). At the time the team performed the interviews, 35 of the 38 Wyoming trade allies listed on the RMP website had completed a project in 2018 or 2019. The team used contact information provided by Nexant and sent a first round of email invitations and supplemented with follow-up calls where necessary. The team also used a consistent interview guide with subsections for programs unique to a specific state or trade. Table 24 shows the total available contacts for trade allies in Wyoming, targets, and completes.

Table 24. 2018-2019 Wyoming Wattsmart Trade Ally and Installer Interviews for Process Evaluation

	Total Active Participating TAs	Target Completes	Actual Completes
Wyoming	35	3	2

Program Implementation Changes

Drawing on stakeholder interviews, this section describes changes in the Wattsmart Business program’s implementation and delivery during the 2018-2019 evaluation period.

Administrator Roles

Through 2018, RMP had outsourced implementation of energy efficiency services for most customers, but it provided energy efficiency services directly for very large customers (referred to as a managed accounts). In mid-2019, after a competitive bidding process, RMP hired Cascade Energy to administer energy efficiency services for all non-Resource Extraction managed accounts. In 2019, RMP also extended the contract with Willdan Energy Services, who also manages the Small Business Direct offering, for energy efficiency services for Resource Extraction (oil, natural gas and mining) managed account customers. This transition, which occurred over a number of months, freed RMP staff to focus more on program design and management. For customers, this change allowed for a more streamlined experience since one team could work with the customer from project identification through to project completion and application processing.

Beginning in 2017 but extended into 2018, Nexant took steps to update the trade ally network serving commercial customers. All trade allies were asked to reapply to the program and to update requirements for training, insurance, and licensing. Nexant also introduced a “Premium” designation for

top-performing trade allies, and quarterly scorecards to keep trade allies apprised of their status. The scorecards track five performance categories – project count and savings, customer satisfaction, program satisfaction, application quality, and years of experience or level of training.

Participation

Table 25 shows the number of unique customers participating, by offering and measure and in total, in 2018 and 2019. Together, these three metrics provide an indication of the effectiveness of the value proposition of the program offerings and the effectiveness of program marketing.

Table 25. 2018-2019 Wyoming Wattsmart Participation by Year and by Offering*

Offering	Measure Category	Unique Customers (Unique Accounts)		Total Projects		Reported Savings (MWh)	
		2018	2019	2018	2019	2018 MWh	2019 MWh
Lighting Instant Incentive (Midstream)		38	69	125	178	1,430,339	1,597,382
SBDI		326	303	335	307	2,407,840	2,475,685
Typical Upgrades and Custom Analysis Incentives	Lighting	173	103	470	296	11,087,029	6,206,945
	Oil & Gas	7	15	15	41	3,905,090	11,755,876
	Motors	28	23	64	45	12,465,398	2,770,887
	Energy Management	4	8	4	9	4,520,161	9,926,778
	HVAC	14	7	66	16	1,204,198	955,588
	Other	21	14	37	34	1,106,976	837,109
Total		581	519	1,116	926	38,127,031	36,526,249

*Excludes three customers that received energy project manager payments, since these projects have no associated savings.

Overall participation by unique account was slightly lower in 2019 than in 2018 but varied more substantially in some individual offerings and measures. For example, the number of unique customers participating in Lighting Instant Incentives almost doubled in 2019 from 2018, the first full year of implementation. However, the number of projects per customer and the average saving per project decreased. This is not unusual for a project that is in a ramp-up phase. This indicates the offering is reaching an expanding group of customers and has value beyond the earliest adopters with the highest savings opportunity.

For projects in the Typical Upgrades and Custom Analysis offerings, lighting and motors had fewer unique customers and fewer projects in 2019 compared to 2018. These measures also had significantly lower reported savings in 2019 than in 2018. On the other hand, oil and gas projects and projects in the Energy Management offering had significantly more. Overall, program implementers managed to keep reported savings relatively even from 2018 to 2019.

According to the program tracking data, participation varied by building type and by offering, as shown in Table 26. Among Lighting Instant Incentive projects, hotels and motels were the most common building type. Among SBDI projects, office/retail space was most common. Among Typical Upgrades and Custom Analysis projects, the largest single group among known building types was described as commercial/industrial space. Note that 9% (n=303) of the midstream projects and 31% (n=1,097) of the projects in the Typical Upgrades and Custom Analysis offerings are Unknown.

Table 26. 2018-2019 Wyoming Wattsmart Projects by Offering and Building Type*

Building Type	Lighting Instant (Midstream) (n=303)	SBDI (n=642)	Typical Upgrade/ Custom Analysis (n=1,097)
Unknown	9%	0%	31%
Commercial/Industrial	0%	2%	14%
Large Retail	12%	6%	7%
School	4%	5%	5%
Office/ Retail	3%	40%	4%
University	16%	3%	4%
Parking Lot Lighting	0%	0%	3%
Agriculture	0%	0%	3%
Food service	1%	3%	3%
Healthcare	9%	3%	3%
Transportation	0%	0%	2%
Auto Repair	0%	11%	2%
Hotel/motel	34%	4%	2%
Penitentiary	0%	0%	2%
Religious Building	0%	3%	2%
Property Management	0%	1%	2%
Exercise Center/ Gym	2%	1%	2%
Warehouse	0%	6%	1%
Financial Institution	0%	3%	1%
Nonprofit	0%	0%	1%
Mall	0%	0%	1%
Public	0%	2%	1%
Manufacturing Facility	2%	0%	1%
Water Treatment Plant	0%	0%	0%
Entertainment	0%	2%	0%
Laundries	0%	1%	0%
Police/Fire Station	0%	1%	0%
Other	9%	5%	3%

*Columns may not sum to 100% due to rounding error.

Trade Ally Experience

Cadmus interviewed two participating RMP Wattsmart Business trade allies to understand their participation experience and gather insights about how the experience can be improved for customers and vendors. Although this small sample is not representative of the whole population of trade allies, the responses provide some insight into trade ally experiences. The interviews addressed the following research questions:

- What do companies expect from participation?
- What aspects of the program work well?
- How have recent program changes impacted trade ally use of programs?

- Are there opportunities for improvement? Where do trade allies need more support?
- What feedback can trade allies offer on customer response to program changes?
- Do trade allies have ideas for new products?

Program Participation

Both trade allies mentioned positive effects from their participation and said the programs fit well into their sales model. Both expressed a high level of satisfaction with the program overall. They also mentioned either a competitive advantage or a business expansion opportunity. For example, one trade ally said the program also allows the company to provide additional offerings to its customers.

Trade allies were asked about the “Premium Vendor” designation, and both were aware of it. One trade ally was listed as a premium vendor and mentioned specific benefits to the designation, such as having certain marketing advantages and the eligibility to receive certain awards once a year. This trade ally intended to maintain the designation. The second trade ally said the company was interested in receiving the premium vendor designation, but senior leadership was unwilling to incur the cost they thought would be necessary.

Scorecards that show the number of projects completed and customer satisfaction ratings are sent to trade allies each quarter. Interviewed trade allies had little familiarity with these quarterly scorecards. One was not aware of what the quarterly scorecards were, and the other mentioned getting the notifications but not fully understanding what the scorecards were.

Areas for Improvement

Trade allies also offered suggestions for improvement and detailed where they need more support. One said updates or improvements to the online experience would be helpful for them as well as their customers. They suggested adding a feature where they (the trade ally) could monitor project status, including who conducted the pre-inspection and when the post-inspection was scheduled.

One trade ally also said additional training on the motors incentive would be beneficial. This trade ally along with a colleague wanted to learn more about the motors incentive and how to better navigate the program.

Participant Experience and Satisfaction

The Cadmus team conducted an online survey with 40 Wattsmart Business program participants—11 receiving Typical Upgrades or Custom Analysis incentives, 23 receiving incentives through the SBDI offer, and six receiving incentives through the Lighting Instant Incentive (Midstream) offer.

Wattsmart Business Typical Upgrades and Custom Analysis

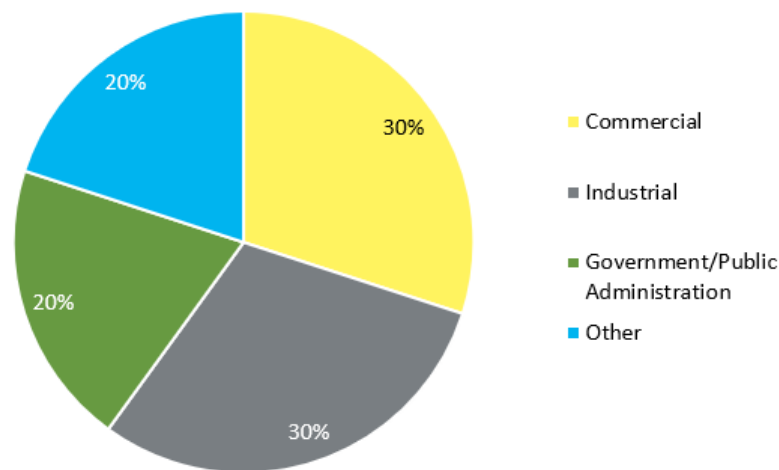
As shown in Table 27, there were 11 survey respondents who received Typical Upgrades or Custom Analysis incentives across six measure categories.

Table 27. 2018-2019 Wyoming Wattsmart Typical Upgrades and Custom Analysis Customers by Measure Type

Measure Category	Typical Upgrades	Custom Analysis
Lighting	7	0
Oil & Gas	2	0
Energy Management	0	1
Motor Systems	0	1
Total	9	2

As shown in Figure 12, most respondents were commercial or industrial businesses (30% each, n=10).¹⁵

Figure 12. Typical Upgrades and Custom Analysis Participant Respondents by Business Sector



Source: RMP Wattsmart Business Program 2018-2019
Wattsmart Business Participant Survey QE1. Don't know and refused responses removed. (n=10)

Business sizes varied. Four of nine respondents said their company employs between 11 and 25 people, two said their company employs between one and 10 people, two said 76 to 100 people, and one said 26 to 50 people.

Six of nine respondents said their company uses gas to fuel their space heating, two use electric, and one uses both. Four of eight respondents reported using electricity for water heating, three use gas, and one uses both.

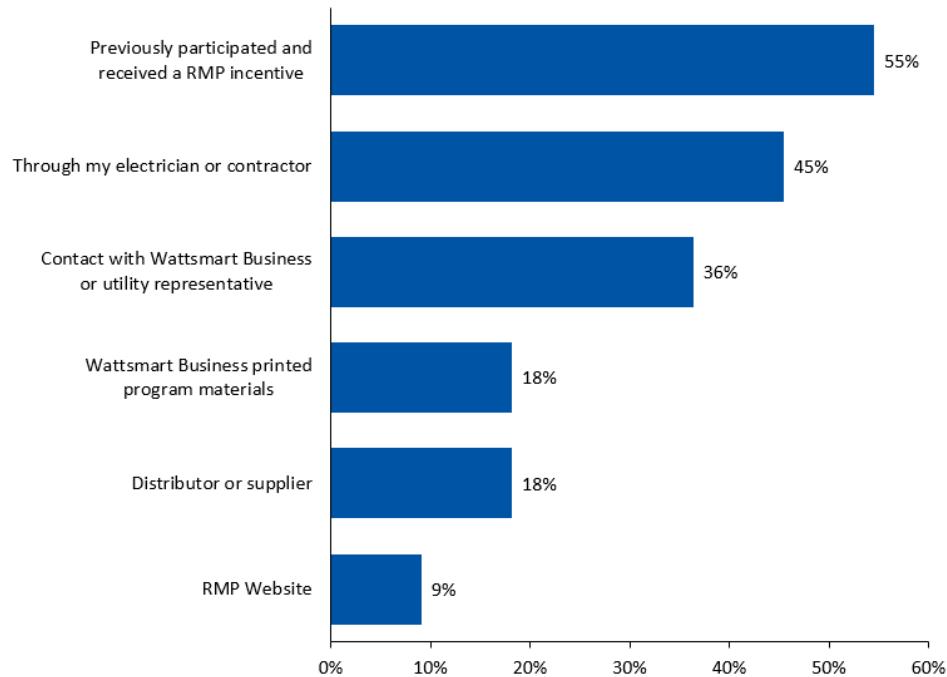
Awareness

Among respondents, the most common sources of awareness about the Wattsmart Business Typical Upgrade or Custom Analysis incentives was previous participation and receiving an RMP incentive

¹⁵ The “n” represents the number of respondents providing a relevant response to the question. Percentages may sum to more than 100% as some respondents provided multiple responses. The analysis does not include respondents indicating “don’t know” or “refused.”

(55%, n=11), followed by learning through an electrician or contractor and contact with a Wattsmart Business or utility representative. The number of participants indicating previous participation (6) is high, since RMP has an active marketing strategy for the offering, but may be an anomaly due to the small sample size. Figure 13 shows the distribution of responses across each mentioned information source.

Figure 13. Typical Upgrades and Custom Analysis Participants Information Sources



Source: RMP Wattsmart Business Program 2018-2019 Wattsmart Business Participant Survey QA4. Don't know and refused responses removed. Multiple responses allowed. (n=11)

Customer Experience

Cadmus identified three key metrics that provide a high-level picture of how participants are engaging with the Wattsmart Business program and application processes. These metrics are how much of the project cost is covered by incentives, who installed the measure, and who filled out the application. These metrics were not captured in previous surveys, but Cadmus intends to continue to monitor them moving forward.

Project cost covered by incentive. Of seven respondents, four respondents (57%) reported their incentive covered 25% or less of their project cost, and three (43%) said it covered between 25% and 50%. Of these respondents, 4 completed lighting projects and 3 completed a non-lighting project.

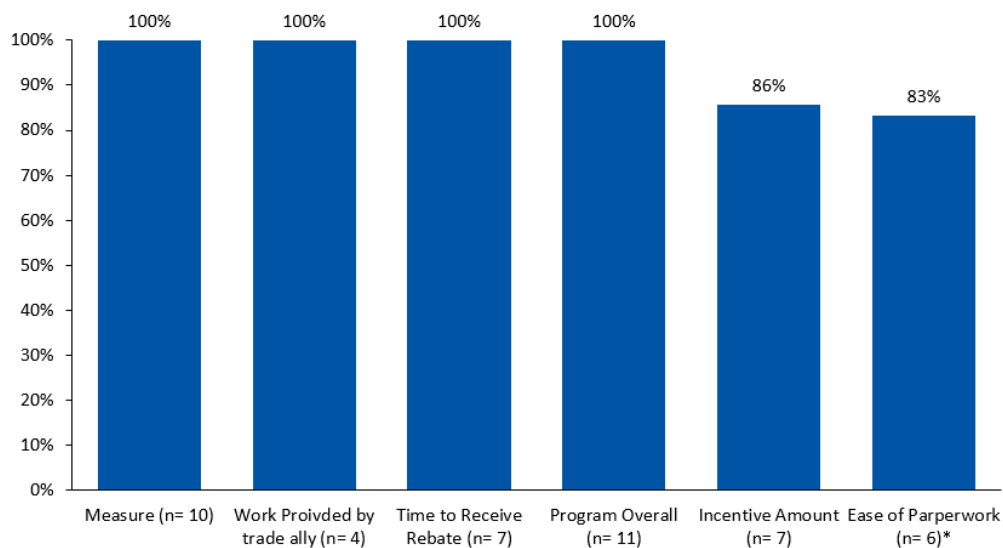
Installation of project. Six respondents said their projects were primarily installed by an independent contractor, one said by a Wattsmart Business program participating vendor, and one respondent with no additional help (n=8).

Completion of application. Three respondents said they or someone else at their company completed the applications, three said their contractor or installer completed the application, one said a Wattsmart Business representative or energy engineer completed it, and one said someone else (n=8).

Satisfaction and Areas for Improvement

Figure 14 shows respondent satisfaction levels with several program components and with the program overall. Respondents were most likely to be *very satisfied* or *somewhat satisfied* with the measure they purchased, the work provided by a trade ally, the time to receive their rebate, and the program overall. Respondents were still likely to be satisfied with incentive amounts and the ease of filling out their paperwork, although a few were less than satisfied.

Figure 14. Satisfaction with Program Components



Source: RMP Wattsmart Business Program 2018-2019 Wattsmart Business Participant Survey QB2, QB4, QB7, B10, B12, and QB15. Don't know and refused responses removed.
 *Rating scale measured "easy" rather than "satisfied."

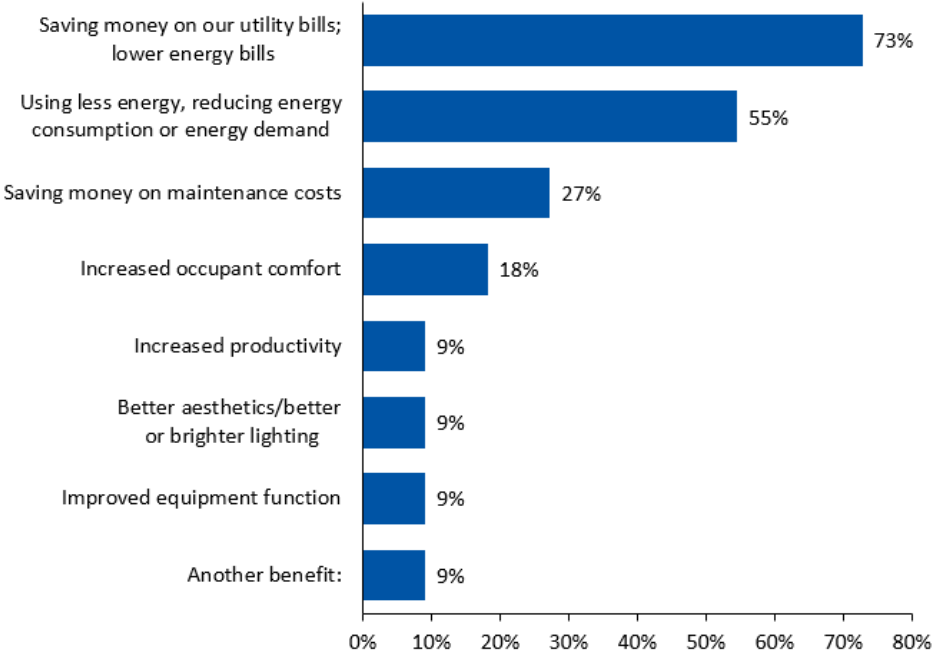
One respondent was *not too satisfied* with the dollar amount of the incentive, which the respondent indicated was 0% of the project cost. One respondent was said the paperwork was *not too easy* to fill out and needed a clearer understanding of what was required along with the associated forms.

Though satisfaction with the program and its components was high, one respondent suggested broader marketing and another had questions about how the ESP incentive was determined.

Project Benefits

Surveys asked respondents about benefits they experienced from program participation. Five said their company experienced one or more benefits due to equipment installation. None of the respondents said their company experienced no benefits. The most common benefits were saving money on utility bills (73%) and using less energy (55%). Figure 15 shows the frequency of all benefits cited by respondents.

Figure 15. Benefits of Equipment Installed

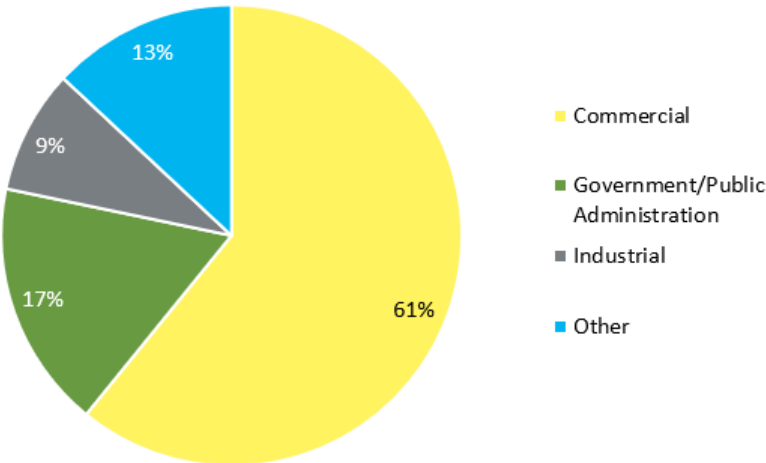


Source: RMP Wattsmart Business Program 2018-2019 Wattsmart Business Participant Survey QB14. Don't know and refused responses removed. Multiple responses allowed. (n=11)

Small Business Direct Install

The Cadmus team surveyed 23 SBDI participants. As shown in Figure 16, most participants came from the commercial business sector (61%, n=23).

Figure 16. SBDI Participant Respondents by Business Sector



Source: RMP Wattsmart Business Program 2018-2019 SBDI Participant Survey QE1. Selected Choice (n=23).

Among SBDI respondents, 95% (n=22) owned their facilities. Most respondents (55%, n=22) said their company employs between one and 10 people, 27% of respondents said 11 to 25 people, and 9% said

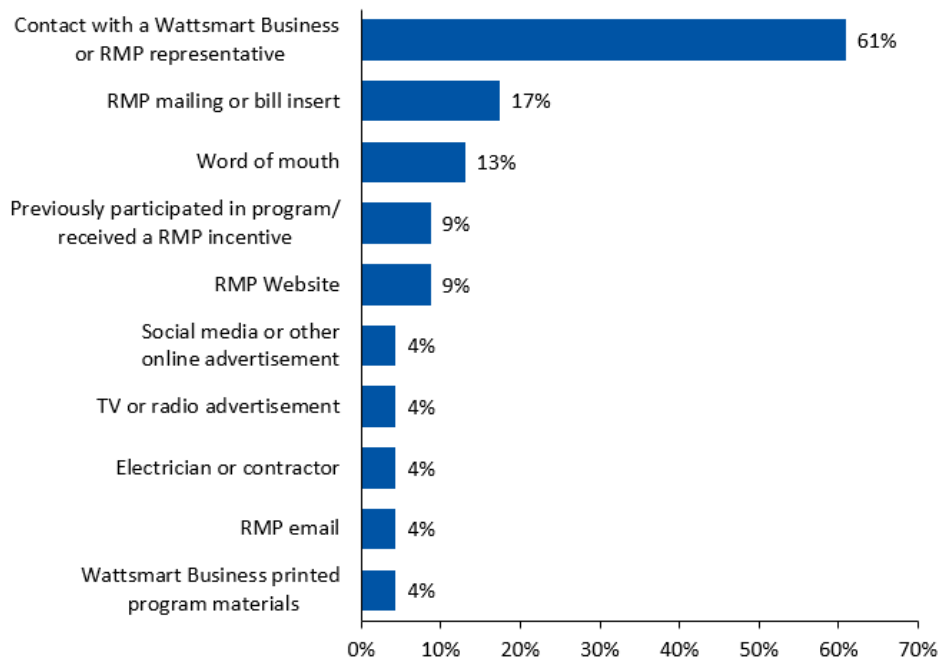
26 to 50 people. Two respondents (9%) reported their organizations employ more than 500 people. One of these respondents was a commercial business while the other was a school.

Ninety-six percent (n=23) of respondents said they use gas for space heating at their facility, while one respondent said the company uses propane. Similarly, most respondents (70%, n=23) reported using gas for water heating, 26% use electricity, and 4% use propane.

Awareness and Communication

SBDI participants most commonly became aware of the program through contact with a Wattsmart Business or RMP representative. Other common sources of program awareness included an RMP mailing or bill insert and word-of-mouth. Figure 17 shows a breakdown of all awareness channels.

Figure 17. Sources of Program Awareness Among SBDI Participants



Source: RMP Wattsmart Business Program 2018-2019. SBDI Participant Survey QB1. Don't know and refused responses removed. Multiple responses allowed (n=23).

Motivation and Participation

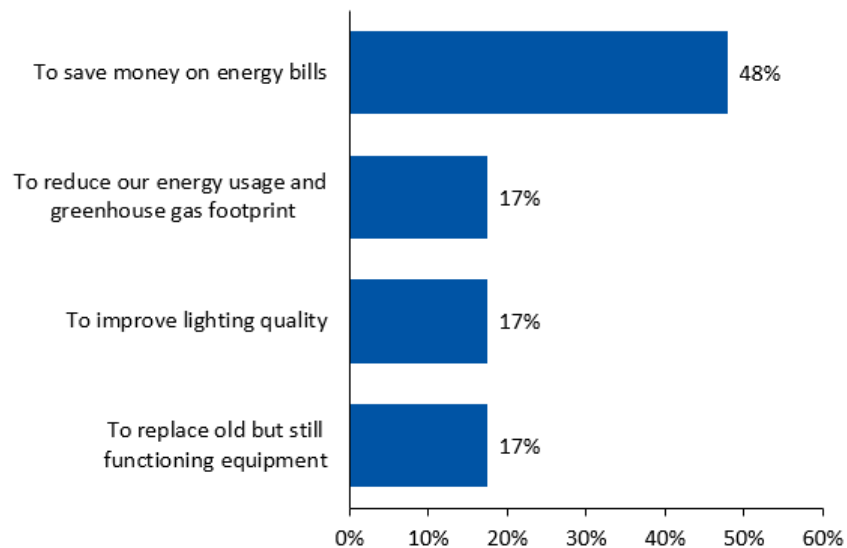
Figure 18 shows the most important factors in respondent companies' decisions to participate in the SBDI program. Nearly half of the respondents cited saving energy or saving money on energy bills as the most significant factor in their decision-making.

Respondents were also asked about the project proposal they may have received after their free energy assessment. Ninety-five percent of respondents said they did receive a project proposal with estimates of their incentive or discount and utility bill savings after their energy assessment (n=20). Of these respondents, 58% said the information in the project proposal that was most influential in their decision

to proceed was information on project cost savings, and 37% said it was utility bill and energy savings (n=19).

Six of twenty-three respondents (26%) said there was other lighting equipment they wanted to install, which was not offered in their project proposal. Of these respondents, four described the additional lighting they wanted as hanging lights, shop lights, lighting in “one additional warehouse”, and one “fixture they missed”, respectively. Additionally, respondents said they asked their contractor about the other equipment they wanted, and one respondent said their contractor mentioned other Wattsmart Business incentives that may be available for that equipment.

Figure 18. Motivation to Participate



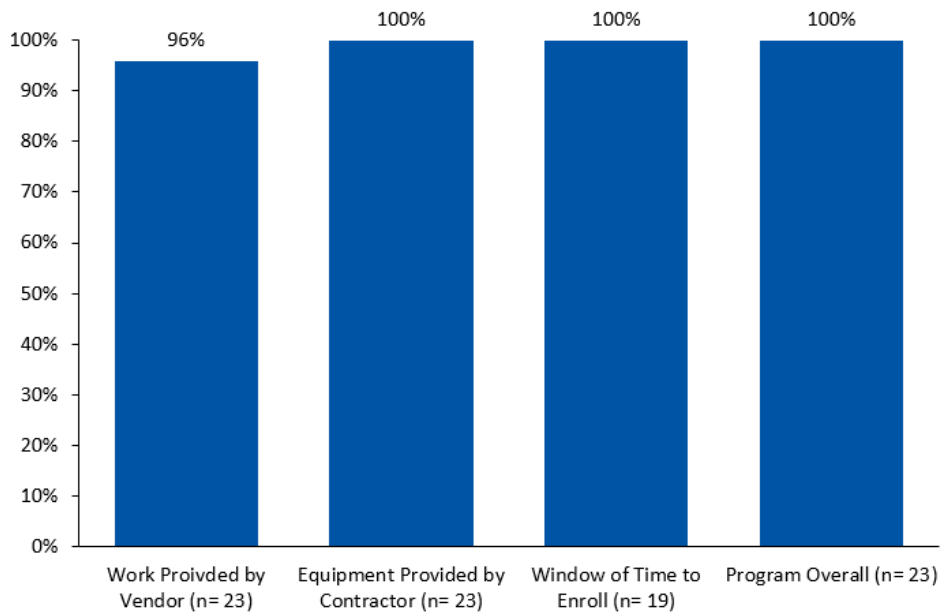
Source: RMP Wattsmart Business Program 2018-2019. SBDI Participant Survey QB2. Don't know and refused responses removed. Selected Choice (n=23).

Satisfaction

Respondents were asked to rate their satisfaction with several program aspects and with the program overall. As shown in Figure 19, satisfaction levels were high among the program and its components with two components and the program receiving 100% satisfaction.

Four SBDI respondents who were *somewhat satisfied* or *not too satisfied* with the contractor's work reported specific concerns. The one respondent who was *not too satisfied* said the contractor left behind a mess at the business. Of the three respondents who said they were *somewhat satisfied*, two said it was because the contractor did not install all the equipment they were expecting (one because the contractor ran out of time and the other because the contractor was not able to reach taller ceiling fixtures) and one respondent said it was because some of the lights that were installed had already burnt out. (In an interview, the SBDI implementer explained that SBDI projects need to be completed in a single day to control costs, which limits the work that can be included in the scope. The subcontractors completing the jobs are also sometimes limited by code requirements and access issues.)

Figure 19. Customer Satisfaction Levels with SBDI Elements



Source: RMP Wattsmart Business Program 2018-2019. SBDI Participant Survey QB7, QB9, QB16 and QB21.

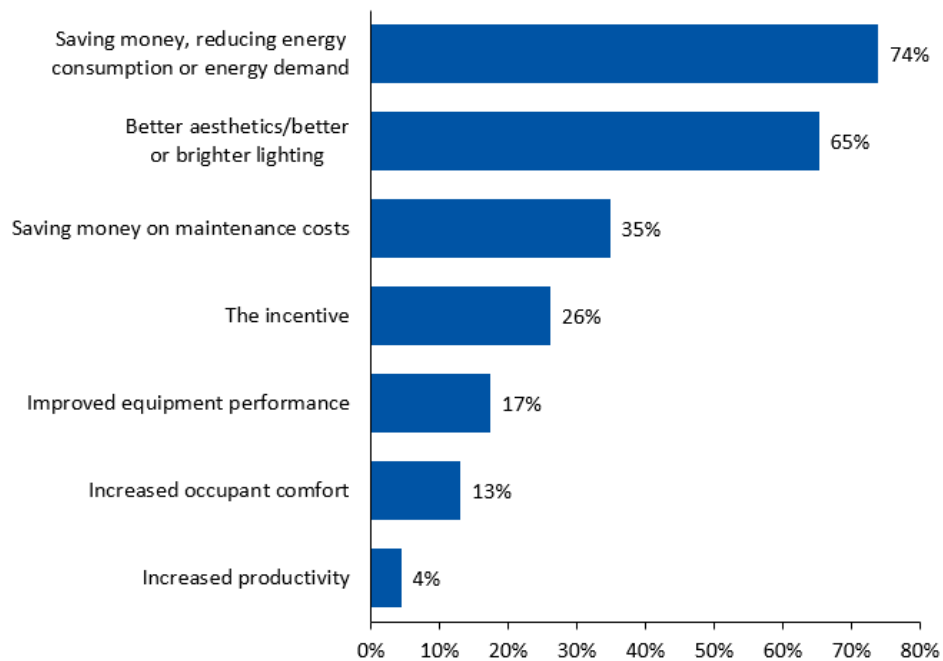
Benefits and Challenges

Most respondents (74%, n=23) identified more than one benefit from participating in the SBDI program. None of the respondents said their company received no benefits. As shown in Figure 20, most SBDI respondents cited saving money and better aesthetics/better or bright lighting as benefits (74% and 65%, respectively).

When asked if they had encountered any challenges in participating in the SBDI program, 87% of participants (n=23) replied that they had not. Three participants identified challenges that included contractors not installing all the intended equipment (one respondent), contractors not cleaning the work area (one respondent), and communication issues (one respondent).

When asked what RMP could do to help overcome these challenges, respondents’ suggestions included providing a more reliable point of contact (one respondent) and requiring an inspection prior to the contractor leaving (one respondent). When asked for suggestions that could help improve the SBDI program overall, participants’ responses included providing a better estimation of time involved to ensure all the work can be done (one respondent), notifying customers sooner about application deadlines (one respondent), and replacing lights that may have been missed originally (one respondent).

Figure 20. Customer-Reported Benefits of Equipment Installed Through SBDI



Source: RMP Wattsmart Business Program 2018-2019. SBDI Participant Survey: QB17.
 Don't know and refused responses removed. Select up to three (n=23).

Lighting Instant Incentives

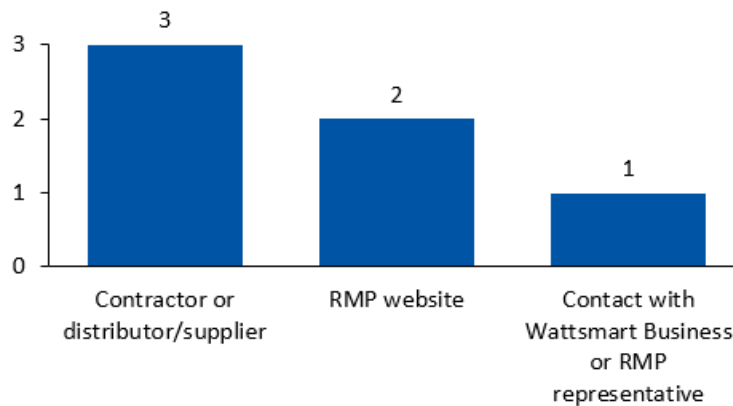
The Cadmus team received six responses from customers who participated in the Lighting Instant Incentive (Midstream) program. Four respondents were commercial businesses, and two were in the government/public administration sector. Three respondent’s organizations employed between 11 and 25 people, another employed between 101 and 200, and the third employed more than 500 people. Five respondents said their organization owned the facility where the project was completed, and one said the organization leased the facility. Two respondents said their organization used electricity for space heating and three said they use gas. Additionally, four respondents said they use gas for water heating.

Awareness and Participation Experience

As shown in Figure 21, respondents learned about incentives available for the equipment they purchased through multiple channels. The primary channel respondents identified was through the contractor or distributor where they purchase equipment.

Respondents were also asked about their main reasoning for purchasing their equipment. Three respondents said they were purchasing lamps for a larger lighting retrofit or new construction project, two respondents reported making the purchases to replace burned-out lamps, and two others said they were re-lamping an area of their facility as part of ongoing maintenance.

Figure 21. Awareness Channels for Incentives



Source: RMP Wattsmart Business Program 2018-2019 Wattsmart Business Participant Survey QB1. Multiple responses allowed (n=6).

Satisfaction and Areas for Improvement

All six respondents reported being satisfied with the two components of the program they were asked about (ease of finding a program discount¹⁶ and the incentive amount) and with the program itself.

One respondent reported experiencing challenges with the program. This respondent said they had to contact program staff when changing lights to see what applied and they felt it was “a little time-consuming.” No respondents provided any recommendations on ways to improve the program.

Partial Participants

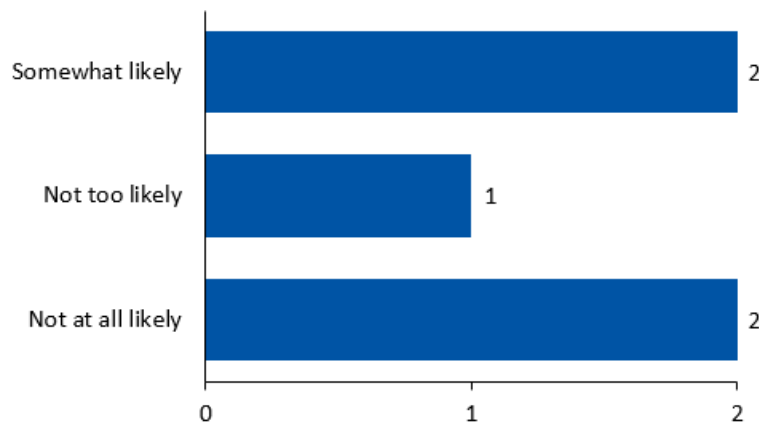
The Cadmus team received results from five partial participants: two who considered (or began) projects with VFD motor retrofits, one with a lighting retrofit, one with a pump motor retrofit, and one with industrial recommissioning. Four respondents were industrial businesses, and one respondent was a commercial business.

Awareness

Three respondents learned about the program through contact with a Wattsmart Business or utility representative, and one learned through previous participation (n=4). As shown in Figure 22, none of the respondents said they were *very likely* to request an incentive for a project in the next six months. All respondents (n=5) said the best ways for RMP to keep them informed about incentives for energy efficiency improvements were through utility mailings, emails, newsletters with bills, or bill inserts.

¹⁶ Rating scale measured “easy” rather than “satisfied”

Figure 22. Likelihood of Requesting an Incentive



Source: RMP Wattsmart Business Program 2018-2019. Wattsmart Business Partial/Non-Participant Survey QC4. Don't know and refused responses removed. Selected choice. (n=5)

Motivation and Barriers

All respondents reported that their company’s most important motivating factor when making decisions about energy-efficient upgrades was saving money on energy bills (n=5).

One respondent reported that they completed the initiated project, even though it was not through the Wattsmart Business program. When the other respondents were asked why they did not complete their project, two said it was because of the cost of the project, and one respondent said it was because more information was needed before completing the project. Additionally, one respondent indicated having applied for a Wattsmart Business incentive.

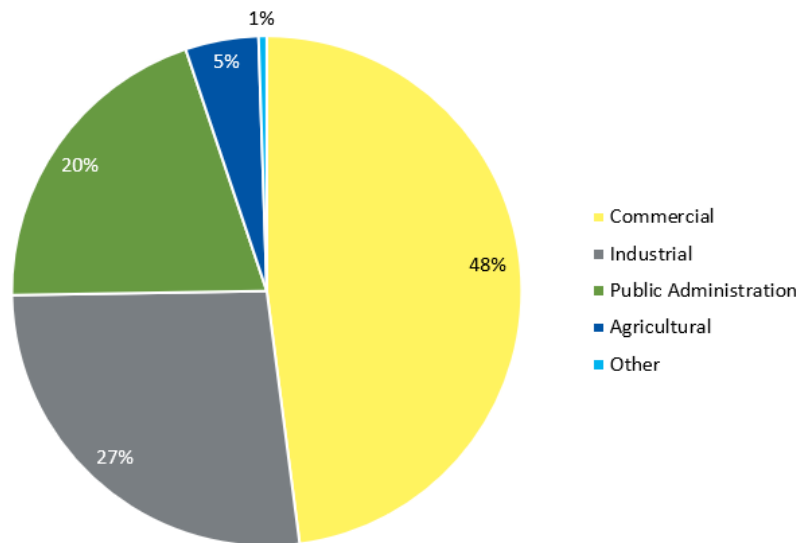
Satisfaction

Of the five partial participants, three reported being *very satisfied* with the program overall and two were *somewhat satisfied*. When asked what RMP could do to improve their experiences with the program, one respondent said increasing the incentive amount while the other four respondents said there was nothing.

Nonparticipants

The Cadmus team surveyed 200 nonparticipants who either never completed a project through the program or had not done so within the past two years. As shown in Figure 23, nonparticipant respondents included several business types. The largest group was commercial businesses (48%, n=194). Most respondents (65%, n=185) employed zero to 10 people, and others employed anywhere from 11 to 25 people to more than 500 people.

Figure 23. Nonparticipant Respondents by Business Sector



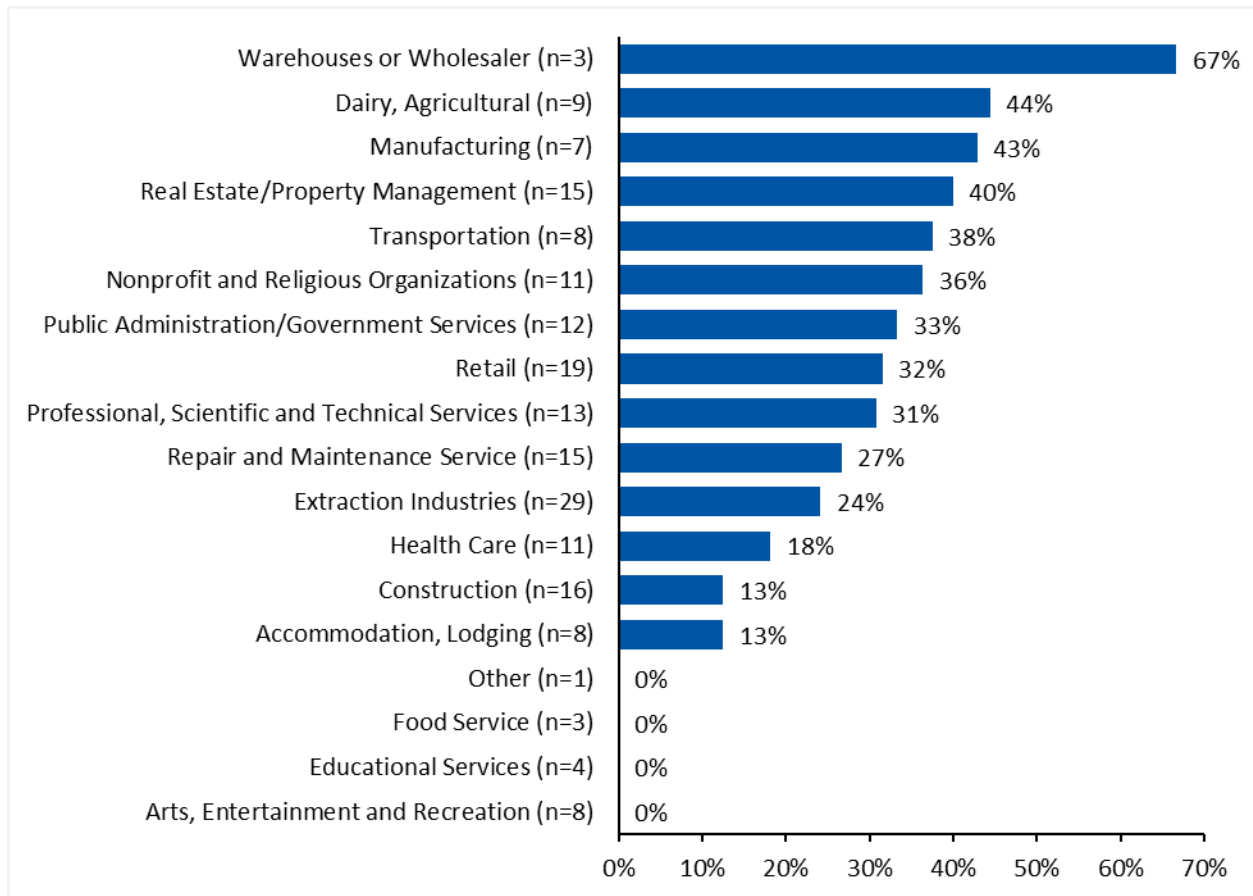
Source: RMP Wattsmart Business Program 2018-2019 Nonparticipant-Partial Participant Survey QF1. Don't know and refused responses removed. (n=194).

Seventy-one percent of nonparticipants used gas to heat their facilities, 18% used electricity, and 11% used a combination of the two or other fuels such as diesel, propane, oil, or did not heat their space (n=181). Participants relied on gas for water heating (55%), with 38% using electricity and 7% using both, other fuels, or not heating water (n=169).

Awareness

Nearly three-fourths of nonparticipants (73%, n=198) did not know of the Wattsmart program prior to participating in the survey. Awareness varied by sector from 54% of respondents to 18% of respondents. Sectors including agriculture, manufacturing, warehousing, and nonprofit organizations among the most aware. Healthcare and food service were among the least aware. To some extent, this difference in awareness may be due to customers having facility or maintenance staff who engage with the program that are different than the point of contact for the RMP account, who was the contact used for the survey.

Figure 24. Nonparticipant Awareness of Wattsmart Program Offerings by Sector

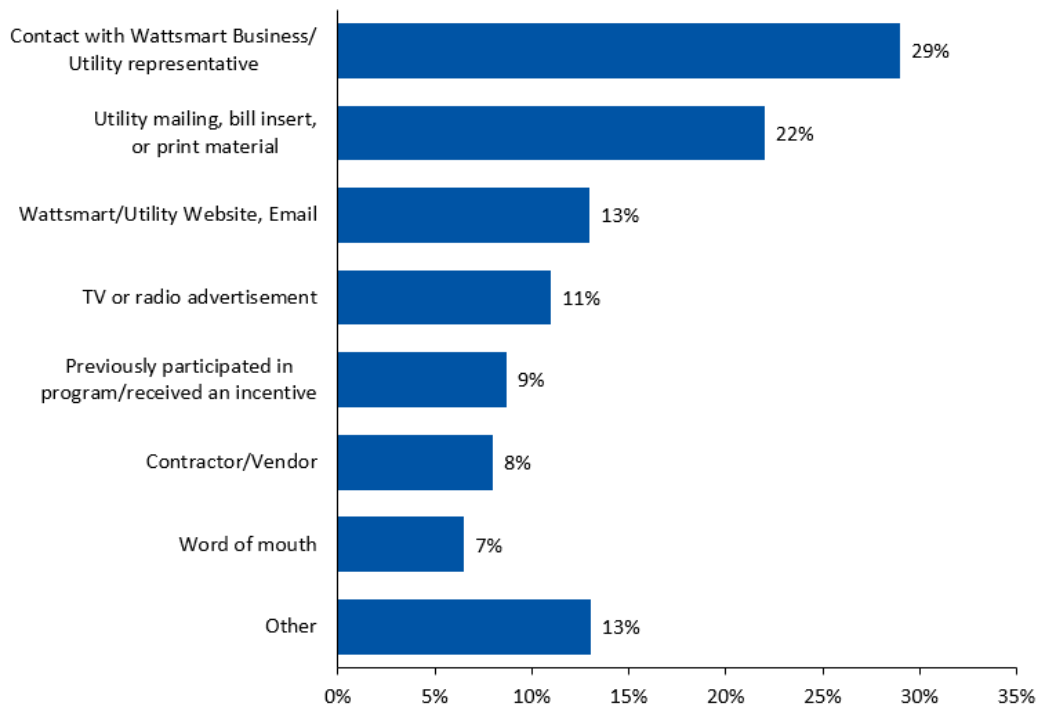


Source: RMP Wattsmart Business Program 2018-2019 Nonparticipant-Partial Participant Survey QF1. Don't know and refused responses removed. (n=192).

Most of the respondents who were aware of the program learned of it through a Wattsmart Business or utility representative (29%, n=46) or through a utility mailing or print material (22%). Figure 25 shows all information channels mentioned by nonparticipants.

Most respondents (68%, n=50) said it was *not too likely* or *not at all likely* they would apply for a Wattsmart Business incentive in the next six months.

Figure 25. Nonparticipants Source of Awareness of Wattsmart Business Program



Source: RMP Wattsmart Business Program 2018-2019 Nonparticipant-Partial Participant Survey QC3. Don't know and refused responses removed. (n=46).

Motivation

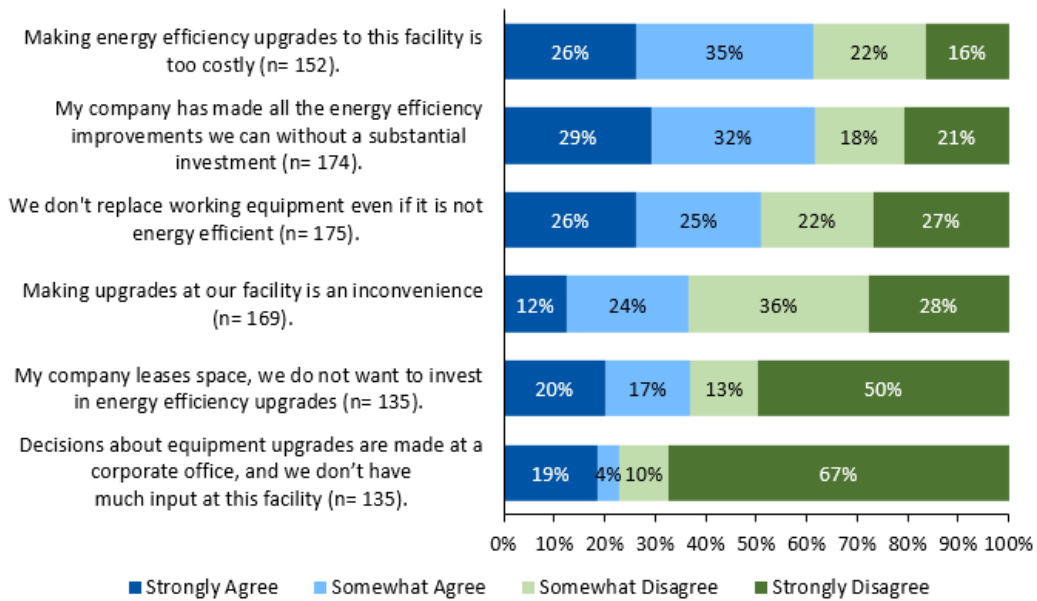
More than any other reason given, when considering energy efficiency upgrades, nonparticipant respondents were primarily motivated by the opportunity to save money on energy bills (79%, n=165). Other responses described a variety of motivations (e.g., costs of equipment and installation, obtaining a program incentive, or increasing training and knowledge about equipment).

Nonparticipants said they would be more motivated to make energy-efficient purchases or upgrades if equipment costs were lower (57%), incentives were higher (15%), or if they had more information on return on investment/help with the business case for investment (8%, n=162). Other responses included receiving more information generally, incentives on different products/technologies, higher annual savings, and ownership of the property.

The Cadmus team also asked nonparticipants: “When calculating the return on investment for proposed capital upgrades, does your company include savings gained from energy efficiency?” Nonparticipants more often said “Yes” (61%) than “No” (39%, n=170).

To explore nonparticipants’ attitudes about making energy efficiency upgrades at their facilities, the survey asked respondents to what extent they agreed with the barrier statements shown in Figure 26. Statements are shown in order by percentage of respondent agreement.

Figure 26. Nonparticipants' Attitudes About Energy Efficiency Improvements



Source: RMP Wattsmart Business Program 2018-2019 Partial Participant/Nonparticipant Survey: QD7a-QD7f. Not applicable, don't know, and refused responses were removed.

Responses strongly indicate that nonparticipants viewed energy efficiency as not worth the required upfront investment. Respondents generally have input into decisions about energy efficiency upgrades (77% *somewhat disagreed* or *strongly disagreed* with the statement that they did not, n=135), and most were not opposed to investing in upgrades even in leased spaces (63%, n=135). However, 61% *strongly agreed* or *somewhat agreed* that their company had made all the energy improvements they could without substantial investment (n=174), and 61% also agreed that energy efficiency upgrades were too costly (n=152).

Cost-Effectiveness

In assessing the Wattsmart Business program’s cost-effectiveness, the Cadmus team analyzed program benefits and costs from five different perspectives, using Cadmus’ DSM Portfolio Pro model.¹⁷ The California Standard Practice Manual for assessing 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 RMP and 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 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 kWh sales. The benefits include avoided energy costs, capacity costs, and line losses. Costs include all RMP program costs and decreased revenues.
- **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 28. 2018-2019 Wyoming Wattsmart Benefits and Costs
Included in Various Cost-Effectiveness Tests**

Test	Benefits	Costs
PTRC	Present value of avoided energy and capacity costs, ^a 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 ^a	Program administrative and marketing costs, and costs incurred by participants
UCT	Present value of avoided energy and capacity costs ^a	Program administrative, marketing, and incentive costs
RIM	Present value of avoided energy and capacity costs ^a	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

^a These tests include avoided line losses.

¹⁷ 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 29 provides selected cost analysis inputs for each year, including evaluated energy savings, discount rate, line loss, inflation rate, and total program costs. RMP provided all of these values except for energy savings.^{18,19}

Table 29. 2018-2019 Wyoming Wattsmart Selected Cost Analysis Inputs

Input Description	2018	2019	Total
Evaluated Net Energy Savings (kWh/year) ^a	35,187,050	34,396,919	69,583,969
Discount Rate	6.57%	6.57%	N/A
Commercial Line Loss	8.90%	8.90%	N/A
Industrial Line Loss	5.61%	5.61%	N/A
Irrigation Line Loss	9.28%	9.28%	N/A
Inflation Rate	2.2%	2.2%	N/A
Total Program Costs	\$8,330,591	\$8,159,153	\$16,489,744

^a Savings are realized at the meter, while benefits account for line loss.

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 energy savings and measure lives documented in the program’s tracking data.²⁰

For all analyses, the team used avoided costs associated with the RMP 2015 IRP Eastside Class 2 DSM Decrement Values.²¹

The Cadmus team analyzed Wattsmart Business program cost-effectiveness for net savings by incorporating the evaluated freeridership and spillover.

Table 30 presents the 2018 and 2019 program years’ cost-effectiveness analysis results, including the evaluated NTG (but not accounting for non-energy benefits [except those represented by the 10% conservation adder included in the PTRC test]). For this scenario, the Wattsmart Business program proved cost-effective from the PTRC, UCT, and PCT perspectives but not the TRC and RIM perspectives.

¹⁸ Rocky Mountain Power, Wyoming Annual Demand-Side Management Report: January 1, 2018 – December 31, 2018. Issued August 1, 2019:
https://www.pacificorp.com/content/dam/pacorp/documents/en/pacificorp/environment/dsm/wyoming/2018_WY_Annual_DSM_Report_8-1-19.pdf.

¹⁹ Rocky Mountain Power, Wyoming Annual Demand-Side Management Report: January 1, 2019 – December 31, 2019. Issued July 1, 2020:
https://www.pacificorp.com/content/dam/pacorp/documents/en/pacificorp/environment/dsm/wyoming/Energy_Efficiency_and_Peak_Reduction_Report_WY_2019.pdf.

²⁰ See Appendix C for detailed cost-effectiveness inputs and results at the measure category level.

²¹ PacifiCorp’s *Class 2 DSM Decrement Study* details the IRP decrements. Dated April 20, 2015, the report is available online:
http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/2015/2015_Class_2_DSM_Decrement_Study.pdf

The primary criterion for assessing cost-effectiveness in Wyoming is the TRC, which achieved a 0.94 benefit/cost ratio for the combined years’ net savings.

The RIM test measures program impacts on customer rates. Most programs do not pass the RIM test because, while energy efficiency programs reduce costs, they also reduce energy sales. As a result, the average rate per unit of energy may increase. Passing the RIM test indicates that rates as well as costs will decrease due to the program. Typically, this only happens for demand response programs or from programs targeted to the highest marginal cost hours (when marginal costs are greater than rates).

Table 30. 2018-2019 Wattsmart Business Program Cost-Effectiveness Summary of Net Savings

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC	\$0.0419	\$23,203,097	\$23,893,645	\$690,548	1.03
TRC	\$0.0419	\$23,203,097	\$21,721,496	(\$1,481,601)	0.94
UCT	\$0.0301	\$16,675,833	\$21,721,496	\$5,045,662	1.30
RIM		\$31,318,679	\$21,721,496	(\$9,597,183)	0.69
PCT		\$14,387,162	\$49,426,595	\$35,039,434	3.44
Lifecycle Revenue Impacts (\$/kWh)				\$0.000105781	
Discounted Participant Payback (years)					1.23

Table 31 presents the 2018 program cost-effectiveness analysis results, including the evaluated NTG, but not accounting for non-energy benefits (except those represented by the 10% conservation adder included in the PTRC test). For this scenario, the Wattsmart Business program proved cost-effective from all perspectives except the RIM test.

Table 31. Wattsmart Business Program Cost-Effectiveness Summary of 2018 Net Savings

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC	\$0.037	\$11,628,878	\$14,599,321	\$2,970,443	1.26
TRC	\$0.037	\$11,628,878	\$13,272,110	\$1,643,232	1.14
UCT	\$0.026	\$8,330,591	\$13,272,110	\$4,941,519	1.59
RIM		\$18,525,385	\$13,272,110	(\$5,253,275)	0.72
PCT		\$8,130,061	\$30,401,081	\$22,271,020	3.74
Lifecycle Revenue Impacts (\$/kWh)				\$0.000045749	
Discounted Participant Payback (years)					1.29

Table 32 presents the 2019 program cost-effectiveness analysis results, including evaluated NTG, but not accounting for non-energy benefits (except those represented by the 10% conservation adder included in the PTRC test). For this scenario, the Wattsmart Business program proved cost-effective from the UCT and PCT perspectives but not the PTRC, TRC, and RIM test perspectives.

Table 32. Wattsmart Business Program Cost-Effectiveness Summary of 2019 Net Savings

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC	\$0.045	\$11,574,218	\$9,294,324	(\$2,279,894)	0.80
TRC	\$0.045	\$11,574,218	\$8,449,385	(\$3,124,833)	0.73
UCT	\$0.033	\$8,345,242	\$8,449,385	\$104,143	1.01
RIM		\$12,793,293	\$8,449,385	(\$4,343,908)	0.66
PCT		\$6,257,101	\$19,025,514	\$12,768,414	3.04
Lifecycle Revenue Impacts (\$/kWh)					\$0.000055074
Discounted Participant Payback (years)					1.17

Conclusions and Recommendations

RMP, in collaboration with its administrators, Cascade Energy, Nexant, and Willdan Energy Solutions, is successfully delivering energy efficiency incentives and services to its customers, as designed in the Wattsmart Business program. Overall, customers reported high satisfaction levels with the program and its elements, including for the new Lighting Instant Incentive (Midstream) offering.

The Lighting Instant Incentive offering made a strong start in 2018 and continued to grow in 2019, showing increased unique customer participants, total projects, and overall savings in 2019. Savings per project did begin to decline in 2019, which is not unexpected as a project moves out of a ramp-up period into a more mature phase of implementation. The SBDI offering showed relatively steady savings and participation across both years, as did the Typical Incentive and Custom Analysis offerings, although measure uptake shifted across years.

Trade allies reported overall satisfaction with the program. They observed that enhanced online tools, and training on incentives for specific measures, such as motors, would be helpful.

The 2018 and 2019 program evaluation yielded an overall gross realization rate of 106%, with a precision of $\pm 6.5\%$ at 90% confidence. Realization rates and precision varied to some degree within each of the seven measure categories. The team calculated 88% NTG for the program overall.

Five strata—lighting, energy management, oil and gas, motors, and direct install—accounted for 95% of reported energy savings. Lighting projects exhibited the greatest variability in realization rates due to Rocky Mountain Power's inconsistent use of waste heat factor and hours of use by facility type when compared to the RTF. Within the Oil & Gas strata, Cadmus found no differences between evaluated and reported savings. RMP's evaluators implemented all of the recommendations from the prior impact evaluation on oil and gas projects and Cadmus found no discrepancies in reported savings methodology or documentation. Two large projects contributed the greatest impact to realization rates among the Energy Management and Motors strata projects. For these two projects, Cadmus collected additional post-implementation data (unavailable to RMP's implementors at the time) to evaluate savings and found the load shape profile of the incentivized equipment and associated savings to differ from the reported documentation.

This section provides the Cadmus team's conclusions and recommendations, based on findings presented in this report.

Savings Considerations

Conclusion—Lighting Hours of Use

RMP reported lighting Hours of Use (HOU) for small business direct install projects and midstream based on internally developed tables defining hours of use by facility type. Cadmus evaluated these lighting projects by using the table within the RTF and Idaho Power TRM defining HOU by facility type. Because the lighting tables differed between RMP and Cadmus, evaluated energy savings were found to be higher or lower than reported.

Recommendation

Cadmus recommends RMP adopt the lighting tables defining HOU by facility type from the RTF. Adopting the lighting tables from the RTF will ensure consistency with reported lighting savings among other regional utility energy efficiency programs.

Conclusion—Midstream Lighting Methodology

RMP uses a review of previous RMP midstream program data and product reviews to arrive at average efficient lamp wattages and average lumen values. RMP's baseline wattage is calculated by dividing the fixture type-specific average lumens by an efficacy value. To evaluate midstream lighting savings, the evaluation team used the methodology outlined in the RTF and used the lumen equivalence method to determine baseline wattages. This methodology accounted for HVAC interactive effects by applying a Waste Heat Factor (WHF). HVAC interactive effects refers to the HVAC cooling energy required in conditioned spaces to match the heat load from lighting. When high efficiency lighting is installed, less HVAC cooling energy is used to satisfy the reduced heating load. Evaluated savings include a WHF when determining total energy savings. Reported savings do not use WHF.

Recommendation

Cadmus recommends using the methodology outlined in the RTF to calculate midstream savings, which includes accounting for HVAC interactive effects through applying a WHF. In addition, Cadmus recommends using the lumen equivalence method to calculate baseline wattage for midstream lighting projects.

Conclusion—Green Motor Rewind Energy Savings

RMP reports energy savings for green motor rewind projects based on a green motor rewind measure from the RTF that was updated on December 28, 2017. The newer version of the green motor rewind measure from the RTF show reduced energy savings for most motor sizes. Cadmus evaluated these projects based on the newer version of the green motor rewind measure and found lower savings were realized for all sampled green motor rewind projects.

Recommendation

Cadmus recommends RMP adopt the energy savings specified by motor size from the newest version of the green motor rewind measure from the RTF, version 3.1 (December 2017).

Conclusion—Prescriptive VFDs

Reported deemed savings for VFDs were based on the 2010 Wyoming Market Characterization Study, which includes two categories: VFDs installed on fans and VFDs installed on pumps. VFDs savings can vary substantially based on the equipment they are installed on, especially heating versus cooling pumps. Cadmus evaluated incentivized VFDs in the 2018-2019 program years based on the specific equipment type the VFDs were installed on (such as chilled water pumps).

Recommendation

Based on evaluation findings, the Cadmus team recommends increasing deemed savings for prescriptive VFD projects to match the Cadmus 2014 *Variable Speed Drive Loadshape Project* report for HVAC fan projects (with savings shown in Table 33).

Table 33. 2018-2019 Wyoming Wattsmart Deemed Energy Savings for HVAC Fan Projects

HVAC Fan Motor Type	Deemed Energy Savings (kWh/year/hp) ^a
Supply Fan Motor	2,033
Return Fan Motor	1,788
Exhaust Fan Motor	1,788

^a Deemed savings based on the Cadmus 2014 *Variable Speed Drive Loadshape Project* report, created for NEEP. Available online: <http://www.neep.org/variable-speed-drive-loadshape-study-final-report>

For central equipment (e.g., hot/chilled water pumps, condenser water pumps, cooling tower fans), the team recommends using average savings from the 2018 PA TRM. Using average energy-savings factors, operating hours, and a default load factor of 75% from the PA TRM, and assuming a motor full-load efficiency of 93% (i.e., the National Electrical Manufacturers Association’s premium efficiency for a 20-horsepower motor), a deemed savings factor results: 1,191 kWh per year, per horsepower.

Small Business Direct Install

Conclusion

The program may be leaving some savings on the table given the high number of customers (26%, n=23) reporting they had additional lighting needs, and the low number of customers (1 of 4) who reported their contractor gave them a referral to other RMP programs. Although the SBDI implementer reported SBDI projects are limited to what work can be done in a single day, RMP has other offerings that SBDI customers can take advantage of to meet their remaining needs.

Recommendation

The implementer of the Small Business Direct install offering should update the assessment template to include an estimate of Wattsmart Business prescriptive incentives available for any lighting the customer requests that does not qualify for the SBDI incentives. SBDI customers should also receive literature and an explanation of the Typical Incentives and Instant Incentives offerings.

Conclusion

The program may be overpaying for some savings due to participation by larger customers in the program. Two of 22 respondents (9%) reported that their company employs more than 500 people. This is greater than expected as most companies participating in small business programs typically have 75 or fewer employees, and all other Wyoming respondents have 50 or fewer employees. These customers may be considered mid-size or larger based on the number of employees they have but qualify for the SBDI program due to their electricity usage at the meter level.

Recommendation

Consider a modified threshold for identifying a small business, such as considering electricity usage at the company level rather than the meter level.

Nonparticipants

Conclusion

Both participant and nonparticipant surveys indicate that program outreach strategies may not be penetrating all customer segments equally. Among participants, 55% said they learned about the program through previous participation. At the same time, nearly three-fourths of the nonparticipants said they were not familiar with the Wattsmart program. Among nonparticipants, program awareness varied significantly by sector. Sectors that typically have high energy efficiency opportunity, such as healthcare and food service, had low levels of program awareness.

Recommendation

In addition to broadly distributing program marketing, the implementer should develop case studies and other materials that can be targeted to specific customer segments through trusted messengers such as industry associations, professional groups, or community organizations.

Appendices

Appendix A. Self-Report NTG Methodology

Appendix B. Nonparticipant Spillover

Appendix C. Participant Survey Guides

Appendix D. Nonparticipant/Partial Participant Survey Guide

Appendix E. Measure Category Cost-Effectiveness

Appendix A. Self-Report Net-to-Gross Methodology

Net-to-gross (NTG) estimates are a critical part of demand-side management 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. Freeridership and participant spillover are the two NTG components calculated in this evaluation. True freeriders are customers who would have purchased an incented appliance or equipment without any support from the program (e.g. taking the incentive). Participant spillover is the amount of additional savings obtained by customers investing in additional energy-efficient measures or activities due to their program participation.

Various methods can be used to estimate program freeridership and spillover; for this evaluation, the Cadmus team used self-reports from survey participants to estimate measure stratum level NTG ratios. The Cadmus team used the same net savings methodology that has been used since the 2009-2011 Energy FinAnswer Program Evaluations and described in detail in Appendix B of the 2009-2011 evaluation report.²² This net savings approach aligns with industry best practices summarized in the Uniform Methods Project (UMP) section discussing net savings.²³ This appendix provides a detailed description of how the evaluation team estimated NTG for the 2018-2019 Wattsmart Business program.

Survey Design

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 savings attributed to the program that would have occurred without its intervention and is often referred to as "freeridership."

Cadmus 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

²² Navigant. January 29, 2015. *Evaluation Report For Wyoming's Energy FinAnswer Program (PY 2009-2013)* – Appendix B. Prepared for Rocky Mountain Power
https://www.pacificcorp.com/content/dam/pcorp/documents/en/pacificcorp/environment/dsm/wyoming/2011-2013_RMP-WY_EnergyFinAnswer_FINAL-REPORT-5-27-15_UPDATE.pdf

²³ National Renewable Energy Laboratory. October 2017. "Chapter 21: Estimating Net Savings – Common Practices" in *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. <https://www.nrel.gov/docs/fy17osti/68578.pdf> See also: Pacific Northwest National Laboratory. January 2015. *Methodology of Evaluating Cost-effectiveness of Commercial Energy Code Changes*. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23923.pdf

equipment). Nonparticipant spillover savings occur indirectly (i.e., trade allies install additional energy-efficient equipment for customers who choose not to participate as a result of the program).

Freeridership Calculation

To determine freeridership, the interview 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 1.0 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 0.0 (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 interview 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 non-freerider. If the project would have occurred within the same 12-month period but 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 or:

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

The initial freeridership score was adjusted to account for prior program participation. Given Rocky Mountain Power’s efforts to cross-promote its entire portfolio of energy efficiency programs, a respondent’s prior participation in a Rocky Mountain Power 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 Rocky Mountain Power 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

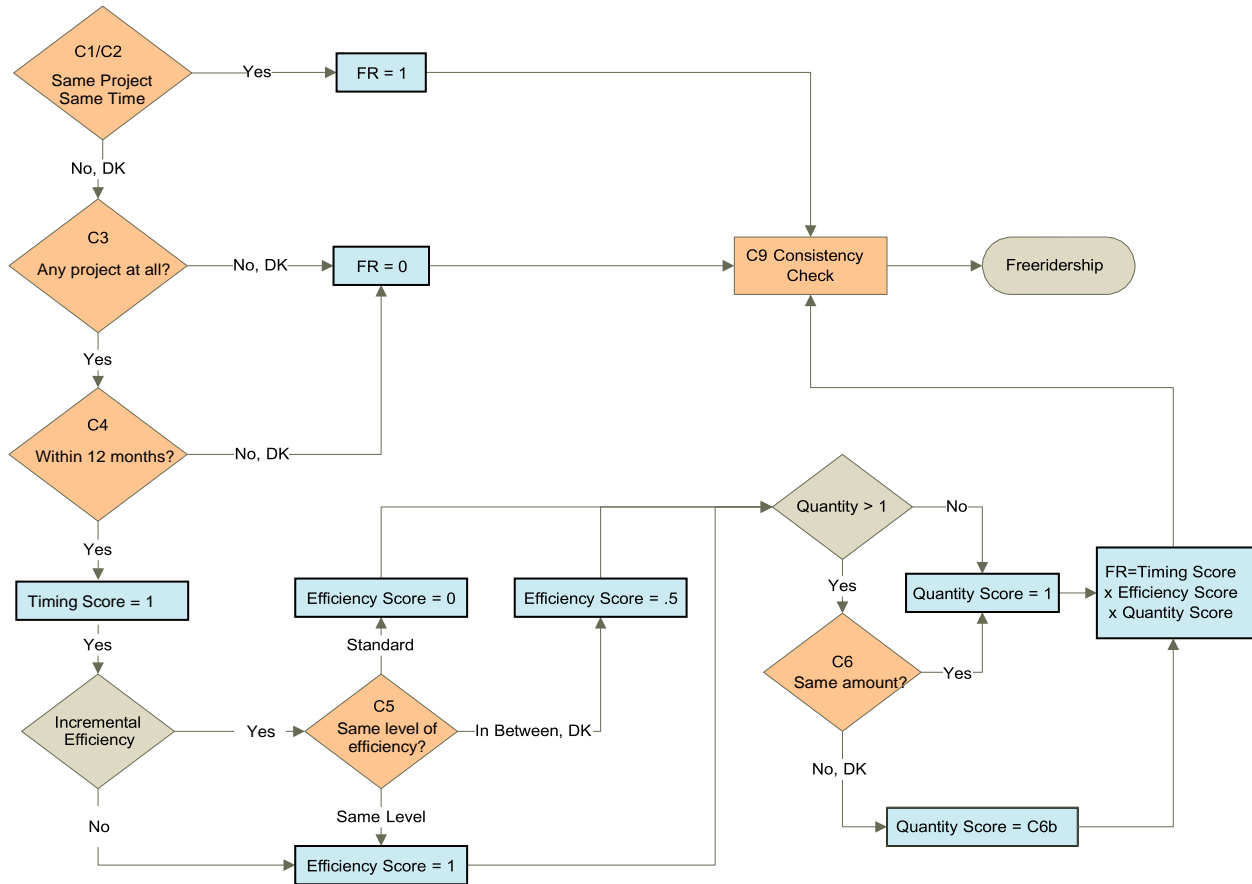
extremely important to their decision (question C9.2 = 5 – extremely important) but that they would have installed the exact same equipment at the same time without the program (question C2 = Yes and question C1= Yes), the interviewer asked the respondent to describe in their own words what impact the 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 A-1 provides detailed scoring and descriptions of each question.

Table A-1. 2018-2019 Wyoming 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 Rocky Mountain Power 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 Rocky Mountain Power 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 Rocky Mountain Power 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 A-1 shows the freeridership calculation approach.

Figure A-1. Freeridership Calculation Approach



Participant Spillover Calculation

For the Wattsmart Business program, the Cadmus team measured participant spillover by asking a sample of participants about their purchases and whether they received an incentive for a particular measure (if they installed another efficient measure or undertook another energy efficiency action because of their program participation). 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 Cadmus team used a top-down approach to calculate spillover savings. The team began its analysis with a subset of data containing only survey respondents who indicated they installed additional energy-savings measures after participating in the Wattsmart Business program. From this subset, we removed participants who said the program had little influence on their decisions to purchase additional measures, thus retaining only participants who rated the program as highly important. The team also removed participants who applied for a Wattsmart Business program incentive for the additional measures they installed.

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 not similar to the equipment that is incentivized by the program. Table A-2 provides detailed scoring and descriptions of each like spillover question.

Table A-2. 2018-2019 Wyoming Wattsmart Participant Spillover Calculation Approach

Question	Question Text	Scoring
E9	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
E10	What type of equipment did you install?	If no, potential spillover savings = 0
E10.# Series	Measure specific efficiency, capacity, fuel type questions	If responses indicated non-program qualifying unit, potential spillover savings = 0
E11	How many did you purchase and install?	E11 x program-evaluated per-unit savings = potential spillover savings
E12	Did you receive an incentive from Rocky Mountain Power or another organization for this equipment?	If yes, potential spillover savings = 0.
E15	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:

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

Appendix B. Nonparticipant Spillover

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 nonparticipant spillover (NPSO), and it results in energy savings caused by, but not rebated through, utilities' demand-side management activities.

To understand whether Rocky Mountain Power'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 8,876 randomly generated nonresidential nonparticipant accounts provided by Rocky Mountain Power.

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 Rocky Mountain Power. This question determined whether Rocky Mountain Power's energy efficiency initiatives motivated energy-efficient purchases. The surveys asked respondents to address the following factors:

- General information about energy efficiency provided by Rocky Mountain Power
- Information from Rocky Mountain Power program staff or contractors
- Past participation experience participating in a Rocky Mountain Power 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 2018-2019 Wattsmart Business program evaluation activities.

Using the variables shown in Table B-1, the Cadmus team determined total NPSO generated by Rocky Mountain Power's marketing and outreach efforts during the 2018 and 2019 program years.

Table B-1. 2018-2019 Wyoming 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	Rocky Mountain Power Customer Database
D	Sample NPSO	$A \div C$
E	Total Population Usage kWh	Rocky Mountain Power Customer Database
F	NPSO kWh Savings Applied to Population	$D \times E$
G	Total Gross Program Evaluated kWh Savings	2018-2019 Wattsmart Business Evaluation
H	NPSO as a Percentage of Total 2018-2019 <i>wattsmart</i> Business Evaluated kWh Savings	$F \div G$

Results

Of 200 Rocky Mountain Power nonparticipant customers surveyed, five nonparticipant respondents reported installing measures attributed to Rocky Mountain Power’s influence. Table B-2 presents measures types and gross evaluated kWh savings the Cadmus team attributed to Rocky Mountain Power, generating total savings of 46,574 kWh.

Table B-2. 2018-2019 Wyoming Wattsmart NPSO Response Summary

Reported Spillover Measure Type	Quantity	Unit Energy Savings (kWh) ¹	Total Savings (kWh)
Lighting	178	262 per unit	46,574
Total	178		46,574

¹ Unit energy savings (kWh) estimated for each measure were generated from the 2018-2019 Wattsmart Business program evaluated gross savings analysis. Unit energy savings represents the average savings per unit for all attributable measures for a given measure type.

The NPSO represents energy savings from companies that did not participate in the 2018-2019 Wattsmart Business program who reduced their energy consumption and attributed their action to information provided by Rocky Mountain Power or past participation in a Rocky Mountain Power energy efficiency program.

Cadmus found NPSO as a percentage of total 2018-2019 Wattsmart Business evaluated kWh Savings in Wyoming to be 1% (H). Table B-3 below details the analysis steps. The first step is taking the total sample spillover savings from the 200 respondents (46,574 kWh (A)) and dividing it by the total sample usage (45,131,244 kWh (C)). This results in the Sample NPSO 1% (D)).

The sample NPSO is then applied to the total population of consumption as calculated using average consumption by revenue class multiplied by the number of customers in each class (541,774,365 kWh (E)), as provided to Cadmus by Rocky Mountain Power.²⁴

²⁴ NPSO savings were not extrapolated to industrial customers to provide a conservative estimate.

The total population energy usage is then multiplied by the Sample NPSO to obtain the population NPSO savings (559,088 kWh (F)). This savings is then divided by the total gross program kWh savings (78,879,090 (G)) found in the 2018-2019 Wattsmart Business Evaluation to calculate the NPSO of 1%.

Table B-3. 2018-2019 Wyoming Wattsmart NPSO Results

Variable	Metric	Value	Source
A	Total kWh Spillover Savings from Survey Respondents	46,574	Survey data / Engineering Analysis
B	Total Nonparticipant Customers Surveyed	200	Survey disposition
C	Sample Usage	45,161,244	Rocky Mountain Power Customer Database
D	Sample NPSO	0.1%	$A \div C$
E	Total Population Usage kWh	541,774,365	Rocky Mountain Power Customer Database
F	NPSO kWh Savings Applied to Population	559,088	$D \times E$
G	Total Gross Program Evaluated kWh Savings	78,879,090	2018-2019 Wattsmart Business Evaluation
H	NPSO as a Percentage of Total 2018-2019 Wattsmart Business Evaluated kWh Savings	1%	$F \div G$

Appendix C. PacifiCorp Wattsmart Business Program 2018 - 2019 Wattsmart Business Participant Survey

Researchable Questions		
Key Research Topics	Areas of Investigation	Related Questions
Screening	Project initiation process	B1
Marketing and Outreach	Program Awareness	A4, A5
Barriers	Obstacles to installing high-efficiency equipment	B2, B13, B17, B18
Satisfaction	Assess satisfaction with Program application process, various program components and reasons for dissatisfaction among participants	B4-B13, B15, B16
Firmographics	Determine building and company characteristics of participants	Section E
Decision Making	Key factors influencing customers' decision to participate in program	B1, B14
Freeridership and Spillover	Assess net savings	Sections C and D

Target Quota = TBD

General Instructions

- This survey is designed for visual presentation online
- Text in red indicates programming instructions that will not be seen by the respondent
- Question numbers will not be seen by the respondent

Variables to be pulled into Survey

- **[PROGRAM NAME]**
- **[UTILITY]**
- **[MEASURE1]**
- **[LTG FLAG]** (indicates a participant that purchased LEDs, but did not purchase controls)
- **[PROGRAM YEAR]**
- **[CONTACT NAME]**
- **[CUSTOMER NAME]**
- **[SITE ADDRESS 1]**
- **[SITE CITY]**
- **[SITE ZIP]**
- **[PROJECT STATE]**
- **[CUSTOMER INCENTIVE]**
- **[BILL_CREDIT]**

Email Invitation

To: [EMAIL]

From: **UTILITY** Feedback

Subject: We're checking in...give us an update on your efficient equipment purchase with a **[UTILITY] Wattsmart Business** rebate

Dear **[CONTACT NAME]**,

We invite you to tell us about your recent experience with **UTILITY's [PROGRAM NAME]** program. Your input is very important to us and will be kept confidential and only used for research purposes. The survey will take 7-10 minutes to complete. As our thanks for completing the survey, eligible respondents will be **entered into a drawing to win one of five \$50 Amazon gift cards**. Your vital feedback will be used to improve our programs for customers like you.

Click the link below to find out if you are eligible:

[auto-generated link]

Or you may copy and paste the URL below into your internet browser: [auto-generated URL]

If you have any questions about this research, or any difficulties taking the survey, please contact Alex Opipari at The Cadmus Group, the national research firm conducting this survey on **[UTILITY'S]** behalf. You can reach Alex at alex.opipari@cadmusgroup.com.

Thank you in advance for sharing your experiences and your time.

Alesha Pino
Sr. Business Specialist
PacifiCorp

Reminder Invitation

To: [EMAIL]

From: **UTILITY** Feedback

Subject: Don't forget to tell **UTILITY** about your **[PROGRAM NAME]** program experience!

Dear **[CONTACT NAME]**,

We recently invited you to tell us about your experience with **UTILITY's [PROGRAM NAME]** program. We would still like to hear from you. Your input is very important to us and will be kept confidential. **Please take 7-10 minutes today to complete the survey.** As our thanks for completing the survey, eligible respondents will be entered into a drawing to win one of five \$50 Amazon gift cards. Your vital feedback will be used to improve our programs for customers like you.

Click the link below to find out if you are eligible:

[auto-generated link]

Or you may copy and paste the URL below into your internet browser: [auto-generated URL]

If you have any questions about this research, or any difficulties taking the survey, please contact Alex Opipari at The Cadmus Group, the national research firm conducting this survey on **[UTILITY'S]** behalf. You can reach Alex at alex.opipari@cadmusgroup.com.

Thank you in advance for sharing your experiences and your time.

Alesha Pino
Sr. Business Specialist
PacifiCorp

Email Invitation – for suggested contacts

To: **[EMAIL]**

From: **UTILITY** Feedback

Subject: We're checking in...give us an update on your efficient equipment purchase with a **[UTILITY] Wattsmart Business** rebate

Dear **[CONTACT NAME]**,

We are reaching out to you based on a referral from **[NAME OF REFERRER]**. We invite you to tell us about your recent experience with **UTILITY's [PROGRAM NAME]** program. Your input is very important to us and will be kept confidential and only used for research purposes. The survey will take 7-10 minutes to complete. As our thanks for completing the survey, eligible respondents will be **entered into a drawing to win one of five \$50 Amazon gift cards**. Your vital feedback will be used to improve our programs for customers like you.

Click the link below to find out if you are eligible:

[auto-generated link]

Or you may copy and paste the URL below into your internet browser: [auto-generated URL]

If you have any questions about this research, or any difficulties taking the survey, please contact Alex Opipari at The Cadmus Group, the national research firm conducting this survey on **[UTILITY'S]** behalf. You can reach Alex at alex.opipari@cadmusgroup.com.

Thank you in advance for sharing your experiences and your time.

Alesha Pino
Sr. Business Specialist
PacifiCorp

Survey Introduction and Screener

[UTILITY-APPROVED LOGO TO APPEAR ON START SCREEN]

Welcome! Thank you for sharing your experience with the [PROGRAM NAME] program, offered by UTILITY.

[TERMINATION MESSAGE] Based on your responses, you are not eligible for this survey. Thank you for your interest in the WattsMart Business program.

[UTILITY] offers a variety of energy efficiency programs that could help you save energy and manage your monthly bills. For more information on other ways to save, please visit [UTILITY].net.

A. Screeners

A1. Before beginning, please verify our program information is correct and you are familiar with the project.

Our records show that you installed energy efficient equipment including [MEASURE1], at [SITE ADDRESS 1] in [INSERT PROGRAM YEAR]? Is this correct? [MULTIPLE RESPONSE]

1. Yes
2. No, wrong year
 - A1a. In what year did you install this project? [RECORD CORRECT YEAR : _____]
3. No, wrong address
 - A1b. What is the correct address? [RECORD CORRECT ADDRESS: fields for street, city, state, zip]
4. No, wrong measure
 - A1c. What type of equipment did you install or adjust? [CALL THIS VARIABLE C_MEASURE]
 1. Lighting
 2. New HVAC equipment
 3. HVAC equipment scheduling or setpoint changes
 4. Ventilation, Motor or Fan
 5. Refrigeration
 6. Compressed air
 7. Irrigation
 8. Other equipment
 - A1d. Can you describe this equipment? [OPEN_ENDED: _____]

5. No, I did not participate [THANK AND TERMINATE]

98. I don't know

A1e. Can you provide the name and email address of the right person to speak to about this project?

1. [First Name] [Last Name] [Email address]
[THANK AND TERMINATE]

A2. To ensure our records are correct, can you confirm that you received an incentive for this upgrade? The incentive may have been in the form of a check from the utility, a utility bill credit, or a discount applied to your project or equipment invoice.

1. Yes, I received an incentive

2. No, I did not receive an incentive [THANK AND TERMINATE]

98. I don't know

A2f. Can you provide the name and email address of the right person to speak to about this project?

1. [First Name] [Last Name] [Email address]
[THANK AND TERMINATE]

A3. Great, you are eligible to take this short survey and be entered to win one of five \$50 Amazon gift cards!

This survey will take 7-10 minutes to complete. Your responses will remain confidential and will only be used for research purposes. Be sure to enter your name and address at the end of the survey to enter the drawing.

A4. How did your organization learn about the incentives or discounts available for this project? Please select all that apply and scroll down to see all options. [RANDOMIZE LIST]

1. Contact with Wattsmart Business representative or utility representative

2. Wattsmart Business printed program materials

3. [UTILITY] Website

4. Wattsmart Business sponsored workshop or community event

5. [UTILITY] mailing or bill insert

6. [UTILITY] email

7. Through my electrician or contractor

8. Previously participated and received a [UTILITY] incentive

9. Through a civic organization, trade association or professional organization [SPECIFY:

_____]

10. Through the distributor or supplier where I purchase equipment

11. Word of mouth, family, friend, or business colleague

12. TV or radio advertisement

- 13. Social media or other online advertisement
- 14. Other [SPECIFY: _____]
- 98. I don't know

- A5. **[IF A4≠8]** To your knowledge, had your company participated in a **[UTILITY]** incentive program prior to completing this project?
- 1. Yes
 - 2. No
 - 3. I don't know

B. **Wattsmart Business**

Thank you. This next section will ask you about the process to apply for and receive your incentive.

- B1. Who took the lead role in completing the application paperwork, including any supplemental applications? **[RANDOMIZE LIST; MAINTAIN "OTHER" AND "DON'T KNOW" AT END]**
- 1. Myself or someone else at my company
 - 2. My contractor or installer
 - 3. A Wattsmart Business representative or Energy Engineer
 - 4. My **[UTILITY]** account representative
 - 5. Someone else: [_____]
 - 6. I don't know
- B2. How easy would you say this paperwork was to complete?
- 1. Very easy
 - 2. Somewhat easy
 - 3. Not too easy
 - 4. Not at all easy
 - 98. I was not involved in the paperwork at all

[ASK IF B2=2, 3 OR 4]

- B3. What would have made this paperwork easier to complete?
- 1. [_____]
 - 98. I don't know
- B4. Thinking about the incentive you received for this project, how satisfied were you with the dollar amount of the incentive?
- 1. Very satisfied
 - 2. Somewhat satisfied
 - 3. Not too satisfied

4. Not satisfied at all

98. I don't know the amount of the incentive [SKIP TO B6]

B5. About what percent of the project cost would you estimate was covered by the incentive?

1. [NUMERIC: 0% to 100%] % of the total project cost

98. I don't know

B6. [IF B4=2, 3 OR 4 OR 98] What incentive amount would have been enough for you to say you were very satisfied? Please respond as a percent of the total project cost.

1. [NUMERIC: 0% to 100%] % of the total project cost

98. I don't know

B7. How satisfied were you with the number of weeks from when you submitted a final application to when you received your incentive?

1. Very satisfied

2. Somewhat satisfied

3. Not too satisfied

4. Not satisfied at all

98. I don't know

B8. [IF B7=2, 3 OR 4] How many weeks would be acceptable from when you submit your application to when you receive your incentive?

1. [_Numeric 0-20_] weeks

98. I don't know

Screen Text: Thank you, the next questions will ask you about the implementation of your project.

B9. Who, if anyone, was involved in helping you install the [INSERT MEASURE1 OR C_MEASURE1].

1. A Wattsmart Business program participating vendor

2. My independent contractor [SKIP TO B12]

3. Someone else [SPECIFY: _____] [SKIP TO B12]

98. I don't know [SKIP TO B12]

B10. How satisfied were you with the work provided by the participating vendor that installed the [INSERT MEASURE1 OR C_MEASURE1]?

1. Very satisfied

2. Somewhat satisfied

3. Not too satisfied

4. Not satisfied at all

98. I don't know

B11. **[IF B10=2, 3 or 4]** Why do you say that?

1. **[TEXT: _____]**
98. I don't know

B12. How satisfied are you with the **[MEASURE1 OR C MEASURE1]** you installed?

1. Very satisfied
2. Somewhat satisfied
3. Not too satisfied
4. Not satisfied at all
98. I don't know

B13. **[IF B12=2, 3 or 4]** Why do you say that?

1. **[TEXT: _____]**
98. I don't know

B14. What would you say are the main benefits your company has experienced as a result of the energy-efficient equipment you installed? **Select all that apply. [RANDOMIZE]**

1. Using less energy, reducing energy consumption or energy demand
2. Saving money on our utility bills; lower energy bills
3. Increased occupant comfort
4. Better aesthetics/better or brighter lighting
5. Increased productivity
6. Saving money on maintenance costs
7. Improved equipment function
8. Another benefit: **[_____]**
9. NO BENEFITS **[LOCK OUT OTHER RESPONSES IF SELECTED]**

B15. Thinking about your project overall, how satisfied are you with the Wattsmart Business program?

1. Very satisfied
2. Somewhat satisfied
3. Not too satisfied
4. Not satisfied at all

[IF B15=2, 3, OR 4]

B16. Why do you say you were **[INSERT ANSWER FROM B15]** with the Wattsmart Business program?

1. **[SPECIFY: _____]**
98. I don't know

- B17. **[IF LTG FLAG=YES]** In the process of scoping your project, did you consider installing lighting controls?
1. Yes
 2. No
- B18. **[IF LTG FLAG=YES]** Why did you not purchase controls for your lighting equipment?
1. Our company has no need to automate lighting
 2. Controls are too expensive
 3. Didn't know enough about the technology or the options
 4. We already have controls installed
 5. We did purchase controls
 6. Another reason: _____
- B19. Do you have any recommendations to improve the Wattsmart Business program?
- 1.No
 - 2.Yes **[OPEN END TEXT ENTRY]**

C. *Freeridership*

[ASK SECTION C IF PROJECT STATE = WA, UT,WY OR ID; AND IF [PROGRAM YEAR] = 2019] [FORCE RESPONSE TO ALL QUESTIONS]

Thank you. For the next questions, think about the process to identify your project and finalize your decision to purchase the **MEASURE1/C_MEASURE1.**

- C1. Without the program, meaning without either the technical assistance or the financial incentive, would you have still completed the **exact same [MEASURE_1/C_MEASURE1] project?**
1. Yes
 2. No **[SKIP TO C3]**
 98. I don't know **[SKIP TO C3]**
- C2. Without the program, meaning without either the technical assistance or the financial incentive, would you have still installed the **[MEASURE_1/C_MEASURE1]** at the same time?
1. Yes **[SKIP TO C7]**
 2. No **[SKIP TO C4]**
 98. I don't know **[SKIP TO C4]**
- C3. Without the program, would you have installed **any [MEASURE_1/C_MEASURE1]?**
1. Yes
 2. No **[SKIP TO C8]**
 98. I don't know **[SKIP TO C8]**

- C4. Without the program, in terms of timing, when would you have installed the **[MEASURE_1/C_MEASURE1]**?
1. Within one year from original participation date
 2. In one to two years from original participation date
 3. More than two years from original participation date **[SKIP TO C8]**
 98. I don't know
- C5. Relative to the energy efficiency of **[MEASURE_1/C_MEASURE1]** installed through the program, how would you characterize the efficiency of equipment you would have installed **without** the program?
1. Just as efficient as installed with the program
 2. Lower than installed through the program, but better than standard efficiency
 3. Standard efficiency
 98. I don't know
- C6. Would you have installed more, less, or the same amount of **[MEASURE_1/C_MEASURE1]** without the program?
1. More
 - C6a. Compared to the installed amount, how much more?
[RECORD PERCENTAGE: _____]
 2. Less
 - C6b. Compared to the installed amount, how much less?
[RECORD PERCENTAGE: _____]
 3. Same amount
 98. I don't know
- C7. Prior to hearing about the program, was the cost of **[MEASURE_1/C_MEASURE1]** included in your organization's most recent capital budget?
1. Yes
 2. No
 98. I don't know
- 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_1/C_MEASURE1]**?
- C9. With the Wattsmart Business program, your company received financial incentives of **[CUSTOMER INCENTIVE]** for installing **[MEASURE_1/C_MEASURE1]**.

For the **[MEASURE_1/C_MEASURE1]** purchase, 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. If a factor is not applicable to you, please say so. **[NOTE: Respondent fills in numeric value (1 to 5) for each of the below six items. Respondents can also state that a particular factor is Not Applicable, please code N/A as 99]**

1. Recommendation from contractor or vendor
2. Information provided by [UTILITY] on energy saving opportunities
3. Information on payback
4. The [UTILITY] incentive or discount
5. Familiarity with this equipment
6. Previous participation with a [UTILITY] program

D. Spillover

[ASK SECTION D IF PROJECT STATE = WA, UT, WY OR ID]

The next questions will ask about energy efficiency improvements *other than those* you installed through the program.

- D1. Since participating in this program, have you purchased and installed any additional energy efficiency improvements on your own without any financial assistance from a utility?
1. Yes
 2. No [SKIP TO SECTION E]
 98. I don't know [SKIP TO SECTION E]
- D2. Did you purchase and install any energy efficient improvements that are the **same type** as the [MEASURE_1/C_MEASURE1] you installed through the program?
1. Yes
 2. No [SKIP TO D8]
 98. I don't know [SKIP TO D8]
- D3. How many did you purchase and install?
1. [RECORD RESPONSE]
 98. I don't know
- D4. Relative to the energy efficiency of the equipment installed through the program, how would you characterize the efficiency of this equipment?
1. Just as efficient as installed through the program
 2. Lower than installed through the program, but better than the standard efficiency
 3. Standard efficiency
 98. I don't know
- D5. Did you receive an incentive from [UTILITY] or another organization for this equipment?
1. Yes
 2. No
 98. I don't know

[ASK IF D5=1]

D6. 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] Wattsmart Business program was in your decision to install these energy efficient products.

1. [RECORD RATING: _____]
98. I don't know

[ASK IF D5=2]

D7. Why did you not apply for an incentive from [UTILITY] for this equipment?

1. [RECORD RESPONSE]
98. I don't know

[ASK ALL]

D8. Since participating in the [PROGRAM NAME] program, did you purchase and install any *other* energy efficiency improvements on your own without any financial or technical assistance from a utility, vendor or other organization?

1. Yes
2. No [SKIP TO SECTION E]
98. I don't know [SKIP TO SECTION E]

D9. What type of equipment did you install? [SELECT ALL THAT APPLY]

1. Lighting equipment
2. HVAC equipment
3. Water heating equipment
4. Variable drive
5. Efficient motor
6. Refrigeration equipment or freezers
7. Building envelope measure
8. Compressed air equipment
9. Chiller
10. Pump
11. Irrigation equipment (gaskets, drains, sprinklers, etc.)
12. Other equipment: [SPECIFY] _____
13. None of the above [SKIP TO SECTION E]
98. I don't know [SKIP TO SECTION E]

[ASK D10.11-D10.14 AND D10-D14 if D9=1]

D10.11 What type of lighting was purchased and installed without assistance?

[MULTIPLE RESPONSE]

1. Decorative LEDs
2. LED wall fixtures
3. General purpose LEDs
4. Pin-based LEDs
5. Reflector/flood LEDs
6. Tubular LEDs
7. Exterior LED wall packs or fixtures
8. Other type [_____]

D10.12 What is the wattage of the lighting? **[SPECIFY]:** _____

D10.13 In what location was it installed?

1. Wall
 2. Ceiling
 3. Outdoors
4. Another location **[SPECIFY]:** _____
98. I don't know

D10.14 What type of equipment was removed or replaced? **[SPECIFY]:** _____

[ASK D10.21-D10.24 AND D10-D14 if D10=2]

D10.21 What type of HVAC equipment was purchased and installed without assistance?

[SPECIFY TYPE]: _

D10.22 What Fuel type is used? **[SPECIFY]:** _____

D10.23 What is the efficiency rating of the equipment? This will be the HSPF or SEER or ER rating of the equipment. **[SPECIFY]:** _____

D10.24 What is the capacity of the equipment in tons? **[SPECIFY]:** _____

[ASK D10.31-D10.34 AND D10-D14 if D10=3]

D10.31 What type of water heating equipment was purchased and installed without assistance? (For example: storage tank, tankless, heat pump, point-of-use, etc.) **[SPECIFY TYPE]:** _____

D10.32 What Fuel type is used? **[SPECIFY]:** _____

D10.33 What is the efficiency rating of the equipment? (This should be an energy factor, such as .62 EF, or 2.6 EF) **[SPECIFY]:** _____

D10.34 33 If a water heater with storage, what is the equipment capacity in gallons? **[SPECIFY]:**

[ASK D10.41-D10.42 AND D10-D14 if D10=4]

D10.41 What type of motor was the VFD installed on? **[SPECIFY TYPE]:** _____

D10.42 What is the horsepower of the motor? **[SPECIFY]:** _____

[ASK D10.51-D10.52 AND D10-D14 if D10=5]

D10.51 What equipment was the motor installed on? **[SPECIFY TYPE]:** _____

D10.52 What is the horsepower of the motor? **[SPECIFY]:** _____

[ASK D10.61 AND D10-D14 if D10=6]

D10.61 What type of refrigeration or freezer equipment did you install without assistance? **[SPECIFY TYPE]:** _____

[ASK D10.71-D10.72 AND D10-D14 if D10=7]

D10.71 What is the efficiency R-value of the insulation measure? **[SPECIFY]:** _____

D10.72 In what location was it installed Wall/Roof/Floor? **[SPECIFY]:** _____

[ASK D10.81-D10.82 AND D10-D14 if D10=8]

D10.81 For what type of application was the compressed air equipment purchased and installed (production line, etc.)? **[SPECIFY APPLICATION]:** _____

D10.82 What is the horsepower of the compressor motor? **[SPECIFY]:** _____

[ASK D10.91-D10.92 AND D10-D14 if D10=9]

D10.91 FOR What type of application was the chiller purchased and installed (commercial building, etc.)? **[SPECIFY APPLICATION]:** _____

D10.92 What size chiller did you install? **[SPECIFY]:** _____ (tons)

[ASK D10.101-D10.103 AND D10-D14 if D10=10]

D10.101 FOR What type of application was the pump purchased and installed (HVAC, etc)? **[SPECIFY APPLICATION]:** _____

D10.102 What is the horsepower of the motor for the pump? **[SPECIFY]** _____

D10.103 What is the efficiency rating of the pump? **[SPECIFY]:** _____ (%)

[ASK D10.111 AND D10-D14 if D10=11]

D10.111 What irrigation equipment did you purchase and install without assistance? **[SPECIFY GASKETS, DRAINS, SPRINKLERS, ETC.]:** _____

[ASK IF D9=1-12] [ASK ABOUT EACH ITEM MENTIONED IN D10]

- D10. In regard to the **[D9 TEXT]**, how many did you purchase and install? **[ASK FOR EACH MEASURE MENTIONED IN D10] [IF D10 MEASURE = 'BUILDING ENVELOPE' THEN ASK HOW MANY 'SQUARE FEET']**
1. **[RECORD RESPONSE]**
 98. I don't know

[ASK IF D10=1-12] [ASK ABOUT EACH ITEM MENTIONED IN D10]

- D11. Just to confirm, did you receive an incentive from **[UTILITY]** or another organization for this equipment? **[ASK FOR EACH MEASURE MENTIONED IN D10]**
1. Yes
 2. No
 98. I don't know

[ASK FOR EACH YES IN D11]

- D12. What utility or organization provided the incentive? **[ASK FOR EACH MEASURE MENTIONED IN D10]**
1. **[RECORD UTILITY OR ORGANIZATION]**
 98. I don't know

[ASK IF D10=1-12] [ASK ABOUT EACH ITEM MENTIONED IN D10]

- D13. What information did you rely upon to determine that the equipment installed was energy efficient? **[ASK FOR EACH MEASURE MENTIONED IN D10]**
1. **[RECORD RESPONSE]**
 98. I don't know

[ASK IF D10=1-12] [ASK ABOUT EACH ITEM MENTIONED IN D10]

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] Wattsmart Business program was in your decision to install [this/these] energy efficient products. [ASK FOR EACH MEASURE MENTIONED IN D10]

1. [RECORD RATING: _____]
98. I don't know

[ASK SECTION E TO ALL SURVEY RESPONDENTS]

E. Firmographics

These final questions will help us understand your business.

- E1. What industry is your company in?
1. Accommodation
 2. Arts, Entertainment and Recreation
 3. Construction
 4. Dairy, Agricultural
 5. Educational Services
 6. Finance, Insurance
 7. Food Service
 8. Food Processing
 9. Health Care
 10. Manufacturing
 11. Mining
 12. Nonprofit and Religious Organizations
 13. Oil and Gas
 14. Professional, Scientific and Technical Services
 15. Public Administration/Government Services
 16. Retail
 17. Refrigerated Warehouse
 18. Real Estate/Property Management
 19. Repair and Maintenance Service
 20. Transportation
 21. Warehouses or Wholesaler
 22. Something else [SPECIFY: _____]
 98. I prefer not to answer

E2. How many people are employed by your company at all locations in **[PROJECT STATE]**?

1. None
2. 1-10
3. 11-25
4. 26-50
5. 51-75
6. 76-100
7. 101-200
8. 201-500
9. More than 500
10. I don't know
11. I prefer not to answer

E3. What type of fuel is used for space heating at your facility?

1. Electric
2. Gas
3. Another fuel **[SPECIFY: _____]**
4. I don't know

E4. What type of fuel is used for water heating at your facility?

1. Electric
2. Gas
3. Another fuel **[SPECIFY: _____]**
4. I don't know

F. Closing

F1. **Please provide the following information to be entered into a drawing to win one of five \$50**

Amazon gift cards.

1. Name:
2. Address:
3. Address 2:
4. City:
5. State:
6. Zip:
7. Email:

This completes the survey! Your responses are very important to [UTILITY]. We appreciate your participation and thank you very much for your time. Have a good day.

**Appendix D. PacifiCorp Wattsmart Business Program
(2018-2019) Nonparticipant/Partial Participant Phone Survey**

Researchable Questions		
Key Research Topics	Areas of Investigation	Related Questions
Marketing and Outreach	Program awareness	C1-C4, D10-D11
	Future communication preferences	C5
Motivation and Barriers	Reasons to make energy-efficient improvements; Obstacles to installing high-efficiency equipment	D1-D9, D12-D14, G1-G3
Spillover	Assess savings spillover	Section E
Firmographics	Determine building and company characteristics of participants	Section F

Target Quota:

Nonparticipants: up to 200 for each state

Partial Participants: up to 50 for each state

Partial participants: (See quota tab in Partial Participants 2018-2019 Sample for VuPoint)

General Instructions

- Interviewer instructions are in green **[LIKE THIS]** (the style is “Survey: Interviewer Instructions”).
- CATI programming instructions are in red **[LIKE THIS]** (the style is “Survey: Programming”).
- Items that should not be read by the interviewer are in parentheses like this ().

Variables to Be Pulled into Survey

- **[CONTACT NAME]**
- **[CUSTOMER NAME]**
- **[SITE.ADDRESS 1]**
- **[SITE CITY]**
- **[SITE STATE]**
- **[UTILITY]**
- **[MEASURE.NAME.FINAL] MEASURE**
- **[YEAR] PROGRAM YEAR**

A. Introduction

- A1. Hello, I'm [INSERT NAME] calling on behalf of [UTILITY]. May I speak with [CONTACT NAME]? OR [IF NO NAME OR NAMED RESPONDENT NO LONGER WORKS FOR COMPANY] May I speak with the person who handles energy decisions for your company? [IF THAT PERSON IS NOT AT THIS PHONE NUMBER, ASK FOR THEIR NAME AND PHONE NUMBER AND START AGAIN]
1. (Yes) [IF CORRECT PERSON, SKIP TO A3. IF TRANSFERRED TO SOMEONE ELSE, READ A2]
 2. (No or not a convenient time) [ASK IF RESPONDENT WOULD LIKE TO ARRANGE A MORE CONVENIENT TIME OR IF YOU CAN LEAVE A MESSAGE FOR A MORE APPROPRIATE PERSON]
 98. (Don't know) [ASK TO SPEAK WITH SOMEONE WHO KNOWS AND BEGIN AGAIN]
 99. (Refused) [THANK AND TERMINATE]
- A2. Hello, I'm [INSERT NAME] calling on behalf of [UTILITY]. Are you the person responsible for making energy decisions for your company at the [SITE.ADDRESS 1] location?
1. (Yes)
 2. (No, person is able to come to phone) [ASK FOR PERSON WHO IS AND START AGAIN]
 3. (No, person is not able to come to phone) [GET NAME AND PHONE NUMBER, SCHEDULE CALL BACK]
 98. (Don't know) [ASK TO SPEAK WITH SOMEONE WHO KNOWS AND BEGIN AGAIN]
 99. (Refused) [THANK AND TERMINATE]
- A3. How are you doing today? I'm calling because we are conducting an important survey today about [UTILITY]'s Wattsmart Business Program. [UTILITY] is actively seeking your opinions to help improve their energy efficiency incentive programs and to better understand how to assist customers in saving money and energy. **THIS CALL WILL TAKE ABOUT FIVE MINUTES.** So you are aware, this call may be monitored or recorded for quality assurance purposes. Anything you share with us today will be kept confidential and anonymous. Is that alright?
1. [IF RESPONDENT ASKS HOW LONG, SAY "Approximately 5 minutes."]
 2. [IF NEEDED, STATE "This survey is for research purposes only and is not a marketing call. This is the primary way for customers to provide input into the incentive programs [UTILITY] offers. Your perspectives help [UTILITY] design energy-efficiency programs to help their customers save money and energy."]
 3. [ONLY IF ASKED FOR A [UTILITY] CONTACT TO VERIFY THE SURVEY AUTHENTICITY, OFFER [Alesha Pino, 801-220-2656]

B. Screeners

[ASK PARTIAL PARTICIPANTS]

- B1. Our records show that you initiated **[DEPENDING ON MEASURE NAME READ “a” or “an”]** **[MEASURE]** project at **[SITE.ADDRESS 1]** with **[UTILITY]** in **[YEAR]**, but did not complete this project through the Wattsmart Business Program. Is this correct?
1. (Yes)
 2. (No, wrong year) **[RECORD CORRECT YEAR, IF POSSIBLE]**
 3. (No, wrong address) **[RECORD CORRECT ADDRESS]**
 4. (No, I did not participate) **[THANK AND TERMINATE]**
 98. (Don’t know) **[ASK TO SPEAK WITH SOMEONE WHO WOULD KNOW AND START AGAIN AT A2. IF NO ONE, THEN THANK AND TERMINATE]**
 99. (Refused) **[THANK AND TERMINATE]**

[THANK AND TERMINATE TEXT] Those are all the questions we have for you today. Thank you for your help. Have a nice day!

[ASK EVERYONE]

- B2. Did your company receive an incentive from **[UTILITY]**’s Wattsmart Business Program for installing **[FOR PARTIAL PARTICIPANTS READ: this equipment?]** **[FOR NONPARTICIPANTS READ: energy efficient equipment in 2018 or 2019? By energy-efficient equipment, I mean high-efficiency lighting, HVAC equipment, irrigation or dairy equipment, variable speed drives, building envelope, or other energy-efficient equipment.]**
1. (Yes) **[READ: For this survey, we are seeking those companies who did not receive an incentive. We will not take any more of your time today. Thank you.] [TERMINATE]**
 2. (No)
 98. (Don’t know) **[ASK TO SPEAK WITH SOMEONE WHO WOULD KNOW AND START AGAIN AT A2. IF NO ONE, THEN THANK AND TERMINATE]**
 99. (Refused) **[THANK AND TERMINATE]**

[THANK AND TERMINATE TEXT] Those are all the questions we have for you today. Thank you for your help. Have a nice day!

C. Awareness

[ASK PARTIAL PARTICIPANTS C1 THEN SKIP TO C4]

- C1. Even though you did not receive an incentive; how did your organization learn about the incentives available for this project? **[DO NOT READ LIST; MULTIPLE RESPONSES POSSIBLE]**
1. (Contact with Wattsmart Business representative or utility representative)
 2. (Wattsmart Business printed program materials)
 3. **[(UTILITY) Website]**
 4. (Wattsmart Business sponsored workshop or community event)
 5. **[(UTILITY) mailing or bill insert]**
 6. **[(UTILITY) email]**
 7. (Through my electrician or contractor)
 8. (Previously participated in program/received an incentive)
 9. (Through a trade association or professional organization) **[SPECIFY: _____]**
 10. (Through a vendor, distributor or supplier where I purchase lighting)
 11. (Word of mouth (family, friend, or business colleague))
 12. (TV or radio advertisement)
 13. (Social media or other online advertisement)
 14. (Other **[SPECIFY: _____]**)
 98. (Don't know)
 99. (Refused)

[ASK NONPARTICIPANTS C2]

- C2. Prior to this call today, were you aware that **[(UTILITY)]** offers technical expertise and cash incentives to help their commercial and industrial customers like you, improve your business' electric energy efficiency?
1. (Yes)
 2. (No) **[SKIP TO C5]**
 98. (Don't know) **[SKIP TO C5]**
 99. (Refused) **[SKIP TO C5]**

[ASK IF C2=1]

- C3. How did your organization learn about the Wattsmart Business Program? **[DO NOT READ LIST; MULTIPLE RESPONSES POSSIBLE]**
1. (Contact with Wattsmart Business representative or utility representative)
 2. (Wattsmart Business printed program materials)
 3. (**[UTILITY]** Website)
 4. (Wattsmart Business sponsored workshop or event)
 5. (**[UTILITY]** mailing or bill insert,)
 6. (**[UTILITY email]**)
 7. (I contacted my contractor/vendor to ask)
 8. (My contractor/vendor let me know about them)
 9. (Previously participated in program/received an incentive)
 10. (Through a trade association or professional organization) **[SPECIFY: _____]**)
 11. (Word of mouth (family, friend, or business colleague)
 12. (TV or radio advertisement)
 13. (Social media or other online advertisement)
 14. (Other **[SPECIFY: _____]**)
 98. (Don't know)
 99. (Refused)

[ASK IF C1=1-10 OR 98 OR 99, OR IF C3=1-11 OR 98 OR 99]

- C4. How likely is it that your business will request an incentive from the Wattsmart Business program for an energy efficiency project in the next 6 months? Would you say ... **[READ LIST]**
1. Very likely
 2. Somewhat likely
 3. Not too likely
 4. Not at all likely
 98. (Don't know)
 99. (Refused)

- C5. What's the best way for **[UTILITY]** to inform you about their incentives for energy-efficient improvements? **[DO NOT READ. MULTIPLE RESPONSES POSSIBLE]**
1. (Contact with Wattsmart Business representative, or utility representative)
 2. (Wattsmart printed program materials or website)
 3. (Wattsmart sponsored workshop or community event)
 4. (Utility mailing, email, newsletter with bill, bill insert,)
 5. (Through my electrician or contractor)
 6. (Through a trade association, trade publication or professional organization) **[SPECIFY: _____]**
 7. (Through the vendor, distributor or supplier where I purchase lighting)
 8. (Newspaper ad)
 9. (Radio ad)
 10. (TV ad)
 11. (Social Media (e.g., Facebook, Instagram, Twitter, YouTube))
 12. (Online ads)
 13. (Other **[SPECIFY: _____]**)
 14. (Not interested in being informed about incentives for energy-efficient improvements)
 98. (Don't know)
 99. (Refused)

D. *Motivation and Barriers*

[ASK EVERYONE D1]

Thank you. The next few questions are about making energy-efficient improvements for your business.

- D1. What factor is the most important to motivate your company to make energy-efficient upgrades? **[DO NOT READ LIST; RECORD ONE RESPONSE]**
1. (To save money on energy bills)
 2. (To obtain a program incentive)
 3. (To obtain a tax credit)
 4. (To replace old (but still functioning) equipment)
 5. (To replace broken equipment)
 6. (To improve productivity)
 7. (To improve lighting quality)
 8. (Other **[SPECIFY _____]**)
 98. (Don't know)
 99. (Refused)

[NONPARTICIPANTS SKIP TO D7]

[PARTIAL PARTICIPANTS ASK D2-D6]

- D2. Did your company complete the **[MEASURE]** project you initiated with **[UTILITY]** even though you did not receive a Wattsmart Business incentive?
1. (Yes) **[SKIP TO D4]**
 2. (No)
 98. (Don't know) **[SKIP TO D4]**
 99. (Refused) **[SKIP TO D4]**
- D3. Why did you not complete the project?
1. **[RECORD RESPONSE] [SKIP TO E1]**
 98. (Don't know) **[SKIP TO E1]**
 99. (Refused) **[SKIP TO E1]**
- D4. Did your company apply for a Wattsmart Business incentive?
1. (Yes)
 2. (No) **[SKIP TO D6]**
 98. (Don't know) **[SKIP TO E1]**
 99. (Refused) **[SKIP TO E1]**
- D5. Why did your project not receive an incentive?
1. **[RECORD RESPONSE] [SKIP TO E1]**
 98. (Don't know) **[SKIP TO E1]**
 99. (Refused) **[SKIP TO E1]**
- D6. Why did you not apply for an incentive?
1. (Project did not qualify) **[SKIP TO E1]**
 2. (Other) **[RECORD RESPONSE] [SKIP TO E1]**
 98. (Don't know) **[SKIP TO E1]**
 99. (Refused) **[SKIP TO E1]**

[NONPARTICIPANT ASK D7-D14]

- D7. I'm going to read you six short statements describing situations companies experience when considering energy-efficient improvements. Please tell me to what extent you agree with each statement. If it doesn't apply to you, please let me know that. The first statement is: **[RANDOMIZE, READ STATEMENT; THEN JUST FOR THE FIRST STATEMENT, READ THE FOLLOWING: Would you say you strongly agree, somewhat agree, somewhat disagree, or strongly disagree?]**
[READ LIST AND RECORD 1=STRONGLY AGREE, 2=SOMEWHAT AGREE, 3=SOMEWHAT DISAGREE, AND 4=STRONGLY DISAGREE; 97= NOT APPLICABLE, 98=DON'T KNOW, AND 99=REFUSED]
- D2a. Making upgrades at our facility is an inconvenience.
 - D2b. Making energy efficiency upgrades to this facility is too costly.
 - D2c. We don't replace working equipment even if it is not energy efficient.
 - D2d. My company has made all the energy efficiency improvements we can without a substantial investment.
 - D2e. My company leases space, we do not want to invest in energy efficiency upgrades.
 - D2f. Decisions about equipment upgrades are made at a corporate office, and we don't have much input at this facility.
- D8. When calculating the return on investment for proposed capital upgrades, does your company include savings gained from energy efficiency?
- 1. (Yes)
 - 2. (No)
 - 98. (Don't know)
 - 99. (Refused)
- D9. What would motivate your business to make more energy-efficient purchases or upgrades to your current equipment? **[DO NOT READ LIST; RECORD UP TO 3 RESPONSES]**
- 1. (Lower costs of product/equipment)
 - 2. (Information on return on investment/help with the business case for investment)
 - 3. (More information generally)
 - 4. (Higher incentives)
 - 5. (Incentives on different products/technologies)
 - 6. (Other) **[SPECIFY]**
 - 98. (Don't know)
 - 99. (Refused)

[ASK IF D9=3]

- D10. When you say you would like more information, what kind of information is most useful?
- 1. **[RECORD RESPONSE]**
 - 98. (Don't know) **[SKIP TO D13]**
 - 99. (Refused) **[SKIP TO D13]**

[ASK IF D10=1]

- D11. Who could best provide you with this information? For example, a Wattsmart Business representative, someone like your contractor, or a product manufacturer?
1. (Wattsmart Business)
 2. (Contractor/Distributor/Vendor)
 3. (Store staff)
 4. (Product Manufacturer)
 5. (Something else) **[SPECIFY: _____]**
 98. (Don't know)
 99. (Refused)

[ASK IF D9=5]

- D12. When you say incentives on different products or technologies, what kind of products or technologies?
1. **[RECORD RESPONSE]**
 98. (Don't know)
 99. (Refused)
- D13. What are the reasons you have not yet participated in a Wattsmart Business program? **[DO NOT READ LIST; MULTIPLE CHOICES POSSIBLE]**
1. (Don't know enough about program)
 2. (Don't understand what equipment/measures are available)
 3. (Don't have resources for initial investment)
 4. (Don't have enough time to participate)
 5. (Not sure how much savings there will be)
 6. (Don't see any benefits)
 7. (Have participated in past and do not see a need)
 8. (Other) **[SPECIFY]**
 98. (Don't know) **[SKIP TO E1]**
 99. (Refused) **[SKIP TO E1]**
- D14. What could **[UTILITY]** do to help your business participate in the Wattsmart Business program?
1. **[RECORD ANSWER]**
 98. (Don't know)
 99. (Refused)

[ASK EVERYONE]

E. Spillover

- E1. In 2018 or 2019, did you purchase and install any energy efficiency improvements on your own without any financial assistance from a utility?
1. (Yes)
 2. (No) **[SKIP TO SECTION F]**
 98. (Don't know) **[SKIP TO SECTION F]**
 99. (Refused) **[SKIP TO SECTION F]**
- E2. What type of equipment did you purchase and install without assistance?
1. (Lighting) **[SPECIFY TYPE EXAMPLE: LED,]:** _____
 - a. How many did you purchase and install **[SPECIFY]:** _____
 - b. What is the wattage of the installed equipment **[SPECIFY]:** _____
 - c. Where is the equipment installed? (Wall/Ceiling/Outdoors) **[SPECIFY]:** _____
 - d. What type of equipment was removed or replaced **[SPECIFY]:** _____
 2. (HVAC (heating and cooling)) **[SPECIFY EQUIPMENT]:** _____
 - a. How many did you purchase and install **[SPECIFY]:** _____
 - b. What fuel type does this equipment use **[SPECIFY]:** _____
 - c. What is the efficiency rating of the equipment? This will be the HSPF or SEER or EER rating of the equipment. **[SPECIFY]:** _____
 - d. What is the equipment's rated capacity in tons **[SPECIFY]:** _____
 3. (Water heating) **[SPECIFY EQUIPMENT]:** _____
 - a. How may did you purchase and install **[SPECIFY]:** _____
 - b. What fuel type does this equipment use **[SPECIFY]:** _____
 - c. What is the efficiency rating of the equipment **[SPECIFY]:** _____
 - d. What is the capacity of the water heater (if water heater with storage) **[SPECIFY]:** _____
 4. (Variable Frequency Drives (VFDs))
 - a. How may did you purchase and install **[SPECIFY]:** _____
 - b. What type of motor was it installed on **[SPECIFY]:** _____
 - c. What is the horsepower of the motor **[SPECIFY]:** _____

5. (Efficient motors)
 - a. How many did you purchase and install **[SPECIFY]**: _____
 - b. What type of equipment is the motor installed on **[SPECIFY]**: _____
 - c. What is the horsepower of the motor **[SPECIFY]**: _____
6. (Refrigeration) **[SPECIFY EQUIPMENT]**: _____
 - a. How much did you purchase and install **[SPECIFY]**: _____
7. (Building envelope) **[SPECIFY TYPE]**: _____
 - a. How may square feet did you purchase and install **[SPECIFY]**: _____
 - b. What is the efficiency (R-value, thickness) **[SPECIFY]**: _____
 - c. Where was it installed (Wall/Roof/Floor) **[SPECIFY]**: _____
8. (Compressed air) **[SPECIFY TYPE OF PROJECT]**: _____
 - a. How many did you purchase and install **[SPECIFY]**: _____
 - b. What is the horsepower of the compressor motor **[SPECIFY]**: _____
9. (Chillers) **[SPECIFY TYPE OF EQUIPMENT]**: _____
 - a. How many did you purchase and install **[SPECIFY]**: _____
 - b. What size unit did you install **[SPECIFY]**: _____
10. (Pumps) **[SPECIFY WHAT IS IT INSTALLED ON]**: _____
 - a. How many did you purchase and install **[SPECIFY]**: _____
 - b. What is the horsepower of the pump motor **[SPECIFY]**: _____
 - c. What is the efficiency rating of the pump **[SPECIFY]**: _____
11. (Irrigation (gaskets, drains, sprinklers) **[SPECIFY]**: _____
 - a. How many did you purchase and install **[SPECIFY]**: _____
12. (Other) **[SPECIFY]**: _____
 - a. How many did you purchase and install **[SPECIFY]**: _____
98. (Don't know) **[SKIP TO F1]**
99. (Refused) **[SKIP TO F1]**

[ASK IF E2=1-12]

- E3. Just to confirm, did you receive an incentive from **[UTILITY]** or another organization for any of these measures? **[RECORD FOR EACH MEASURE MENTIONED IN E2]**
1. (Yes)
 2. (No) **[SKIP TO E5]**
 98. (Don't know) **[SKIP TO E5]**
 99. (Refused) **[SKIP TO E5]**

E4. [Question Deleted]

[ASK IF E2=1-12]

E5. For these purchases, on a scale from 1 to 5, with 1 being not important at all and 5 being very important, please rate how important were each of the following on your decision to purchase and install [this/these] energy efficient improvement(s). If a factor is not applicable to you, please say so. **[NOTE: RESPONDENTS CAN ALSO STATE THAT A PARTICULAR FACTOR IS NOT APPLICABLE, PLEASE CODE N/A AS 6]**

E5.1 How important was general information about energy efficiency provided by **[UTILITY]** ____ on your decision to purchase these improvements?

[IF NEEDED: ON A SCALE FROM 1 TO 5, WITH 1 BEING NOT IMPORTANT AT ALL AND 5 BEING VERY IMPORTANT. IF A FACTOR IS NOT APPLICABLE TO YOU, PLEASE SAY SO.]

E5.1a **[ASK IF E5.1 = 1-5 AND MORE THAN 1 SELECTED IN E2]** Does your rating for the importance of general energy efficiency information provided by **[UTILITY]** differ for any specific improvements you mentioned?

1. (Yes)
2. (No)
98. (Don't know)

E5.1b **[ASK IF E5.1A=1]** For which of the following improvements would you rate the importance of general energy efficiency information differently, and what would be your rating? **[DISPLAY EQUIPMENT MENTIONED IN E2. MULTIPLE RESPONSE ALLOWED]**

ASK RATING FOR EACH EQUIPMENT SELECTED. [IF NEEDED READ: ON A SCALE FROM 1 TO 5, WITH 1 BEING NOT IMPORTANT AT ALL AND 5 BEING VERY IMPORTANT].

- Lighting
- HVAC (heating and cooling)
- Water heating
- Variable drives
- Efficient motors
- Refrigeration
- Building envelope
- Compressed air
- Chillers
- Pumps
- Irrigation
- [OTHER SPECIFY]**
- None of the above

E5.2 Thank you. Now, how important was product information from **[UTILITY]** program staff or contractors. ____

[IF NEEDED: ON A SCALE FROM 1 TO 5, WITH 1 BEING NOT IMPORTANT AT ALL AND 5 BEING VERY IMPORTANT. IF A FACTOR IS NOT APPLICABLE TO YOU, PLEASE SAY SO.]

E5.2a **[ASK IF E5.2 = 1-5 AND MORE THAN 1 SELECTED IN E2]** Does this rating differ for any of the specific improvements you mentioned?

1. (Yes)
2. (No)
98. (Don't know)

E5.2b **[ASK IF E5.2A = 1]** For which of the following improvements would you rate the importance of information from **[UTILITY]** program staff or contractors differently, and what would be your rating? **[DISPLAY EQUIPMENT MENTIONED IN E2. MULTIPLE RESPONSE ALLOWED]**

ASK RATING FOR EACH EQUIPMENT SELECTED. [IF NEEDED READ: ON A SCALE FROM 1 TO 5, WITH 1 BEING NOT IMPORTANT AT ALL AND 5 BEING VERY IMPORTANT.]

- Lighting
- HVAC (heating and cooling)
- Water heating
- Variable drives
- Efficient motors
- Refrigeration
- Building envelope
- Compressed air
- Chillers
- Pumps
- Irrigation
- [OTHER SPECIFY]**
- None of the above

E5.3 How important was your past experience with a **[UTILITY]** energy efficiency program. ____
[IF NEEDED: ON A SCALE FROM 1 TO 5, WITH 1 BEING NOT IMPORTANT AT ALL AND 5 BEING VERY IMPORTANT. IF A FACTOR IS NOT APPLICABLE TO YOU, PLEASE SAY SO.]

E5.3a **[ASK IF E5.3=1-5 AND MORE THAN 1 SELECTED IN E2]** Does this rating differ for any of the specific improvements you mentioned?

1. (Yes)
2. (No)
98. (Don't know)

E5.3b **[ASK IF E5.3A = 1]** For which of the following improvements would you rate the importance of your past experience with a **[UTILITY]** energy efficiency program differently? **[DISPLAY EQUIPMENT MENTIONED IN E2. MULTIPLE RESPONSE ALLOWED]**

ASK RATING FOR EACH EQUIPMENT SELECTED. [IF NEEDED READ: ON A SCALE FROM 1 TO 5, WITH 1 BEING NOT IMPORTANT AT ALL AND 5 BEING VERY IMPORTANT.]

- Lighting
- HVAC (heating and cooling)
- Water heating
- Variable drives
- Efficient motors
- Refrigeration
- Building envelope
- Compressed air
- Chillers
- Pumps
- Irrigation
- [OTHER SPECIFY]**
- None of the above

[ASK SECTION F TO ALL SURVEY RESPONDENTS]

F. Firmographics

Finally, I have a few general questions about your business.

F1. What industry is your company in? [DON'T READ RESPONSES UNLESS NECESSARY]

1. (Accommodation, Lodging)
2. (Arts, Entertainment and Recreation)
3. (Construction)
4. (Dairy, Agricultural)
5. (Educational Services)
6. (Finance, Insurance)
7. (Food Service)
8. (Food Processing)
9. (Health Care)
10. (Manufacturing)
11. (Mining)
12. (Nonprofit and Religious Organizations)
13. (Oil and Gas)
14. (Professional, Scientific and Technical Services)
15. (Public Administration/Government Services)
16. (Retail)
17. (Refrigerated Warehouse)
18. (Real Estate/Property Management)
19. (Repair and Maintenance Service)
20. (Transportation)
21. (Warehouses or Wholesaler)
22. (Other [SPECIFY: _____])
98. (Don't know)
99. (Refused)

F2. [Question removed]

- F3. How many people are employed by your company at all locations?
1. (None)
 2. (1-10)
 3. (11-25)
 4. (26-50)
 5. (51-75)
 6. (76-100)
 7. (101-200)
 8. (201-500)
 9. (More than 500)
 10. (Other) [RECORD VERBATIM: _____]
 98. (Don't know)
 99. (Refused)
- F4. What type of fuel is used for space heating at your facility?
1. Electric
 2. Gas
 3. (Other) [RECORD VERBATIM: _____]
 98. (Don't know)
 99. (Refused)
- F5. What type of fuel is used for water heating at your facility?
1. Electric
 2. Gas
 3. (Other) [RECORD VERBATIM: _____]
 98. (Don't know)
 99. (Refused)

G. Closing

[ASK PARTIAL PARTICIPANTS G1-G3] [NONPARTICIPANTS GO TO CLOSING]

- G1. Overall, how satisfied would you say you are with the Wattsmart Business program? Would you say: [READ LIST]
1. Very satisfied
 2. Somewhat satisfied
 3. Not too satisfied
 4. Not satisfied at all
 98. (Don't know)
 99. (Refused)

[IF G1=3 OR 4]

- G2. Why do you say you were **[INSERT ANSWER FROM G1]** with the program?
1. **[RECORD VERBATIM: _____]**
 98. (Don't know)
 99. (Refused)
- G3. Is there anything that **[UTILITY]** could have done to improve your overall experience with the Wattsmart Business Program? **[DO NOT READ THE LIST, RECORD ALL THAT APPLY]**
1. (Better/more communication **[SPECIFY: WHO WOULD YOU LIKE MORE COMMUNICATION FROM? _____]**)
 2. (Quicker response time **[SPECIFY: WHO WOULD YOU LIKE A QUICKER RESPONSE TIME FROM? __]**)
 3. (Larger selection of eligible equipment **[ASK: WHAT ENERGY-EFFICIENT EQUIPMENT SHOULD WATTSMART BUSINESS OFFER INCENTIVES FOR? _____]**)
 4. (Increasing the incentive amount)
 5. (Simplify the application process) **[ASK: IN WHAT WAY? _____]**)
 6. (Simplify the website) **[ASK: IN WHAT WAY? _____]**)
 7. (Provide quicker approval on applications)
 8. (Send incentive check out faster)
 9. (Other **[SPECIFY: _____]**)
 10. (No, nothing)
 98. (Don't know)
 99. (Refused)

This completes the survey! Your responses are very important to [UTILITY]. We appreciate your participation and thank you for your time. Have a good day.

Appendix E. Measure Category Cost-Effectiveness

Completed at the end-use category level, cost-effectiveness was reported for evaluated net savings. Net results apply the evaluated NTG to evaluated gross savings. Table E-1 shows cost-effectiveness inputs for Wyoming’s Wattsmart program.

Table E-1. 2018-2019 Wyoming Wattsmart Business End-Use Category Cost-Effectiveness Inputs

Input Description	2018	2019	Total
Average Measure Life*			
Direct Install	12.0	12.4	12.2
Energy Management	3.0	3.0	3.0
HVAC	14.7	15.4	15.0
Lighting	13.8	12.9	13.4
Motors	14.8	14.8	14.8
Oil & Gas	7.0	7.0	7.0
Other	14.0	13.9	14.0
Evaluated Net Energy Savings (kWh/year)**			
Direct Install	3,037,763	3,123,357	6,161,120
Energy Management	3,821,960	8,393,451	12,215,412
HVAC	1,337,061	1,061,021	2,398,082
Lighting	10,624,371	6,624,081	17,248,452
Motors	11,372,191	2,527,882	13,900,073
Oil & Gas	3,944,141	11,873,435	15,817,576
Other	1,049,562	793,692	1,843,254
Total Utility Cost (including incentives)***			
Direct Install	\$1,073,294	\$1,276,880	\$2,350,175
Energy Management	\$471,440	\$1,500,975	\$1,972,414
HVAC	\$250,009	\$272,565	\$522,574
Lighting	\$2,332,595	\$1,661,212	\$3,993,807
Motors	\$2,923,198	\$809,894	\$3,733,092
Oil & Gas	\$586,634	\$2,396,631	\$2,983,264
Other	\$693,422	\$240,996	\$934,417

Input Description	2018	2019	Total
Incentives			
Direct Install	\$770,440	\$792,219	\$1,562,659
Energy Management	\$90,403	\$198,536	\$288,939
HVAC	\$116,709	\$107,923	\$224,632
Lighting	\$1,273,754	\$633,694	\$1,907,448
Motors	\$1,789,429	\$417,635	\$2,207,063
Oil & Gas	\$193,416	\$554,192	\$747,608
Other	\$597,623	\$128,240	\$725,863
Commercial Retail Rate	\$0.0861	\$0.0845	N/A
Industrial Retail Rate	\$0.0626	\$0.0618	N/A
Irrigation Retail Rate	\$0.0852	\$0.0839	N/A

*Weighted average measure category lives are based on individual measure lifetimes and weighted by savings and the frequency of installations.

**Evaluated savings reflect impacts at the customer meter.

***Rocky Mountain Power provided program costs and incentives in annual report data, allocating program costs by weighted savings.

Direct Install

Table E-2, Table E-3, and Table E-4 show the direct install end-use category cost-effectiveness results for net evaluated savings. The direct install end-use category proved cost-effective from the PTRC test, TRC test, and PCT perspectives. The direct install end-use category also proved cost-effective from the UCT test perspective in 2019.

**Table E-2. Wyoming Direct Install 2018-2019 Net
(WY_Miscellaneous_Lighting Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0282	\$1,598,691	\$2,518,932	\$920,241	1.58
TRC	\$0.0282	\$1,598,691	\$2,289,938	\$691,247	1.43
UCT	\$0.0468	\$2,648,250	\$2,289,938	(\$358,312)	0.86
RIM		\$4,239,514	\$2,289,938	(\$1,949,576)	0.54
PCT		\$565,602	\$6,734,096	\$6,168,494	11.91
Lifecycle Revenue Impacts (\$/kWh)					\$0.000016978
Discounted Participant Payback (years)					N/A

**Table E-3. Wyoming Direct Install 2018 Net
(WY_Miscellaneous_Lighting Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.020	\$564,388	\$1,229,820	\$665,432	2.18
TRC	\$0.020	\$564,388	\$1,118,018	\$553,630	1.98
UCT	\$0.037	\$1,065,174	\$1,118,018	\$52,844	1.05
RIM		\$2,134,284	\$1,118,018	(\$1,016,266)	0.52
PCT		\$269,654	\$3,455,091	\$3,185,437	12.81
Lifecycle Revenue Impacts (\$/kWh)					\$0.000008850
Discounted Participant Payback (years)					N/A

**Table E-4. Wyoming Direct Install 2019 Net
(WY_Miscellaneous_Lighting Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.032	\$1,034,303	\$1,289,112	\$254,809	1.25
TRC	\$0.032	\$1,034,303	\$1,171,920	\$137,617	1.13
UCT	\$0.050	\$1,583,076	\$1,171,920	(\$411,157)	0.74
RIM		\$2,105,230	\$1,171,920	(\$933,310)	0.56
PCT		\$295,948	\$3,279,005	\$2,983,057	11.08
Lifecycle Revenue Impacts (\$/kWh)					\$0.000008128
Discounted Participant Payback (years)					N/A

Energy Management

Table E-5, Table E-6, and Table E-7 show the energy management end-use category cost-effectiveness results for net evaluated savings. The energy management end-use category proved cost-effective from all perspectives except for the RIM test perspective overall. The energy management end-use category proved cost-effective from the TRC test and UCT perspectives in 2018 but not 2019.

**Table E-5. Wyoming Energy Management 2018-2019 Net
(WY_Industrial_Machinery_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0219	\$736,730	\$866,743	\$130,012	1.18
TRC	\$0.0219	\$736,730	\$787,948	\$51,218	1.07
UCT	\$0.0203	\$683,425	\$787,948	\$104,523	1.15
RIM		\$2,435,341	\$787,948	(\$1,647,393)	0.32
PCT		\$355,604	\$2,161,005	\$1,805,401	6.08
Lifecycle Revenue Impacts (\$/kWh)					\$0.000151751
Discounted Participant Payback (years)					0.05

**Table E-6. Wyoming Energy Management 2018 Net
(WY_Industrial_Machinery_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.020	\$232,330	\$345,771	\$113,442	1.49
TRC	\$0.020	\$232,330	\$314,337	\$82,008	1.35
UCT	\$0.015	\$173,269	\$314,337	\$141,068	1.81
RIM		\$1,130,579	\$314,337	(\$816,241)	0.28
PCT		\$149,463	\$907,702	\$758,239	6.07
Lifecycle Revenue Impacts (\$/kWh)					\$0.000075189
Discounted Participant Payback (years)					0.22

**Table E-7. Wyoming Energy Management 2019 Net
(WY_Industrial_Machinery_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.019	\$504,401	\$520,972	\$16,571	1.03
TRC	\$0.019	\$504,401	\$473,611	(\$30,790)	0.94
UCT	\$0.019	\$510,156	\$473,611	(\$36,545)	0.93
RIM		\$1,304,762	\$473,611	(\$831,151)	0.36
PCT		\$206,140	\$1,253,303	\$1,047,163	6.08
Lifecycle Revenue Impacts (\$/kWh)					\$0.000076562
Discounted Participant Payback (years)					N/A

HVAC

Table E-8, Table E-9, and Table E-10 show the HVAC end-use category cost-effectiveness results for net evaluated savings. The HVAC end-use category proved cost-effective from the PTRC test, UCT, and PCT perspectives. The HVAC end-use category proved cost-effective from the PTRC and TRC test perspectives in 2018 but not 2019.

**Table E-8. Wyoming HVAC 2018-2019 Net
(WY_School_HVAC_Aux Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0494	\$1,284,086	\$1,325,467	\$41,381	1.03
TRC	\$0.0494	\$1,284,086	\$1,204,970	(\$79,116)	0.94
UCT	\$0.0289	\$750,224	\$1,204,970	\$454,746	1.61
RIM		\$1,398,310	\$1,204,970	(\$193,341)	0.86
PCT		\$766,225	\$2,595,785	\$1,829,560	3.39
Lifecycle Revenue Impacts (\$/kWh)					\$0.000001272
Discounted Participant Payback (years)					2.51

**Table E-9. Wyoming HVAC 2018 Net
(WY_School_HVAC_Aux Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.036	\$521,630	\$723,156	\$201,526	1.39
TRC	\$0.036	\$521,630	\$657,414	\$135,784	1.26
UCT	\$0.020	\$290,018	\$657,414	\$367,397	2.27
RIM		\$760,664	\$657,414	(\$103,249)	0.86
PCT		\$348,322	\$1,490,415	\$1,142,093	4.28
Lifecycle Revenue Impacts (\$/kWh)					\$0.000000679
Discounted Participant Payback (years)					2.01

**Table E-10. Wyoming HVAC 2019 Net
(WY_School_HVAC_Aux Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.061	\$762,456	\$602,311	(\$160,145)	0.79
TRC	\$0.061	\$762,456	\$547,555	(\$214,901)	0.72
UCT	\$0.037	\$460,206	\$547,555	\$87,349	1.19
RIM		\$637,647	\$547,555	(\$90,091)	0.86
PCT		\$417,903	\$1,105,370	\$687,467	2.65
Lifecycle Revenue Impacts (\$/kWh)					\$0.000000593
Discounted Participant Payback (years)					3.16

Lighting

Table E-11, Table E-12, and Table E-14 show the lighting end-use category cost-effectiveness results for net evaluated savings. The lighting end-use category proved cost-effective from the UCT and PCT perspectives overall. The lighting end-use category proved cost-effective from the PTRC and TRC test perspectives in 2018 but not 2019.

**Table E-11. Wyoming Lighting 2018-2019 Net
(WY_Miscellaneous_Lighting, WY_Warehouse_Lighting Load Shapes)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0477	\$8,037,603	\$7,957,306	(\$80,297)	0.99
TRC	\$0.0477	\$8,037,603	\$7,233,915	(\$803,689)	0.90
UCT	\$0.0287	\$4,823,671	\$7,233,915	\$2,410,244	1.50
RIM		\$9,312,503	\$7,233,915	(\$2,078,589)	0.78
PCT		\$5,166,339	\$16,653,241	\$11,486,902	3.22
Lifecycle Revenue Impacts (\$/kWh)					\$0.000016353
Discounted Participant Payback (years)					2.24

Table E-12. Wyoming Lighting 2018 Net
(WY_Miscellaneous_Lighting, WY_Warehouse_Lighting Load Shapes)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.039	\$4,210,655	\$5,055,682	\$845,027	1.20
TRC	\$0.039	\$4,210,655	\$4,596,075	\$385,420	1.09
UCT	\$0.023	\$2,485,379	\$4,596,075	\$2,110,695	1.85
RIM		\$5,882,274	\$4,596,075	(\$1,286,199)	0.78
PCT		\$2,999,030	\$10,706,615	\$7,707,585	3.57
Lifecycle Revenue Impacts (\$/kWh)					\$0.000009215
Discounted Participant Payback (years)					2.08

Table E-13. Wyoming Lighting 2019 Net
(WY_Miscellaneous_Lighting, WY_Warehouse_Lighting Load Shapes)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.055	\$3,826,948	\$2,901,624	(\$925,325)	0.76
TRC	\$0.055	\$3,826,948	\$2,637,840	(\$1,189,109)	0.69
UCT	\$0.034	\$2,338,291	\$2,637,840	\$299,549	1.13
RIM		\$3,430,230	\$2,637,840	(\$792,390)	0.77
PCT		\$2,167,309	\$5,946,626	\$3,779,317	2.74
Lifecycle Revenue Impacts (\$/kWh)					\$0.000006234
Discounted Participant Payback (years)					2.48

Motors

Table E-14, Table E-16, and Table E-17 show the motors end-use category cost-effectiveness results for net evaluated savings. The motors end-use category proved cost-effective from the PTRC test, UCT, and PCT perspectives overall. The motors end-use category proved cost-effective from the PTRC test, TRC test, and PCT perspectives in 2018 but not 2019.

Table E-14. Wyoming Motors 2018-2019 Net
(WY_Miscellaneous_Mfg_General Load Shape)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0468	\$7,043,813	\$7,192,685	\$148,872	1.02
TRC	\$0.0468	\$7,043,813	\$6,538,804	(\$505,009)	0.93
UCT	\$0.0292	\$4,392,966	\$6,538,804	\$2,145,838	1.49
RIM		\$7,673,229	\$6,538,804	(\$1,134,424)	0.85
PCT		\$4,887,355	\$12,617,045	\$7,729,690	2.58
Lifecycle Revenue Impacts (\$/kWh)					\$0.000007461
Discounted Participant Payback (years)					2.97

**Table E-15. Wyoming Motors 2018 Net
(WY_Miscellaneous_Mfg_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.042	\$4,990,711	\$5,889,096	\$898,385	1.18
TRC	\$0.042	\$4,990,711	\$5,353,724	\$363,013	1.07
UCT	\$0.027	\$3,200,787	\$5,353,724	\$2,152,937	1.67
RIM		\$6,169,702	\$5,353,724	(\$815,979)	0.87
PCT		\$3,579,352	\$10,493,871	\$6,914,519	2.93
Lifecycle Revenue Impacts (\$/kWh)					\$0.000005367
Discounted Participant Payback (years)					2.49

**Table E-16. Wyoming Motors 2019 Net
(WY_Miscellaneous_Mfg_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.072	\$2,053,103	\$1,303,589	(\$749,514)	0.63
TRC	\$0.072	\$2,053,103	\$1,185,081	(\$868,022)	0.58
UCT	\$0.042	\$1,192,179	\$1,185,081	(\$7,098)	0.99
RIM		\$1,503,526	\$1,185,081	(\$318,446)	0.79
PCT		\$1,308,003	\$2,123,174	\$815,171	1.62
Lifecycle Revenue Impacts (\$/kWh)					\$0.000002095
Discounted Participant Payback (years)					5.31

Oil and Gas

Table E-17, Table E-18, and Table E-19 show the oil and gas end-use category cost-effectiveness results for net evaluated savings. The oil and gas end-use category proved cost-effective from the UCT and PCT perspectives overall. The oil and gas end-use category proved cost-effective from the PTRC and TRC test perspectives in 2018 and not 2019.

**Table E-17. Wyoming Oil and Gas 2018-2019 Net
(WY_Petroleum_Refining_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0378	\$3,542,419	\$3,126,874	(\$415,545)	0.88
TRC	\$0.0378	\$3,542,419	\$2,842,612	(\$699,807)	0.80
UCT	\$0.0245	\$2,296,969	\$2,842,612	\$545,643	1.24
RIM		\$4,730,098	\$2,842,612	(\$1,887,485)	0.60
PCT		\$2,031,828	\$6,390,342	\$4,358,515	3.15
Lifecycle Revenue Impacts (\$/kWh)					\$0.000033906
Discounted Participant Payback (years)					1.16

**Table E-18. Wyoming Oil and Gas 2018 Net
(WY_Petroleum_Refining_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.028	\$693,832	\$837,005	\$143,173	1.21
TRC	\$0.028	\$693,832	\$760,914	\$67,082	1.10
UCT	\$0.016	\$394,010	\$760,914	\$366,904	1.93
RIM		\$1,396,137	\$760,914	(\$635,223)	0.55
PCT		\$493,238	\$1,823,572	\$1,330,334	3.70
Lifecycle Revenue Impacts (\$/kWh)					\$0.000011411
Discounted Participant Payback (years)					1.20

**Table E-19. Wyoming Oil and Gas 2019 Net
(WY_Petroleum_Refining_General Load Shape)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.036	\$2,848,587	\$2,289,868	(\$558,719)	0.80
TRC	\$0.036	\$2,848,587	\$2,081,699	(\$766,889)	0.73
UCT	\$0.024	\$1,902,959	\$2,081,699	\$178,739	1.09
RIM		\$3,333,961	\$2,081,699	(\$1,252,262)	0.62
PCT		\$1,538,590	\$4,566,770	\$3,028,181	2.97
Lifecycle Revenue Impacts (\$/kWh)					\$0.000022495
Discounted Participant Payback (years)					1.14

Other

Table E-20, Table E-21, and Table E-22 show the other end-use category cost-effectiveness results for net evaluated savings. The other end-use category proved cost-effective from the PCT perspective overall. The other end-use category proved cost-effective from the PTC and TRC test perspectives in 2018 but not 2019.

**Table E-20. Wyoming Other 2018-2019 Net
(WY_Warehouse_Refrigeration, WY_Miscellaneous_Mfg_General, WY_School_Space_Cool,
WY_Restaurant_Water_Heat, WY_Irrigation_General, WY_Grocery_Refrigeration Load Shapes)**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/ Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.0505	\$959,754	\$905,640	(\$54,114)	0.94
TRC	\$0.0505	\$959,754	\$823,309	(\$136,445)	0.86
UCT	\$0.0568	\$1,080,328	\$823,309	(\$257,019)	0.76
RIM		\$1,529,685	\$823,309	(\$706,376)	0.54
PCT		\$614,209	\$2,275,080	\$1,660,871	3.70
Lifecycle Revenue Impacts (\$/kWh)					\$0.000005061
Discounted Participant Payback (years)					N/A

Table E-21. Wyoming Other 2018 Net
(WY_Warehouse_Refrigeration, WY_Miscellaneous_Mfg_General, WY_School_Space_Cool,
WY_Restaurant_Water_Heat, WY_Irrigation_General, WY_Grocery_Refrigeration Load Shapes)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.038	\$415,333	\$518,791	\$103,458	1.25
TRC	\$0.038	\$415,333	\$471,628	\$56,295	1.14
UCT	\$0.067	\$721,954	\$471,628	(\$250,326)	0.65
RIM		\$1,051,746	\$471,628	(\$580,118)	0.45
PCT		\$291,002	\$1,523,815	\$1,232,813	5.24
Lifecycle Revenue Impacts (\$/kWh)					\$0.000004156
Discounted Participant Payback (years)					N/A

Table E-22. Wyoming Other 2019 Net
(WY_Warehouse_Refrigeration, WY_Miscellaneous_Mfg_General, WY_Restaurant_Water_Heat,
WY_Irrigation_General, WY_Grocery_Refrigeration Load Shapes)

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
PTRC (TRC + 10% Conservation Adder)	\$0.063	\$544,420	\$386,849	(\$157,572)	0.71
TRC	\$0.063	\$544,420	\$351,681	(\$192,740)	0.65
UCT	\$0.041	\$358,374	\$351,681	(\$6,693)	0.98
RIM		\$477,938	\$351,681	(\$126,258)	0.74
PCT		\$323,207	\$751,266	\$428,058	2.32
Lifecycle Revenue Impacts (\$/kWh)					\$0.000000905
Discounted Participant Payback (years)					2.80