Exhibit No. 2:

Avista 2018 Idaho Annual Conservation Report

2018 Idaho Annual Conservation Report

Date of Revision: July 31, 2020

All forward-looking statements contained in this document are based on underlying assumptions (many of which are based, in turn, upon further assumptions). These statements are subject to a variety of risks, uncertainties and other factors. Most of these factors are beyond our control and may have a significant effect on our operations, results of operations, financial condition or cash flows, which could cause actual results to differ materially from those anticipated in our statements.

Such risks, uncertainties and other factors include, among others, those included in our most recent Annual Report on Form 10-K, or Quarterly Report on Form 10-Q, filed with the Securities and Exchange Commission. Those reports are available on our website at avistacorp.com.

Cover: Coeur d'Alene River, Cataldo, Idaho

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Avista Pavilion, McEuen Park, Coeur d'Alene, Idaho

INTRODUCTION

Since 1978, Avista has remained committed to delivering responsible and cost-effective energy-efficiency programs to its customers. Its *2018 Annual Conservation Report* summarizes the company's annual energy-efficiency achievements for its Idaho electric and natural gas customers. These programs are intended to deliver a cost-effective, least-cost resource while also helping customers conserve energy, save money, and live more comfortably.

Although the intent of this report is to assess the previous year's performance, successes and lessons are applied during the business planning process and throughout the year to inform and improve program design.

Avista's conservation program portfolio consists of a mix of programs implemented both by the utility and by third-party contractors. The company also funds the regional market transformation effort through the Northwest Energy Efficiency Alliance (NEEA); the reported electric energy savings, cost-effectiveness, and other related data, however, are specific to local programs unless otherwise noted.

Electric and natural gas savings are gross values based on all program participants.

FIGURE 1 – ELECTRIC AND NATURAL GAS SERVICE AREAS

TARIFF RIDER BALANCES

At of the start of 2018, the Idaho electric and natural gas (aggregate) tariff rider balances were underfunded by $9.4 million. The large underfunded balances were due primarily to the high level of conservation achieved during the 2016–17 program years. In 2018, $11.5 million in tariff rider revenue was collected to fund energy efficiency, with $9 million spent to operate energy-efficiency programs. The $2.5 million overcollection of tariff rider funding resulted in an underfunded balance of $6.9 million by year-end.

Table 1 illustrates the 2018 tariff rider activity by fuel type.

TABLE 1 – TARIFF RIDER ACTIVITY

	Electric	Natural Gas
Beginning Balance (Underfunded)/Overfunded	**$ (9,574,630)**	**$ 180,889**
Energy-Efficiency Funding	$ 10,177,172	$ 1,332,964
Net Funding of Operations	$ 602,542	$ 1,513,853
Energy-Efficiency Expenditures	$ 7,736,789	$ 1,279,666
Ending Balances (Underfunded)/Overfunded	**$ (7,134,247)**	**$ 234,187**

IDAHO ACHIEVEMENTS

- ***Electric Conservation:*** For 2018, Avista's Energy Efficiency Program achieved 29,805,007 kWh of conservation.
- ***Natural Gas Conservation:*** For 2018, Avista's Natural Gas Energy Efficiency Program archived 247,746 therms of conservation.

Highlights

Avista continued to deliver cost-effective savings in 2018 and introduced some new program offerings to better serve Idaho customers. Several highlights include:

- ***Expanded offerings for hard-to-reach markets:*** Avista began its multifamily direct install pilot program during 2018, which quickly became an effective tool for reaching the company's underserved population. The program serves multifamily units with low-cost energy-efficient equipment. The pilot was adopted as a full program offering and is part of Avista's overall portfolio of offerings for 2019.
- ***Changing trends in commercial/industrial lighting programs:*** The prescriptive lighting program continues to be one of the largest programs in Avista's portfolio of energy-efficiency offerings. Although savings achieved throughout 2018 were substantial, the level of overall throughput was less than in previous years. The company is also seeing a customer shift toward more exterior lighting projects, with throughput increasing by 21 percent from 2017.
- ***Investment in Avista's energy efficiency program infrastructure:*** Avista began implementing its Nexant iEnergy platform, an enterprise software tool for managing its energy-efficiency portfolio, helping the company gather more detailed information about each energy-efficiency project and aiding in more detailed analysis.

Continuing the integrated resource planning and CPA processes, Avista reviews existing and potential programs as part of the energy-efficiency business planning process. The company discontinued the OPower home energy report program as a result of the business planning process, as well as the ENERGY STAR homes offering for stick-built homes (while keeping the offering for manufactured homes). On the commercial/industrial side, Avista discontinued lighting offerings for T12 and T8 fixture replacement with high-performance T8 fixtures, and also applied a variety of adjustments to measure incentives based on business planning and market conditions, as detailed in the *Trade Ally Outreach section below*.

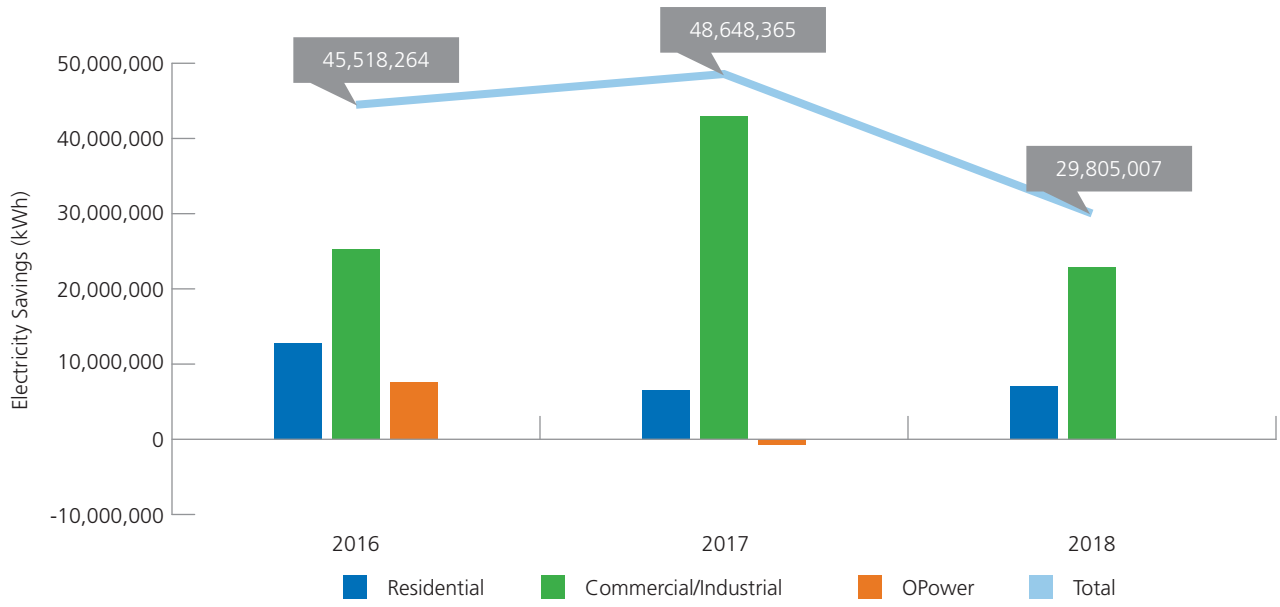
Trade Ally Outreach

In April 2018 Avista introduced a "Trade Ally Network" and actively promoted all of its programs via this network, generally sharing program announcements via email blasts. The company recently upgraded the network to "Trade Ally Connect," a platform that will enable the continuation of communication efforts as well as the creation of webinars, rebate tracking, "Find a Contractor," and other tools to encourage participation and enhanced communication.

Portfolio Trends

Avista's electric portfolio achieved savings consistent with expectations for 2018 compared to previous years, with much of the change attributed to the downward trend in both residential and commercial/industrial interior lighting programs, since a large portion of savings from these programs was captured over 2016 and 2017. As shown in *Figure 2*, Avista's 29,805,007 kWh of energy savings achieved in 2018 is lower than that of 2017 (48,648,365 kWh). Savings acquired through the company's residential program increased from 6,425,361 kWh in 2017 to 6,907,065 kWh in 2018, or 7 percent. Commercial/industrial programs decreased in conservation savings as well, from 42,962,098 kWh in 2017 to 22,897,942 kWh in 2018 (47 percent).

FIGURE 2 – ELECTRIC ENERGY SAVINGS (2016–2018)

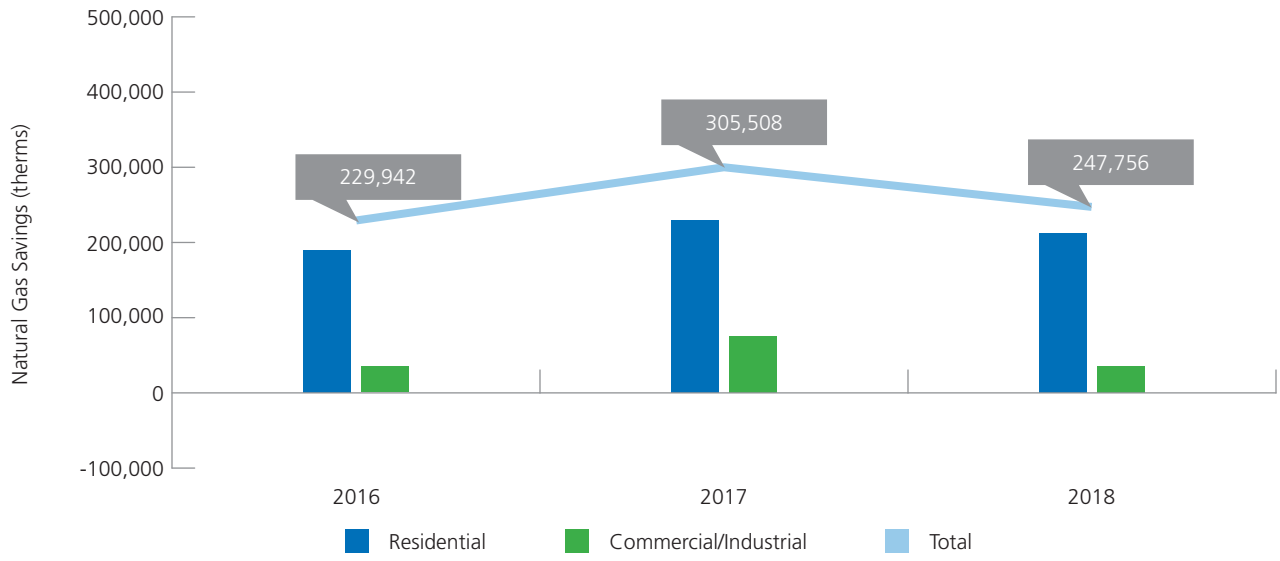


	2016	2017	2018
Residential	12,749,624	6,425,361	6,907,065
Commercial/Industrial	25,244,254	42,962,098	22,897,942
OPower	7,524,386	(739,094)	–
Total	**45,518,264**	**48,648,365**	**29,805,007**

Note: For the purpose of comparing the 2016-18 trend analysis data, all savings are verified gross.

As shown in *Figure 3*, Avista's natural gas portfolio achieved conservation savings consistent with expectations for 2018 compared to the previous year. Much of that change is attributed to commercial/industrial prescriptive programs and to residential HVAC and water heater programs, both of which declined in savings in 2018. Avista's 247,756 therms of energy savings from 2018 is lower than that of 2017 (305,508). Savings acquired through the company's residential programs decreased from 234,325 therms in 2017 to 212,764 in 2018, or 9 percent. Commercial/industrial programs decreased in conservation savings from 71,183 therms in 2017 to 34,992 in 2018, or 51 percent.

FIGURE 3 – NATURAL GAS ENERGY SAVINGS (2016–2018)

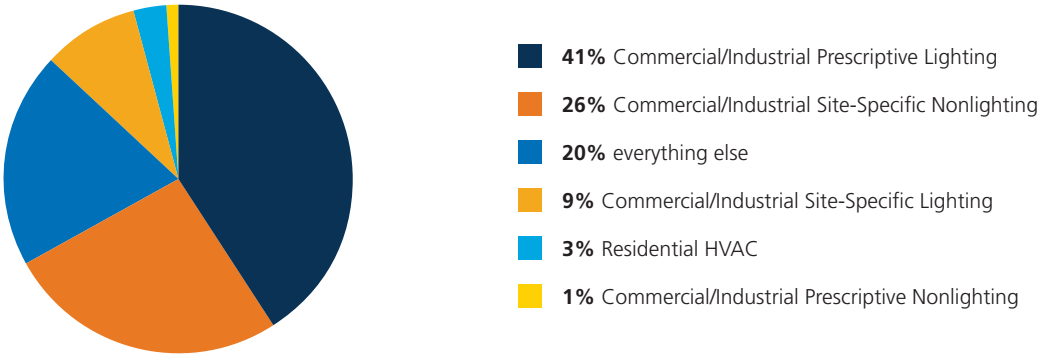


	2016	2017	2018
Residential	192,870	234,325	212,764
Commercial/Industrial	37,072	71,183	34,992
Total	**229,942**	**305,508**	**247,756**

Note: For the purpose of comparing the 2016–18 trend analysis data, all savings are verified gross.

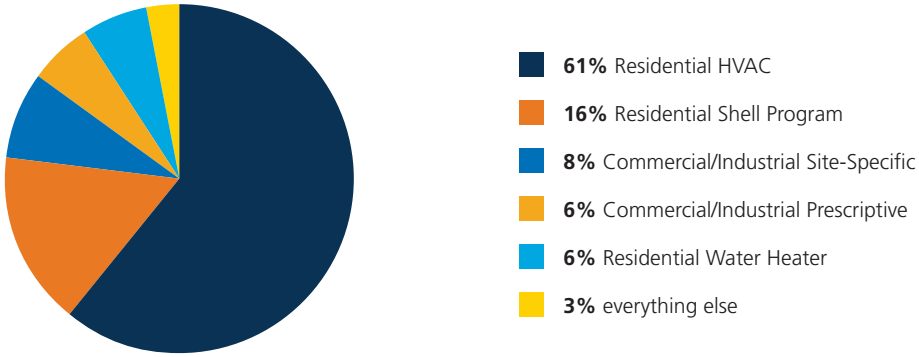
Of Avista's overall electric portfolio in 2018, the commercial/industrial prescriptive and site-specific programs obtained 77 percent of the savings. The residential HVAC program and all other programs combined achieved the remaining 23 percent of savings (see *Figure 4*).

FIGURE 4 – ELECTRIC SAVINGS PORTFOLIO



Of Avista's overall natural gas savings portfolio, residential HVAC programs obtained 61 percent of the savings in 2018. Residential water heater, shell, commercial/industrial prescriptive, and site-specific programs combined achieved 36 percent of the overall savings for 2018. Everything else obtained 3 percent (see *Figure 5)*.

FIGURE 5 – NATURAL GAS SAVINGS PORTFOLIO



Verified Savings

Avista's Idaho targets are set through the *Integrated Resource Plan* (IRP) process; targets for 2018 were 18,594 MWh and 246,440 therms.

For its 2018 electric target, the company chose to use the *2017 Electric IRP* centered on its Conservation Potential Assessment (CPA) as the basis for its Annual Conservation Plan (ACP) savings goals and targets. Avista's 2018 conservation acquisition target identified in its *IRP* was 12,008 MWh of qualifying energy efficiency in Idaho. In addition to the *IRP*-identified conservation target, the company further adjusted this number to an overall 2018 target of 18,594 MWh, which accounts for a 28 percent increase from a Total Resource Cost (TRC)-based CPA and *IRP*-informed goal to a Utility Cost Test (UCT)-informed goal. It also includes an additional 3,224 MWh, which is the amount planned from behavioral programs.[1]

The 2018 natural gas target of 246,440 therms was identified in the *2016 Natural Gas IRP* and adopted in the *2018 Natural Gas Conservation Plan*.

1) Savings amount is from Avista's former Home Energy Report (HER) program. Although the company will not be continuing the HER program, Avista has committed the estimated savings to its target.

In 2018, the electric energy-efficiency portfolio achieved first-year annual energy savings of 29,805 MWh and natural gas savings of 247,756 therms. Based on the target established in the *Electric* and *Natural Gas IRPs*, Avista achieved 160 percent of the electric savings target and 101 percent of the natural gas savings target. *Tables 2* and *3* show 2018 savings by fuel and sector.

TABLE 2 – ENERGY EFFICIENCY SAVINGS BY SECTOR – ELECTRIC

Sector	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Commercial/Industrial	22,832,307	22,630,556	99%
Residential	5,400,520	5,108,673	95%
Low-Income	228,498	252,699	111%
Fuel Efficiency	1,824,345	1,813,079	99%
Total	**30,285,670**	**29,805,007**	**98%**

TABLE 3 – ENERGY EFFICIENCY SAVINGS BY SECTOR – NATURAL GAS

Sector	Reported Savings (Therms)	Verified Savings (Therms)	Realization Rate
Commercial/Industrial	38,613	34,992	91%
Residential	205,001	207,992	101%
Low-Income	5,185	4,772	92%
Total	**248,800**	**247,756**	**98%**

Expenditures

For 2018 operations, Avista exceeded budgeted electric energy-efficiency expenditures by approximately $1.5 million, or 23 percent, and exceeded budgeted natural gas expenditures by $142,000, or 12 percent. The primary cause of these over-expenditures was due to increased levels of incentives – the demand for which was slightly higher than anticipated – resulting in underfunding for both electric and natural gas programs.

While the *2018 Annual Conservation Plan* provides an expectation for operational planning, Avista is required to pursue all cost-effective measures under Schedules 90 and 190. Since customer incentives are the largest component of expenditures, customer demand can easily affect the funding level of the tariff riders. *Table 4* below provides a detailed comparison of budgeted to actual energy-efficiency expenditures by fuel type.

TABLE 4 – ANNUAL CONSERVATION PLAN BUDGET TO ACTUAL EXPENDITURES COMPARISON

	Electric	Natural Gas
2018 Annual Conservation Plan		
Incentives Budget	$ 3,413,515	$ 732,909
Non-Incentives and Labor [a)]	$ 2,874,600	$ 404,798
Total Budgeted Expenditures	**$ 6,288,115**	**$ 1,137,707**
Actual 2018 Expenditures		
Incentives	$ 4,878,494	$ 941,827
Non-Incentives and Labor [a)]	$ 2,858,495	$ 337,839
Total Actual Expenditures	**$ 7,736,789**	**$ 1,279,666**
Variance	**$ 1,448,674**	**$ 141,959**

Note: Budget values are from the *2018 Annual Conservation Plan*.

a) Non-Incentives and Labor includes all non-incentive implementation costs of the energy-efficiency program as well as NEEA market transformation expenditures.

The expenditure variance is mainly attributed to Avista's 2018 site-specific program, which had a budgeted expenditure of $640,000 and an actual incentive expenditure of $1,458,134. The company's commercial/industrial lighting programs also contributed to its incentive expenditures of $1,573,232, exceeding the planned expenditures of $1,291,524 by $296,598. *Table 5* illustrates the top five programs with the highest impact on the expenditure variance.

TABLE 5 – PROGRAMS WITH HIGHEST IMPACT ON EXPENDITURE VARIANCE

Program	Planned [a)]	Actual	Variance	Variance Percentage
Site-Specific	$ 640,000	$ 1,458,134	$ 818,134	128%
Exterior Prescriptive Lighting	$ 250,860	$ 759,662	$ 508,802	203%
Interior Prescriptive Lighting	$ 1,040,664	$ 813,570	$ (227,094)	(22)%
Residential Fuel Conversions	$ 526,800	$ 291,437	$ (235,363)	(45)%
Multifamily Market Transformation	$ 178,500	$ 301,000	$ 122,500	69%

a) Planned values are estimated incentive costs from the *2018 Annual Conservation Plan*.

EVALUATION APPROACH

Avista considers evaluation a critical element of a successful energy conservation program. The company incorporates Evaluation, Measurement, and Verification (EM&V) activities to validate and report verified energy savings related to its energy-efficiency measures and programs. Avista relies on EM&V recommendations to improve program performance, enact changes to programs, and decide whether and when to phase out measures. Avista EM&V protocols represent comprehensive analyses and assessments necessary to supply useful information to management and stakeholders.

Third-party EM&V firms generally conduct evaluations for Avista programs. They are selected on a two-year basis, using a competitive bidding process managed by Avista's supply chain management group. Once a contract has been awarded, the third-party evaluator's scope of work is managed by Avista's planning and analytics team. Recommendations pertaining to specific programs and related processes are provided to the company by the third-party evaluator in impact and process evaluation report outputs. Avista tracks these recommendations and uses them as inputs for the annual business planning process.

For 2018, Cadmus was retained to conduct impact and process evaluations of electric and natural gas programs in Avista's Idaho program portfolio. The 2018 EM&V budget provides for third-party EM&V services that deliver an evaluation of the 2018 program year portfolio, along with consolidating these findings with results obtained for 2017. As in past reporting periods, Avista continued to use a portfolio-wide evaluation approach to provide a comprehensive benchmark to compare against future years. Impact and process evaluations for most programs were also completed at the program level, so that each program's customer experience could be better informed and realization rates at the program level could be understood.

To support planning and reporting requirements, several guiding EM&V documents are maintained and published. This includes the Avista EM&V framework, an annual EM&V plan, and EM&V contributions within other DSM and Avista corporate publications. Program-specific EM&V plans are created as required to inform and benefit the DSM activities. These documents are reviewed and updated as necessary, serving to improve the processes and protocols for energy-efficiency measurement, evaluation, and verification.

EM&V efforts will also be applied to evaluating emerging technologies and applications in consideration of potential inclusion in the company's energy-efficiency portfolio. In the electric portfolio, Avista may spend up to 10 percent of its conservation budget on programs whose savings impacts have not yet been measured if the overall portfolio of conservation passes the applicable cost-effectiveness test. These programs may include educational, behavioral change, and other types of investigatory projects. Specific activities can include product and application document reviews, development of formal evaluation plans, field studies, data collection, statistical analysis, and solicitation of user feedback.

Avista and its customers benefit from regional activities and resources in the energy-efficiency and conservation domain. To engage with and contribute to regional efforts, one Avista staff member has a voting role and a second has a corresponding member role on the Regional Technical Forum (RTF) that serves as an advisory committee to the Northwest Power and Conservation Council (NPCC). The RTF is a primary source of information relating to the standardization of energy savings and measurement processes for electric applications in the Pacific Northwest. This knowledge base provides energy efficiency data, metrics, non-energy benefits, and references that are suitable for inclusion in Avista's Technical Reference Manual (TRM) relating to acquisition planning and reporting. In addition, the company engages with other Northwest utilities and the NEEA in various pilot projects or subcommittee evaluations. Portions of the energy-efficiency savings acquired through the NEEA's programs within the region are attributable to Avista's portfolio.

Avista's commitment to the critical role of EM&V is supported by the company's continued focus on the development of best practices for its processes and reporting. Application of the principles of the International Performance Measurement and Verification Protocol serves to guide measurement and verification plans applied to Avista programs. In addition, the recent compilation of EM&V protocols released under the U.S. Department of Energy's Uniform Methods Project will be considered and applied where possible to support consistency and credibility of the reported results. The verification of a statistically significant number of projects is often extrapolated to verify and perform impact analysis on complete programs within reasonable standards of rigor and degree of conservatism. This process serves to ensure that Avista will manage its DSM portfolio in a manner consistent with both utility and public interests.

Evaluation Methodology and Activities

Cadmus conducted the Idaho portfolio impact evaluation using a variety of methods and activities. *Table 6* below lays out evaluation activities for each program in the electric portfolio. Process evaluation activities are described in more detail in the "Customer Satisfaction" sections on page 20 for commercial/industrial and page 53 for residential.

TABLE 6 – PROGRAM EVALUATION ACTIVITIES – ELECTRIC

Sector	Program	Document/Database Review	Verification/Metering Site Visits
Commercial/Industrial	Prescriptive (Multiple)	✔	✔
	Site-Specific	✔	✔
Residential	Simple Steps, Smart Savings	✔	--
	HVAC	✔	--
	Shell	✔	--
	ENERGY STAR Homes	✔	--
	Multifamily Direct Install	✔	--
Low-Income	Low-Income	✔	--
Fuel Efficiency	Commercial/Industrial Site-Specific	✔	--
	Residential Prescriptive	✔	--
	Low-Income	✔	--

Cadmus took a tailored approach to sample design for each of the three sectors previously. More details about sample design are included in program-specific sections later in this report. *Table 7* below lays out evaluation activities for each program in the natural gas portfolio.

TABLE 7 – PROGRAM EVALUATION ACTIVITIES – NATURAL GAS

Sector	Program	Document/Database Review	Verification/Metering Site Visits
Commercial/Industrial	Prescriptive (Multiple)	✔	✔
	Site-Specific	✔	✔
Residential	Simple Steps, Smart Savings	✔	--
	HVAC	✔	--
	Shell	✔	--
	ENERGY STAR Homes	✔	--
	Multifamily Direct Install	✔	--
Low-Income	Low-Income	✔	--
Fuel Efficiency	Commercial/Industrial Site-Specific	✔	--
	Residential Prescriptive	✔	--
	Low-Income	✔	--

Impact Evaluation Results, Portfolio

Cadmus found the following realization rates in the Idaho program portfolios:

- ***Electric:*** 98 percent realization rate and 29,805,007 kWh in annual verified savings (*Table 2* on *page 7*).
- ***Natural Gas:*** 100 percent realization rate and 247,756 therms in annual gross savings (*Table 3* on *page 7*).

Cadmus collected the Avista-reported savings through database extracts from Avista's customer care and billing (residential) and InforCRM (commercial/industrial) databases and from data provided by third-party implementers to determine the *verified savings* that represent the company's findings. In the second year of the two-year evaluation cycle (2019), Cadmus will conduct utility billing regression analyses to evaluate the most accurate energy savings for most residential programs.

COST-EFFECTIVENESS

Before implementing any new program, Avista conducts analyses to determine whether that program is cost-effective both from the company's and from customers' perspectives. Avista uses four metrics to evaluate cost-effectiveness: the Utility Cost Test (UCT), the Total Resource Cost (TRC), the Participant Cost Test (PCT), and the Ratepayer Impact Test (RIM). For Idaho programs, the UCT is the most important. Avista's cost effectiveness goal is for all – except low-income – programs to have a UCT above 1.00, which indicates that the benefits to the utility exceed the costs of implementing the program. In 2018, the UCT benefit/cost ratios were 1.99 for electric and 2.15 for natural gas.

TABLE 8 – PORTFOLIO COST-EFFECTIVENESS RESULTS (COMBINED ELECTRIC AND NATURAL GAS)

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 21,196,887	$ 8,182,178	**2.59**
Total Resource Cost (TRC)	$ 23,098,758	$ 12,310,887	**1.88**
Participant Cost Test (PCT)	$ 38,086,627	$ 10,623,313	**3.59**
Ratepayer Impact (RIM)	$ 21,196,887	$ 31,405,373	**0.67**

Tables 9 and *10* show cost-effectiveness by fuel type. The UCT benefit/cost ratios for the electric and natural gas portfolios are 1.99 and 2.15, respectively.

TABLE 9 – ELECTRIC PORTFOLIO COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 19,018,718	$ 7,156,781	**2.66**
Total Resource Cost (TRC)	$ 20,920,589	$ 10,099,612	**2.07**
Participant Cost Test (PCT)	$ 34,407,265	$ 8,510,017	**4.04**
Ratepayer Impact (RIM)	$ 19,018,718	$ 29,867,430	**0.64**

TABLE 10 – NATURAL GAS PORTFOLIO COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 2,178,169	$ 1,025,397	**2.12**
Total Resource Cost (TRC)	$ 2,178,169	$ 2,211,275	**0.99**
Participant Cost Test (PCT)	$ 3,679,362	$ 2,113,295	**1.74**
Ratepayer Impact (RIM)	$ 2,178,169	$ 1,537,943	**1.42**

Table 11 contains cost-effectiveness results for 2018 programs by sector.

TABLE 11 – PORTFOLIO BENEFIT/COST RATIOS

Benefit Cost Ratios	Residential			Low Income			Commercial/Industrial		
	Electric	Gas	Total	Electric	Gas	Total	Electric	Gas	Total
Utility Cost Test (UCT)	2.25	3.35	**2.46**	0.59	0.15	**0.44**	3.22	1.84	**3.18**
Total Resource Cost (TRC)	2.17	1.18	**1.81**	1.05	0.17	**0.67**	2.09	0.74	**2.03**
Participant Cost Test (PCT)	5.03	1.94	**3.66**	3.05	1.37	**2.32**	3.79	0.96	**3.67**
Ratepayer Impact (RIM)	1.11	2.25	**1.28**	0.48	0.13	**0.36**	0.54	0.77	**0.55**

Downtown Coeur d'Alene, Idaho

COMMERCIAL/INDUSTRIAL SECTOR

Overview

The commercial/industrial energy-efficiency market is served through a combination of prescriptive and site-specific programs. Any savings measure not offered through the prescriptive program – and/or that does not meet its parameters – is automatically eligible for treatment through the site-specific program, subject to the criteria for participation in that program.

The prescriptive program path is selected for smaller, straightforward equipment installations that generally have similar operating characteristics (such as lighting, simple HVAC systems, food service equipment, and variable frequency drives).

The site-specific program path is reserved for more unique or complex projects that require custom savings calculations and technical assistance from Avista's energy engineers (such as compressed air, process equipment and controls, and comprehensive lighting retrofits). In certain instances, a performance basis approach is used.

- ***690 commercial/industrial electric measures in 2018:*** total savings of 22,897,942 kWh, a decrease of 47 percent from the previous year (42,962,098 kWh). Most of this decrease was due to a year-over-year reduction in LED lighting measures.
- ***40 commercial/industrial natural gas measures in Idaho in 2018:*** total savings of 34,992 therms, a decrease of 51 percent from the previous year (71,183 therms). Prescriptive food service equipment achieved savings of 8,871 therms, followed by site-specific EnergySmart Grocer case door savings of 8,402 therms (25 percent and 24 percent of total commercial/industrial savings, respectively). Prescriptive HVAC and insulation and site-specific HVAC combined measures provided the remaining 18 percent of commercial/industrial natural gas savings.

TABLE 12 – COMMERCIAL/INDUSTRIAL VERIFIED SAVINGS BY PROGRAM

Commercial/Industrial	Program Type	Electric Program		Natural Gas Program	
EnergySmart Grocer Prescriptive Cases	Prescriptive	3,402	kWh	0	Therms
Prescriptive Commercial HVAC	Prescriptive	0	kWh	3,956	Therms
Prescriptive Food Service Equipment	Prescriptive	8,527	kWh	8,871	Therms
Prescriptive Green Motors Rewind	Prescriptive	42,870	kWh	0	Therms
Prescriptive Insulation	Prescriptive	929	kWh	1,149	Therms
Prescriptive Exterior Lighting	Prescriptive	4,243,826	kWh	0	Therms
Prescriptive Interior Lighting	Prescriptive	8,012,238	kWh	0	Therms
Prescriptive Motor Controls HVAC	Prescriptive	113,171	kWh	0	Therms
Site-Specific EnergySmart Grocer Case Doors	Site-Specific	198,157	kWh	8,402	Therms
Site-Specific EnergySmart Grocer Cases	Site-Specific	27,026	kWh	0	Therms
Site-Specific EnergySmart Grocer Controls	Site-Specific	37,295	kWh	0	Therms
Site-Specific Compressed Air	Site-Specific	1,882,520	kWh	0	Therms
Site-Specific HVAC Combined	Site-Specific	99,058	kWh	1,266	Therms
Site-Specific HVAC Heating	Site-Specific	2,168	kWh	0	Therms
Site-Specific Industrial Process	Site-Specific	5,229,153	kWh	11,348	Therms
Site-Specific Exterior Lighting	Site-Specific	1,375,335	kWh	0	Therms
Site-Specific Interior Lighting	Site-Specific	1,302,913	kWh	0	Therms
Site-Specific Shell	Site-Specific	117,028	kWh	0	Therms
Site-Specific Multifamily	Fuel Conv.	202,324	kWh	0	Therms
Total Commercial/Industrial		**22,897,942**	**kWh**	**34,992**	**Therms**
Interactive Effects (Therm Offsets)		0	kWh	(10,441)	Therms
Total Commercial/Industrial after Interactive Effects		**22,897,942**	**kWh**	**24,552**	**Therms**

Marketing

Avista published two advertorials in 2018 to increase awareness of its energy-efficiency programs for commercial and industrial customers. The first advertorial (*Figure 6*) showcased three developers who endorsed the company's Multifamily Natural Gas Incentive Program, and included a feature of an apartment building in downtown Coeur d'Alene. The article highlighted participating developers who installed nearly 2,000 natural gas-heated multifamily units, leading to more than 7,000,000 kilowatt-hours of energy savings. The piece was placed in multiple local, regional, and trade publications in March and April, and again from June through October, resulting in more than 700,000 total impressions.

FIGURE 6 – COMMERCIAL/INDUSTRIAL MULTIFAMILY NATURAL GAS INCENTIVE PROGRAM ADVERTORIAL

GREG GERVAIS, CO-FOUNDER OF COPPER BASIN CONSTRUCTION, WITH **SUE BALDWIN**, AVISTA ACCOUNT EXECUTIVE

Natural gas benefits builders and tenants.

Local developers are installing natural gas in their multifamily projects, as this clean, economical fuel adds value to their buildings. The cost for them to do so is also making financial sense now that one regional energy provider, Avista, is providing builders and developers with cash incentives.

Avista generates approximately half of its electricity from hydropower. And while the company embraces renewables such as wind and solar, these are considered intermittent energy resources (i.e., the wind does not always blow, especially in extreme cold temperatures when demand for electricity is at its peak). About 35% of the utility's diverse resource mix comes from natural gas, which provides reliable and affordable energy for many of its customers.

"As demand for energy grows, we're always looking for ways to increase energy efficiency," explains Avista Account Executive Sue Baldwin. "To help meet this demand, we burn natural gas in combustion turbines to generate electricity. However, when gas is converted to electricity and sent over power lines to our customers, nearly half of that energy produced is lost. That's why delivering it directly to a home for heating is much more efficient than using electricity."

And that's also why Avista is offering incentives to assist developers in bringing this plentiful and versatile fuel to multifamily projects. Avista's program provides up to $3,500 per unit for installation of either space heating, hot water, or a combination of both (capped at 100% of the incremental cost to install natural gas). Available in Avista's Washington and Idaho service territory through 2018, the incentive is for construction projects with five or more units per building.

One of the developers to take advantage of Avista's program is Greg Gervais, co-founder of Copper Basin Construction. The Hayden Lake, Idaho-based company specializes in commercial and residential land development and is today one of the Inland Northwest's largest multifamily builders.

Developers can get up to $3,500 per unit to install natural gas.

According to Gervais, installing gas heat requires additional framing (such as soffits for ductwork), along with multiple stages of sheetrocking and added fire prevention between floors.

Gervais installed natural gas in his latest project, the sophisticated 728 apartments in downtown Coeur d'Alene, Idaho. Gervais explained that he is after high-caliber tenants who want some of the amenities they would enjoy with a house. A natural gas furnace lets him provide space heating and central air without unsightly wall heaters and window cooling units. Natural gas also supplies faster and more even heat throughout the apartment.

"We recognize there is a greater cost and additional effort to install natural gas, but the quality of the building is so much better," says Gervais. "And with Avista's help to offset some of those costs, it's definitely worth it."

Another development company that has partnered with Avista is Diamond Rock Construction in Spokane Valley. Diamond Rock has been building quality Spokane-area homes for over 20 years. The company also develops unique multifamily dwellings, one of its latest being Bella Tess, an upper-end apartment complex in the Valley, near the scenic Spokane River and Centennial Trail.

According to Baldwin, Diamond Rock is the area's first developer to successfully determine how to make three-story buildings pencil out using Avista's incentive.

"We had to feel good about bridging the financial gap ourselves," says Diamond Rock President Dennis Crapo. "Avista's incentive program certainly helped with that."

Diamond Rock chose natural gas heating for Bella Tess because it fits the company's environmentally-conscious vision for the property (even the center of the club house has a 15-foot tree growing under a skylight). According to Crapo, the Bella Tess property is Green Globe certified—a nationally recognized, green-rating assessment program that promotes adopting sustainability goals with construction projects.

Crapo listed several things that contribute to Green Globe status, including quality of the windows, thickness of the walls, amount of insulation and other improvements. A high-efficiency natural gas furnace also contributes, as does its integral central air.

"In addition to the energy-efficiency benefits, natural gas is also a plus for our tenants," said Crapo. "Once people experience the comfort that natural gas provides—especially during our cold winter months—they'll begin to expect it in other apartment buildings."

Natural gas space heating is just one of the ways developers are taking advantage of Avista's incentive. Baker Construction & Development, Inc. of Spokane found natural gas hot water to be a perfect solution for its latest 61-unit/214-bedroom apartment building, 940 North.

DENNIS CRAPO, DIAMOND ROCK PRESIDENT

The company has been an industry leader in the western U.S. for seven decades. Their new 940 North building in Spokane serves as premier student housing primarily for Gonzaga University.

According to V.P. of Construction Lucas Holmquist, the luxurious 3- and 4-bedroom floor plans are designed much like a traditional college dorm, where student tenants share the apartment's main living spaces.

"For that reason alone, it made sense to install a central natural gas water heater system instead of individual electric water heaters," says Holmquist.

Most students take showers early in the morning before classes, he explained. The endless supply of hot water keeps roommates happy because the last one out of bed doesn't end up with a cold shower.

"The building's owner also benefits," he says. "This natural gas solution means fewer maintenance costs and a longer life cycle for the system. It's better for the environment, too."

LUCAS HOLMQUIST, V.P. OF CONSTRUCTION, BAKER CONSTRUCTION & DEVELOPMENT, INC.

Developers interested in the incentive program should contact Avista early in the process. "We want to help as much as we can," says Baldwin, "and avoid engineers and architects having to redesign their plans to accommodate a different system."

To date, participating developers have installed nearly 2,000 gas-heated multifamily units.

"That converts to more than 7,000,000 kilowatt-hours of energy savings," said Baldwin.

To learn more about Avista's Multifamily Natural Gas Incentive Program, contact Sue Baldwin at 208-769-1340, or sue.baldwin@avistacorp.com

The second advertorial *(Figure 7)* was focused on lighting, and featured a small business, a medium-sized company, and a large industrial customer. Its purpose was to illustrate how Avista can help customers of all sizes become more energy-efficient with lighting improvements. The advertorial ran in local, regional, trade, and nationally zoned publications from July through December, delivering more than 320,000 impressions.

FIGURE 7 – COMMERCIAL/INDUSTRIAL LIGHTING PROGRAM ADVERTORIAL

CLEARWATER PAPER CORPORATION, (LEFT TO RIGHT) Levi Westra, Engineer, Avista; Ed Arnhold, Account Executive, Avista; Todd Mooers, Senior Process Control Engineer, Clearwater Paper; and Mike Lohman, Maintenance Supervisor, Clearwater Paper

How Avista is lowering lighting costs for companies of every size.

Interior lighting can be a significant portion of a building's electric usage. On average, lighting accounts for 30% of the annual electricity use in commercial buildings. The numbers climb even higher in healthcare environments (43%) and warehouses (80%).

Without a doubt, outdated and inefficient lighting can hurt the bottom line of companies big and small. That's why Avista is helping businesses upgrade to newer, more energy-efficient lighting and technologies by offering valuable incentives and rebates.

Lighting accounts for 30% of the average annual electricity use in commercial buildings.

Large companies like Clearwater Paper Corporation have seen the light. The national pulp and paper product manufacturer upgraded lighting inside its Consumer Products Division building at its Lewiston, Idaho facility.

ADVERTISEMENT

They swapped out 900 outdated metal halides with higher-efficiency LEDs, saving as much as 325 watts per fixture.

They also installed a control system to optimize lighting for their facility's mix of humans and automation. It consists of a grid of light fixtures, each with separate identification numbers. Using a laptop, employees can program lighting parameters via WiFi.

Lighting can be automatically increased in areas such as their warehouse, where employees work or manned vehicles are detected, or lighting can be reduced where unmanned laser-guided forklifts operate.

"We want to be good stewards of the environment," said Plant Manager Donnie Ely. "So it's great to have Avista's help with energy projects that fit our corporate sustainability goals as well as save money."

The company is saving on maintenance and replacement costs, too, since LEDs have a life expectancy of ten years. Plus, 90% of the fixtures have battery power for emergency lighting, which now stays lit four times longer than the previous system.

This was the third time Clearwater Paper has partnered with Avista to upgrade their lighting. "So far, they've received more than $1,000,000 in energy-efficiency rebates and reduced their electric usage by over 7,000,000 kilowatt-hours annually," said Avista Account Executive Ed Arnhold.

Mid-sized companies like Parkwood Business Properties are also saving big with Avista's incentives. The Coeur d'Alene, Idaho-based commercial real estate development and property management firm leases a variety of office, retail, and flex-tech space throughout Northern Idaho.

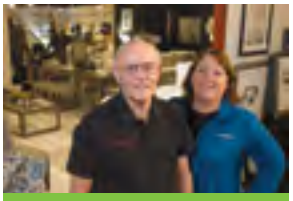
Parkwood partnered with Avista to retrofit interior lighting in its commercial buildings. One building alone—their 700 Ironwood/1919 Lincoln medical building complex, which houses the Cancer Center in Coeur d'Alene—is now saving the company nearly $78,000 in annual energy costs.

"We're always looking for opportunities to lower operating costs and keep rents as low as possible for our tenants," said Steve Meyer, one of four partners at the firm.

In total, the company has completed 33 interior lighting projects and received more than $300,000 in rebates from Avista.

"They've done a great job," said Avista Account Executive Sharmon Schmitt. "Altogether, the lighting upgrades reduced their electric usage by 2.6 million kilowatt-hours annually, saving them approximately $180,000 a year."

Parkwood is also saving over $50,000 in annual maintenance costs.



THE TIN ROOF, (LEFT TO RIGHT) Jim Hanley, Business Co-Owner, the Tin Roof, and Greta Zink, Program Manager, Avista

ADVERTISEMENT

"We used to receive up to 20 calls a month to change bulbs," said Parkwood Facilities Manager Jeff Mallett. "Thanks to longer-lasting LEDs, calls have nearly gone to zero."

Avista helps small businesses, too, like the Tin Roof, Spokane's local and national award-winning home furnishings store. The family-owned and -operated company has always been energy-conscious.

"Earlier, we paid to replace our store's older halogen lights with CFLs," said co-owner Jim Hanley. "So when we were approached about Avista's program to retrofit our lighting for free, we jumped at the chance."

PARKWOOD BUSINESS PROPERTIES, (LEFT TO RIGHT) Jeff Mallett, Facilities Manager, Parkwood; Ryan Nipp, Partner, Parkwood; Sharmon Schmitt, Account Executive, Avista; and Chris Meyer, Partner, Parkwood

As part of the program, the Tin Roof was able to upgrade 20 T-12 lamps to LEDs. They also received a supplemental lighting rebate to do an additional ten lamps.

According to Avista Program Manager Greta Zink, the Tin Roof has reduced its annual electric usage by more than 10,000 kilowatt-hours a year.

"Like many small retail businesses, we operate on slim margins," said Hanley, "so the savings we've obtained with Avista's help makes a real difference."

To learn more about Avista's energy efficiency programs, visit **myavista.com/bizrebates** or email **accountexecs@avistacorp.com.** All Avista customers may be eligible for energy efficiency rebates.

AVISTA

Avista also continued to build awareness of energy-efficiency and related programs through an electronic newsletter sent to commercial customers. As opportunities arose, the company also provided energy-efficiency tips – related to winter weather and summer heat – to local media outlets. Avista updates area vendors about program information through mailings and webinars; they in turn pass that information on to customers.

Outreach efforts included refreshing commercial program collateral and forms as well as launching additional trade ally tools in Avista's iEnergy DSM Central software.

FIGURE 8 – COMMERCIAL/INDUSTRIAL ENERGY EFFICIENCY REBATES FLIER AND FORMS

AVISTA

Reduce your growing energy demands through efficiency.

Take advantage of our expertise along with rebates and incentives.

We want to make your operation more efficient.

Let Avista show you ways to operate more efficiently and save on energy costs—not to mention improve your comfort and air quality while lessening your environmental impact. We also offer rebates and incentives to help get you there.

Standard rebates

Get rebates on smaller projects, such as switching to LED lighting, upgrading food service equipment or installing a natural gas furnace. See our entire list of standard rebates online, where you'll find downloadable forms to mail in.

Custom or site-specific incentives

Whether you're planning a new building or upgrading an existing one, let Avista help identify opportunities where you can receive energy efficiency incentives and save. Just make sure to get Avista involved before you start your project. To learn more, contact your Avista account executive or call 800-936-6629.

Valuable Energy Solutions for Commercial and Industrial Customers

Energy Saving Opportunities	Available Rebates
Commercial Lighting The benefits of upgrading to more efficient lights include: enhanced lighting quality, energy savings, cost savings and reduced maintenance.	Rebates are available for lighting retrofits and installation of occupancy sensors.
Commercial Insulation Adding insulation can make your business more energy efficient and comfortable.	Rebates are available for the installation of energy-efficient wall, attic and roof insulation.
Food Service Equipment Replacing inefficient equipment in your commercial kitchen will save you money.	Rebates are available for a variety of equipment including: fryers, steam cookers, ovens and ice makers.
EnergySmart Grocer For customers with commercial refrigeration (grocery stores, supermarkets, convenience stores), this program helps to upgrade equipment and streamline operations for the highest possible energy savings.	Rebates are available and vary depending on project.
Green Motors Rewind Even the best new motors lose efficiency. A bad repair/rewind can adversely affect all motor characteristics. This incentive program ensures quality rewinding (commonly called a "green rewind") that results in the motor maintaining its original efficiency.	Rebates are available and vary depending on the horsepower of the motor.
Variable Frequency Drive (VFD) If you are using single-speed motors to drive fans or pumps, you may be able to save energy through the use of a VFD. This can be an efficient way to convert, for example, constant-volume air systems into variable volume.	Rebates are available and vary depending on project.
Commercial Natural Gas HVAC Program Are you thinking about replacing your natural gas furnace or boiler? Installing energy-efficient heating equipment will reduce your operating costs and save your business energy if the new model meets certain efficiency specifications.	Rebates are available and vary depending on project.
Air Guardian Program Avista customers with rotary screw compressors of at least 15 horsepower may save energy with this program.	Rebates are available and vary depending on project.
Fleet Heat Looking to save money while keeping your fleet heated and ready to start? The Twinstart™ heater cord by HOTSTART may be your answer.	Rebates are available.

For full details and forms, go to avistautilities.com/bizrebates or call our Business Service Line at 800-936-6629.

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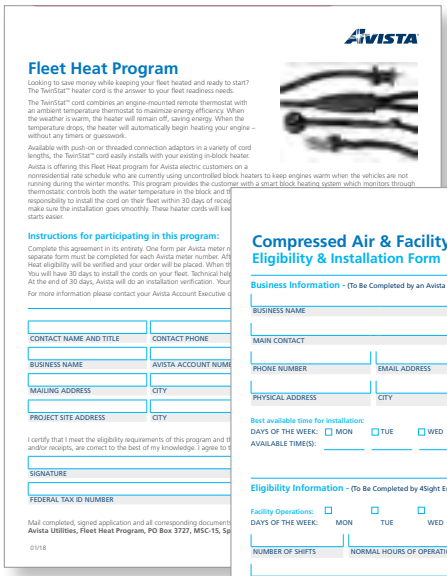

AVISTA

Fleet Heat Program

Looking to save money while keeping your fleet heated and ready to start? The TwinStat™ heater cord is the answer to your fleet readiness needs.

The TwinStat™ cord combines an engine-mounted remote thermostat with an ambient temperature thermostat to maximize energy efficiency. When the weather is warm, the heater will remain off, saving energy. When the temperature drops, the heater will automatically begin heating your engine – without any timers or guesswork.

Available with push-on or threaded connection adaptors in a variety of cord lengths, the TwinStat™ cord easily installs with your existing in-block heater.

Avista is offering this Fleet Heat program for Avista electric customers on a nonresidential rate schedule who are currently using uncontrolled block heaters to keep engines warm when the vehicles are not running during the winter months. This program provides the customer with a smart block heating system which monitors through thermostatic controls both the water temperature in the block and t responsibility to install the cord on their fleet within 30 days of recei make sure the installation goes smoothly. These heater cords will kee starts easier.

Instructions for participating in this program:

Complete this agreement in its entirety. One form per Avista meter r separate form must be completed for each Avista meter number. Aft Heat eligibility will be verified and your order will be placed. When t You will have 30 days to install the cords on your fleet. Technical hel At the end of 30 days, Avista will do an installation verification. Your

For more information please contact your Avista Account Executive o

CONTACT NAME AND TITLE | CONTACT PHONE

BUSINESS NAME | AVISTA ACCOUNT NUM

MAILING ADDRESS | CITY

PROJECT SITE ADDRESS | CITY

I certify that I meet the eligibility requirements of this program and t and/or receipts, are correct to the best of my knowledge. I agree to

SIGNATURE

FEDERAL TAX ID NUMBER

Mail completed, signed application and all corresponding document **Avista Utilities, Fleet Heat Program, PO Box 3727, MSC-15, Sp**

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AVISTA

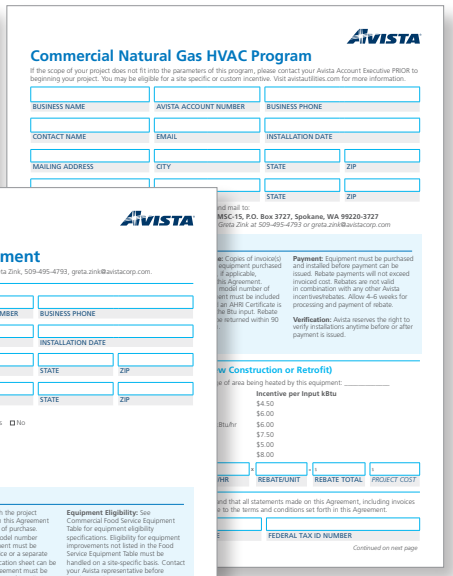
Commercial Insulation Program

If the scope of your project does not fit into the parameters of this program, please contact your Avista Account Executive PRIOR to beginning your project. You may be eligible for a site specific or custom incentive. Visit avistautilities.com for more information.

BUSINESS NAME | AVISTA ACCOUNT NUMBER | BUSINESS PHONE

CONTACT NAME | EMAIL | INSTALLATION DATE

MAILING ADDRESS | CITY | STATE | ZIP



AVISTA

Commercial Natural Gas HVAC Program

If the scope of your project does not fit into the parameters of this program, please contact your Avista Account Executive PRIOR to beginning your project. You may be eligible for a site specific or custom incentive. Visit avistautilities.com for more information.

BUSINESS NAME | AVISTA ACCOUNT NUMBER | BUSINESS PHONE

CONTACT NAME | EMAIL | INSTALLATION DATE

MAILING ADDRESS | CITY | STATE | ZIP

STATE | ZIP

nd mail to:
MSC-15, P.O. Box 3727, Spokane, WA 99220-3727
Greta Zink at 509-495-4793 or greta.zink@avistacorp.com

e: Copies of invoice(s) equipment purchased if applicable. his Agreement. model number of ent must be included an AHRI Certificate is he Btu input. Rebate e returned within 90

Payment: Equipment must be purchased and installed before payment can be issued. Rebate payments will not exceed invoiced cost. Rebates are not valid in combination with any other Avista incentives/rebates. Allow 4-6 weeks for processing and payment of rebate.

Verification: Avista reserves the right to verify installations anytime before or after payment is issued.

w Construction or Retrofit)

e of area being heated by this equipment: _____

	Incentive per Input kBtu
Btu/hr	$4.50
	$6.00
	$7.50
	$5.00
	$8.00

HR | x | = | x | =

REBATE/UNIT | REBATE TOTAL | *PROJECT COST*

nd that all statements made on this Agreement, including invoices e to the terms and conditions set forth in this Agreement.

FEDERAL TAX ID NUMBER

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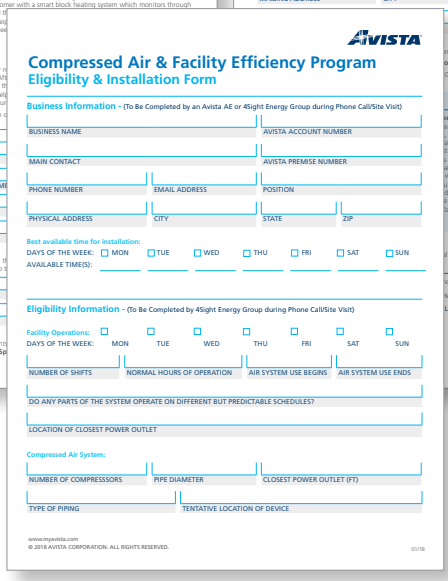

AVISTA

Compressed Air & Facility Efficiency Program
Eligibility & Installation Form

Business Information - (To Be Completed by an Avista AE or 4Sight Energy Group during Phone Call/Site Visit)

BUSINESS NAME | AVISTA ACCOUNT NUMBER

MAIN CONTACT | AVISTA PREMISE NUMBER

PHONE NUMBER | EMAIL ADDRESS | POSITION

PHYSICAL ADDRESS | CITY | STATE | ZIP

Best available time for installation:

DAYS OF THE WEEK: ☐ MON ☐ TUE ☐ WED ☐ THU ☐ FRI ☐ SAT ☐ SUN

AVAILABLE TIME(S): _____

Eligibility Information - (To Be Completed by 4Sight Energy Group during Phone Call/Site Visit)

Facility Operations: ☐ ☐ ☐ ☐ ☐ ☐ ☐

DAYS OF THE WEEK: MON TUE WED THU FRI SAT SUN

NUMBER OF SHIFTS | NORMAL HOURS OF OPERATION | AIR SYSTEM USE BEGINS | AIR SYSTEM USE ENDS

DO ANY PARTS OF THE SYSTEM OPERATE ON DIFFERENT BUT PREDICTABLE SCHEDULES?

LOCATION OF CLOSEST POWER OUTLET

Compressed Air System:

NUMBER OF COMPRESSSORS | PIPE DIAMETER | CLOSEST POWER OUTLET (FT)

TYPE OF PIPING | TENTATIVE LOCATION OF DEVICE

www.myavista.com

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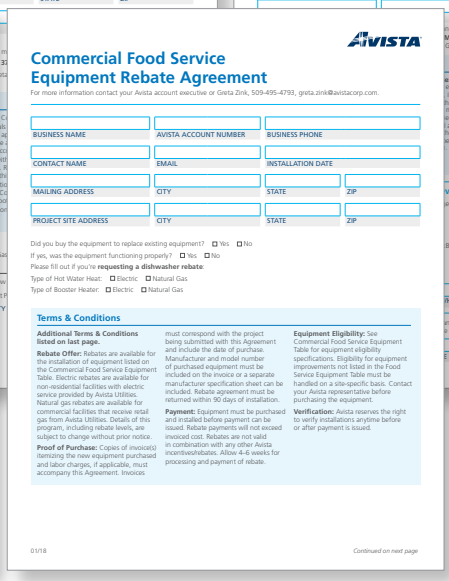

AVISTA

Commercial Food Service Equipment Rebate Agreement

For more information contact your Avista account executive or Greta Zink, 509-495-4793, greta.zink@avistacorp.com.

BUSINESS NAME | AVISTA ACCOUNT NUMBER | BUSINESS PHONE

CONTACT NAME | EMAIL | INSTALLATION DATE

MAILING ADDRESS | CITY | STATE | ZIP

PROJECT SITE ADDRESS | CITY | STATE | ZIP

Did you buy the equipment to replace existing equipment? ☐ Yes ☐ No

If yes, was the equipment functioning properly? ☐ Yes ☐ No

Please fill out if you're **requesting a dishwasher rebate**.

Type of Hot Water Heat: ☐ Electric ☐ Natural Gas

Type of Booster Heater: ☐ Electric ☐ Natural Gas

Terms & Conditions

Additional Terms & Conditions listed on last page.

Rebate Offer: Rebates are available for the installation of equipment listed on the Commercial Food Service Equipment Table. Electric rebates are available for non-residential facilities with electric service provided by Avista Utilities. Natural gas rebates are available for commercial facilities that receive retail gas from Avista Utilities. Details of this program, including rebate levels, are subject to change without prior notice.

Proof of Purchase: Copies of invoice(s) itemizing the new equipment purchased and labor charges, if applicable, must accompany this Agreement. Invoices must correspond with the project being submitted with this Agreement and include the date of purchase. Manufacturer and model number of purchased equipment must be included on the invoice or a separate manufacturer specification sheet can be included. Rebate agreement must be returned within 90 days of installation.

Payment: Equipment must be purchased and installed before payment can be issued. Rebate payments will not exceed invoiced cost. Rebates are not valid in combination with any other Avista incentives/rebates. Allow 4-6 weeks for processing and payment of rebate.

Equipment Eligibility: See Commercial Food Service Equipment Table for equipment eligibility specifications. Eligibility for equipment improvements not listed in the Food Service Equipment Table must be handled on a site-specific basis. Contact your Avista representative before purchasing the equipment.

Verification: Avista reserves the right to verify installations anytime before or after payment is issued.

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Customer Satisfaction

Cadmus was contracted in 2018 to conduct process evaluations on multiple commercial/industrial programs. The methodology consisted of a mix of three approaches: interviews with Avista staff, interviews with implementer staff, and an online participant survey. Programs were evaluated according to *Table 13* below.

TABLE 13 – COMMERCIAL/INDUSTRIAL EVALUATION TECHNIQUE BY PROGRAM

Program	Avista Staff Interview	Implementer Staff Interview	Participant Survey
Lighting	✔	N/A	✔
HVAC, Shell, VFD, Food Service Equipment	✔	N/A	✔
Green Motors	✔	*	✔
AirGuardian	✔	✔	N/A
Fleet Heat	✔	N/A	**
Site-Specific	✔	N/A	✔

* Cadmus was unable to reach the Green Motors implementer in Q1 despite support from Avista.
** A small sample of Fleet Heat customers were included in the survey target but did not respond to online survey invitations.

Interviews with Avista and implementer staff focused on the following program topics:

- Program roles and responsibilities
- Program goals and objectives
- Program design and implementation
- Data tracking
- Program participation
- Marketing and outreach
- Program successes
- Market barriers
- Program impact on the market
- Future program changes including redesign

The online participant survey focused on a number of insights:

- Program awareness
- How respondents learned about the program
- General program participation
- Reasons for participation
- Program benefits
- Program delivery experience
- Overall program satisfaction
- Satisfaction with Avista
- Current energy-efficient behaviors and purchases
- Suggestions for program improvements

Cadmus completed 65 online commercial/industrial participant surveys May–August 2018 and February–March 2019. Cadmus sent email invitations to all eligible participants and one reminder email to any participants who did not respond to the initial invitation. Cadmus field engineers also encouraged participants to complete the survey following site visits. Overall, a response rate of 47 percent was realized (65 of 138 invited participants). Cadmus will review the 2019 evaluation plan with Avista to determine whether the 2018 response rate is adequate, or if efforts to increase response rates within individual commercial/industrial programs should be considered.

Key Findings

Generally, **participants were highly satisfied with commercial/industrial programs**. All site-specific survey respondents (n=19) and 91 percent of prescriptive survey respondents (n=46) were satisfied with the program. Prescriptive survey respondents were highly satisfied with the pre-project inspection, the rebate amount, and the process of completing and submitting their applications. Site-specific participants were very happy with Avista staff's help navigating the process.

Cadmus found that participants are motivated by saving energy and money, and that Avista's rebate is important in the decision to complete the energy-efficiency project. All site-specific and all but one of the prescriptive survey respondents said the rebate provided by Avista was important in their decisions to complete the project. Site-specific respondents indicated that the two most important criteria were return on investment and initial cost of equipment, while prescriptive survey respondents chose maintenance costs and energy/operating costs. Participants of both programs said that saving money and using less energy were the top benefits of participation.

Cadmus also found that **participants most often learn about the program from Avista or a contractor, vendor, or retailer**, and that customers often participate in repeat conservation projects with Avista. In fact, two-thirds of commercial/industrial survey respondents had participated in past business energy-efficiency programs.

Finally, Cadmus found that most survey respondents elected to receive a check directly from Avista rather than an instant discount from their contractor. Only 6 of 56 respondents had opted for the instant discount, although many may not have known about it. At least two respondents indicated that an instant rebate would be easier.

Recommendations

A small number of survey respondents said they received an instant discount from their contractor because it was easier to have their contractor apply the discount to the total cost of the project. Cadmus recommended that Avista should consider customer education around the ease of use for the instant discount option.

Other recommendations from Cadmus are summarized in the program by program summaries (see pages 25-43).

Avista has some interest in expanding the instant discount program and will consider approaches to increasing customer uptake for 2019. Efficiency engineers already discuss this option with customers for site-specific projects, but there may be an opportunity to better educate trade allies. Such an opportunity would need to take into account perspectives of multiple contractors; for example, smaller contractors may be more averse to taking on the risk of the final incentive amount differing from the estimated amount. If Avista decides to implement an instant rebate, the company would also make efforts to educate its customers on its ease of use.

Impact Evaluation: Commercial/Industrial Sector

While some individual project results varied, the overall commercial/industrial sector performed strongly in 2018. Most of the projects Cadmus sampled for evaluation were well-documented and matched what was found during site visit verification. Savings realization rates were as follows:

- ***Electric:*** total verified savings of 22,898 MWh in 2018 with a combined realization rate of 99 percent
- ***Natural Gas:*** total verified savings of 34,992 therms in 2018 with a combined realization rate of 91 percent

Performance and Savings Goals

The commercial/industrial sector also exceeded the combined prescriptive and site-specific program paths' electric savings goal of 13,007 MWh by 74 percent. The commercial/industrial sector fell short of the combined prescriptive and site-specific program paths' natural gas savings goal of 79,605 therms by 56 percent.

Impact Evaluation Methodology

To verify impact evaluation savings for the 2018 commercial/industrial sector, Cadmus performed several activities in two waves:

- Selected an evaluation sample and requested project documentation from Avista
- Performed project documentation review
- Prepared on-site M&V plans
- Performed site visits and collected on-site data (such as trends, photos, and operating schedules)
- Used site-visit findings to calculate verified savings by measure
- Applied realization rates to total reported savings population to determine overall verified savings

Sample Design

For the first wave, Cadmus formed the evaluation sample January–April 2018 program data. The second-wave evaluation sample was based on program data from May–December 2018. As a guideline, Cadmus used the proposed overall 2018 and 2019 commercial/industrial sample sizes by subprogram in the M&V plan, seeking to complete approximately one quarter of the sample during the first wave and another quarter during the second wave.

For each activity wave, submitted program applications were broken down by path and measure (such as site-specific shell measure, prescriptive lighting, or prescriptive motor controls), allowing for the selection of highest-savings applications in each category with certainty. For applications with reported savings greater than 1 percent of total savings by category, Cadmus assigned arbitrary numbers and sampled randomly. Applications with less than 1 percent of total savings by category were removed from the sample consideration, except where another application at the same location or facility was previously selected.

Cadmus sampled randomly selected sites across both Idaho and Washington since Avista's programs are implemented similarly in both states. Results were pooled to calculate a realization rate by stratum, which was then applied to projects in both states. Verified savings were applied for sites selected with certainty only to the state in which they had been implemented.

Across both states, Cadmus sampled 40 prescriptive applications at 34 unique sites. Of the sampled applications, 21 were selected for certainty review based on the scale of savings, measure type, or location, with the remaining 19 selected randomly. There was no participation in the AirGuardian and Fleet Heat programs in Idaho in 2018.

For the Idaho service territory, 16 applications were sampled. See *Table 14* below for details.

TABLE 14 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE ELECTRIC EVALUATION SAMPLE

Program Type	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Interior Lighting	6	2,311,797	29%
Exterior Lighting	2	110,360	3%
Shell Measure	1	198	21%
Green Motors	4	18,678	44%
Motor Control (VFD)	2	104,755	93%
Fleet Heat	0	0	N/A
Food Service Equipment	0	0	0%
AirGuardian	0	0	N/A
EnergySmart Grocer	1	3,402	100%
Commercial/Industrial Prescriptive	**16**	**2,549,190**	**20%**

Document Review

Cadmus requested and reviewed project documentation for each sampled application and prepared M&V plans to guide site visits. Project documentation typically included incentive applications, calculation tools, invoices, equipment specification sheets, and post-inspection reports.

On-Site Verification

Cadmus performed site visits at 46 unique commercial/industrial locations to assess electric savings for 58 unique prescriptive and site-specific measures (not including fuel efficiency measures). Site visits involved verifying the installed equipment type, make and model numbers, operating schedules, and setpoints, as applicable. Cadmus collected two weeks of trend data for two of the site-specific industrial process measures at one industrial site. Project documentation review and on-site findings were used to adjust the reported savings calculations where necessary.

Cost-Effectiveness

Tables 15 and *16* show the commercial/industrial sector cost-effectiveness results by fuel type.

TABLE 15 – COMMERCIAL/INDUSTRIAL ELECTRIC COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 13,144,689	$ 4,087,552	**3.22**
TRC	$ 14,459,158	$ 6,916,874	**2.09**
PCT	$ 23,417,691	$ 6,181,653	**3.79**
RIM	$ 13,144,689	$ 24,152,913	**0.55**

TABLE 16 – COMMERCIAL/INDUSTRIAL NATURAL GAS COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 225,802	$ 122,997	**1.84**
TRC	$ 225,802	$ 303,805	**0.74**
PCT	$ 256,647	$ 268,334	**0.96**
RIM	$ 225,802	$ 292,118	**0.77**

Commercial/Industrial Site-Specific Program

TABLE 17 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC PROGRAM METRICS

Site-Specific Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		77
Overall kWh Savings [a)]		10,205,592
Idaho Energy Efficiency Rider Spend	$	1,717,120
Site-Specific Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		5
Overall Therm Savings		21,016
Idaho Energy Efficiency Rider Spend	$	82,850

a) Metrics do not include non-residential fuel conversion projects; fuel conversion project metrics are on page 32 under Multifamily Market Transformation.

Description

The site-specific program path is the most comprehensive offering for the commercial/industrial sector. Avista's account executives work with commercial/industrial customers to assist with identifying energy-efficiency opportunities. Customers receive technical support in determining potential energy and cost savings, as well as for identifying and estimating incentives for participation. Site-specific program path incentives are capped at 70 percent of the incremental cost for all projects with simple paybacks of less than 15 years. All projects must have a measured life of 10 years or more. Avista's program approach strives for a flexible response to energy-efficiency projects that have demonstrable kWh/therm savings within program criteria. The majority of site-specific kWh/therm savings are composed of custom lighting projects that don't fit the prescriptive path: appliances, compressed air, HVAC, industrial process, motors, shell measures, and natural gas multifamily market transformation. This program is available to all commercial/industrial retail electric and natural gas customers in Idaho.[1] The site-specific program typically brings in the largest portion of savings to the overall energy-efficiency portfolio.

Key to delivering on the objectives of the program are the direct incentives to encourage customer interest, the marketing efforts and account executives to drive customers to the program, and the ongoing work with trade allies to ensure that customer demand can be met. The Avista website is also used to communicate program requirements, incentives, and provide forms.

1) Transport natural gas customers are excluded from conservation programs, because they do not pay into the Energy Efficiency Tariff.

Fuel efficiency measures are part of the site-specific program path and involve a combination of electric savings and natural gas penalties. These measures typically involve replacing electric space heating or water heating systems with natural gas equipment. They are included in the metrics summary below. Please refer to the *Fuel Efficiency Impact Evaluation* section for Cadmus' evaluation methodology and findings for commercial/industrial fuel efficiency measures.

Program Activities

- ***Electric:*** savings of 10,205,592 kWh, or 45 percent of the overall electric savings – a slight decrease (approximately 5 percent) from the 10,705,817 kWh savings achieved in 2017. The largest percentage of incentives went to process load reduction measures (29 percent) followed by compressed air savings measures (22 percent).
- ***Natural Gas:*** savings of 21,016 therms in 2018, or 54 percent of the overall natural gas savings. This is a nearly fivefold increase in savings relative to the 4,420 therms achieved in 2017. However, 2017's numbers do not include 28,975 therms in small business savings, a program that was ended in 2017. 55 percent of incentive dollars were distributed for heating savings. 39 percent of incentives went to the EnergySmart Grocer case doors program, with the remaining 6 percent going to combined HVAC savings.

FIGURE 9 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC ELECTRIC INCENTIVE DOLLARS BY MEASURE

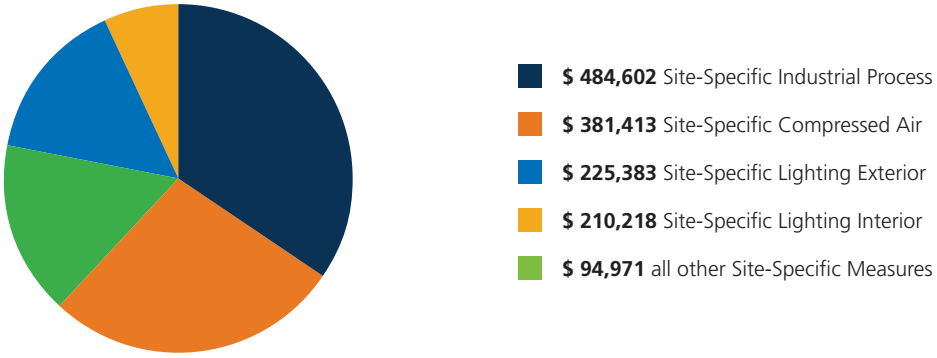
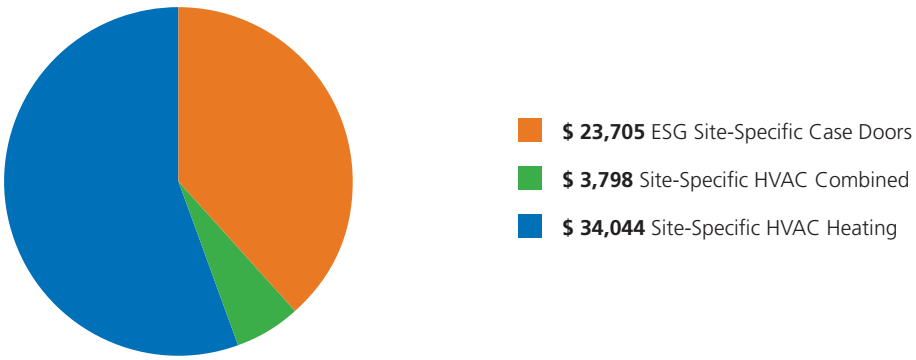


FIGURE 10 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC NATURAL GAS INCENTIVE DOLLARS BY MEASURE

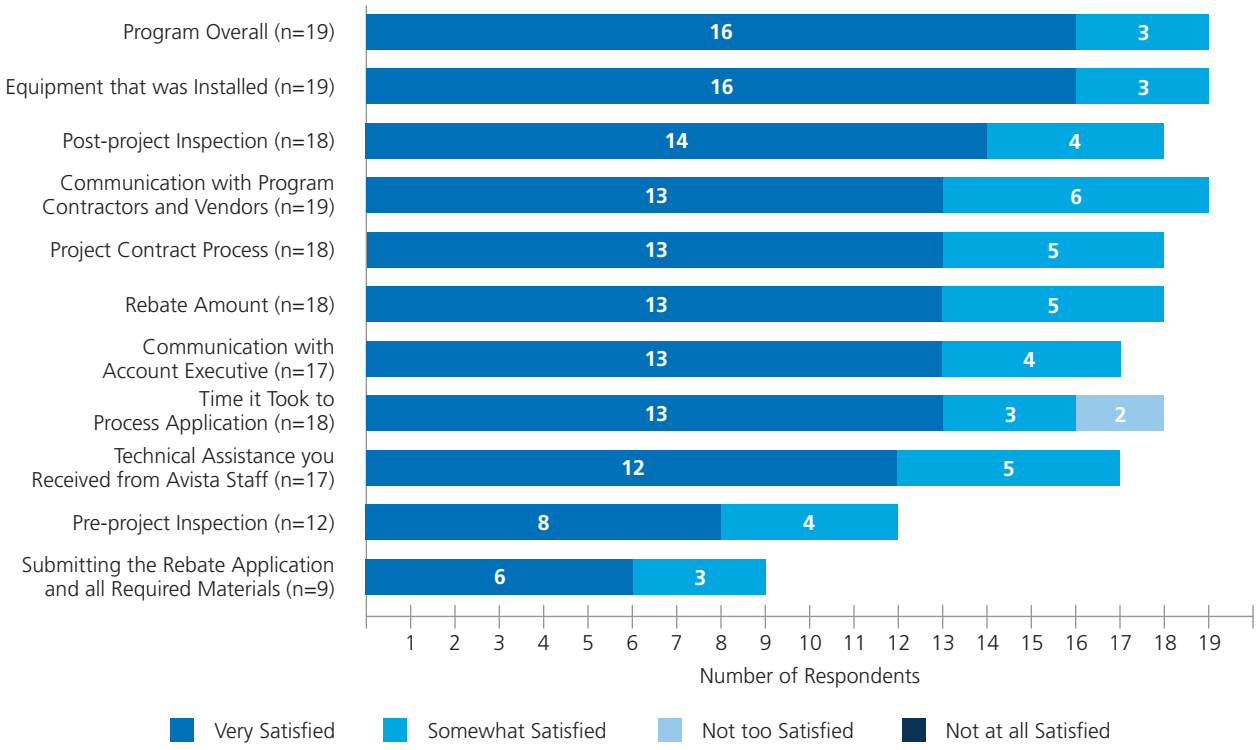


Customer Satisfaction

Cadmus included site-specific customers in its 2018 process evaluation and analyzed results for the program separately from the prescriptive program. Site-specific results are as follows:

- Site-specific survey respondents said the program was successful because of Avista staff (7 of 12 respondents).
- Site-specific program participants also cited the rebate (2 of 12); rebate delivery time (2 of 12); and overall process, communication, and energy savings (one response each) as working well.
- Site-specific respondents were satisfied with all components of the program except for the time it took to process the application; 2 of 19 were *not too satisfied* with this component because of delays caused by incorrect rebate calculations and the time it took to complete site inspections.
- The top challenge for participating in the site-specific program was determining whether a project was eligible for a rebate.
- Site-specific survey respondents said the program was successful because of Avista staff (7 of 12).
- All site-specific survey respondents (n=19) were satisfied with the program overall.

FIGURE 11 – COMMERCIAL/INDUSTRIAL SATISFACTION WITH SITE-SPECIFIC PROGRAM COMPONENTS



Source: Site-specific survey question E1: "In terms of the site-specific program, how satisfied were you with the following aspects? Please think about each item individually as you select your answer."

- All survey respondents reported being either *very* or *somewhat satisfied* (n=19) with the rebate amount and all respondents (n=19) said the rebate was *very* or *somewhat important* in their decision to complete the project as it was implemented. In addition, the program manager said the program was more attractive to customers because Avista is using a flat rebate structure rather than a tiered rebate structure.
- 12 respondents reported a variety of program participation challenges (*Table 18*). 2 respondents said they did not encounter challenges with the program, and the remaining 5 did not provide a response to this question.

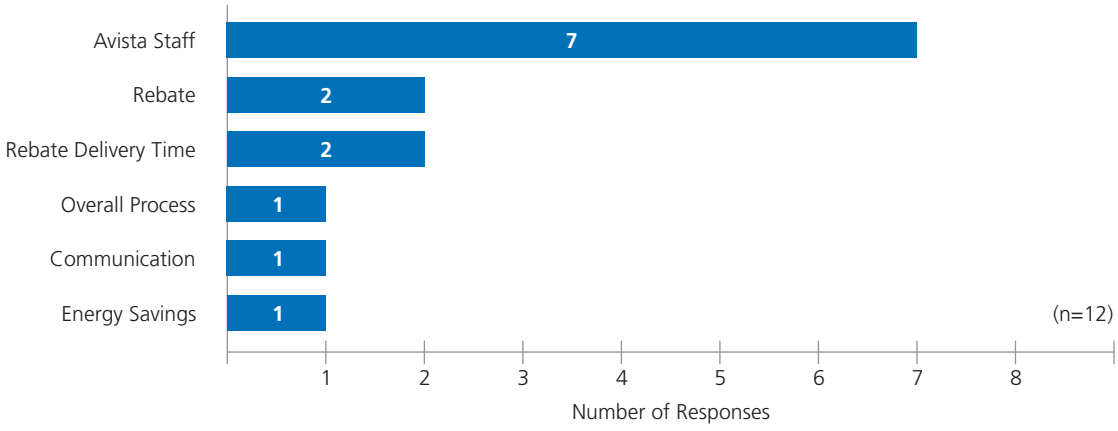
TABLE 18 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC PARTICIPATION CHALLENGES

Challenge	Number of Responses (n=12)
Determining Program Eligibility	3
Determining the Correct Rebate Amount	1
Deciding when to Engage Avista Engineers and Vendors	1
Cost of the Project	1
Getting Internal Buy-in	1
Reminding Installers about Taking Pre- and Post-installation Photos	1
Vendor Availability	1
Working with Multiple Internal and External Staff to Complete the Project	1
Time Needed to Complete the Project	1
Rebate Availability for Large, Multi-year Projects in Apartment Complexes	1

Source: Site-specific survey question E3. "What do you see as the biggest challenges to participating in Avista's site-specific program?"

- Despite these issues, 12 respondents called out several program areas that they viewed as working well (*Figure 12*).

FIGURE 12 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC PROGRAM SUCCESSES



Source: Site-specific survey question E5: "What would you say is working particularly well with Avista's site-specific program?" Multiple responses allowed.

Impact Evaluation

Table 19 shows reported and verified electric energy savings for Avista's 2018 commercial/industrial sector site-specific program path, as well as a comparison between verified and reported savings for 2018. The overall site-specific program path electric realization rate was 98 percent. Note that the table does not include reported and verified electric savings for measures in the fuel efficiency path.

TABLE 19 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC ELECTRIC IMPACT FINDINGS

Program Path	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Site-Specific	10,381,411	10,205,592	98%

Of the evaluated applications, Cadmus identified discrepancies in 5 based on the site visit and project documentation review. *Table 20* summarizes the reasons for discrepancies between reported and verified savings.

TABLE 20 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC EVALUATION SUMMARY OF DISCREPANCIES

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Exterior Lighting	1	↓	The site installed a higher quantity of exterior LED fixtures. The reported savings in database did not match the implementer's submitted calculation workbook.
	1	↓	The site installed fewer LED pole lighting fixtures and more LED wall pack fixtures than reported.
Industrial Process	1	↑	The site converted two pressure roll vacuum units from double zone to single zone units, eliminating the need for one of the four 500-horsepower vacuum pumps. Reported savings calculations assumed the pump motor to be 100% efficient. Cadmus adjusted the savings calculations to incorporate losses for a conservative, high-efficiency 500-horsepower motor (95.8%).
Compressed Air	1	↓	The site replaced two fixed-speed air compressors with two 350-horsepower variable speed rotary-screw air compressors. Project documentation included post-installation power and airflow metered data. Cadmus updated the reported savings calculations by breaking out pre- and post-period airflow and baseline system performance on a weekday basis, rather than an overall metered period basis. Although the difference in average overall airflow was minimal between the verified and reported methodology, there were days (such as Wednesdays and Fridays) that differed by 175 CFM to 230 CFM from reported. This difference had a significant impact on the performance of the baseline air compressors.
Interior Lighting	1	↑	Cadmus included the calculated cooling load electric energy savings in the interim verified savings. These savings were calculated in the project documentation but not included in the reported savings.

Table 21 shows reported and verified natural gas energy savings for Avista's 2018 commercial/industrial sector site-specific program path, as well as a comparison between verified and reported savings for 2018. The overall site-specific program path natural gas realization rate was 100 percent. Note that the table does not include reported and verified natural gas penalties for measures in the fuel efficiency path. Cadmus did not identify discrepancies in any of the 3 evaluated applications.

TABLE 21 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC NATURAL GAS IMPACT FINDINGS

Program	Reported Savings (therms)	Verified Savings (therms)	Realization Rate
Site-Specific	21,016	21,016	100%

Recommendations

Cadmus made the following recommendations for the site-specific program:

- For compressed air projects, ensure that power metered data and pressure and airflow trend data collected are analyzed on a day-type approach (instead of taking the overall averages for the metered period) to improve the accuracy of the energy-savings calculations. The day-type analysis method is recommended by the U.S. Department of Energy's Advanced Manufacturing Office and Compressed Air Challenge® and is used in the AIRMaster+ free online software tool. This method provides a more detailed estimation of the baseline and installed system flow rates, performance, and energy use.
- Ensure that the final reported savings calculations reflect the most up-to-date project details, including post-installation verification photos, equipment submittals, and invoices. During two project verifications, Cadmus found different installed equipment sizes, quantities, or performance ratings than those used in the reported savings calculations.

Plans for 2019

Avista plans to continue to offer the site-specific program in Idaho for both electric and natural gas customers in 2019. For compressed air projects, Avista will review the methodology offered by Cadmus with relevant customers and their mechanical contractors to align the analysis with the recommended DOE tools and methods where appropriate.

Avista will also continue to work with customers to ensure that final reported savings calculations reflect the most up-to-date project details. In 2018, the majority of accuracy issues were with site-specific multifamily HVAC projects where 80 percent-efficiency furnaces were modeled when 95 percent-efficiency was actually what was installed. This did not affect the kWh savings, only the therm penalty, where the therm penalty was actually less of an impact than modeled. Avista recognizes that customers sometimes make last-minute changes to scopes; the company will, however, continue to coordinate closely to ensure that project documentation most accurately reflects the project's characteristics.

Commercial/Industrial Multifamily Natural Gas Market Transformation

TABLE 22 – COMMERCIAL/INDUSTRIAL MULTIFAMILY NATURAL GAS MARKET TRANSFORMATION PROGRAM METRICS

Multifamily Natural Gas Market Transformation Program Summary		2018
Participation, Savings, and Costs		
Conservation Projects		3
Overall kWh Savings		267,385
Idaho Energy Efficiency Rider Spend	$	307,314

Description

The site-specific program path also includes a market transformation initiative intended to increase the availability of natural gas space and water heating in multifamily residential developments. The focus is on new-construction multifamily residential rentals larger than a five-plex. The goal of the program is to address (1) the split incentive issue where developers are focused on first costs that drive poor, lost-opportunity heating choices and (2) tenants who have to pay those heating costs without sufficient options in the rental market to demonstrate. Natural gas presents a preferred option with less expense and a societal benefit. The program intends to create developer confidence in the natural gas heating design for multifamily construction as well as understanding the added long-term value. Similarly, the program assists potential tenants who otherwise have no control and limited options in the market to influence their heating fuel and better manage their heating costs. Avista offers program incentives of $3,500 per unit for converting to natural gas by installing standard-efficiency space heat and water heaters.

Program Activities

The program had three projects in 2018 for 267,385 kWh savings, roughly 1 percent of total savings in the commercial/industrial electric program portfolio. The savings declined approximately 3 percent from the 275,016 kWh achieved in 2017.

Marketing Activities

Avista's account executive team focused on creating relationships with regional builders, including one-on-one conversations with contractors and developers and regular informal check-ins to educate them about offered programs, benefits, savings, and payoffs in installing natural gas – from environmental, comfort, and cost-saving standpoints.

Account executives also reached out to area HVAC dealers. Engagements included a regional road show as well as multiple informational meetings in which all area HVAC dealers were invited to attend. In addition to educational content – such as *Figures 13* (below) and *6* (page 17) – dealers also had opportunities to ask questions and connect with Avista representatives for further discussion. The success of the program also had a lot to do with relationships with trade allies and developers, which existed prior to its launch. Often, account executives would hear of new multifamily developments through informal channels, which allowed them to reach out to customers and sell the program at the right time in the development and construction process.

FIGURE 13 – COMMERCIAL/INDUSTRIAL MULTIFAMILY NATURAL GAS INCENTIVE PROGRAM BROCHURE

Impact Evaluation

Cadmus followed the same impact evaluation methodology for fuel efficiency measures as outlined in the *Impact Evaluation Methodology* section. 6 multifamily market transformation program projects were selected for evaluation of the commercial/industrial sector fuel efficiency measures. Of the sampled applications, 5 were selected for certainty review based on the scale of savings, measure type, or location. The remaining application was selected randomly.

Cadmus performed site visits at 5 unique commercial/industrial locations to assess electric savings for the 6 unique multifamily market transformation program measures. Site visits involved verifying installed equipment type, make and model numbers, operating schedules, and set points, as applicable.

TABLE 23 – COMMERCIAL/INDUSTRIAL FUEL EFFICIENCY ELECTRIC IMPACT FINDINGS

Fuel Efficiency Measure	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Commercial/Industrial Site-Specific	65,061	65,061	100%
Multifamily Market Transformation	207,408	202,324	98%
Total	**272,469**	**267,385**	**98%**

Of the evaluated applications, Cadmus identified discrepancies in the randomly sampled multifamily market transformation program measure based on the evaluation site visit and project documentation review. The site installed more efficient furnaces than reported, which resulted in lower natural gas energy consumption of the installed units versus baseline efficiency units, meaning that less electricity was offset for this measure than reported.

Plans for 2019

The program will continue in the Idaho service area with a reduced incentive of $3,000 per unit.

Commercial/Industrial Prescriptive Programs

TABLE 24 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE LIGHTING PROGRAM METRICS

Prescriptive Lighting Program Summary		2018
Participation, Savings, and Costs		
Conservation Projects		588
Overall kWh Savings		12,256,065
Idaho Energy Efficiency Rider Spend	$	1,955,727

TABLE 25 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE NON-LIGHTING PROGRAM METRICS

Prescriptive Non-lighting Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		22
Overall kWh Savings		168,899
Idaho Energy Efficiency Rider Spend	$	26,484
Prescriptive Non-lighting Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		35
Overall Therm Savings		13,976
Idaho Energy Efficiency Rider Spend	$	51,782

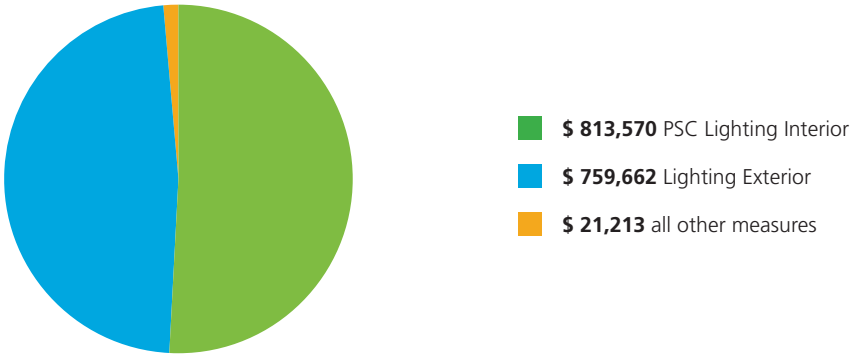
Description

Avista determines incentive amounts for the prescriptive program path by applying the incentive formula contained within Schedules 90 and 190 to a prototypical installation. Avista tracks the actual costs and savings and reports these to the third-party impact evaluator. When applicable, Avista uses Regional Technical Forum unit energy savings for the prescriptive program path measures.

Program Activities

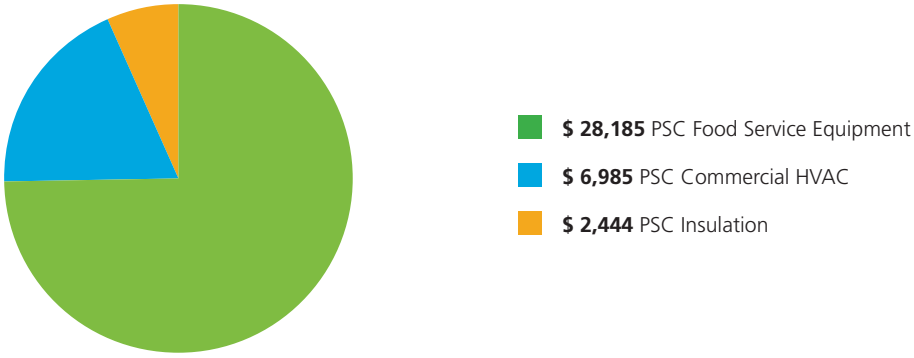
- ***Electric:*** 12,424,964 kWh, or 54 percent of overall savings, a significant decrease from 2017 (24,280,158 kWh). This decrease can be attributed to the significant amount of interior lighting savings that was already captured over the 2016–17 biennium.
- ***Natural Gas:*** 13,976 therms (36 percent of overall savings), which is also a significant decrease from the 37,788 therms in 2017.

FIGURE 14 – COMMERCIAL/INDUSTRIAL ELECTRIC PRESCRIPTIVE INCENTIVE DOLLARS BY MEASURE



Lighting still comprised the vast majority of prescriptive electric program activities, with interior and exterior measures together accounting for 98 percent of commercial/industrial incentives.

FIGURE 15 – COMMERCIAL/INDUSTRIAL NATURAL GAS PRESCRIPTIVE INCENTIVE DOLLARS BY MEASURE



PSC food service equipment accounted for 75 percent of commercial/industrial natural gas prescriptive incentives.

Avista made several changes to commercial lighting program rebates in 2018, as summarized in *Table 26.* In addition to the changes to the rebate amounts, Avista modified the wattage range on most interior and exterior lighting products.[2]

TABLE 26 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE LIGHTING PROGRAM REBATE CHANGES

Change	2017	2018
Interior 4-Foot 4-Lamp T12/T8 Fixture to 2-Lamp HP T8 Fixture or Retrofit Kit	$ 35	$ 0*
Interior 4-Foot 3-Lamp T12/T8 Fixture to 2-Lamp HP T8 Fixture or Retrofit Kit	$ 25	$ 0*
Interior 4-Foot 2-Lamp T12/T8 Fixture to 1-Lamp HP T8 Fixture/Retrofit Kit	$ 18	$ 0*
Interior 250-Watt HID to ≤ 140-watt DLC Approved LED Fixture	$ 180	$ 155
Exterior New Construction 320 & 400-Watt HID to ≤ 175-Watt DLC LED Fixture	$ 175	$ 250

Source: 2017 Avista DSM Standard Operating Procedures Manual and 2018 Avista DSM Standard Operating Procedures Manual.

When rebates or other program changes occur, Avista holds webinars or other events to explain the changes. In addition, program staff for the lighting program attend trade ally meetings to discuss program changes with contractors and vendors.

While outreach remained the same for most 2018 commercial/industrial programs, a slight change was made to outreach for the green motors initiative in 2018. In the past, the program implementer, Green Motors Practice Group (GMPG), placed cold calls to Avista customers to find and recruit participants. In 2018, GMPG focused outreach efforts on customers who had been identified as interested and eligible by account executives.

Marketing Activities

The program used a direct, customer-centered approach for outreach: marketing the program through established relationships with account executives (AE). AEs most commonly reach out to customers through email blasts. In addition, the Avista website provided preliminary information about the program and encouraged customers to contact their account executive or a trade ally when they had questions. AEs and trade allies cross-promoted all commercial/industrial programs when discussing energy-efficiency improvement projects with customers. To answer questions and promote the commercial/industrial programs to trade allies, Avista also hosted informational breakfasts throughout the year.

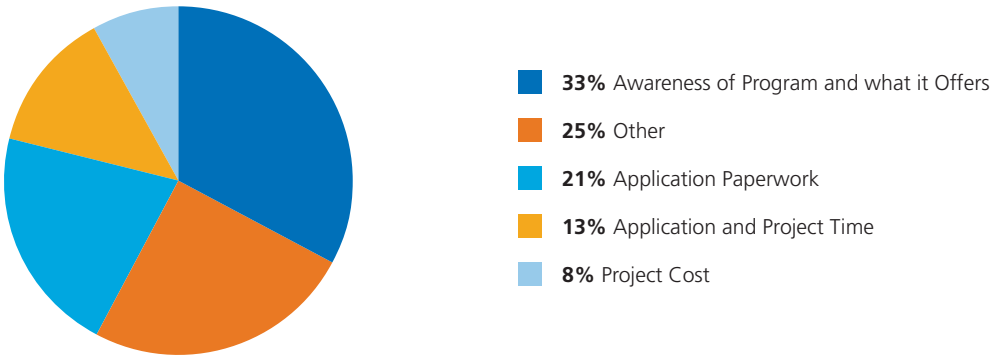
2) A comparison of 2017 and 2018 Prescriptive Lighting rebates is found in the 2018 Avista DSM Standard Operating Procedures Manual, p. 36–37.

Customer Satisfaction

Cadmus included prescriptive program offerings in the 2018 process evaluation study. Key findings:

- Prescriptive survey respondents (n=46) cited quick turnaround (28 percent) and customer service (24 percent) as program elements that were working particularly well.
- Prescriptive survey respondents said their top challenges were knowing about the program and its offerings, completing application paperwork, and finding the time needed to apply and complete the project. The application paperwork was of particular concern among lighting participants.
- Prescriptive survey respondents were highly satisfied with the pre-project inspection, the rebate amount, and the process of completing and submitting their applications. Several survey respondents provided reasons for their dissatisfaction with the program and some of its components (4 said there was not enough communication with an AE and their trade ally), 1 expressed dissatisfaction because the rebate check had not yet arrived at the time of the survey, and 1 felt the equipment was not as effective as expected, which led to low energy savings. Another respondent reported concerns about their contractor that Avista did not address.
- Almost all respondents (98 percent; n=45) were satisfied with Avista and 91 percent (n=34) were satisfied with the program. All respondents were *very* or *somewhat satisfied* with the pre-project inspection and the rebate amount. Program staff said that if rebate levels were reduced, participation would decrease, especially in the lighting and insulation programs. The lighting program manager said current rebates for exterior lighting motivated customers to participate while current interior lighting rebates were less motivating.
- Over half of respondents (52 percent; n=46) reported program participation challenges. The most common challenge, as shown in *Figure 16*, was being aware of the program and what it offers. Other responses included contractor availability, receiving rebates, getting buy-in, prioritizing projects, getting a quality result, and no more improvements to make.
- 5 of the 8 respondents who said program awareness was a challenge were interior or exterior lighting participants. 3 lighting participants said the rebate paperwork was challenging. They said the form was confusing and did not provide precise directions. In addition, they said identifying fixtures that qualified for the program was challenging. These were reinforced by the program manager, who said the biggest challenge for lighting participants was understanding the terminology, especially around Design Lights Consortium certification. The program manager also said that there have been fewer application rejections in the past year or two because of an improved rebate application form. The AirGuardian implementer said the biggest challenge for this program is assuring participants that there is no cost to them to participate. When customers are skeptical, the implementer refers them to Avista for confirmation.

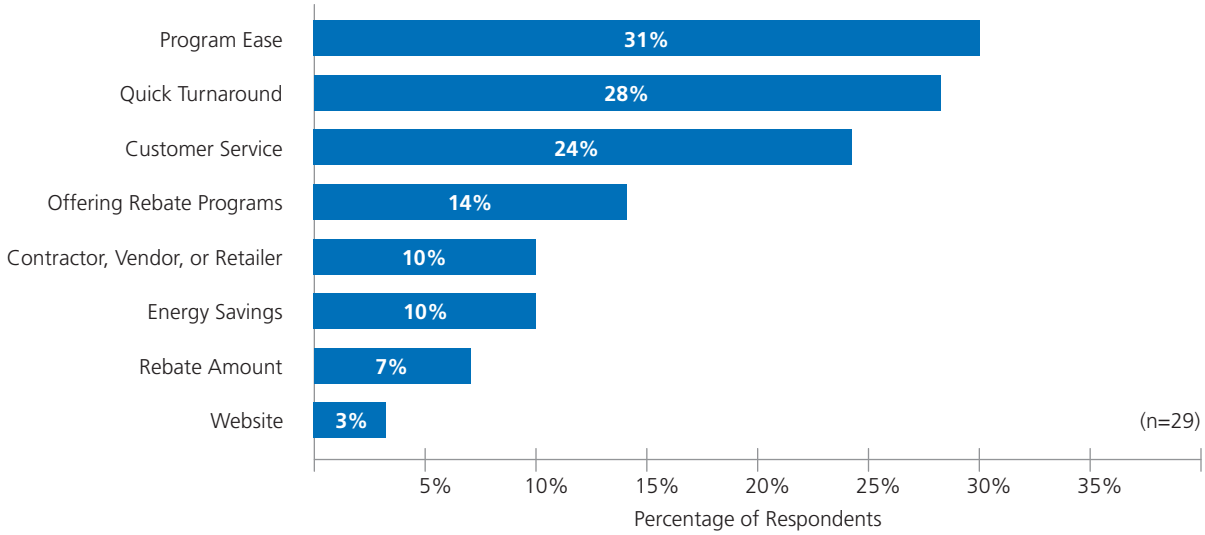
FIGURE 16 – COMMERCIAL/INDUSTRIAL PARTICIPATION CHALLENGES



Source: Prescriptive survey question H9: "What do you see as the biggest challenges to participating in Avista's [PROGRAM NAME]?"

- Despite these issues, 29 respondents called out several program areas that they viewed as working well (*Figure 17*).

FIGURE 17 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE PROGRAM SUCCESSES



Source: Prescriptive survey question H11: "What would you say is working particularly well with Avista's program?" Multiple responses allowed.

Impact Evaluation

Avista's third-party 2018 impact evaluation included some, but not all, current commercial/industrial prescriptive measures. *Table 27* below lists the prescriptive programs and measures included in this impact evaluation.

TABLE 27 – COMMERCIAL/INDUSTRIAL EVALUATED PROGRAM DESCRIPTIONS

Program	Measure(s)	Implementer	Program Summary
Prescriptive	Lighting, HVAC, VFDs, Food Service Equipment, and Shell	Avista	Customers identify potential energy efficiency projects, submit paperwork and receive prescriptive rebates for projects.
Fleet Heat	Smart Block Heating System	Avista	Electric customers are provided with a smart block heating system to install on vehicles. The device controls both the water temperature in the block and the air temperature outside the block. Installation help is available from HOTSTART.
Green Motor Rewind	Repair/Rewind of Motors	The Green Motors Practices Group (GMPG)	Electric customers who receive a green motor rewind at a participating service will receive a rebate. The rebate applies to 15 HP to 5,000 HP industrial motors.
AirGuardian Compressed Air	Compressed Air Leak Reduction Device	4Sight Energy Group	Direct installation of compressed air leak reduction device to electric customers following a compressed air audit

Electric: *Table 28* shows reported and verified electric energy savings for Avista's commercial/industrial sector prescriptive program path and the realization rates between verified and reported savings for 2018. The overall commercial/industrial sector prescriptive program path electric realization rate was 100 percent.

TABLE 28 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE ELECTRIC IMPACT FINDINGS

Program Type	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Interior Lighting	8,038,814	8,012,238	100%
Exterior Lighting	4,243,826	4,243,826	100%
Shell Measure	929	929	100%
Green Motors	42,466	42,870	101%
Motor Control (VFD)	112,931	113,171	100%
Fleet Heat	0	0	100%
Food Service Equipment	8,527	8,527	100%
AirGuardian	0	0	100%
EnergySmart Grocer	3,402	3,402	100%
Total Commercial/Industrial Prescriptive	**12,450,896**	**12,424,964**	**100%**

Of the evaluated applications, Cadmus identified discrepancies for seven based on the site visit and project documentation review. *Table 29* summarizes the reasons for discrepancies between reported and verified savings.

TABLE 29 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE EVALUATION SUMMARY OF DISCREPANCIES – ELECTRIC

Program Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Interior Lighting	2	↓	Cadmus reduced the lighting fixture in-service rate for two projects to account for incented fixtures that were on the site but in storage.
	1	↓	Savings in project documentation were slightly lower than reported savings in program database.
	1	↑	Cadmus accounted for additional savings from delamping for reported 4-lamp LED fixtures that only had two lamps. The participant had removed two lamps per fixture due to brightness.
Green Motor Rewind	2	↑	Reported savings for two projects referenced the 2017 RTF. Cadmus applied deemed motor savings from the 2018 TRM workbook.
Motor Control (VFD)	1	↓	Cadmus reduced the reported quantity of 2.5 horsepower return air fans with VFDs from three to one and added two 3 horsepower return air fans with VFDs.

Natural Gas: *Table 30* shows reported and verified natural gas energy savings for Avista's commercial/industrial sector prescriptive program path and the realization rates between verified and reported savings for 2018.

TABLE 30 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE NATURAL GAS IMPACT FINDINGS

Program Type	Reported Savings (therms)	Verified Savings (therms)	Realization Rate
HVAC	3,956	3,956	100%
Shell	1,149	1,149	100%
Food Service Equipment	12,492	8,871	71%
Total Commercial/Industrial Prescriptive	**17,597**	**13,976**	**79%**

Of the evaluated applications, Cadmus identified discrepancies for 4 based on the site visit and project documentation review (with 1 application having 2 discrepancies). *Table 31* summarizes the reasons for discrepancies between reported and verified savings.

TABLE 31 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE EVALUATION SUMMARY OF DISCREPANCIES – NATURAL GAS

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Food Service Equipment	3	↓	Cadmus reduced the pounds of food cooked per day for three fryer measures from the value in the savings calculator based on the site manager interview.
	1	↓	Cadmus decreased operating hours for a fryer measure from the value in the savings calculator based on the site manager interview.
	1	↓	Cadmus reduced the pounds of food cooked per day and operating hours for a steam cooker measure from the value in the savings calculator based on the site manager interview.

Cadmus made the following recommendations for improving the commercial/industrial sector prescriptive energy-savings program:

- For natural gas measures, revisit the prescriptive ENERGY STAR food service equipment calculator workbook and review the default assumptions for hours of use and pounds of food cooked per day. During three food service project verifications, the feedback provided by site contacts for these calculator inputs differed significantly from the calculator default values. Cadmus also recommended that Avista adjust future rebate application forms to ask for site-specific hours of use and load estimates. Cadmus will review the RTF calculation methods to determine whether the deemed RTF values are more appropriate for these measures. RTF savings values will be more consistent with regional savings estimates.
- According to some survey respondents, the lighting application paperwork was challenging because it was confusing and did not provide precise instructions for completing the application. Although the Avista website provides several ways for customers to contact the company for additional information, Avista should create and post a document on its website with answers to frequently asked questions about the application to decrease customer challenges. The FAQ document could focus on ways to avoid the application being rejected.

Plans for 2019

Avista plans to make multiple changes to programs, measures, and processes based on recommendations in the 2018 Impact and Process evaluations:

- For natural gas measures, Avista will seek advisory group input in considering whether to ask for site-specific hours of use and load estimates and, for food equipment, pounds of food cooked per day. We will also review default assumptions for hours of use.
- Regarding lighting data enhancement for the new iEnergy tracking database, Avista has decided to collect measure type, default base-value wattage by measure, actual installed wattages, total units by measure, average run hours and customer-provided hours of operation. iEnergy went live in September of 2018. Data will be monitored over 2019 and will be analyzed to determine whether it is sufficient for 2020 planning purposes.
- Avista also plans to draft a "Lighting FAQ" document to aid customers in filling out lighting paperwork.

RESIDENTIAL SECTOR

Overview

Avista's residential sector portfolio is composed of several approaches that encourage customers to consider energy-efficiency improvements within their homes. Prescriptive rebate programs are the main component of the portfolio and are augmented by a variety of additional interventions: upstream buy-down of low-cost lighting and water-saving measures, select distribution of low-cost lighting and weatherization materials, direct-installation programs, and a multifaceted, multichannel outreach and customer engagement effort.

More than $1.6 million in rebates and direct customer benefits were provided to Idaho residential customers to offset the cost of implementing these energy-efficiency measures in 2018. All programs within the residential sector portfolio combined contributed 6,551 MWh and 207,992 therms to the annual energy savings.

TABLE 32 – RESIDENTIAL SAVINGS BY PROGRAM

Program By Sector	Energy Efficiency Savings			
Residential	**Electric Program**		**Natural Gas Program**	
ENERGY STAR Homes	83,738	kWh	406	Therms
Multifamily Direct Install	729,920	kWh	2,014	Therms
Fuel Conversions	1,442,640	kWh	0	Therms
HVAC	750,709	kWh	150,936	Therms
Water Heat	47,398	kWh	14,622	Therms
Shell	85,608	kWh	40,014	Therms
Simple Steps, Smart Savings	3,411,298	kWh	0	Therms
Total Residential	**6,551,312**	**kWh**	**207,992**	**Therms**
Interactive Effects (Therm Offsets)	0	kWh	(71,853)	Therms
Total Residential after Interactive Effects	**6,551,312**	**kWh**	**136,140**	**Therms**

Marketing

Avista's residential outreach included the popular "Efficiency Matters" promotion from April through June. During the seven-week contest, television viewers could watch any KREM newscast for Avista's energy-efficiency word-of-the-day and enter it on krem.com for a chance to win a new Toyota Camry hybrid. Promotional vehicles emphasized energy efficiency tips and rebates, and included television advertising, online and mobile display ads, video pre-roll, social media, email, and direct mail (*Connections* newsletter article and bill insert). In addition to Avista's outreach, krem.com promoted the contest with a home-page news story as well as targeted extended-reach banner ads.

The campaign was a success in driving customer engagement, resulting in more than 90,000 entries for the contest. The finale at Avista Stadium included interviews with Avista's Energy Efficiency Manager talking about the importance of energy efficiency on the 5 p.m. and 6 p.m. news broadcasts, as well as coverage of the car giveaway.

FIGURE 18 – RESIDENTIAL "EFFICIENCY MATTERS" ONLINE AND MOBILE DISPLAY ADS

FIGURE 19 – RESIDENTIAL "EFFICIENCY MATTERS" BILL INSERT

FIGURE 20 – RESIDENTIAL "EFFICIENCY MATTERS" SOCIAL MEDIA

FIGURE 21 – RESIDENTIAL "EFFICIENCY MATTERS" TELEVISION ADVERTISING

In late summer/early fall, a second wave of energy efficiency outreach ran with the "Way to Save" advertising campaign. The television and digital ads were designed to increase awareness of Avista's rebate programs and educate customers about energy-saving tips. Two 30-second TV commercials were created – one highlighting all-up kilowatt-hour savings and the other focused on emissions reductions. Accompanying these TV spots, a series of 15-second commercials also ran in rotation: six promoted rebates, while another six provided energy-saving tips. The timing of the television advertising took advantage of new season premieres and football to deliver high viewership. Digital ads were also incorporated, including online banner ads for desktop, tablet, and mobile. Placement included local, regional, and national sites (geo-targeted to Avista's Idaho and Washington service territory). Search-engine marketing and social media were also used to reinforce messaging and drive customer engagement.

With a call-to-action to visit myavista.com for more information, the advertising successfully worked to help increase awareness as evidenced by the spike in traffic to our website: Visits to the "Rebates Overview" page increased 716 percent, and hits to the "Energy Saving Advice" page increased by 894 percent.

FIGURE 22 – RESIDENTIAL ENERGY-SAVINGS "EMISSIONS" AND "HOMES" :30 TV ADVERTISING

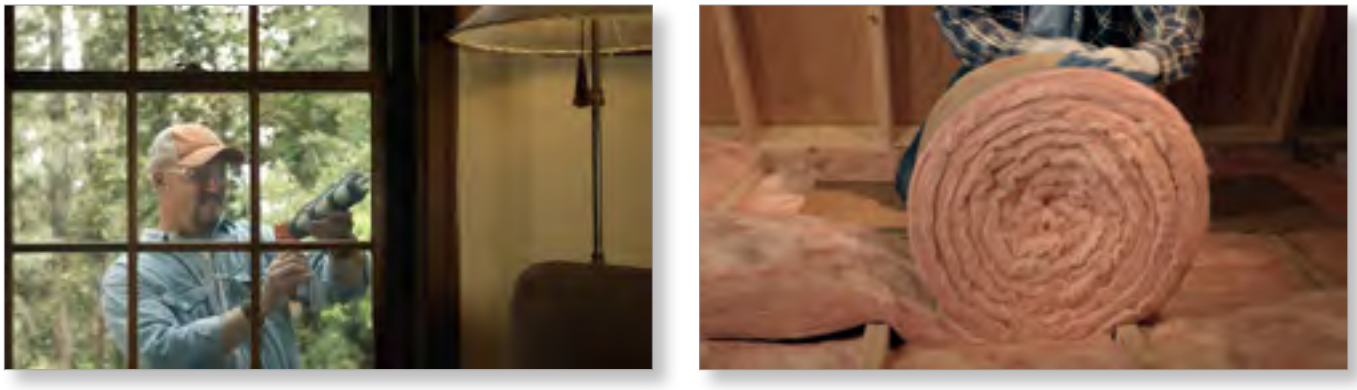


FIGURE 23 – RESIDENTIAL ENERGY-SAVINGS MYAVISTA.COM HOME PAGE FEATURE

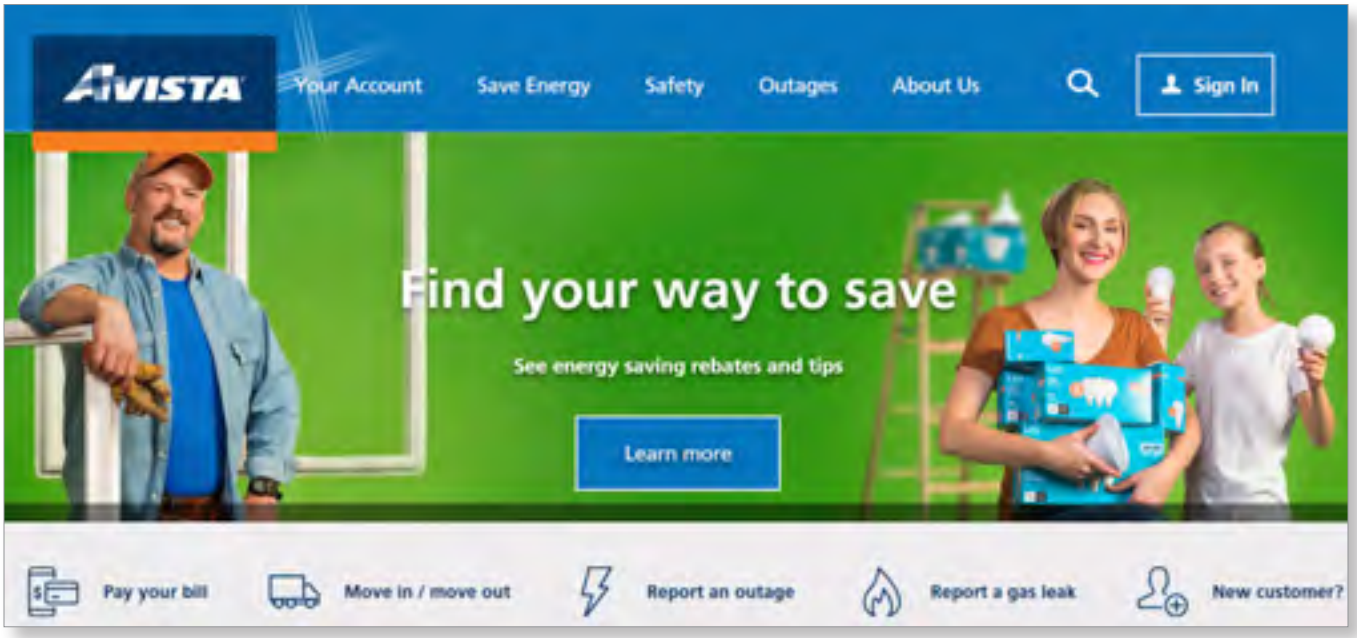


FIGURE 24 – RESIDENTIAL ENERGY-SAVINGS "WAY TO SAVE" REBATES :15 TV ADVERTISING

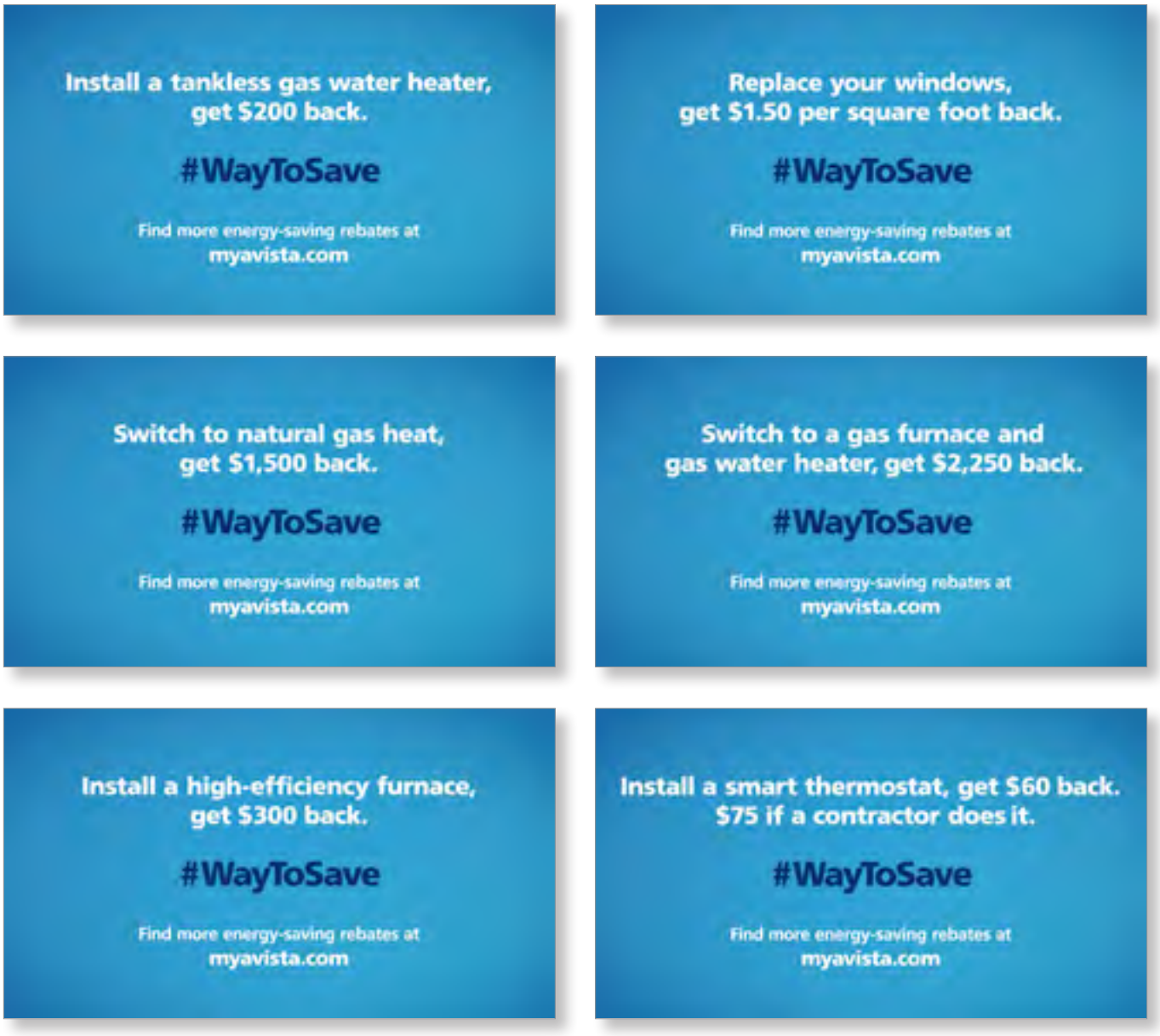


FIGURE 25 – RESIDENTIAL ENERGY-SAVINGS "WAY TO SAVE" REBATES ONLINE AND MOBILE DISPLAY ADS

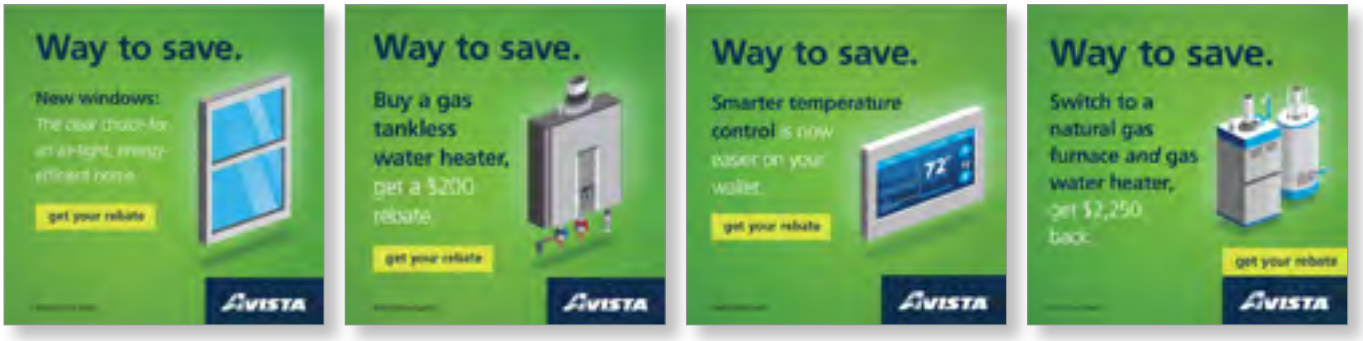


FIGURE 26 – RESIDENTIAL ENERGY-SAVINGS "WAY TO SAVE" TIPS :15 TV ADVERTISING

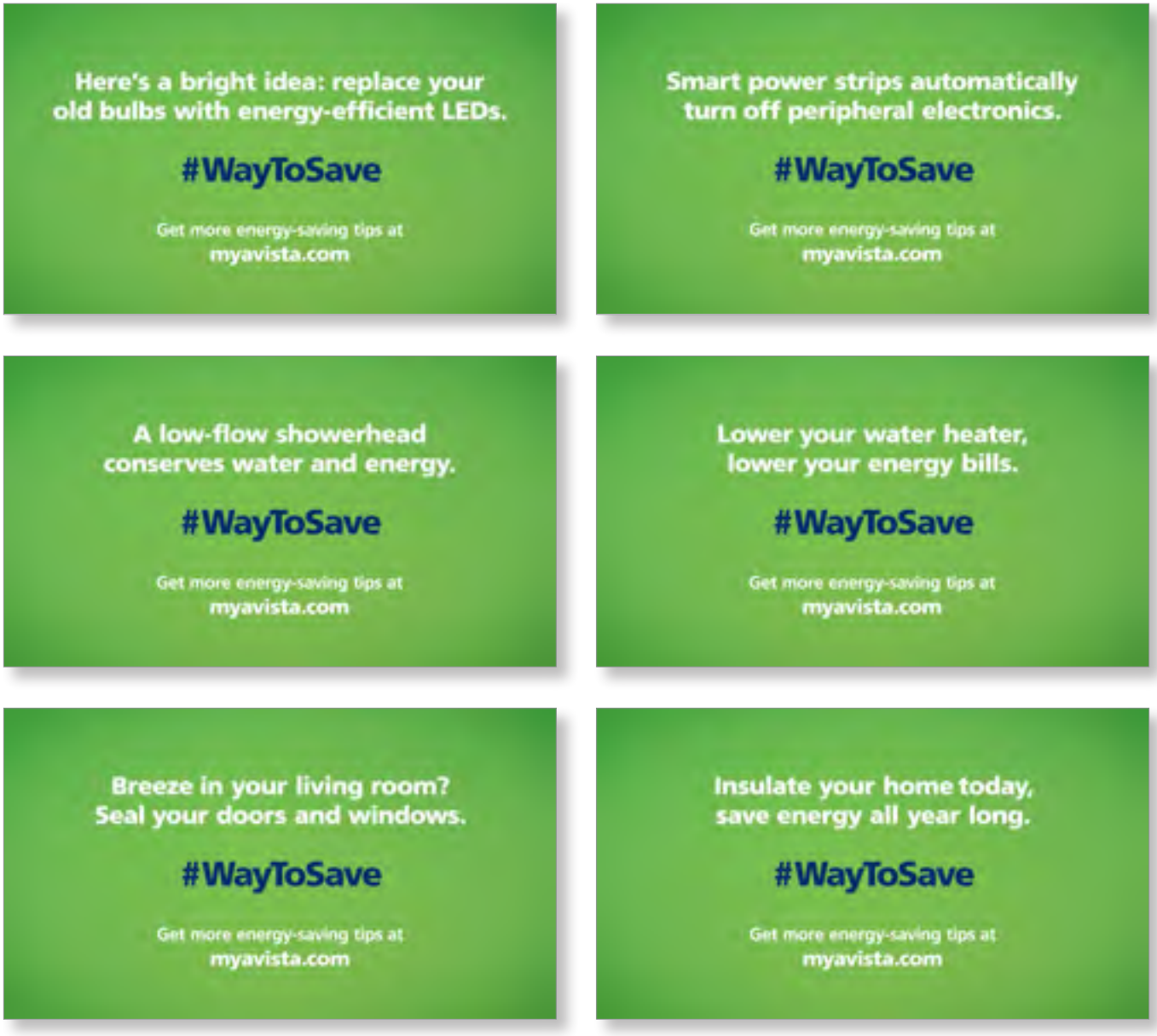


FIGURE 27 – RESIDENTIAL ENERGY-SAVINGS "WAY TO SAVE" TIPS ONLINE AND MOBILE DISPLAY ADS

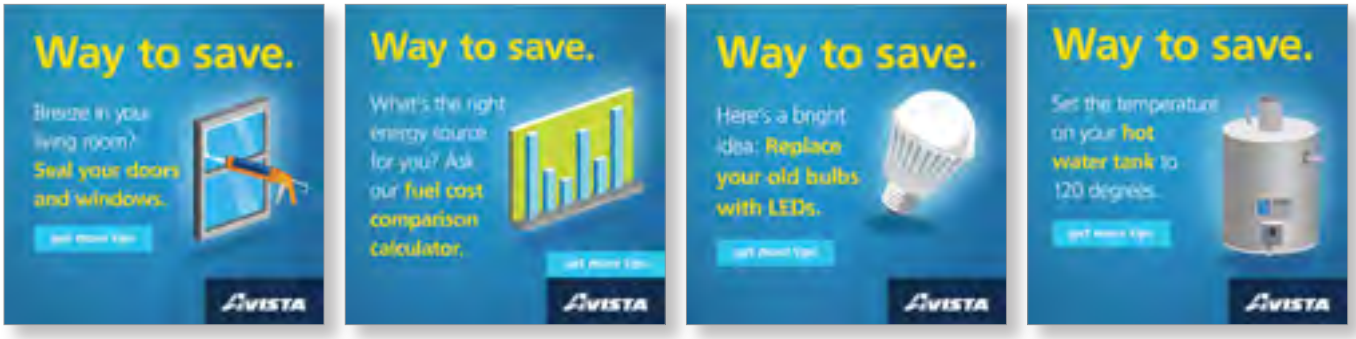
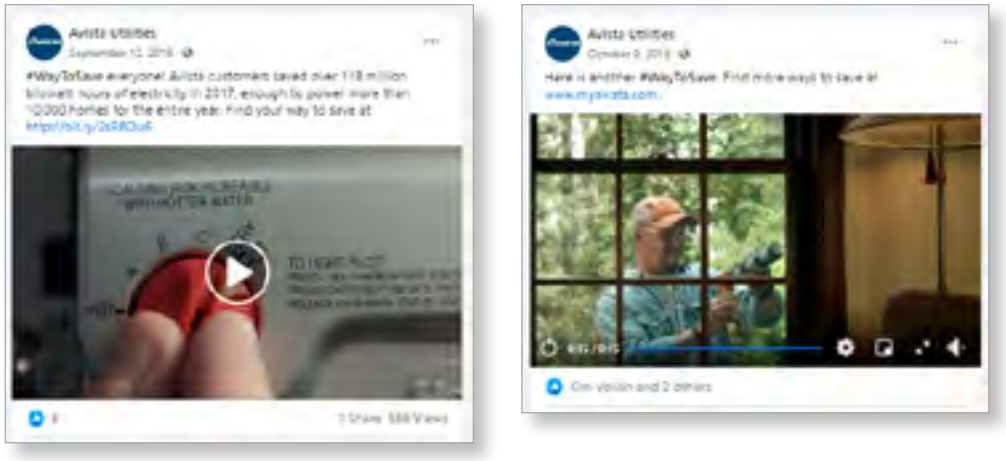


FIGURE 28 – RESIDENTIAL ENERGY-SAVINGS "WAY TO SAVE" SOCIAL MEDIA



As cold weather moved in, a "Winter Bill" campaign was implemented to remind customers of energy-saving tips for the season.

FIGURE 29 – RESIDENTIAL ENERGY-SAVINGS WINTER TIPS EMAILS

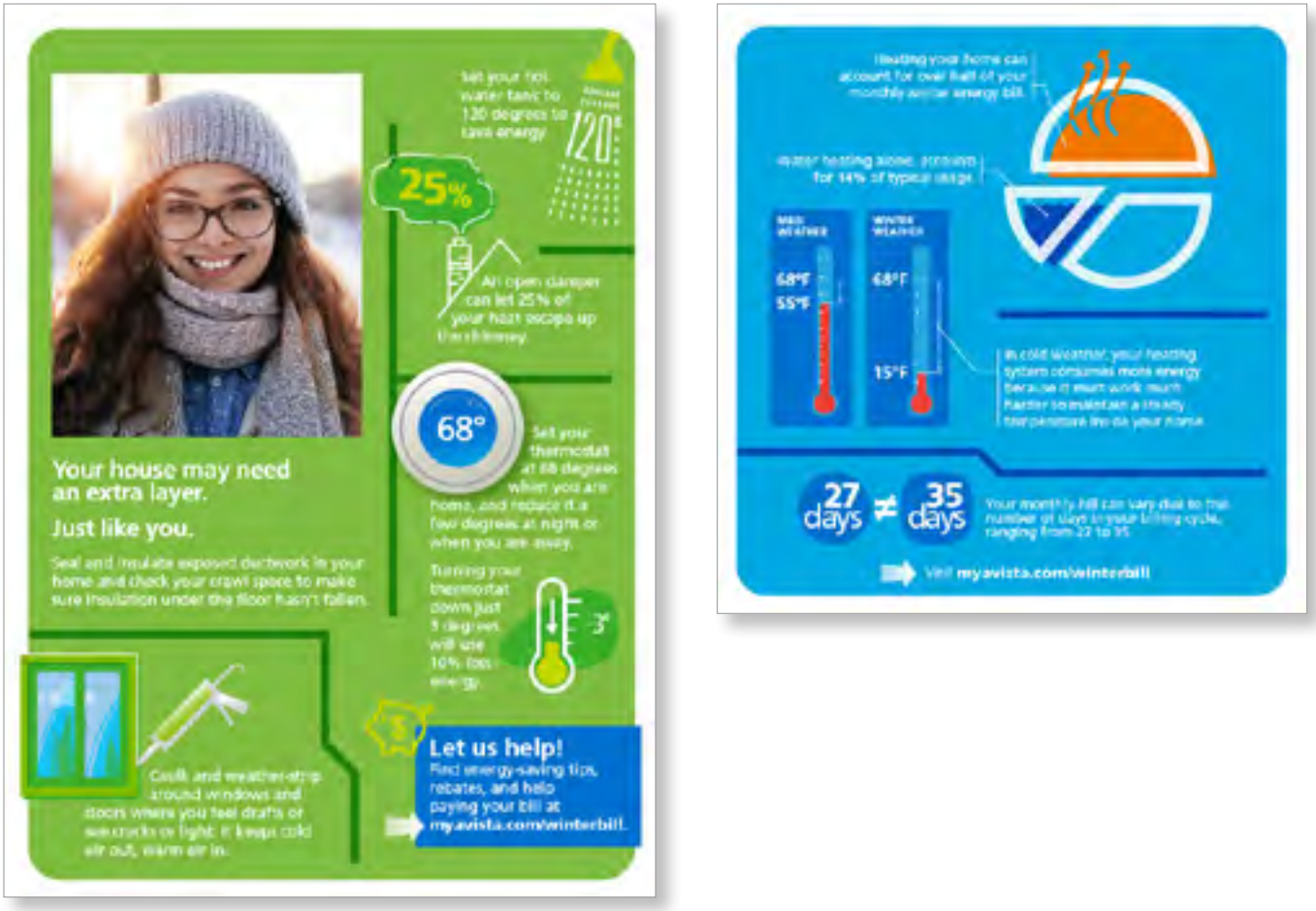
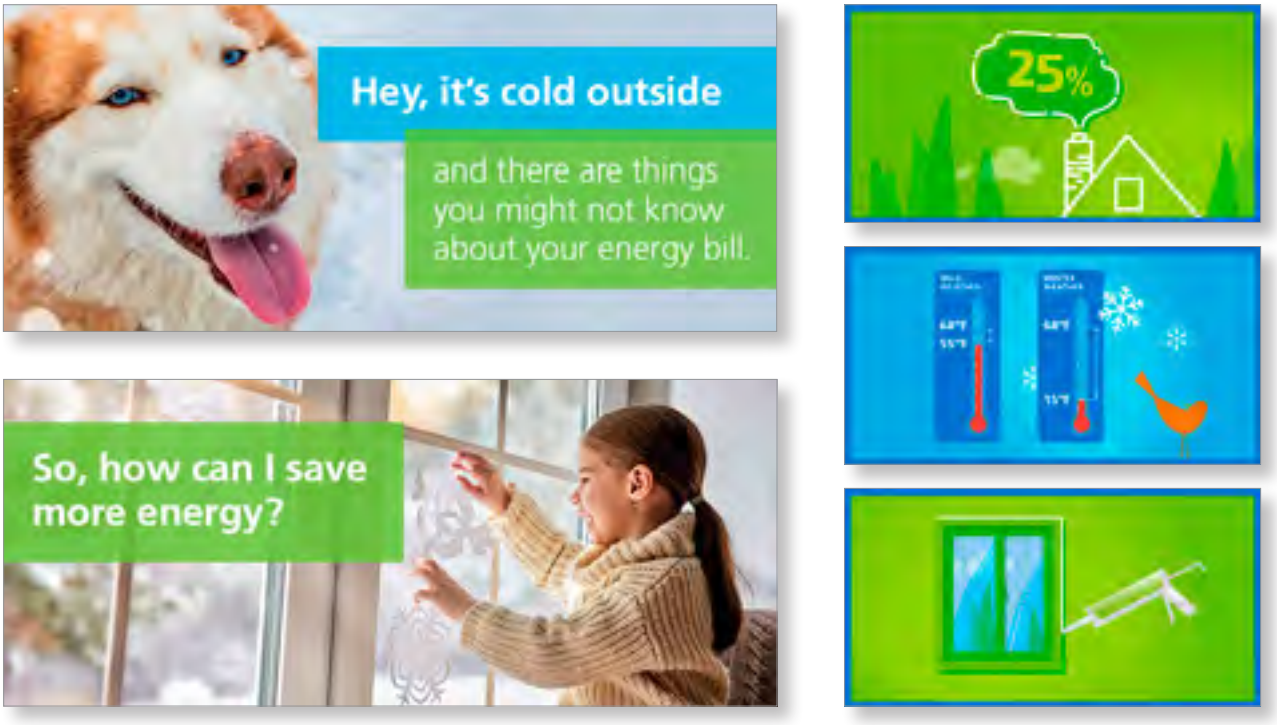


FIGURE 30 – RESIDENTIAL ENERGY-SAVINGS WINTER TIPS BANNER ADS



Avista also made the most of local sponsorships for an "Energy Efficiency Night" at a Spokane Chiefs hockey game.

FIGURE 31 – RESIDENTIAL ENERGY-SAVINGS "ENERGY EFFICIENCY NIGHT" SOCIAL MEDIA

Trade Ally Outreach

In April 2018 Avista introduced a "Trade Ally Network." The company actively promoted all of its programs via this network, including email blasts with program announcements. Avista recently upgraded the network to "Trade Ally Connect," a platform that will enable the continuation of communication efforts as well as the creation of webinars, rebate tracking, "Find a Contractor," and other tools to encourage participation and enhanced communication.

Customer Satisfaction

Avista retained Cadmus to conduct a variety of process evaluation activities for 2018 related to residential programs. The evaluation effort focused on four fundamental objectives:

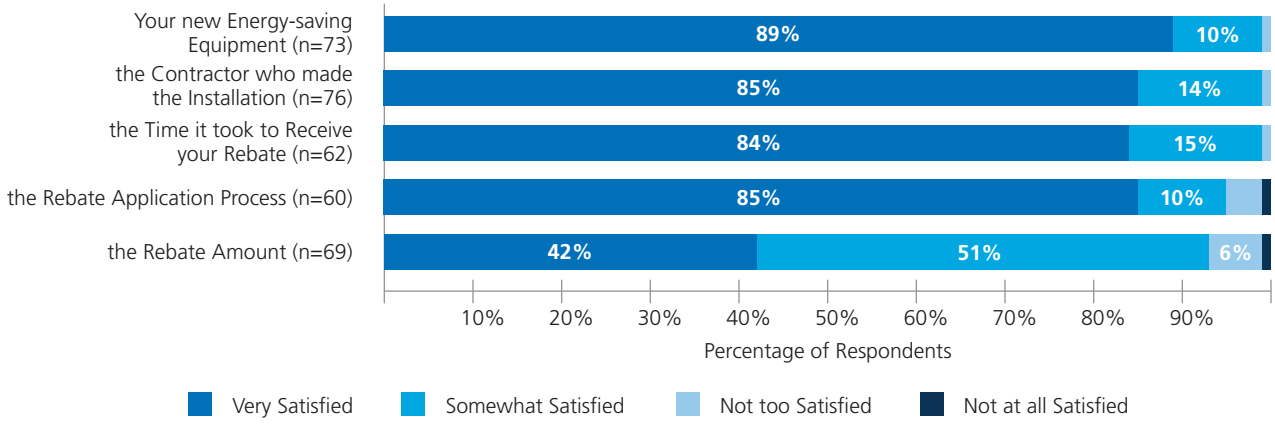
- Assess program delivery channels and marketing methods
- Assess participant and market actor experience with the program, including barriers to participation, satisfaction with the program, and effectiveness of rebate levels
- Assess Avista and implementer staff experiences including organizational structure, communication, and program processes
- Document areas of success, challenge, and changes to the program

To evaluate program processes in the residential sector, Cadmus conducted stakeholder interviews with Avista and implementer staff, phone interviews with HVAC contractors, and phone surveys with residential program participants. Each data collection task informed its own set of research objectives and covered the HVAC, shell, and fuel efficiency programs together. Findings that pertain to all three programs are summarized in this section. Program-specific findings and recommendations are included in program-specific sections of the report.

Generally, residential program delivery was smooth per both Avista and implementer staff, and, except for small changes to the rebate levels outlined in the *2018 Annual Conservation Plan*, the HVAC, shell, and fuel efficiency programs were delivered and performed as expected. Customers were, by and large, very satisfied with residential programs, as were HVAC contractors.

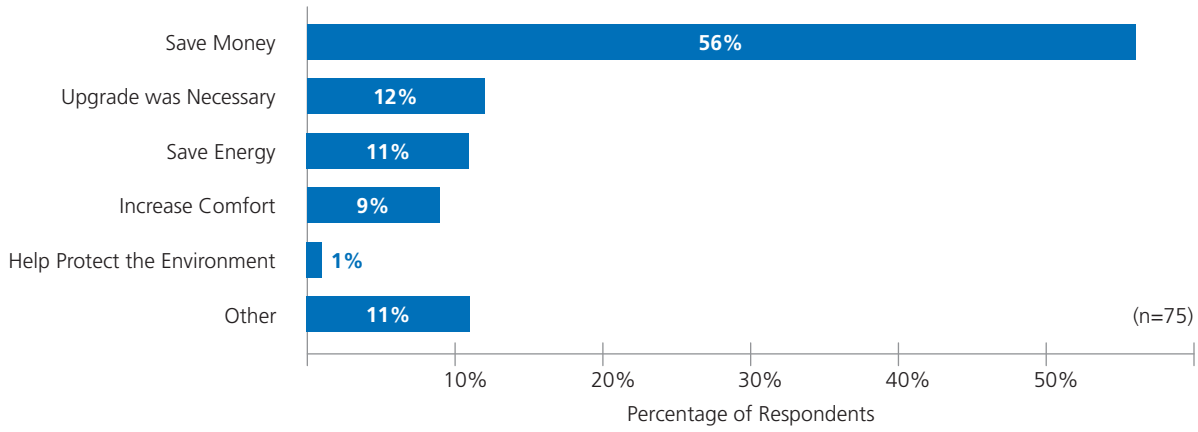
At least 93 percent of residential survey respondents were *very satisfied* or *somewhat satisfied* with every element of the program in which they participated as well as with Avista overall.

FIGURE 32 – SATISFACTION WITH RESIDENTIAL PROGRAM ELEMENTS



Source: Cadmus Residential Programs Participant Survey, Question C2: "How would you rate your overall experience with..."

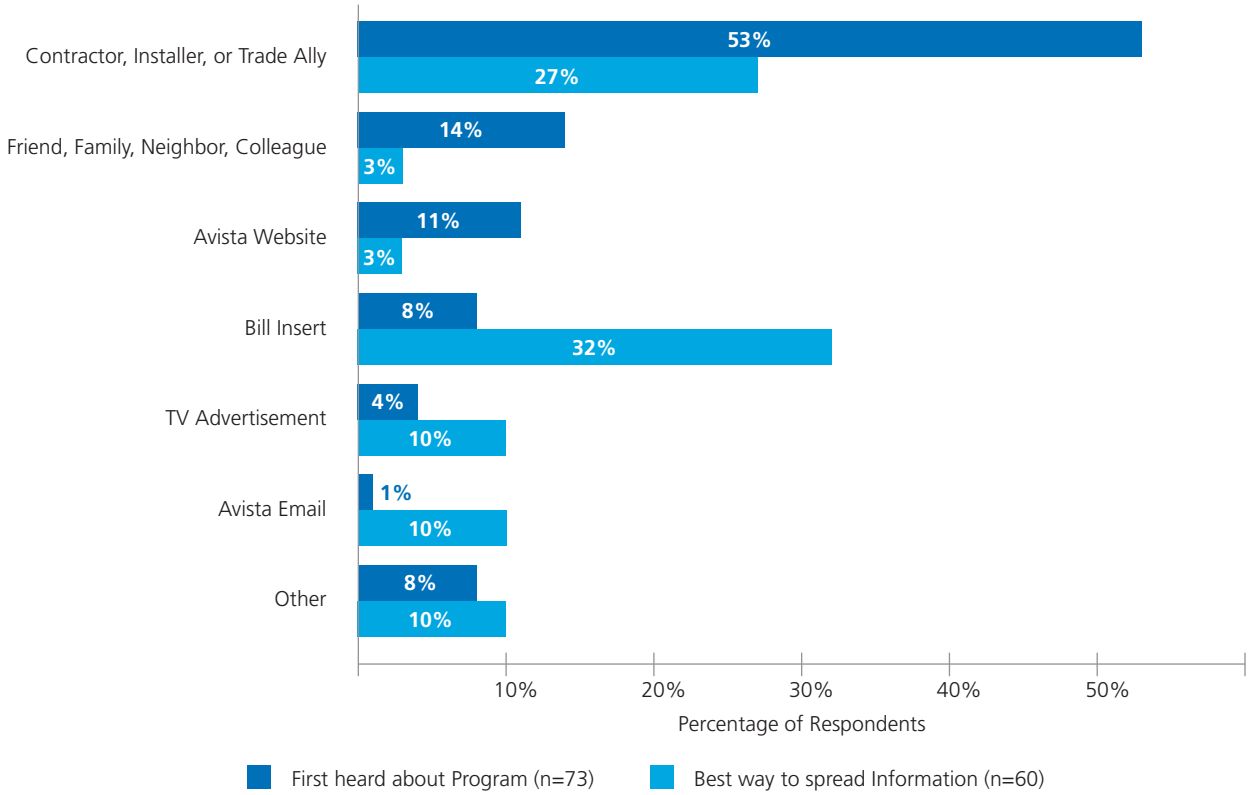
FIGURE 33 – MOTIVATION TO PARTICIPATE IN RESIDENTIAL PROGRAMS



Source: Cadmus Residential Programs Participant Survey, Question B3: "What motivated you to participate in the [PROGRAM NAME] Program?"

More than half of residential program participants heard about the program in which they participated through their contractor, installer, or trade ally (53 percent, n=73). Although a significant portion of respondents (n=60) said contractors are the best way to spread information about Avista programs (27 percent), more respondents said bill inserts are the best way to spread information (32 percent).

FIGURE 34 – HEARING ABOUT RESIDENTIAL PROGRAMS AND BEST WAY TO SPREAD INFORMATION



Source: Cadmus Residential Programs Participant Survey, Question B1: "How did you first hear about the [PROGRAM NAME] Program?"; Question B2: "What is the best way for Avista to inform residential customers like you about their energy efficiency improvement rebates?"

Because so many customers heard of incentive programs through contractors and other trade allies, trade ally engagement will continue to be developed as a central marketing strategy for Avista residential programs.

Recommendations

Cadmus recommends that Avista consider adjusting the constraints used to verify mailing addresses for customers trying to submit their rebate application forms online, because the system occasionally created frustration for customers with non-typical address formats.

Avista plans to develop and launch a new online rebate web portal that will improve the customer experience and resolve this particular issue with a Google address autofill feature.

The complete process evaluation of commercial/industrial and residential programs can be found in *Appendix C*.

Impact Evaluation: Residential Sector

- ***Electric:*** realization rate of 94 percent on savings of 4,378,753 kWh[1].
- ***Natural Gas:*** realization rate of 101 percent on savings of 205,978 therms[2], which is 124 percent of the savings goal for the year. Reported savings for the Multifamily Direct Install program added 2,014 therms of savings, for a total of 207,992 therms in acquired savings.

Lighting measures account for a high percentage of residential sector program path savings: Simple Steps, Smart Savings provided 68 percent of residential savings, mostly through lighting measures, and Multifamily Direct Install provided 14 percent of savings, also mostly through lighting measures. The HVAC program accounted for 15 percent of savings, with shell and ENERGY STAR homes accounting for a combined 3 percent of residential sector savings.

The HVAC program accounts for most verified residential natural gas savings – 79 percent – followed by the shell program with 19 percent of natural gas savings. Simple Steps, Smart Savings; Multifamily Direct Install; and ENERGY STAR homes account for a combined 2 percent of savings, primarily through water-saving measures.

Performance and Savings Goals

The residential sector exceeded its electric savings goal of 1,164 MWh by 202 percent, due largely to program participation that was 265 percent of the goal. Reported savings for the Multifamily Direct Install program added 729,920 kWh for a total acquired savings of 5,108,673 kWh.

Natural gas savings for the year were 124 percent of the savings goal of 165,271 therms.

1) Excludes 729,920 kWh attributable to the Multifamily Direct Install program and 1,442,640 attributable to the Residential Fuel Efficiency Program.

2) Excludes 2,014 therms attributable to the Residential Fuel Efficiency Program.

Impact Evaluation Methodology

To determine the residential sector verified savings for 2018, Cadmus employed two impact evaluation methods for most residential programs:[3]

- Database review
- Document review

Similar to previous practice, Cadmus calculated adjusted savings based on results of the database review and applied realization rates from Avista's document reviews, as shown in *Figure 35*. Verified savings are adjusted savings multiplied by document review realization rates.

FIGURE 35 – RESIDENTIAL IMPACT PROCESS

Database Review

For the impact evaluation database review, Cadmus used UES values, as provided in the TRM, to calculate savings for measures reported in the measure tracking database. This impact activity may help identify incorrect UES values used to calculate reported savings. Savings calculated during the database review are defined as *adjusted savings*.

Document Review

For the document review, Cadmus compared information from rebate forms and other supporting documents to measure tracking data for a random sample of projects. This impact activity may identify installed measures that did not meet eligibility requirements, quantities that did not match the measure tracking database, and other discrepancies. Following our review of all projects, we calculated a realization rate for the document review by dividing savings calculated for the sample (using the revised information) by reported savings for the sample. We then multiplied this realization rate by adjusted savings for the entire program to determine verified savings.

Cadmus conducted 34 document reviews for the HVAC and shell programs, drawing roughly equal samples from participants in each quarter.

Complete impact evaluations for electric and natural gas are included in *Appendices A* and *B*.

3) With approval from Avista, Cadmus ceased performing a third impact activity – verification surveys – in the third quarter of 2018 to eliminate redundancy between verification surveys and document review.

Cost-Effectiveness

Tables 33 and *34* show the residential sector cost-effectiveness results by fuel type.

TABLE 33 – RESIDENTIAL COST-EFFECTIVENESS – ELECTRIC

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 5,506,504	$ 2,446,528	**2.25**
Total Resource Cost (TRC)	$ 6,057,155	$ 2,787,962	**2.17**
Participant Cost Test (PCT)	$ 9,891,003	$ 1,968,131	**5.03**
Ratepayer Impact (RIM)	$ 5,506,504	$ 4,956,536	**1.11**

TABLE 34 – RESIDENTIAL COST-EFFECTIVENESS – NATURAL GAS

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 1,902,484	$ 568,340	**3.35**
Total Resource Cost (TRC)	$ 1,902,484	$ 1,612,158	**1.18**
Participant Cost Test (PCT)	$ 3,044,342	$ 1,569,729	**1.94**
Ratepayer Impact (RIM)	$ 1,902,484	$ 847,367	**2.25**

Program by Program Summaries

Residential HVAC Program

TABLE 35 – RESIDENTIAL HVAC PROGRAM METRICS

HVAC Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		458
Overall kWh Savings		750,709
Idaho Energy Efficiency Rider Spend	$	213,605
HVAC Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		1,900
Overall Therm Savings		150,936
Idaho Energy Efficiency Rider Spend	$	472,608

Description

Through the HVAC program, Avista encourages residential customers to select a high-efficiency solution when making energy upgrades to their homes.

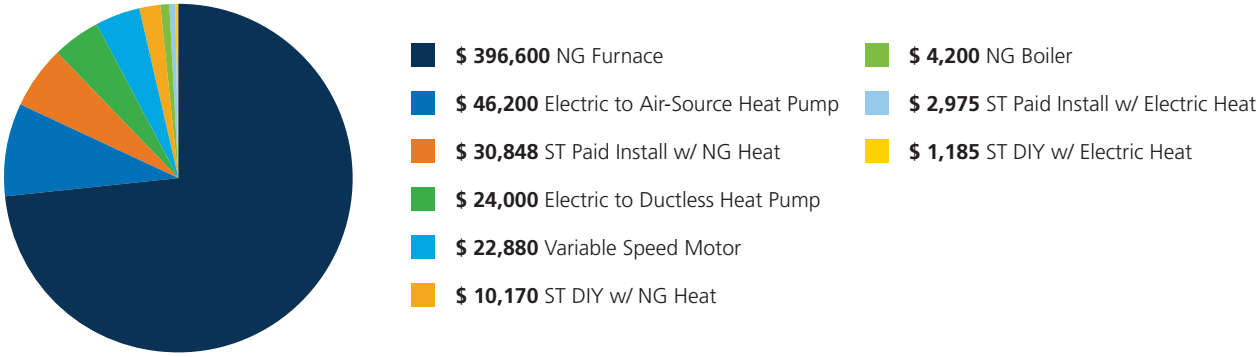
Idaho electric customers (Schedule 1) who heat their homes with Avista electricity may be eligible for a rebate for installing a variable speed motor on their forced-air heating equipment or for converting their electric straight-resistance space heating to an air-source heat pump. Any Idaho residential natural gas customers (Schedule 101) who heat their homes with natural gas may be eligible for a rebate for installing a high-efficiency natural gas furnace or boiler. Avista reviews energy usage as part of the program eligibility requirements: Customers must demonstrate a heating season electricity usage of 8,000 kWh and natural gas usage of less than 340 therms for replacement of electric straight-resistance to air-source heat pump and ductless heat pump. High-efficiency natural gas furnaces and boilers must have 90 percent AFUE or greater, while tankless water heaters must have an efficiency of 0.82 EF or higher, ductless heat pumps must be 9.0 HSPF or greater, and heat pump water heaters must have an efficiency of 180 percent or higher. The supporting documentation required for participation includes, but may not be limited to, copies of project invoices and an Air Conditioning, Heating, and Refrigeration Institute certification.

This prescriptive rebate approach issues payment to the customer after the measure has been installed. Energy-efficiency marketing efforts build considerable awareness of opportunities in the home and drive customers to the website for rebate information. Vendors generate participation using the rebate as a sales tool for their services. Utility website promotion, vendor training, retail location visits, and presentations at various customer events throughout the year are some additional communication methods that encourage program participation.

Program Activities

- ***Electric:*** savings of 750,709 kWh in 2018, 12 percent of the overall savings achieved in Avista's residential portfolio. The program had a 33 percent increase over the 565,325 kWh achieved in 2017.
- ***Natural Gas:*** savings of 150,936 therms in 2018 – 61 percent of the overall savings – a 23 percent decrease relative to the 194,247 therms achieved in 2017. For 2018, Avista revised its unit energy savings value for residential high-efficiency furnaces, which resulted in a decrease of approximately 35 therms per unit. The revised per-unit savings resulted in lower overall energy achievement of approximately 46,270 therms for this measure alone.

FIGURE 36 – RESIDENTIAL HVAC INCENTIVE DOLLARS BY MEASURE



Overall, residential customers continue to respond well to the program. High-efficiency natural gas furnaces provide the largest portion of natural gas savings in the residential sector portfolio, comprising approximately 75 percent of Avista's 2018 residential HVAC incentives. Electric air-source heat pumps also accounted for a significant portion of 2018 residential HVAC incentives. Thermostat incentives also continued to be popular with customers, with 621 installed in the service area in 2018.

Program Changes

Staff reduced rebates for smart thermostats to $60 if self-installed (originally $75) and $75 if contractor-installed (originally $100) to stay within budget. Despite lower rebate levels, rebate applications increased from those in 2017.

Staff increased rebates to $500 for ductless heat pumps (originally $450). Avista discontinued conversion rebates for natural gas water heaters because of a lack of interest in the measure, but still provided incentives as part of a $2,250 combined rebate for converting to natural gas for both space and water heating.

Marketing Activities

The HVAC program was part of the broad-reach "Way to Save" advertising campaign, which promoted rebates for conversions from electric to natural gas and high-efficiency equipment. See pages 48-51.

In addition to the marketing campaigns, Avista program managers kept in regular contact with trade allies via topical, focused email blasts. These blasts notified trade allies of upcoming program changes and deadlines. Avista program managers also held 6 trade ally engagement events – in person and via email – to review program changes, encourage program participation, and answer trade ally questions. Trade ally engagement continues to be a core marketing strategy for this program.

Trade Ally Satisfaction

HVAC contractors interviewed by Cadmus rated all program elements shown in *Table 36* with high satisfaction marks, ranging from 4.4 to 4.9 on a scale of 1 to 5, where 1 meant *not at all satisfied* and 5 meant *very satisfied*.

TABLE 36 – SATISFACTION RATINGS BY RESIDENTIAL PROGRAM ELEMENT

Program Element	Satisfaction Ratings					Average
	1 – Not at all Satisfied	2	3	4	5 – Very Satisfied	
Interaction with Avista	0	0	0	1	7	4.9
Rebate Application Process	0	0	1	1	6	4.6
Rebate Levels	0	0	0	4	4	4.5
Equipment Covered by Rebates	0	0	2	1	5	4.4
Program Overall	**0**	**0**	**0**	**2**	**6**	**4.8**

Additional details related to contractors' ratings for each program element above include the following:

- ***Interaction with Avista:*** Contractors rated their interactions with Avista the highest of the five discussed program elements (4.9), although some said they did not contact Avista very often. The one contractor who did not give a 5 rating still praised Avista's customer service team but said it seemed understaffed at times.
- ***Rebate application:*** All contractors said the application process was simple, straightforward, and user-friendly. Three contractors experienced problems submitting applications online, primarily because the website could not verify a customer's mailing address, so they submitted application forms by mail instead.
- ***Rebate levels:*** Contractors were generally satisfied with the rebate levels, although 4 said they could be higher to provide further benefits to customers.[4]
- ***Equipment:*** Contractors were mostly satisfied with equipment covered by the program's rebates but suggested other types of high-efficiency equipment (such as air conditioners, water heaters, and side-arm heat exchangers for boilers and furnaces) that could benefit customers.

4) This feedback is commonly provided regarding prescriptive rebate programs like Avista's HVAC program.

Contractors rated the HVAC program's influence on a customer's decision to purchase new equipment as a 4.6 on average, using a scale from 1 to 5, where 1 meant *not at all influential* and 5 meant *very influential*. Contractors who gave a 5 rating said the program provided incentives to offset job costs and educated customers about energy efficiency.[5] Contractors who provided a 4 rating said Avista branding increased the program's effectiveness, and the rebates sold customers on the program. HVAC contractors interviewed by Cadmus said the HVAC program plays an important role in "leveling the playing field" because it enabled them to install more costly high-efficiency equipment in the homes of customers who might otherwise not be able to afford them.

Impact Evaluation

The Cadmus impact evaluation team found a 99 percent realization rate for the electric HVAC program and a 100 percent realization rate for the natural gas HVAC program in 2018. The HVAC program accounted for 15 percent of savings in the electric portfolio and 79 percent of savings for the natural gas portfolio.

Profiling of electric program participants revealed high annual consumption during the pre-treatment period, indicating a strong likelihood that these customers had electric resistance heating before their retrofit. This consumption profile supports application of RTF-deemed savings for resistance-heat conversion.

Avista confirmed during evaluation that both electric and natural gas UES values for several HVAC measures mistakenly had not been updated to 2018 TRM values. This resulted in a number of measures with under-represented savings, especially for heat pump measures. Under Avista direction, Cadmus adjusted reported savings for these measures to use 2018 TRM UES values.

For the natural gas HVAC program, the 2018 impact evaluation recommends that Avista continue to encourage installations of high-efficiency natural gas equipment through the HVAC program, which provides nearly three-quarters of natural gas savings for residential programs. The *Northwest Energy Efficiency Alliance's Residential Building Stock Analysis II* estimates that roughly 50 percent in Idaho single-family homes have an AFUE under 90 percent, indicating plenty of remaining opportunity for savings.

Plans for 2019

Based on 2018 impact evaluation results, Avista plans to continue to update reported savings based on the most recent iterations of relevant RTF workbooks. Avista will continue to use RTF values for this program, and monitor its realization rates related to this and all measures so the most accurate unit energy savings values can be used.

There is another impact evaluation planned for this program for 2019. The impact evaluator, Cadmus, will conduct 70 document reviews to assess the quality of HVAC program tracking data and will verify that values of key metrics are within expected limits. Avista's reported gross *ex ante* savings estimates and assumptions – particularly for increasingly significant equipment such as air-source heat pump measures – will also be reviewed and benchmarked against similar programs in the Northwest.

5) One contractor made a distinction that the program was a 5 when influencing customers to install new equipment, but only a 2 or 3 when influencing customers to upgrade.

Verified net savings will be determined through a billing analysis of participant and comparison groups where practical.

This program will also undergo a process evaluation in 2019. The evaluation of the program's design, delivery, and performance will include a review of program documents and databases to assess participation and savings trends. The evaluator will also interview Avista staff to document the inclusion of the energy-use component of program eligibility. Finally, participating contractors will be interviewed to assess program understanding, experience and satisfaction, how contractors identify customers, how rebates are used as a sales factor, and customer awareness of the program.

Residential Shell Program

TABLE 37 – RESIDENTIAL SHELL PROGRAM METRICS

Shell Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		64
Overall kWh Savings		85,608
Idaho Energy Efficiency Rider Spend	$	25,238
Shell Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		156
Overall Therm Savings		40,014
Idaho Energy Efficiency Rider Spend	$	37,580

Description

Through the shell program, Avista encourages residential customers to improve their home's shell or exterior by upgrading windows and storm windows. This prescriptive rebate approach issues payment to the customer after the measure has been installed. Energy-efficiency marketing efforts build considerable awareness of opportunities in the home and drive customers to the website for rebate information; vendors generate participation using the rebate as a sales tool for their services. Additional participation encouragement comes through utility website promotion, vendor training, retail location visits, and presentations at various customer events throughout the year.

Idaho residential electric customers (Schedule 1) who heat their homes with Avista electric are eligible to apply, as are Idaho residential natural gas customers (Schedule 101) who heat their homes with natural gas.

Storm windows (interior/exterior) must be new, the same size as the existing window, and not be in direct contact with the existing window, and exterior window low-e coating must be facing the interior of the home. Glazing material emissivity must be less than 0.22 with a solar transmittance greater than 0.55. Windows must have a U-factor rating of 0.30 or lower.

Avista will review energy usage as part of the program eligibility requirements. Customers in Idaho with electric heated homes must demonstrate a heating season usage of 8,000 kWh; those with natural gas heated homes must demonstrate a heating season usage of 340 therms.

Program Activities

- ***Electric:*** savings of 85,608 kWh in 2018 (1 percent of the overall savings), an 87 percent increase over the 45,870 kWh achieved in 2017.
- ***Natural Gas:*** savings of 40,014 therms in 2018, or 19 percent of the overall savings. The program had a 237 percent increase in savings over the 11,857 therms achieved in 2017.

The savings derived from the residential shell program for both natural gas and electric homes are primarily attributed to single-pane window replacements.

Shell program participants had been inclined to replace existing windows with regular windows rather than storm windows. Avista has considered retiring rebates for storm windows, but has not decided at this time to make that change.

Marketing Activities

The shell program was part of the broad-reach "Way to Save" advertising campaign, which promoted rebates for energy-efficient windows and provided tips for stopping drafts. See pages 48-51.

Impact Evaluation

The Cadmus impact evaluation team found an 89 percent realization rate of savings for prescriptive shell rebate measures in electric homes and a realization rate of 107 percent in rebate measures in natural gas homes.

Natural gas shell prescriptive incentives accounted for 19 percent of natural gas savings, while electric shell measures accounted for less than 3 percent of electric savings of the residential sector program portfolio.

Avista confirmed during evaluation that natural gas unit energy savings (UES) values for several measures throughout the portfolio mistakenly had not been updated to 2018 TRM values. Initially, the shell natural gas program grossly un-reported savings, which were based on 2017 TRM values. Under Avista direction, Cadmus adjusted reported savings for the shell windows measures to use 2018 TRM values.

In summary, Cadmus recommended that prescriptive measures be updated in accordance with updates to the TRM UES values or RTF methods. Cadmus also recommended that Avista continue to emphasize windows measures through the shell program, given their contribution of 19 percent of residential program path natural gas savings.

Plans for 2019

Avista will continue to pursue and encourage this program and will base values on RTF data, continuing to update these values as they change. For 2019, Avista will implement the "most favorable fuel" methodology when the least penalized fuel dictates the incentive.

There is another impact evaluation planned for this program for 2019. The evaluator will conduct 70 document reviews to assess the quality of program tracking data, and will also review Avista's reported gross *ex ante* savings estimates and assumptions about per-home consumption and benchmark these against similar programs in the Northwest. Verified net savings will be determined through a billing analysis of participant and nonparticipant groups. Savings estimates will be achieved through the use of two modeling approaches: monthly fixed effects panel modeling and customer-specific regression. Results will be summarized by measure.

This program will also undergo a process evaluation in 2019. The evaluation of the program's design, delivery, and performance will include a review of program documents and databases to document tactics used to drive the customer to the website, changes in rebates, and contractor engagement strategies. The evaluator will also interview Avista staff to discuss and document the energy-usage component of program eligibility. Vendor training, rebate changes, and techniques to build market awareness will also be examined. Finally, participating customers will be interviewed to explore customer experience around the application process, satisfaction with the program, the influence of the contractor on the process, and customer marketing preferences.

Residential Water Heating Program

TABLE 38 – RESIDENTIAL WATER HEATING PROGRAM METRICS

Water Heating Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		1,011
Overall kWh Savings		47,398
Idaho Energy Efficiency Rider Spend	$	8,147
Water Heating Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		1,077
Overall Therm Savings		14,622
Idaho Energy Efficiency Rider Spend	$	38,983

Description

Idaho customers who heat their homes with Avista electric or natural gas may be eligible for a rebate for the installation of a high-efficiency heat pump water heater, tankless water heater, or natural gas high-efficiency water heater. Efficiencies for space- and water-heating equipment are verified according to the contractor invoice or the Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

Program Activities

The residential electric water heating program obtained savings of 47,398 kWh in 2018, which included 4,345 kWh of savings attributed to high-efficiency water heaters and 43,053 kWh attributed to electric non-lighting measures from the Simple Steps, Smart Savings program. These savings represent approximately 1 percent of savings in the residential electric program portfolio.

The residential natural gas water heating program obtained savings of 14,622 therms in 2018, which represents 7 percent of the overall savings achieved in Avista's residential portfolio. The program had a 44 percent decrease in savings over the 25,932 therms achieved in 2017, despite rebate amounts for high-efficiency natural gas tankless water heaters and high-efficiency heat pump water heaters remaining unchanged. Therm savings for 2018 also included gas water heating measures from the Simple Steps, Smart Savings program.

Marketing Activities

The water heating program was included in the broad-reach "Way to Save" advertising campaign, which promoted rebates for energy-efficient equipment. See pages 48-51.

Plans for 2019

Avista plans to revise the following 2019 incentives:

TABLE 39 – RESIDENTIAL WATER HEATING PROGRAM PLANNED CHANGES FOR 2019

Measure Description	2018	2019
Heat Pump Water Heater (any size Ave Tier 2/3)	$ 200	$ 215
Natural Gas Tankless Water Heater (0.82+)	$ 200	$ 215
Natural Gas High-Efficiency Water Heater (<= 55)	NA	$ 60

Residential ENERGY STAR Homes Program

TABLE 40 – RESIDENTIAL ENERGY STAR HOMES PROGRAM METRICS

ENERGY STAR Homes Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		26
Overall kWh Savings		83,738
Idaho Energy Efficiency Rider Spend	$	37,958
ENERGY STAR Homes Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		2
Overall Therm Savings		406
Idaho Energy Efficiency Rider Spend	$	2,083

Note: The TRC and UCT values for the gas program was based on two projects that were combination electric and natural gas. The majority of costs were allocated to electric causing a high cost-effectiveness result for the natural gas program.

Description

The ENERGY STAR homes program takes advantage of the regional and national effort surrounding the U.S. Department of Energy and U.S. Environmental Protection Agency's ENERGY STAR label. Avista and partnering member utilities of NEEA have committed significant resources to develop and implement this program to set standards, train contractors, and provide third-party verification of qualifying homes. NEEA, in effect, administers the program and Avista pays the rebates for homes that successfully complete the process and are labeled ENERGY STAR. In addition, after the launch of NEEA's regional effort, the manufactured homes industry established manufacturing standards and a labeling program to obtain ENERGY STAR-certified manufactured homes. While the two approaches are unique, they both offer 15-25 percent savings versus the baseline.

The ENERGY STAR homes program promotes to builders and homeowners a sustainable, low-operating-cost, environmentally friendly structure as an alternative to traditional home construction. In Idaho, Avista offers both electric and natural gas energy-efficiency programs, and, as a result, has structured the program to account for homes where either a single fuel or both fuels are used for space and water heating needs. Avista continues to support the regional program to encourage sustainable building practices.

Any Idaho residential electric customer (Schedule 1) with a certified ENERGY STAR home or ENERGY STAR/ECO-rated all-electric manufactured home is eligible. Any Idaho residential electric customer (Schedule 1) with a certified ENERGY STAR home that has Avista electric for lights and appliances and Avista residential natural gas (Schedule 101) for space and water heating is eligible. For 2018, stick-built ENERGY STAR homes with electric heating did not pass the TRC cost-effectiveness test and were removed.

A certified ENERGY STAR home with Avista electric or both Avista electric and natural gas service provides energy savings beyond code requirements for space heating, water heating, shell measures, lighting, and appliances. Space-heating equipment can be either electric forced air or electric heat pump, or a natural gas furnace. This rebate may not be combined with other Avista individual measure rebate offers (such as high-efficiency water heaters).

Program Activities

For 2018, Avista discontinued ENERGY STAR incentives for stick-built new construction homes; however, the incentive for ENERGY STAR manufactured homes was raised from $800 to $1,000 per unit. The program saw a 60 percent reduction in kWh savings and a 46 percent reduction in therm savings.

The ENERGY STAR for homes natural gas program accounted for less than 2 percent of residential natural gas program savings; its electric program accounted for less than 3 percent of residential electric program savings.

Impact Evaluation

The 2018 natural gas impact evaluation found that the realization rate for the two natural gas ENERGY STAR for homes projects was 50 percent; it was 72 percent for the 26 electric projects. In both cases, the evaluator could not confirm reported savings calculations which depended on inputs not included in tracking data (for example air infiltration and duct sealing).

Based on reported savings, the ENERGY STAR for homes program achieved 253 percent of the goal, but reported participation and verified savings both showed that the program achieved approximately 72 percent of the goal, which indicates that reported savings values are well over the 2018 TRM UES values.

Cadmus recommended that reported savings for all prescriptive measures, including ENERGY STAR homes programs, be calculated using current TRM or RTF UES values.

Plans for 2019

Revised Rebates for 2019:

TABLE 41 – RESIDENTIAL ENERGY STAR HOMES PROGRAM PLANNED CHANGES FOR 2019

Measure Description	2018	2019
ENERGY STAR Home – Natural Gas Only	$ 600	$ 200
ENERGY STAR Home – Manufactured Home, Electric/Dual Fuel	$ 1,000	$ 650

Evaluation Plans

There is another impact evaluation planned for 2019. The evaluator will review program records and simulation model inputs for a sample of homes. Program tracking records will be compared to Home Energy Rating System's (HERS) home characterizations in the simulation models to verify participation and appropriate incentive levels. Simulation model-predicted savings will be used to compute the gross program electricity and natural gas energy savings. Average program savings by HERS level will be applied to the program population to estimate overall program savings.

The net-to-gross ratio for Idaho will be ascertained through participant builder surveys to gather information about participant builder practices when incentives aren't provided by the program (that is, building practices used for non-program homes represent the baseline for that particular builder). The goal will be to understand how and if the ENERGY STAR homes program drives different building practices than non-participating homes. If there is evidence that participating builders construct homes above the baseline for non-participating homes, the net-to-gross for those builders will be based on the difference in energy consumption between a non-program home and a program home. If the data suggests that non-program homes were built to the same standards as the simulation model baseline home, net savings would be equal to gross savings.

This program will also undergo a process evaluation in 2019. The evaluation of the program's design, delivery, and performance will include a review of program documents and databases to assess marketing and outreach efforts as well as participation trends. The evaluator will also interview Avista staff to document regional communication and coordination with NEEA and other partnering utilities that offer contractor training and third-party verification of qualifying projects.

Residential Fuel Efficiency Program

TABLE 42 – RESIDENTIAL FUEL CONVERSION METRICS

Fuel Conversion Program Summary – Fuel Efficiency		2018
Participation, Savings, and Costs		
Conservation Projects		170
Overall kWh Savings		1,442,640
Idaho Energy Efficiency Rider Spend	$	515,055

Description

The fuel efficiency program rebate encourages customers to consider converting their resistive electric space and water heating to natural gas. The direct use of natural gas continues to be the most efficient fuel choice when available, and, over time, offers the most economic value in terms of the operating costs of the equipment. Since the early 1990s, Avista has offered a conversion rebate. While natural gas prices have fallen in recent years, the cost of infrastructure continues to rise, both for the utility and for customers' installation costs for this particular measure. For 2018, conversions to natural gas water heater-only rebates are no longer available. However, Avista provides a combination conversion rebate for water heater and natural gas furnaces.

Avista pays this prescriptive rebate upon the measure installation and receipt of all relevant documentation. A customer's minimum qualifications include using Avista electricity for electric straight-resistance heating or water heating, which is verified by evaluating their energy use. Energy-efficiency marketing efforts build considerable awareness of opportunities in the home and drive customers to the website for rebate information. Vendors generate participation using the rebate as a sales tool for their services. Utility website promotion, vendor training, retail location visits, and presentations at various customer events throughout the year are some additional communication methods that encourage program participation.

Residential electric customers (Schedule 1) in Idaho who heat their homes or water with Avista electricity may be eligible for a rebate for converting to natural gas. The home's electric baseboard or furnace heat consumption must indicate a use of 8,000 kWh or more during the previous heating season (and less than 340 therms).

Program Activities

The fuel-efficiency program obtained 1,442,640 kWh of savings in 2018, which is a decrease of 10 percent from the 1,709,299 kWh achieved in 2017. Avista served a total of 170 customers in 2018, with the majority choosing to convert both their furnace and water heater (using the "combo measure"). These customers installed either residential or low-income fuel efficiency measures. In 2017, Avista served 318 customers, with a similar share pursuing the combo measure as in 2018.

Marketing Activities

The fuel efficiency program was part of the broad-reach "Way to Save" advertising campaign, which promoted rebates for conversions from electric to natural gas. See pages 48-51.

Program Changes

The 2017 impact evaluation recommended that Avista reduce reported savings and consider using the low-income conversion-deemed savings assumptions for all fuel efficiency programs. Avista updated this program's savings values for 2018 based on relevant UES values.

Impact Evaluation

In the 2018 natural gas impact evaluation study, Cadmus conducted database and document review for 34 fuel efficiency projects in 2018. The study found an overall realization rate of 116 percent for the program, and a document audit realization rate of 100 percent. Furthermore, residential prescriptive natural gas measures more than offset the natural gas penalty of residential prescriptive fuel efficiency measures.

Plans For 2019

Avista plans to offer the following revised rebates for 2019, in accordance with most current UES values:

TABLE 43 – RESIDENTIAL FUEL CONVERSION PLANNED CHANGES FOR 2019

Measure Description	2018	2019
Electric to Natural Gas Furnace	$ 1,500	$ 1,200
Electric to Natural Gas Combo	$ 2,250	$ 1,700
Electric to Natural Gas Wall Heater	$ 1,300	discontinued

This program is scheduled for another impact evaluation in 2019. Quality of program tracking data will be assessed and Avista's reported gross *ex ante* savings estimates and assumptions will be reviewed. The most recent data from the NEEA Residential Building Stock Assessment (RBSA) will be used to analyze the saturation of the water heater fuel type in the territory and update the allocation of energy savings to electric and natural gas accordingly. Cadmus will work with Avista to determine the most appropriate programs to which the new regional residential data can be applied and will benchmark these programs against similar programs in the Northwest.

Verified net savings will be determined through a billing analysis of participant and nonparticipant groups. Savings for each participant group will be estimated using two modeling approaches – monthly fixed-effects panel modeling and customer-specific regression – and results will be summarized by measure type. We will also perform a natural gas billing analysis to better estimate the increase in the natural gas usage from fuel conversion.

This program will also undergo a process evaluation in 2019. The evaluation of the program's design, delivery, and performance will include a review of program documents and databases to identify changes in eligibility requirements, rebate changes, and documentation of contractor support. The evaluator will also interview Avista staff to document successes and challenges of recent changes to program measures. Vendor training and other market awareness building efforts will also be examined. Finally, participating customers will be surveyed to explore awareness of fuel switching as an efficiency opportunity, motivation to participate, and customer experience around the application process, customer marketing preferences, and the influence of contractors for customer choices.

Residential Simple Steps, Smart Savings Program

TABLE 44 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS METRICS

Simple Steps, Smart Savings Lighting Program Summary – Electric	2018
Participation, Savings, and Costs	
Conservation Projects	239,430
Overall kWh Savings	3,411,299
Idaho Energy Efficiency Rider Spend	$ 752,823

Note: Simple Steps natural gas water heating savings were included in the Residential Prescriptive program as part of water heat related savings.

Description

Simple Steps, Smart Savings is a regional program designed to increase the adoption of energy-efficient residential products. To achieve energy savings, residential consumers are encouraged to purchase and install high-quality LED bulbs, light fixtures, energy-saving showerheads, and ENERGY STAR appliances.

Simple Steps, Smart Savings continues to provide the region's best opportunity to collectively influence both retail stocking practices and consumer purchasing. There continue to be opportunities for efficient lighting improvements in customer residences, as many residential lighting sockets are still occupied by inefficient bulbs. Incentives also encourage customers to increase efficiency before the existing, less-efficient lighting burns out. Energy savings claimed are based on RTF-deemed savings.

Key to delivering on the objectives of this program are the incentives that encourage customer interest and the marketing efforts that drive customers to use the program. The upstream model for lighting and showerheads uses a manufacturer partnership to reduce the cost of products and allow for greater flexibility in how money is used (such as for markdowns or marketing).

Avista contracted with CLEAResult to provide the manufacturer and retail coordination. CLEAResult is responsible for coordinating program marketing efforts, performing outreach to retailers, ensuring that the proper program tracking is in place, and coordinating all implementation aspects of the program. Big-box retailers and select regional and national mass-market chains are the primary recipients of program measures and typically offer a variety of Simple Steps, Smart Savings products. These products include LED bulbs such as general purpose, dimmable, decorative, mini-base, globe, reflectors, and outdoor lights, as well as three-way ENERGY STAR LED fixtures and showerheads with 2.0 gallons per minute (GPM), 1.75 GPM, and 1.5 GPM ratings. These products are clearly identified with point-of-purchase tags indicating they are part of the program.

Simple Steps, Smart Savings is available at retail locations with allocations among participating utilities based on an estimated percentage of customers shopping at specific locations.

Program Activities

Avista witnessed a regional drop in Q1 2018 sales compared to 2017. One big impact has been a change of SKUs and multi-packs at Costco. In February, Feit/Costco decided to phase out certain SKUs; there's now a different product mix at the retailer, affecting stocking practices and availability as new products were sold and replaced by either rolling or replacement SKUs. Feit/Costco also eliminated a 10-pack which sold in high volume in 2017, leading to a percentage decrease due to phasing in new SKU products and also eliminating higher volume multi-packs.

Avista has also experienced a series of regional resets at retailers – including Home Depot and Lowes – which has meant that certain products have been made available to consumers at reduced rates. The reduced end-price means that the price is too low to qualify for an incentive; Avista therefore cannot report them as incentive-eligible products through the program.

Also, when BPA lowered its UES savings rates in late 2017, Simple Steps, Smart Savings had to reduce its available incentives on several products, including A-lamps and reflectors. With the reduced incentive, fewer products were sold as the cost difference narrowed between ENERGY STAR and non-ENERGY STAR products.

In its April 2018 *Regional Building Stock Assessment*, the NEEA also confirmed the significant increase in market penetration of LED lamps, though there is still an opportunity, specifically for LED products, to continue to transform the market.

Program Changes

On October 1, 2017, changes came into effect to the annual generator busbar (kWh/yr) savings for Simple Steps, Smart Savings-eligible products on the lighting and showerhead promotion that are set forth in the BPA-UES Measure List Version 6.0. The updated measure list in turn discontinued buy-down of all compact fluorescent lighting (CFL) products.

For 2018, the pricing structure changed slightly from the previous year. The kWh rate was increased from $0.11 cents per kWh to $0.12 cents per kWh with a discounted rate of $0.105 cents per kWh once Avista hit 10,000,000 kWh in total savings.

On January 1, 2018 an updated version of the Retail Sales Allocation Tool (RSAT) was implemented. The new RSAT reflected changes to Avista's allocations at participating retailers on the Simple Steps, Smart Savings program.

Customer Satisfaction

The following calendar describes the outreach activities conducted in 2018:

TABLE 45 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS OUTREACH ACTIVITIES

Deliverable	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Program-Driven Activities												
Online Utility Stakeholder Surveys			✔	✔				✔	✔			
Retail Collateral (by promo)		✔		✔			✔		✔	✔	✔	
Digital Assets (place by promo)				✔			✔		✔	✔	✔	
Peer Interface with Utility Marcomm			✔	✔		✔	✔		✔	✔		
Utility-Driven Activities												
Paid Online Search (by promo)				✔		✔	✔		✔	✔	✔	
Promoted Facebook Posts				✔		✔	✔		✔	✔	✔	
Direct E-mail Messages (by promo)				✔		✔	✔		✔	✔	✔	
Traditional Customer Communication				✔		✔	✔		✔	✔	✔	
Market Partner Driven Activities												
Stand-alone Brand Communications			✔	✔		✔	✔		✔	✔	✔	
Co-marketing with Market Partners				✔		✔	✔		✔	✔	✔	
Sales Holiday Planning – Stacked Offers						✔	✔		✔	✔	✔	

Appliance promotions were held on the following dates:

- Presidents' Day: February 15–28, 2018
- Memorial Day: May 15–31, 2018
- Independence Day: June 26–July 11, 2018
- Labor Day: August 21–September 18, 2018
- Black Friday: November 4–December 3, 2018

Shelf survey periods were the months of April and November.

In late Q1 of 2018, there was a consumer website refresh completed: www.simplestepsnw.com.

Impact Evaluation

The 2018 electric impact evaluation by Cadmus found a realization rate of 94 percent for the Simple Steps, Smart Savings electric program and a 495 percent realization rate for the Simple Steps, Smart Savings natural gas program.

Even with this adjustment, however, the program accounts for less than 2 percent of residential sector natural gas savings – yet the lighting measures in the electric program account for 68 percent of residential sector electric program savings.

The impact evaluator recommends that Avista continue to encourage adoption of efficient lighting through the Simple Steps, Smart Savings program. The NEEA's *Residential Building Stock Assessment II* shows that roughly 40 percent of installed lamps in single-family homes in Washington and Idaho are based either on incandescent or halogen technology.

Plans for 2019

Avista will continue to operate, pursue, and promote lighting measures through Simple Steps, Smart Savings.

For showerheads distributed through the Simple Steps, Smart Savings program, Avista will continue to allocate 61 percent of its reported savings to electric savings and 39 percent to natural gas. This change was made in August of 2018 and accounts for homes that have different water-heating fuel types. This is proportional to customer meters specific to each fuel source within the company's territory.

For the Simple Steps, Smart Savings program, Cadmus will evaluate its impact for 2019 by calculating *ex post* savings using RTF UES and primary data gathered by Avista's vendors regarding units sold. Savings calculated using RTF UES can be considered net savings values because the RTF uses a market average baseline, which effectively accounts for free-ridership.

For any lighting measures without RTF UES, Cadmus will calculate savings using an annual savings algorithm with these variables – lamp wattage, delta watt multiplier, hours of use, days per year, waste heat factor, and in-service rate – and apply RTF assumptions where practical. This algorithm is derived from industry-standard engineering practices and is consistent with the methodology used by the RTF for calculating energy use and savings for residential lighting.

This program will also undergo an extensive process evaluation in 2019. The evaluation of the program's design, delivery, and performance will include a review of program documents and databases to assess roles and responsibilities of the implementer, manufacturer, and retailer, as well as coordination activities with the Bonneville Power Administration. The evaluator will also interview Avista staff to document program understanding, including coordination of program marketing, outreach to retailers, product tracking, development of measure costs and savings, and overall program experience, including satisfaction and suggestions for improvement.

Participating manufacturers will be interviewed to assess and document program understanding, participant motivation and experience, perceived impact of the program on the market, and suggestions for improvement. Finally, participating retailers will be interviewed to document program understanding, participant motivation and experience, impact of program on customer uptake of eligible products, and suggestions for improvement.

There is a very slight chance that Avista's pricing may be adjusted to $0.13 per kWh for 2019 as it has been in the past. This is largely due to the fact that the cost of running the program remains the same, but that the kWh associated with each product was reduced on October 1, 2018. Avista's contract does not allow the company to move to new pricing until April 1, 2019. It is more likely that Avista will stay with $0.12 per kWh for the entire year, but will be unable to receive the price discount as in 2018 when the company paid the reduced price of $0.105 cents per kWh after 10,000,000 kWh in savings.

Residential Multifamily Direct Install Program and Supplemental Lighting

TABLE 46 – RESIDENTIAL MULTIFAMILY DIRECT INSTALL PROGRAM METRICS

Multifamily Direct Install Program Summary – Electric	2018
Participation, Savings, and Costs	
Conservation Projects	1,330
Overall kWh Savings	729,920
Idaho Energy Efficiency Rider Spend	$ 524,290
Multifamily Direct Install Program Summary – Natural Gas	**2018**
Participation, Savings, and Costs	
Conservation Projects	1,330
Overall Therm Savings	2,014
Idaho Energy Efficiency Rider Spend	$ 16,491

Description

Multifamily Direct Install (MFDI), administered by SBW Consulting, Inc., is a direct-installation and audit program that provides customer energy-efficiency opportunities by (1) directly installing appropriate energy-saving measures at each target site, (2) conducting a brief on-site audit to identify customer opportunities and interest in existing Avista programs, and (3) providing materials and contact information so that customers are able to follow up with additional energy-efficiency measures under existing programs. Direct installation measures include faucet aerators, showerheads, screw-in LEDs, smart power strips, and VendingMisers in common areas.

This program is available only to customers who receive electric service from Avista and own or manage five-unit (or more) multifamily properties. This program ran as a pilot for several months before Avista decided to scale it to a full program in late 2018. The company also ran a pilot for common-area supplemental lighting that was scaled to a full program for properties that had been audited and treated through the direct installation program.

Marketing Activities

FIGURE 37 – RESIDENTIAL MULTIFAMILY DIRECT INSTALL PROGRAM FLIER

FREE Energy Conservation Devices for Multifamily Units

For a limited time, Avista is providing energy-saving equipment that can help lower multifamily housing utility bills. Be sure to get your free LEDs, faucet aerators, low-flow showerheads, smart power strips, water heater temperature assessments, and other items before the program ends.*

- **LED LAMPS** provide better lighting and have a longer life while using less energy.
- **FAUCET AERATORS** can save both water and energy in bathroom and kitchen sinks.
- **ENERGY-EFFICIENT SHOWERHEADS** reduce energy and water costs while maintaining excellent water pressure.
- **SMART POWER STRIPS** can keep home entertainment centers from wasting energy.
- **VENDINGMISERS** can significantly reduce energy consumption for each cold beverage vending machine.

Warranty Information

LOW-FLOW SHOWERHEADS come with a 10-year warranty. Call customer service at AM Conservation regarding the Earth Chrome 1.5 gpm showerhead at 888-513-3005.

SMART POWER STRIPS include a lifetime product warranty against defective manufacturing and components. Call customer service at AM Conservation regarding the Tricklestar Smart Power Strip at 888-513-3005.

VENDINGMISERS are covered by a 5-year warranty. Email USA Technologies at customerservice@usatech.com with the model number and a short explanation regarding the unit problem.

**Free installation based on existing equipment that is eligible for replacement. If not satisfied, any items can be removed free of charge within 30 days of installation.*

AVISTA

Impact Evaluation

The 2018 Impact Evaluation report found that the MFDI program has proven to be an efficient, effective mechanism for installing high-efficiency lighting and aerators in multifamily units throughout the Avista service territory. The NEEA's *Residential Building Stock Assessment II* "Multifamily Buildings Report" estimated that 44 percent of lighting in multifamily units uses incandescent or halogen technology. Cadmus recommends focusing on replacement of high-use, low-efficiency lamps where practical, to maximize program cost effectiveness while keeping savings high.

Cadmus also evaluated the MFDI pilot process. Per Avista and implementer staff, the pilot, like Avista's residential programs, had a smooth delivery and ran as expected. Pilot participants were generally highly satisfied with the pilot and with the direct-installation measures provided to their tenants. Participating property managers did express some confusion with the timing of rolling out the supplemental lighting phase of the pilot.

- **Avista facilitated the MFDI pilot delivery by mimicking the design of the Small Business Direct Install (SBDI) program and recruiting its implementer to assume the same role for the pilot.** Per Avista and implementer staff, the pilot, like Avista's residential program, was delivered smoothly and as expected. Avista overcame barriers to participation by engaging in a highly targeted marketing campaign.
- **Pilot participants were generally highly satisfied with the pilot and direct-installation measures provided to their tenants,** per Avista reports and direct feedback from multifamily residence property managers. Although some property managers reported that tenants had problems with certain measures installed through the pilot, these issues occurred infrequently, and were all resolved by the implementer.
- **Participating property managers were unclear about the timing of the supplemental lighting phase of the pilot** at the time of interviews with Cadmus. Interviewees were not dissatisfied with the supplemental phase but expressed confusion about the timing of its rollout.
- **Pre- and post-pilot per-unit energy savings differed significantly because of substantial differences in algorithm inputs such as hours of use (HOU)**. Avista originally calculated energy-savings estimates using broad characterizations of building stock in its service territory and intended to use the pilot to collect more refined information about its customers' households. Differences between estimated and finalized energy savings were therefore not an unexpected outcome for Avista.

Plans for 2019

Avista plans to continue to offer the program for 2019, including the supplemental common-area lighting program offerings.

There is an impact evaluation planned for this program for 2019. Cadmus will conduct document reviews on the census of projects installed through the pilot program through May 1, 2018. Quality of program tracking data will be assessed (noting missing, duplicate, and out-of-range values) and the evaluator will verify whether values of key metrics are within expected limits. Measure installation will be verified through an online survey with building managers and tenants.

Ex post measure savings for each project will be compared against the most recent 12 months of energy consumption to confirm that the magnitude of savings is reasonable. The portion of consumption that direct-installation measures are expected to offset will be calculated and benchmarked against similar measures and expected savings for other regional utilities. *Ex post* savings values will be provided by measure.

This program will also undergo an extensive process evaluation in 2019. The evaluation of the program's design, delivery, and performance will include a review of program documents and databases to record the program processes, marketing efforts, and data tracking. The evaluator will also interview Avista staff to document pilot design including goal setting, delivery process, customer eligibility, incentive structure, and data tracking, as well as roles and responsibilities, areas of success, and challenges. Participating customers will be interviewed to explore customer experience, including pilot awareness, satisfaction, energy efficiency actions, barriers to energy efficiency programs, and marketing preferences.

In 2018, Avista put on nearly 70 low-income-specific events for its Idaho customers

LOW-INCOME SECTOR

Program by Program Summary

Low-Income Program

TABLE 47 – LOW-INCOME PROGRAM METRICS

Low-Income Program Summary – Electric		2018
Participation, Savings, and Costs		
Conservation Projects		9,405
Overall kWh Savings		355,753
Idaho Energy Efficiency Rider Spend	$	629,674
Low-Income Program Summary – Natural Gas		**2018**
Participation, Savings, and Costs		
Conservation Projects		127
Overall Therm Savings		4,772
Idaho Energy Efficiency Rider Spend	$	337,360

Note: Low-income conservation projects are counted in a combination of units and square footage of units installed; this is not a number of homes or customers served.

Description

Avista uses the infrastructure of its Idaho program implementation partner, the Community Action Partnership (CAP), to deliver energy-efficiency programs to its low-income residential electric and natural gas customers in the Idaho service territory. The low-income program was designed to serve Avista's residential customers in Idaho whose income falls between 150 and 250 percent of the most current federal poverty level.

The community action agency qualifies (based on income), prioritizes, and treats customers' homes based on a number of characteristics. The agency is allowed to spend its annual allocated funds on either electric or natural gas efficiency measures. The home must demonstrate a minimum level of electric or natural gas energy use for space heating to be eligible for the Avista funds. The agency is authorized to use 15 percent of its funds for administration cost reimbursement. The company also permits the agency to use up to 15 percent of its contract to fund health and safety improvements. Health and safety spending is at the agency's discretion and provides the flexibility that may be needed to preserve the integrity of the improvements that have been installed in the home. In addition to Avista's annual funding, the agency has other monetary resources they can use when treating a home with weatherization or other energy-efficiency measures. The agency uses a combination of in-house or contract crews to install many of the program efficiency measures.

Program Activities

Avista continued to reimburse the agencies for 100 percent of the cost for installing most energy-efficiency measures defined on the approved measure list (see chart below). Avista deemed these measures as cost-effective during the *Annual Conservation Plan* development.

TABLE 48 – LOW-INCOME PROGRAM APPROVED MEASURE LIST

Electric Measures	Natural Gas Measures
Air Infiltration Attic Insulation Duct Sealing ENERGY STAR doors ENERGY STAR windows Floor Insulation LED Lighting Wall Insulation	ENERGY STAR doors High-efficiency Furnace (90% AFUE) High-efficiency Natural Gas Water Heater (0.67 for storage; 0.82 for tankless)
	Fuel Conversion Measures
	Electric to Natural Gas Furnace Electric to Natural Gas Furnace and Water Heat Electric to Air-source Heat Pump

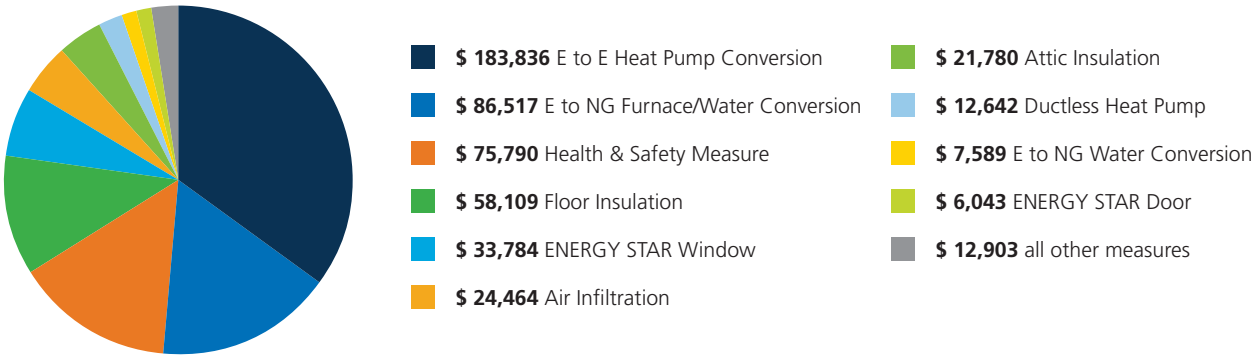
Measures that did not meet the cost-effectiveness test were listed on the qualified rebate list and the agency received partial reimbursement for its installation. The reimbursement amount was equal to the avoided cost energy value of the improvement. This approach focused the agency toward installing measures that had the greatest cost-effectiveness from the utility's perspective. To allow for additional flexibility, the agency may also choose to use its health and safety dollars to fully fund the cost of the measures on the qualified rebate list.

TABLE 49 – LOW-INCOME PROGRAM REBATE MEASURE LIST

Electric Measures	Natural Gas Measures
Duct Insulation Electric to Ductless Heat Pump (9.0 HSPF) Electric to Natural Gas Water Heater ENERGY STAR Refrigerator Air-source Heat Pump (8.5 HSPF) Heat Pump Water Heater	Air Infiltration Attic Insulation Duct Insulation Duct Sealing ENERGY STAR Windows Floor Insulation Wall Insulation

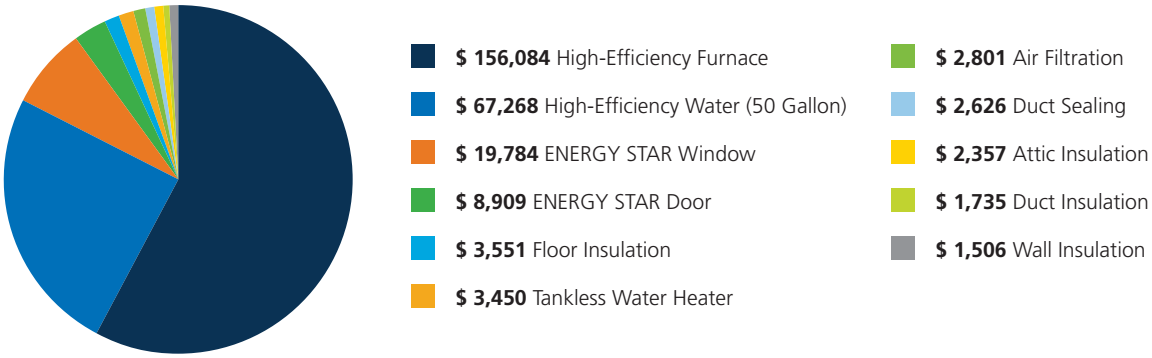
The below charts show how incentives broke by measure for 2018:

FIGURE 38 – LOW-INCOME ELECTRIC INCENTIVE DOLLARS BY MEASURE



This chart does not include the LED giveaway, which distributed 9,162 lamps to customers in the service territory.

FIGURE 39 – LOW-INCOME NATURAL GAS INCENTIVE DOLLARS BY MEASURE



Program Changes

In May and June 2018, Avista amended the agency contract to include an additional $125,000 for weatherization improvements and an additional $25,000 for conservation education personnel.[1] This brought the total weatherization contract to $825,000 and the conservation education component to $75,000.

1) Order No. 34067 in Docket Nos. AVU-E-18-02 and AVU-G-18-01 issued 05/30/18.

Marketing Activities

In partnership with Avista's energy-efficiency marketing, its consumer affairs department conducts conservation education and outreach for low-income customers, seniors, individuals living with disabilities, and veterans. The company reaches this target population through bill inserts, fliers, emails, and news releases, as well as print, radio, and online advertising. In-person efforts also included mobile outreach at local food banks and other venues, general outreach through partnerships, and workshops at senior centers. Each method includes demonstrations and distribution of low- and no-cost materials with a focus on energy efficiency, conservation tips and measures, and information regarding energy assistance that may be available through various agencies. One low-income and senior outreach goal is to increase awareness of energy assistance programs such as the Low Income Home Energy Assistance (LIHEAP) program and Project Share. In 2018, energy-efficiency expenditures related to residential outreach totaled approximately $123,378 in Idaho.

FIGURE 40 – ENERGY FAIR MARKETING

The company recognizes several educational strategies as being efficient and effective activities for delivering energy efficiency and conservation outreach:

- Energy conservation workshops for groups of Avista customers where the primary target audience is composed of senior and low-income participants.
- Energy fairs where attendees can receive information about low- and no-cost methods to weatherize their homes through demonstrations and limited samples. In addition, fair attendees can learn about bill assistance and watch demonstrations of the online account and energy management tools. Community partners that provide services to low-income populations and support to increase personal self-sufficiency are invited, at no cost, to host a booth and provide information about their services and accessibility.
- Mobile outreach is conducted through the Avista energy resource van, where visitors can learn about effective tips to manage their energy use, bill payment options, and community assistance resources. Through general outreach, Avista provides energy management information and resources at events (such as resource fairs) and through partnerships that reach the target populations. General outreach also includes outlining bill payment options and assistance resources in senior and low-income publications.

In 2018, Avista conducted and participated in 67 events that included workshops, energy fairs, mobile outreach, and general outreach (via partnerships and events) that reached 5,279 customers in Idaho; 9,162 lamps were given away at these events.

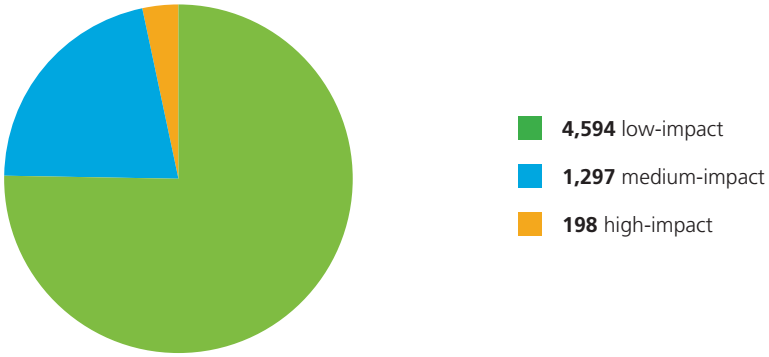
In addition to the company's outreach and education activities, Avista partners with CAP in the employment of a full-time conservation education specialist. CAP uses the funds to enable energy assistance intake specialist in their 10 offices to conduct conservation education activities with clients and in communities. The conservation education specialist conducts activities similar to and in parallel with Avista, and also provides one-on-one education to individuals seeking energy assistance while weatherization projects are underway. Furthermore, the specialist supports each CAP office's energy staff in their local conservation efforts.

In some situations, the specialist partners with Avista outreach. These collaborations provide an opportunity for the specialist to learn Avista outreach practices and messaging. During the events where both the company and agency staff are present, the specialist focuses on promoting CAP services and programs.

CAP categorizes their activities in three different approaches: low-, medium-, and high-impact. Low-impact activities are designed to heighten awareness but have the least probability of resulting in behavior change. They include available brochures or fliers on the wall in the office waiting room. Medium-impact activities help to heighten awareness, are educational in nature, and have a moderate probability of resulting in behavior changes. They include workshops and/or informational booths at community events. Finally, high-impact activities are conducted one-on-one with individuals and have the highest probability of inspiring behavior change. High-impact activities are conducted during energy assistance intake appointments and/or while weatherization projects are underway.

In 2018, CAP's conservation activities reached 6,449 individuals. Below is a breakdown per approach:

FIGURE 41 – LOW-INCOME CAP CONSERVATION ACTIVITIES BY LEVEL OF IMPACT



Impact Evaluation

TABLE 50 – LOW-INCOME ELECTRIC IMPACT FINDINGS

Program	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Verified Electric Savings (kWh)	Realization Rate
Low-Income	228,498	252,699	252,699	111%

TABLE 51 – LOW-INCOME NATURAL GAS IMPACT FINDINGS

Program	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)	Realization Rate
Low-Income	5,185	4,772	4,772	92%

TABLE 52 – LOW-INCOME FUEL-EFFICIENCY PROGRAM ELECTRIC IMPACT FINDINGS

Fuel-Efficiency Measure	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Verified Electric Savings (kWh)	Realization Rate
Low-Income Fuel-Efficiency	101,882	103,054	103,054	101%

TABLE 53 – LOW-INCOME FUEL-EFFICIENCY PROGRAM NATURAL GAS IMPACT FINDINGS

Fuel-Efficiency Measure	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)	Realization Rate
Low-Income Fuel-Efficiency	(4,042)	(4,668)	(4,668)	115%

Performance Savings Goals

Low-income electric programs achieved savings of 252,699 kWh in 2018, or about 159 percent of the goal. Reported program participation reached 386 percent of the expected value.

Roughly one third of verified low-income electric program savings resulted from LED bulbs given out at events.

Low-income natural gas programs achieved savings of 4,772 therms in 2018, or about 61 percent of the goal. Cadmus determined that the 39 percent gap between verified savings and the goal results largely from relatively low program participation (22 percent). Another factor, however, is that the UES values in the Avista TRM often exceed 20 percent of low-income annual usage. The low-income program caps savings at 20 percent of a home's annual usage, and therefore doesn't always match the UES values in the Avista TRM.

Fuel-efficiency programs achieved savings of 103,054 kWh in 2018, achieving 30 percent of the goal.

Impact Evaluation Methodology

Cadmus' impact evaluation of low-income program measures encompassed a database review. Cadmus used unit energy savings provided in the Avista *Technical Reference Manual* to calculate savings for measures reported in the measure-tracking database. Cadmus labeled savings calculated during the database review as *adjusted savings*.

Cadmus collected the Avista reported savings through database extracts from Avista's customer care and billing (residential) and InforCRM (commercial/industrial) databases and from data provided by third-party implementers.

For low-income fuel-efficiency measures, Cadmus used a database review to conduct an impact evaluation. Unit savings values provided in the TRM were used to calculate savings for measures reported in the measure tracking database. Savings calculated during the database review are *adjusted savings*. For low-income programs' measures in general (including low-income fuel efficiency measures), these savings are also considered *verified savings*.

Recommendations

Cadmus recommends that Avista adjust its participation goal to better align with 2018 findings – and also adjust savings per participant – as the participation goal was exceeded by a much larger margin than the total savings goal.

Plans for 2019

Avista will review program participation rates from 2018 and adjust participation goals for 2019 accordingly. Avista will also consider adjusting savings per participant.

For the 2019 Impact Evaluation, Cadmus will determine verified savings for the low-income programs through database review of data obtained in quarterly and semiannual reports. This approach will provide a strong estimate of achieved savings until Cadmus can perform billing analysis at the end of the two-year evaluation cycle.

A process evaluation for low-income programs is also planned for 2019. This evaluation will engage third-party implementers as well as Avista staff, and may help identify further opportunities to improve program performance.

Cost-Effectiveness

Tables 54 and *55* show the low-income sector cost-effectiveness results by fuel type.

TABLE 54 – LOW INCOME ELECTRIC COST-EFFECTIVENESS

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 367,524	$ 622,702	**0.59**
Total Resource Cost (TRC)	$ 404,277	$ 386,685	**1.04**
Participant Cost Test (PCT)	$ 1,098,570	$ 360,234	**3.05**
Ratepayer Impact (RIM)	$ 367,524	$ 757,981	**0.49**

TABLE 55 – LOW INCOME NATURAL GAS COST-EFFECTIVENESS

Cost-Effectiveness Test	Benefits	Costs	Benefit-Cost Ratio
Utility Cost Test (UCT)	$ 49,883	$ 334,060	**0.15**
Total Resource Cost (TRC)	$ 49,883	$ 295,312	**0.17**
Participant Cost Test (PCT)	$ 378,372	$ 275,233	**1.37**
Ratepayer Impact (RIM)	$ 49,883	$ 398,458	**0.13**

GENERATION AND DISTRIBUTION EFFICIENCY

An Avista lineman upgrades pole components to support Avista's grid modernization program

GENERATION AND DISTRIBUTION EFFICIENCY

Generation

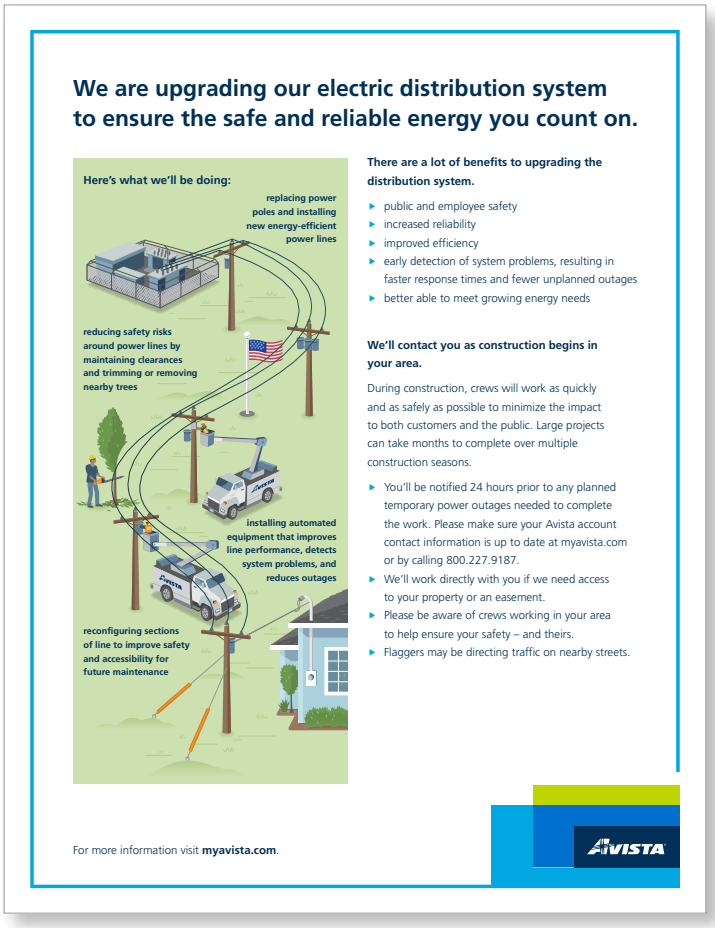
Avista did not complete any efficiency projects at its generation facilities in 2018.

Distribution

During 2018, Avista's grid modernization program led to a completed upgrade of one Washington feeder with annual savings of 233 MWh and one Idaho feeder with annual savings of 66 MWh.

Avista created the grid modernization program, which officially started in 2013, to provide a thorough examination of its electric distribution circuits and programmatically address its facilities' upgrading and modernization. Avista is focused on selecting and improving the worst-performing feeders that have been assessed to provide the most opportunity for improvement in reliability and energy efficiency. This includes the identification, prioritization, selection, and engineering analysis of the distribution circuits. For grid modernization, Avista performs a comprehensive inventory of each electric feeder on the system in order to appropriately prioritize and select candidate feeders for the program. Then Avista uses the feeder criteria information to rank the potential benefits for each circuit compared with all the system distribution feeders.

FIGURE 42 – GRID MODERNIZATION PROGRAM MAILER



Avista initially optimized grid modernization at a cycle interval of rebuilding every distribution feeder over 60 years, since it both reflects the average lifespan of the company's distribution infrastructure and relates to the 20-year interval cycle time for the Wood Pole Management (WPM) program.

Grid modernization and WPM are integrated in several important ways. Avista relies on the inspection data from WPM for its grid modernization asset condition assessment and to target the timing of feeder rebuilds to optimize the value of wood pole inspections and follow-up that is already performed. WPM relies on the poles inspected for grid modernization as contributions to the total number that must be inspected annually to remain on the 20-year inspection cycle. Further, the grid modernization program integrates activities of other operational programs beyond WPM, including the transformer change-out, vegetation management, and various budgeted maintenance programs, as well as the segment reconductor and feeder tie programs.

Through the grid modernization program, Avista aims to accomplish a comprehensive modernization approach from both an energy efficiency and a reliability perspective. The program has several targeted criteria:

- Reliability index analysis
- Peak loading study
- Load balancing
- High loss conductors
- Feeder reconfiguration or relocation
- Primary trunk and lateral conductor analysis
- Feeder tie location and opportunities
- Voltage quality study
- Voltage regulator settings
- Fuse coordination and sizing analysis
- Distribution line loss assessment
- Transformer core losses
- Power factor analysis
- Power factor correction
- Distribution automation deployment
- Open wire secondary analysis
- Existing pole analysis
- Underground facilities
- Vegetation management

With approximately 350 feeders in Avista's system and a targeted 60-year life cycle, Avista needs to complete almost 6 grid modernization feeders each year when staffed and funded appropriately and has worked on 19 grid modernization feeders so far (which were in varying forms of design, construction, or completion). *Table 56* shows the grid modernization plan by feeder and identifies the program results and plans that extends through 2023.

TABLE 56 – GRID MODERNIZATION PLAN BY FEEDER

Feeder	State	Construction Start Date	Construction End Date	Baseline Report Date	Baseline Report Version	Estimated Annual Pri. Reconductor MWh Savings	Estimated Annual Transformer Loss MWh Savings	Total Estimated Annual MWh Savings[3,4,5]
9CE 12F4	WA	–	2009	Annual MWh Energy Savings were not Estimated or Documented as this time[1]				
BEA 12F1	WA	2012	2012	Annual MWh Energy Savings were not Estimated or Documented as this time[2]				
F&C 12F2	WA	2012	2012	Annual MWh Energy Savings were not Estimated or Documented as this time[2]				
BEA 12F5	WA	2013	2013	Annual MWh Energy Savings were not Estimated or Documented as this time[2]				
CDA 121	ID	2012	2013	Annual MWh Energy Savings were not Estimated or Documented as this time[2]				
WIL 12F2	WA	2013	2015	Annual MWh Energy Savings were not Estimated or Documented as this time[2]				
OTH 502	WA	2015	2015	Annual MWh Energy Savings were not Estimated or Documented as this time[2]				
M23 621	ID	2014	2015	3/20/2015	Version 4	412.6	163.2	575.8
RAT 231	ID	2014	2015	3/17/2015	Version 3	0.0	148.7	148.7
WAK 12F2	WA	2015	2016	3/3/2015	Version 7	40.3	135.3	175.6
MIL 12F2	WA	2016	2017	3/10/2015	Version 4	21.0	164.8	185.8
SPI 12F1	WA	2015	2019	4/1/2015	Version 2	31.6	83.2	114.8
RAT 233	ID	2016	2019	3/17/2015	Version 5	90.3	381.4	471.7
SPR 761	WA	2017	2019	9/17/2015	Version 3	49.9	55.7	105.6
ORO 1280	ID	2017	2017	10/19/2015	Version 1	3.5	108.2	111.7
TUR 112	WA	2017	2018	5/6/2016	Version 2	140.1	92.7	232.8
PDL 1201	WA	2017	2017	5/27/2016	Version 2	23.5	165.5	189.0
MIS 431	ID	2018	2023	8/22/2016	Version 1	128.8	128.3	257.1
F&C 12F1	WA	2018	2019	11/16/2016	Version 1	1.8	258.5	260.3
HOL 1205	ID	2018	2018	3/30/2017	Version 1	0	65.5	65.5
BEA 12F2	WA	2019	2020	10/13/2017	Version 1	8.8	260.5	269.3
M15 514	ID	2020	2023	4/30/2018	Version 1	0	245.6	245.6
SIP 12F4	WA	2020	2022	12/14/2018	Version 1	10.5	272.8	283.3
ROS 12F5	WA	TBA	TBA	TBA	Version 1	–	–	–

1) Completed under the DREE Program. Annual MWh Energy Savings may have been estimated and provided by others, however they did not follow the same analysis process and documentation that was started by Grid Modernization in late 2013, and may note be able to be recreated.
2) Competed under the Feeder Upgrade Program. Annual MWh Energy Savings may have been estimated and provided by others, however they did not follow the same analysis process and documentation that was started by Grid Modernization in late 2013 and may not be able to be recreated.
3) Additional MWh savings estimated through Distribution Automation improvements are not included in these figures.
4) Additional MWh savings estimated through the removal of Open Wire Secondary districts are not included in these figures.
5) Additional MWh savings estimated through power factor correction initiatives with capacitors, IVVC, or CVR are not included in these figures.

Also in 2018, through its LED streetlight change-out program, Avista successfully converted 2,742 high-pressure sodium streetlights to LED technology, resulting in energy savings of 738 MWh in Idaho and 139 MWh in Washington.

Avista manages streetlights for many local and state government entities to provide street, sidewalk, and highway illumination by installing overhead streetlights. The primary reason for converting overhead streetlights from high-pressure sodium to LED is the significant improvements in energy savings, lighting quality, and resource cost savings. In all, over the five-year program, Avista will change out over 28,000 streetlights by the end of 2019. *Table 57* shows the distribution efficiency savings by program.

TABLE 57 – DISTRIBUTION EFFICIENCY SAVINGS BY PROGRAM

Program	Idaho Savings (MWh)	Washington Savings (MWh)	Total Savings (MWh)
Grid Modernization	66	233	299
LED Streetlight Change-Out	738	139	877
Total	**804**	**372**	**1,176**

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REGIONAL MARKET TRANSFORMATION

REGIONAL MARKET TRANSFORMATION

Avista's local energy efficiency portfolio consists of programs and supporting infrastructure designed to enhance and accelerate the saturation of energy-efficiency measures throughout its service territory through a combination of financial incentives, technical assistance, program outreach, and education.

It is not feasible for Avista to independently have a meaningful impact on regional or national markets. Consequently, utilities within the Northwest have worked together through Northwest Energy Efficiency Alliance (NEEA) to address opportunities beyond the ability or reach of individual utilities. Avista has been participating in and funding NEEA since it was founded in 1997.

Table 58 shows the 2018 NEEA forecast savings versus actual savings and the associated costs for Idaho.

TABLE 58 – ACTUAL SAVINGS AND ASSOCIATED COSTS

Fuel Type	2018 NEEA Final Reported Energy Savings as of March 2019	2018 Costs (Avista Financials)	Avista Current Funding Share (Washington and Idaho Combined)
Electric	5,028 MWh (0.574 aMW)	$ 422,241	5.77%
Natural Gas	N/A	$ 49,712	15.63%

Electric Energy Savings Share

All the values provided in this report represent the amounts that are allocated to Avista's service territory, which is a combination of site-based energy savings data (where available) or is an allocation of savings based on funding share. Using the funding share allocation approach, Avista is split: 70 percent for Avista Washington and 30 percent for Avista Idaho (shown in the table above). The company's share varies by funding cycle and within each cycle if the funding composition changes.

Natural Gas Energy Savings Share

The natural gas 2015-19 business plan does not forecast energy savings in the short term within this cycle. Avista focused the business plan on developing the portfolio of initiatives that will deliver savings anticipated in 2019 or later.

2018 Costs

NEEA's annual costs do not relate directly to the annual energy savings for a given year. Due to the market transformation nature of NEEA's work, the energy savings investments are costly at the start then return (in the form of energy savings) after a few years. Approximately 68 percent of the regional energy savings value delivered in 2018 was from initiatives with an investment period of 2010–14. The current investment period has a forecasted energy stream that extends beyond 2019.

NEEA's costs include all expenditures for operations and value delivery:

- Energy savings initiatives
- Investments in market training and infrastructure
- Stock assessments, evaluations, data collection, and other regional and program research
- Emerging technology research and development
- All administrative costs

Avista's criteria for funding NEEA's electric market transformation portfolio calls for the portfolio to deliver incrementally cost-effective resources beyond what could be acquired through the company's local portfolio alone. Avista has historically communicated with NEEA the importance of NEEA delivering cost-effective resources to the Avista service territory. Avista believes that NEEA will continue to offer cost-effective electric market transformation in the foreseeable future, and will continue to be active in the organizational oversight of NEEA. This will be critical to ensuring that geographic equity, cost-effectiveness, and resource acquisition goals are met.

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GLOSSARY OF TERMS

Rooftop solar panels atop Avista's corporate headquarters, Spokane, Washington

GLOSSARY OF TERMS

advisory group: Avista's group of external stakeholders who comment about the company's energy efficiency activities.

adjusted market baseline: Based on the RTF guidelines, represents a measurement between the energy efficient measure and the standard efficiency case that is characterized by current market practice or the minimum requirements of applicable codes or standards, whichever is more efficient. When applying an Adjust Market Baseline, no net-to-gross factor would be applied since the resultant unit energy savings amount would represent the applicable savings to the grid.

Advanced Metering Infrastructure (AMI): Systems that measure, collect and analyze energy usage, from advanced devices such as electricity meters, natural gas meters and/or water meters through various communication media on request or on a predetermined schedule.

aMW: The amount of energy that would be generated by one megawatt of capacity operating continuously for one full year. Equals 8,760 MWhs of energy.

American National Standards Institute (ANSI): A source for information on national, regional, international standards and conformity assessment issues.

American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE): Devoted to the advancement of indoor-environment-control technology in the heating, ventilation, and air conditioning (HVAC) industry, ASHRAE's mission is "to advance technology to serve humanity and promote a sustainable world.

Annual Fuel Utilization Efficiency (AFUE): A measurement on how efficiently a furnace or boiler uses its fuel.

Applied Energy Group (AEG): A consulting service that provides a wide range of energy efficiency and demand response related management services to assist clients in designing and implementing programs for their customers.

avoided cost: An investment guideline, describing the value of conservation and generation resource investments in terms of the cost of more expensive resources that would otherwise have to be acquired.

baseline: Conditions, including energy consumption, which would have occurred without implementation of the subject energy efficiency activity. Baseline conditions are sometimes referred to as "business-as-usual" conditions.

baseline efficiency: The energy use of the baseline equipment, process, or practice that is being replaced by a more efficient approach to providing the same energy service. It is used to determine the energy savings obtained by the more efficient approach.

baseline period: The period of time selected as representative of facility operations before the energy efficiency activity takes place.

British Thermal Unit (Btu): The amount of heat energy necessary to raise the temperature of one pound of water one degree Fahrenheit (3,413 BTUs are equal to one kilowatt-hour).

busbar: The physical electrical connection between the generator and transmission system. Typically load on the system is measured at busbar.

capacity: The maximum power that a machine or system can produce or carry under specified conditions. The capacity of generating equipment is generally expressed in kilowatts or megawatts. In terms of transmission lines, capacity refers to the maximum load a line is capable of carrying under specified conditions.

Community Action Partnership (CAP): General term for Community Action Programs, Community Action Agencies, and Community Action Centers that provide services such as low-income weatherization through federal and state and other funding sources (e.g. utility constitutions).

conservation: According to the Northwest Power Act, any reduction in electric power consumption as a result of increases in the efficiency of energy use, production or distribution.

Conservation Potential Assessment (CPA): An analysis of the amount of conservation available in a defined area. Provides savings amounts associated with energy efficiency measures to input into the Company's Integrated Resource Planning (IRP) process.

cost-effective: According to the Northwest Power Act, a cost-effective measure or resource must be forecast to be reliable and available within the time it is needed, and to meet or reduce electrical power demand of consumers at an estimated incremental system cost no greater than that of the least-costly, similarly reliable and available alternative or combination of alternatives.

curtailment: An externally imposed reduction of energy consumption due to a shortage of resources.

customer/customer classes: A category(ies) of customer(s) defined by provisions found in tariff(s) published by the entity providing service, approved by the PUC. Examples of customer classes are residential, commercial, industrial, agricultural, local distribution company, core and non-core.

decoupling: In conventional utility regulation, utilities make money based on how much energy they sell. A utility's rates are set based largely on an estimation of costs of providing service over a certain set time period, with an allowed profit margin, divided by a forecasted amount of unit sales over the same time period. If the actual sales turn out to be as forecasted, the utility will recover all of its fixed costs and its set profit margin. If the actual sales exceed the forecast, the utility will earn extra profit.

deemed savings: Primarily referenced as unit energy savings, an estimate of an energy savings for a single unit of an installed energy efficiency measure that (a) has been developed from data sources and analytical methods that are widely considered acceptable for the measure and purpose, and (b) is applicable to the situation being evaluated.

demand: The load that is drawn from the source of supply over a specified interval of time (in kilowatts, kilovolt-amperes, or amperes). Also, the rate at which natural gas is delivered to or by a system, part of a system or piece of equipment, expressed in cubic feet, therms, BTUs or multiples thereof, for a designated period of time such as during a 24-hour day.

Demand Response (DR): A voluntary and temporary change in consumers' use of electricity when the power system is stressed.

Demand Side Management (DSM): The process of helping customers use energy more efficiently. Used interchangeably with Energy Efficiency and Conservation although conservation technically means using less while DSM and energy efficiency means using less while still having the same useful output of function.

discount rate: The rate used in a formula to convert future costs or benefits to their present value.

distribution: The transfer of electricity from the transmission network to the consumer. Distribution systems generally include the equipment to transfer power from the substation to the customer's meter.

Distributed Generation (DG): An approach that employs a variety of small-scale technologies to both produce and store electricity close to the end users of power.

Effective Useful Life (EUL): Sometimes referred to as measure life and often used to describe persistence. EUL is an estimate of the duration of savings from a measure.

end-use: A term referring to the final use of energy; it often refers to the specific energy services (for example, space heating), or the type of energy-consuming equipment (for example, motors).

energy assistance advisory group: An ongoing energy assistance program advisory group to monitor and explore ways to improve Avista's Low-Income Rate Assistance Program (LIRAP).

energy-efficiency measure: Refers to either an individual project conducted or technology implemented to reduce the consumption of energy at the same or an improved level of service. Often referred to as simply a "measure".

evaluation: The performance of a wide range of assessment studies and activities aimed at determining the effects of a program (and/or portfolio) and understanding or documenting program performance, program or program-related markets and market operations, program-induced changes in energy efficiency markets, levels of demand or energy savings, or program cost-effectiveness. Market assessment, monitoring and evaluation, and verification are aspects of evaluation.

Evaluation, Measurement, and Verification (EM&V): Catch-all term for evaluation activities at the measure, project, program and/or portfolio level; can include impact, process, market and/or planning activities. EM&V is distinguishable from Measurement and Verification (M&V) defined below.

ex-ante savings estimate: Forecasted savings value used for program planning or savings estimates for a measure; Latin for "beforehand."

ex-post evaluated estimated savings: Savings estimates reported by an independent, third-party evaluator after the energy impact evaluation has been completed. If only the term "ex-post savings" is used, it will be assumed that it is referring to the ex-post evaluation estimate, the most common usage; from Latin for "from something done afterward."

external evaluators (AKA third-party evaluators): Independent professional efficiency person or entity retained to conduct EM&V activities. Consideration will be made for those that are Certified Measurement and Verification Professionals (CMVPs) through the Association of Energy Engineers (AEE) and the Efficiency Evaluation Organization (EVO).

free rider: A common term in the energy efficiency industry meaning a program participant who would have installed the efficient product or changed a behavior regardless of any program incentive or education received. Free-riders can be total, partial, or deferred.

generation: The act or process of producing electricity from other forms of energy.

gross savings: The change in energy consumption and/or demand that results from energy efficiency programs, codes and standards, and naturally-occurring adoption which have a long-lasting savings effect, regardless of why they participated.

heating degree days: A measure of the amount of heat needed in a building over a fixed period of time, usually a year. Heating degree days per day are calculated by subtracting from a fixed temperature the average temperature over the day. Historically, the fixed temperature has been set at 65 degrees Fahrenheit, the outdoor temperature below which heat was typically needed. As an example, a day with an average temperature of 45 degrees Fahrenheit would have 20 heating degree days, assuming a base of 65 degrees Fahrenheit.

Heating Seasonal Performance Factor (HSPF): Defined as the ratio of heat output over the heating season to the amount of electricity used in air source or ductless heat pump equipment.

Heating, Ventilation, and Air Conditioning (HVAC): Sometimes referred to as climate control, the HVAC is particularly important in the design of medium to large industrial and office buildings where humidity and temperature must all be closely regulated whilst maintaining safe and healthy conditions within.

Idaho Public Utilities Commission (IPUC): Regulators of investor-owned or privatively owned utilities that provide gas, water, electricity, or some telephone services for profit.

impact evaluation: Determination of the program-specific, directly or indirectly induced changes (e.g., energy and/or demand usage) attributable to an energy efficiency program.

implementer: Avista employees whose responsibilities are directly related to operations and administration of energy efficiency programs and activities, and who may have energy savings targets as part of their employee goals or incentives.

incremental cost: The difference between the cost of baseline equipment or service and the cost of alternative energy- efficient equipment or service.

Integrated Resource Plan (IRP): An IRP is a comprehensive evaluation of future electric or natural gas resource plans. The IRP must evaluate the full range of resource alternatives to provide adequate and reliable service to a customer's needs at the lowest possible risk-adjusted system cost. These plans are filed with the state public utility commissions on a periodic basis.

Integrated Resource Plan Technical Advisory Committee (IRP TAC): Advisory committee for the IRP process that includes internal and external stakeholders.

International Performance Measurement and Verification Protocol (IPMVP): A guidance document with a framework and definitions describing the four M&V approaches; a product of the Energy Valuation Organization (www.evo-world.org).

Investor-Owned Utility (IOU): A utility that is organized under state law as a corporation to provide electric power service and earn a profit for its stockholders.

Kilowatt (kW): The electrical unit of power that equals 1,000 watts.

Kilowatt-hour (kWh): A basic unit of electrical energy that equals one kilowatt of power applied for one hour.

Levelized Cost of Energy (LCOE): The present value of a resource's cost (including capital, financing, and operating costs) converted into a stream of equal annual payments. This stream of payments can be converted to a unit cost of energy by dividing them by the number of kilowatt-hours produced or saved by the resource in associated years. By levelizing costs, resources with different lifetimes and generating capabilities can be compared.

line losses: The amount of electricity lost or assumed lost when transmitting over transmission or distribution lines. This is the difference between the quantity of electricity generated and the quantity delivered at some point in the electric system.

Low-Income Home Energy Assistance Program (LIHEAP): Federal energy assistance program, available to qualifying households based on income, usually distributed by community action agencies or partnerships.

Low-Income Rate Assistance Program (LIRAP): LIRAP provides funding (collected from Avista's tariff rider) to CAP agencies for distribution to Avista customers who are least able to afford their utility bill.

market effect evaluation: An evaluation of the change in the structure or functioning of a market, or the behavior of participants in a market, that results from one or more program efforts. Typically, the resultant market or behavior change leads to an increase in the adoption of energy-efficient products, services, or practices.

measure (also Energy Efficiency Measure or "EEM"): Installation of a single piece of equipment, subsystem or system, or single modification of equipment, subsystem, system, or operation at an end-use energy consumer facility, for the purpose of reducing energy and/or demand (and, hence, energy and/or demand costs) at a comparable level of service.

measure life: See Effective Useful Life (EUL)

Measurement and Verification (M&V): A subset of program impact evaluation that is associated with the documentation of energy savings at individual sites or project, using one or more methods that can involve measurements, engineering calculations, statistical analyses, and/or computer simulation modeling. M&V approaches are defined in the International Performance Measurement and Verification Protocol (IPMVP available at www.evo-world.org).

Megawatt (MW): The electrical unit of power that equals one million watts or one thousand kilowatts.

Megawatt-hour (MWh): A basic unit of electrical energy that equals one megawatt of power applied for one hour.

net savings: The change in energy consumption and/or demand that is attributable to an energy efficiency program. This change in energy use and/or demand may include, implicitly or explicitly, consideration of factors such as free drivers, non-net participants (free riders), participant and non-participant spillover, and induced market effects. These factors may be considered in how a baseline is defined and/or in adjustments to gross savings values.

Non-Energy Benefit/Non-Energy Impact (NEB/NEI): The quantifiable non-energy impacts associated with program implementation or participation; also referred to as non-energy benefits (NEBs) or co-benefits. Examples of NEIs include water savings, non-energy consumables and other quantifiable effects. The value is most often positive, but may also be negative (e.g., the cost of additional maintenance associated with a sophisticated, energy-efficient control system).

portfolio: Collection of all programs conducted by an organization. In the case of Avista, portfolio includes electric and natural gas programs in all customer segments. Portfolio can also be used to refer to a collection of similar programs addressing the market. In this sense of the definition, Avista has an electric portfolio and a natural gas portfolio with programs addressing the various customer segments.

prescriptive: A prescriptive program is a standard offer for incentives for the installation of an energy efficiency measure. Prescriptive programs are generally applied when the measures are employed in relatively similar applications.

process evaluation: A systematic assessment of an energy efficiency program or program component for the purposes of documenting operations at the time of the examination, and identifying and recommending improvements to increase the program's efficiency or effectiveness for acquiring energy resources while maintaining high levels of participant satisfaction.

program: An activity, strategy or course of action undertaken by an implementer. Each program is defined by a unique combination of program strategy, market segment, marketing approach and energy efficiency measure(s) included. Examples are a program to install energy-efficient lighting in commercial buildings and residential weatherization program.

project: An activity or course of action involving one or multiple energy efficiency measures at a single facility or site.

Regional Technical Forum of the Northwest Power and Conservation Council (RTF): A technical advisory committee to the Northwest Power and Conservation Council established in 1999 to develop standards to verify and evaluate energy efficiency savings.

Realization Rate (RR): Ratio of ex-ante reported savings to ex-post evaluated estimated savings. When realization rates are reported, they are labeled to indicate whether they refer to comparisons of 1) ex-ante gross reported savings to ex-post gross evaluated savings, or 2) ex-ante net reported savings to ex-post net evaluated savings.

reliability: When used in energy efficiency evaluation, the quality of a measurement process that would produce similar results on (a) repeated observations of the same condition or event, or (b) multiple observations of the same condition or event by different observers. Reliability refers to the likelihood that the observations can be replicated.

reported savings: Savings estimates reported by Avista for an annual (calendar) period. These savings will be based on best available information.

Request for Proposal (RFP): Business document that announces and provides details about a project, as well as solicits bids from potential contractors.

retrofit: To modify an existing generating plant, structure, or process. The modifications are done to improve energy efficiency, reduce environmental impacts, or to otherwise improve the facility.

rigor: The level of expected confidence and precision. The higher the level of rigor, the more confident one is that the results of the evaluation are both accurate and precise, i.e., reliable.

R-value or R-factor (resistance transfer factor): Measures how well a barrier, such as insulation, resists the conductive flow of heat.

schedules 90 and 190: Rate schedules that show energy efficiency programs.

schedules 91 and 191: Rate schedules that are used to fund energy efficiency programs.

sector(s): The economy is divided into four sectors for energy planning. These are the residential, commercial (e.g., retail stores, office and institutional buildings), industrial, and agriculture (e.g. dairy farms, irrigation) sectors.

site-specific (SS): A non-residential program offering individualized calculations for incentives upon any electric or natural gas-efficiency measure not incorporated into a prescriptive program.

simple payback: The time required before savings from a particular investment offset costs, calculated by investment cost divided by value of savings (in dollars). For example, an investment costing $100 and resulting in a savings of $25 each year would be said to have a simple payback of four years. Simple paybacks do not account for future cost escalation, nor other investment opportunities.

spillover: Reductions in energy consumption and/or demand caused by the presence of an energy efficiency program, beyond the program-related gross savings of the participants and without direct financial or technical assistance from the program. There can be participant and/or nonparticipant spillover (sometimes referred to as "Free Drivers"). Participant spillover is the additional energy savings that occur as a result of the program's influence when a program participant independently installs incremental energy efficiency measures or applies energy-saving practices after having participated in the energy efficiency program. Non-participant spillover refers to energy savings that occur when a program non-participant installs energy efficiency measures or applies energy savings practices as a result of a program's influence.

technical reference manual: An Avista-prepared resource document that contains Avista's (ex-ante) savings estimates, assumptions, sources for those assumptions, guidelines, and relevant supporting documentation for its natural gas and electricity energy efficiency prescriptive measures which is populated and vetted by the RTF and 3rd party evaluators.

Total Resource Cost (TRC) test: A cost-effectiveness test that assesses the impacts of a portfolio of energy-efficiency initiatives regardless of who pays the costs or who receives the benefits. The test compares the present value of costs of efficiency for all members of society (including all costs to participants and program administrators) compared to the present value of all quantifiable benefits, including avoided energy supply and demand costs and non-energy impacts.

transmission: The act or process of long-distance transport of electric energy, generally accomplished by elevating the electric current to high voltages. In the Pacific Northwest, Bonneville operates a majority of the high-voltage, long-distance transmission lines.

Uniform Energy Factor (UEF): A measurement on how efficiently a water heater utilizes its fuel.

Unit Estimated Savings (UES): Defines the first-year kWh savings value for an energy efficiency measure.

U-value or U-factor: The measure of a material's ability to conduct heat, numerically equal to 1 divided by the R-value of the material. Used to measure the rate of heat transfer in windows. The lower the u-factor, the better the window insulates.

uncertainty: The range or interval of doubt surrounding a measured or calculated value within which the true value is expected to fall within some degree of confidence.

Utility Cost Test (UCT): One of the four standard practice tests commonly used to evaluate the cost-effectiveness of DSM programs. The UCT evaluates the cost-effectiveness based upon a program's ability to minimize overall utility costs. The primary benefits are the avoided cost of energy in comparison to the incentive and non-incentive utility costs.

verification: An assessment that the program or project has been implemented per the program design. For example, the objectives of measure installation verification are to confirm (a) the installation rate, (b) that the installation meets reasonable quality standards, and (c) that the measures are operating correctly and have the potential to generate the predicted savings. Verification activities are generally conducted during on-site surveys of a sample of projects. Project site inspections, participant phone and mail surveys, and/or implementer and consumer documentation review are typical activities association with verification. Verification may include one-time or multiple activities over the estimated life of the measures. It may include review of commissioning or retro-commissioning documentation. Verification can also include review and confirmation of evaluation methods used, samples drawn, and calculations used to estimate program savings. Project verification may be performed by the implementation team, but program verification is a function of the thrid-party evaluator.

weather normalized: This is an adjustment that is made to actual energy usage, stream-flows, etc., which would have happened if "normal" weather conditions would have taken place.

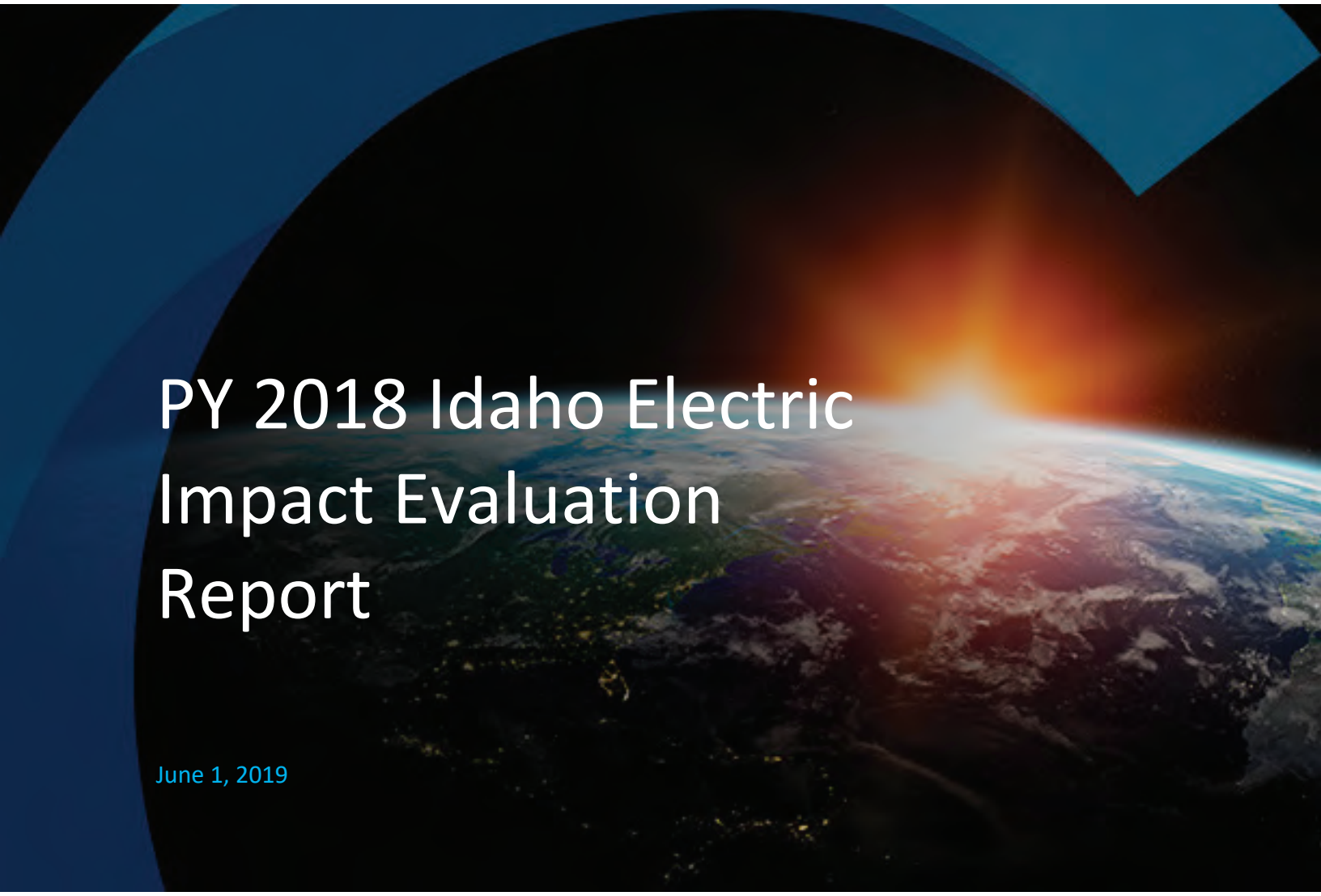
8760: Total number of hours in a year.

APPENDICES AND SUPPLEMENTS

Noxon Rapids Dam, Clark Fork River, northwest Montana

APPENDIX A – 2018 IDAHO ELECTRIC IMPACT EVALUATION REPORT

CADMUS



PY 2018 Idaho Electric Impact Evaluation Report

June 1, 2019

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CADMUS

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Portfolio Executive Summary

For several decades, Avista Corporation has been administering demand-side management programs to reduce electricity and natural gas energy use for its portfolio of customers. Most of these programs have been implemented in-house, but a few have external implementers. Avista contracted with Cadmus to complete process and impact evaluations of its PY 2018 and PY 2019 electric demand-side management programs in Idaho. This report presents our electric impact evaluation findings for PY 2018. Cadmus did not apply net-to-gross adjustments to savings values, except in cases where deemed energy savings values already incorporate net-to-gross as a function of the market baseline.

Evaluation Methodology and Activities

Cadmus conducted the Idaho portfolio evaluation using a variety of methods and activities, shown in Table 1.

Table 1. Electric Program Evaluation Activities (PY 2018)

Sector	Program	Document/Database Review	Verification/Metering Site Visits
Nonresidential	Prescriptive (Multiple)	✓	✓
	Site Specific	✓	✓
Residential	Simple Steps, Smart Savings™	✓	--
	HVAC	✓	--
	Shell	✓	--
	ENERGY STAR® Homes	✓	--
	Multifamily Direct Install	✓	--
Low Income	Low Income	✓	--
Fuel Efficiency	Site Specific (Nonresidential)	✓	--
	Prescriptive (Residential)	✓	--
	Low Income	✓	--

Summary of Impact Evaluation Results

Overall, the Idaho electric portfolio achieved a 98% realization rate and acquired 29,805,007 kWh in annual verified savings (Table 2). Cadmus collected the Avista-reported savings through database extracts from Avista's Customer Care and Billing (residential) and InforCRM (nonresidential) databases and from data provided by third-party implementers to determine the *verified savings* that represent our findings. In the second year of the two-year evaluation cycle (PY 2019), Cadmus will conduct utility billing regression analyses to evaluate the most accurate energy savings for most residential programs.

Table 2. Reported and Verified Electric Savings (PY 2018)

Sector	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Nonresidential	22,832,307	22,630,556	99%
Residential	5,400,520	5,108,673	95%
Low Income	228,498	252,699	111%
Fuel Efficiency	1,824,345	1,813,079	99%
Total	**30,285,671**	**29,805,007**	**98%**

Conclusions and Recommendations

During the PY 2018 evaluation, Cadmus identified several areas for improvement, outlined below by sector.

Nonresidential Conclusions and Recommendations

While some individual project results varied, the overall nonresidential sector performed strongly in PY 2018. Most of the projects Cadmus sampled for evaluation were well-documented and matched what we found during site visit verifications.

Cadmus has two recommendations for improving the nonresidential sector energy savings:

- Ensure that the final reported savings calculations reflect the most up-to-date project details, including post-installation verification photos, equipment submittals, and invoices. During two project verifications, Cadmus found different installed equipment sizes, quantities, or performance ratings than used in the reported savings calculations.
- Ensure that power metered data and pressure and airflow trend data collected for compressed air projects are analyzed on a day-type approach (instead of taking the overall averages for the metered period) to improve the accuracy of the energy-savings calculations. The day-type analysis method is recommended by the Department of Energy's Advanced Manufacturing Office and Compressed Air Challenge® and is used in the AIRMaster+ free online software tool.[1] This method provides a more granular estimation of the baseline and installed system flow rates, performance, and energy use.

Residential Conclusions and Recommendations

During the evaluation, Avista confirmed that unit energy savings (UES) values used to calculate reported savings for numerous residential measures had not been updated to match the 2018 Avista technical reference manual (TRM) UES values. This was especially pronounced in the residential HVAC program, where reported savings under-represented savings for heat pump measures. Under the direction of Avista, Cadmus adjusted reported savings for these measures to match the 2018 TRM UES values.

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[1] Office of Energy Efficiency and Renewable Energy. April 10, 2014. "AIRMaster+ Motor Driven Systems." https://www.energy.gov/eere/amo/articles/airmaster

Based on reported savings, the ENERGY STAR Homes program achieved 253% of goal, but reported participation and verified savings both showed that the program achieved approximately 72% of goal, which indicates that reported savings values are well over the current TRM UES values.

Cadmus offers three recommendations regarding Avista's residential electric programs:

- Ensure that reported savings for all prescriptive measures are calculated using the current TRM or current 2017 Regional Technical Forum[2] (RTF) UES values.
- Continue to encourage the adoption of efficient lighting through the Simple Steps, Smart Savings program. The Northwest Energy Efficiency Alliance *Residential Building Stock Assessment II* shows that roughly 40% of installed lamps in single family homes in Washington and Idaho are incandescents or halogens.
- The Multifamily Direct Install (MFDI) program has proven to be an efficient, effective mechanism for installing high-efficiency lighting and aerators in multifamily units. The Northwest Energy Efficiency Alliance *Residential Building Stock Assessment II* "Multifamily Buildings Report" estimated that 44% of lighting in multifamily units use incandescent or halogen technology. Cadmus recommends to focus on replacing high-use, low-efficiency lamps where practical, to maximize program cost-effectiveness while keeping savings high.

Fuel Efficiency Recommendations

Cadmus recommends that Avista update reported residential savings for fuel efficiency measures to use current TRM UES values, particularly for measures where the differences are especially notable, such as conversions to natural gas water heaters and natural gas wall furnaces.

[2] Regional Technical Forum. 2017. *Standard Protocols*. https://rtf.nwcouncil.org/standard-protocols

Nonresidential Impact Evaluation

Through its nonresidential portfolio of programs, Avista promotes the purchase of high-efficiency equipment for commercial and industrial utility customers. Avista provides rebates to partially offset the difference in cost between high-efficiency equipment and standard equipment.

Program Summary

Avista completed and incented 685 nonresidential electric measures in Idaho in PY 2018 and reported total electric energy savings of 22,832,307 kWh. Through the nonresidential sector, Avista offers incentives for high-efficiency equipment and controls through three program paths: Prescriptive, Site Specific, and Fuel Efficiency.

The Prescriptive program path is selected for smaller, straightforward equipment installations that generally have similar operating characteristics (such as lighting, simple HVAC systems, food service equipment, and variable frequency drives).

The Site Specific program path is reserved for more unique projects that require custom savings calculations and technical assistance from Avista's account executives (such as compressed air, process equipment and controls, and comprehensive lighting retrofits).

Fuel Efficiency measures are part of the Site Specific program path, but involve a combination of electric savings and natural gas penalties. These measures typically involve replacing electric space heating or water heating systems with natural gas equipment. Please refer to the *Fuel Efficiency Impact Evaluation* section for Cadmus' evaluation methodology and findings for nonresidential Fuel Efficiency measures.

Program Participation Summary

This section summarizes nonresidential sector participation and progress toward PY 2018 goals through the Prescriptive and Site Specific program paths.

Nonresidential Prescriptive Program Path

Table 3 shows electric energy savings goals assigned to Avista's nonresidential Prescriptive program path for PY 2018 as well as reported savings and a comparison between reported savings and goals.

Table 3. Nonresidential Prescriptive Electric Savings (PY 2018)

Program Name	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Interior Lighting	6,635,450	8,038,814	121%
Exterior Lighting	1,405,118	4,243,826	302%
Shell Measure	629	929	148%
Green Motors	45,180	42,466	94%
Motor Control (Variable Frequency Drives [VFD])	75,595	112,931	149%
Fleet Heat	8,000	0	0%
Food Service Equipment	94,730	8,527	9%
AirGuardian	18,000	0	0%
Energy Smart Grocer[a]	724,348	3,402	0%
Total	**9,007,050**	**12,450,896**	**138%**

[a] The Energy Smart Grocer savings goal includes Site Specific Energy Smart Grocer measures. The Site Specific portion constitutes approximately 10% of the overall goal.

Table 4 shows participation goals by rebated equipment quantity, as provided by Avista. The PY 2018 nonresidential tracking database extract listed individual projects, but did not include rebated equipment quantity. For reference, Table 5 provides participation by unique application numbers.

Table 4. Nonresidential Prescriptive Participation Goals by Equipment Rebated

Program Type	Planned Participation
Interior Lighting	26,904
Exterior Lighting	4,302
Shell Measure	325
Green Motors	18
Motor Control (VFD)	55
Fleet Heat	1
Food Service Equipment	18
AirGuardian	3
Energy Smart Grocer[a]	2,097

[a] The Energy Smart Grocer goal includes Site Specific Energy Smart Grocer participants.

Table 5. Nonresidential Prescriptive Participation by Project (PY 2018)

Program Type	Participation Reported[a]
Interior Lighting	315
Exterior Lighting	273
Shell Measure	3
Green Motors	11
Motor Control (VFD)	3
Fleet Heat	0
Food Service Equipment	4
AirGuardian	0
Energy Smart Grocer	1
Total	**610**

[a] A participant is defined as a unique application number.

Nonresidential Site Specific Program Path

Table 6 shows electric savings goals assigned to the Site Specific program path in Avista's nonresidential sector for PY 2018, as well as reported savings. Note that the table does not include reported electric savings for the Fuel Efficiency sector, such as those associated with the Multifamily Market Transformation program.

Table 6. Nonresidential Site Specific Electric Savings (PY 2018)

Program Path	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Site Specific	4,000,000	10,381,411	260%

Evaluation Goals and Objectives

For the PY 2018 quarterly, semiannual, and annual reports, Cadmus conducted nonresidential impact activities to determine verified savings for most programs.

Nonresidential Impact Evaluation Methodology

To evaluate impact evaluation savings for the PY 2018 nonresidential sector, Cadmus performed several activities in two waves:

- Selected an evaluation sample and requested project documentation from Avista
- Performed project documentation review
- Prepared on-site M&V plans
- Performed site visits and collected on-site data (such as trend data, photos, and operating schedules)
- Used site visit findings to calculate verified savings by measure
- Applied realization rates to total reported savings population to determine overall verified savings

The program context, along with Cadmus' sample design, document review, and on-site verification activities, is described in more detail below.

Program Context

As the first step of our evaluation activities, we gained an understanding of the programs and measures being evaluated. Specifically, Cadmus explored documents and data records:

- Avista's annual business plans, which detail processes and energy savings justifications
- Project documents from external sources (customers, program consultants, and implementation contractors)

Based on the initial review, Cadmus outlined the distribution of program contributions to the overall portfolio of programs. In addition, the review allowed us to understand the sources for UES for each measure offered through the programs, along with the sources for energy-savings algorithms and the internal quality assurance and quality control processes for large nonresidential sector projects.

Following this review, Cadmus designed the sample strategy for the impact evaluation activities, as discussed in the following section.

Sample Design

We based the first evaluation sample on program data from January 2018 to April 2018, and we based the second evaluation sample on program data from May 2018 through December 2018. As a guideline, Cadmus used the proposed, overall PY 2018 and PY 2019 nonresidential sample sizes by subprogram in the M&V plan, seeking to complete approximately one-quarter of the sample during the first wave and another one-quarter during the second wave.

For each activity wave, we broke down submitted program applications by path and measure (such as Site Specific shell measure, Prescriptive lighting, or Prescriptive motor controls), allowing us to select the highest-savings applications in each category with certainty. For applications with reported savings greater than 1% of total savings by category, Cadmus assigned random numbers and sampled randomly. We removed applications with less than 1% of total savings by category from the sample consideration, except where another application at the same location or facility was previously selected (and where we could assess both applications with one site visit, which is a cost-effective verification strategy even if the second application represents minimal claimed savings).

Cadmus sampled randomly selected sites across both Washington and Idaho since Avista's programs are implemented similarly in both states. We pooled the results from the randomly selected sites to calculate a realization rate by stratum that we applied to projects in both states. We applied verified savings for sites selected with certainty only to the state in which they had been implemented.

Table 7 summarizes the Idaho nonresidential Prescriptive program path evaluation sample. Across both states, Cadmus sampled 40 Prescriptive applications at 34 unique sites. Of the sampled applications, we selected 21 for certainty review based on the scale of savings, measure type, or location, and we

selected the remaining 19 applications randomly. There was no participation in the AirGuardian and Fleet Heat programs in Idaho in PY 2018.

Table 7. Idaho Nonresidential Prescriptive Electric Evaluation Sample

Program Type	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Interior Lighting	6	2,311,797	29%
Exterior Lighting	2	110,360	3%
Shell Measure	1	198	21%
Green Motors	4	18,678	44%
Motor Control (VFD)	2	104,755	93%
Fleet Heat	0	0	N/A
Food Service Equipment	0	0	0%
AirGuardian	0	0	N/A
Energy Smart Grocer	1	3,402	100%
Nonresidential Prescriptive	**16**	**2,549,190**	**20%**

Table 8 summarizes the Idaho nonresidential Site Specific program path evaluation sample. Across both states, Cadmus sampled 18 Site Specific applications at 15 unique sites. Of the sampled applications, we selected 12 for certainty review based on the scale of savings, measure type, or location, and we selected the remaining six applications randomly.

Table 8. Idaho Nonresidential Site Specific Electric Evaluation Sample

Program Path	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Site Specific	7	7,648,853	74%

Document Review

We requested and reviewed project documentation for each sampled application and prepared M&V plans to guide our site visits. Project documentation typically included incentive applications, calculation tools (usually based on the 2017 RTF), invoices, equipment specification sheets, and post-inspection reports.

On-Site Verification

Cadmus performed site visits at 46 unique nonresidential locations to assess electric savings for 58 unique Prescriptive and Site Specific measures (not including Fuel Efficiency measures). Site visits involved verifying the installed equipment type, make and model numbers, operating schedules, and setpoints, as applicable. We did not consider it necessary to conduct power metering or light logging for PY 2018 site visits. Cadmus collected two weeks of trend data for two of the Site Specific industrial process measures at one industrial site. We used the project documentation review and on-site findings to adjust the reported savings calculations where necessary.

Nonresidential Impact Evaluation Results

This section summarizes the nonresidential sector Prescriptive and Site Specific program paths' electric impact evaluation results for PY 2018.

Nonresidential Prescriptive Programs

Table 9 shows reported and verified electric energy savings for Avista's Nonresidential sector Prescriptive program path and the realization rates between verified and reported savings for PY 2018. The overall nonresidential sector Prescriptive program path electric realization rate was 100%.

Table 9. Nonresidential Prescriptive Electric Impact Findings

Program Type	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Interior Lighting	8,038,814	8,012,238	100%
Exterior Lighting	4,243,826	4,243,826	100%
Shell Measure	929	929	100%
Green Motors	42,466	42,870	101%
Motor Control (VFD)	112,931	113,171	100%
Fleet Heat	0	0	100%
Food Service Equipment	8,527	8,527	100%
AirGuardian	0	0	100%
Energy Smart Grocer	3,402	3,402	100%
Nonresidential Prescriptive	**12,450,896**	**12,424,964**	**100%**

Of the evaluated applications, Cadmus identified discrepancies for seven based on the site visit and project documentation review. Table 10 summarizes the reasons for discrepancies between reported and verified savings.

Table 10. Nonresidential Prescriptive Evaluation Summary of Discrepancies

Program Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Interior Lighting	2	↓	Cadmus reduced the lighting fixture in-service rate for two projects to account for incented fixtures that were on the site but in storage.
	1	↓	Savings in project documentation were slightly lower than reported savings in program database.
	1	↑	Cadmus accounted for additional savings from delamping for reported 4-lamp LED fixtures that only had two lamps. The participant had removed two lamps per fixture due to brightness.
Green Motor Rewind	2	↑	Reported savings for two projects referenced the 2017 RTF. Cadmus applied deemed motor savings from the 2018 TRM workbook.
Motor Control (VFD)	1	↓	Cadmus reduced the reported quantity of 2.5 horsepower return air fans with VFDs from three to one and added two 3 horsepower return air fans with VFDs.

Nonresidential Site Specific Program

Table 11 shows reported and verified electric energy savings for Avista's PY 2018 nonresidential sector Site Specific program path, as well as a comparison between verified and reported savings for PY 2018. The overall Site Specific program path electric realization rate was 98%. Note that the table does not include reported and verified electric savings for measures in the Fuel Efficiency path.

Table 11. Nonresidential Site Specific Electric Impact Findings (PY 2018)

Program Path	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Site Specific	10,381,411	10,205,592	98%

Of the evaluated applications, Cadmus identified discrepancies in five based on the site visit and project documentation review. Table 12 summarizes the reasons for discrepancies between reported and verified savings.

Table 12. Nonresidential Site Specific Evaluation Summary of Discrepancies

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Exterior Lighting	1	↓	The site installed a higher quantity of exterior LED fixtures. The reported savings in database did not match the implementer's submitted calculation workbook.
	1	↓	The site installed fewer LED pole lighting fixtures and more LED wall pack fixtures than reported.
Industrial Process	1	↑	The site converted two pressure roll vacuum units from double zone to single zone units, eliminating the need for one of the four 500-horsepower vacuum pumps. Reported savings calculations assumed the pump motor to be 100% efficient. Cadmus adjusted the savings calculations to incorporate losses for a conservative, high-efficiency 500-horsepower motor (95.8%).
Compressed Air	1	↓	The site replaced two fixed-speed air compressors with two 350-horsepower variable speed rotary-screw air compressors. Project documentation included post-installation power and airflow metered data. Cadmus updated the reported savings calculations by breaking out pre- and post-period airflow and baseline system performance on a weekday basis, rather than an overall metered period basis. Although the difference in average overall airflow was minimal between the verified and reported methodology, there were days (such as Wednesdays and Fridays) that differed by 175 CFM to 230 CFM from reported. This difference had a significant impact on the performance of the baseline air compressors.
Interior Lighting	1	↑	Cadmus included the calculated cooling load electric energy savings in the interim verified savings. These savings were calculated in the project documentation but not included in the reported savings.

Nonresidential Conclusions and Recommendations

The nonresidential sector achieved total verified electric energy savings of 22,631 MWh in PY 2018 with a combined realization rate of 99%. The nonresidential sector also exceeded the combined Prescriptive and Site Specific program paths' electric savings goal of 13,007 MWh by 74%.

While some individual project results varied, the overall nonresidential sector performed strongly in PY 2018. Most of the projects Cadmus sampled for evaluation were well-documented and matched what we found during site visit verification.

Cadmus has two recommendations for improving the nonresidential sector energy savings:

- Ensure that the final reported savings calculations reflect the most up-to-date project details, including post-installation verification photos, equipment submittals, and invoices. During two

project verifications, Cadmus found different installed equipment sizes, quantities, or performance ratings than used in the reported savings calculations.

- Ensure that power metered data and pressure and airflow trend data collected for compressed air projects are analyzed on a day-type approach (instead of taking the overall averages for the metered period) to improve the accuracy of the energy-savings calculations. The day-type analysis method is recommended by the U.S. Department of Energy's Advanced Manufacturing Office and Compressed Air Challenge® and is used in the AIRMaster+ free online software tool. This method provides a more granular estimation of the baseline and installed system flow rates, performance, and energy use.

Residential Impact Evaluation

Cadmus designed the residential sector impact evaluation to verify reported program participation and energy savings. We used data collected and reported in the tracking database, online application forms, Avista TRM and RTF savings review, and applicable updated deemed savings values.

Program Summary

Avista completed and incented 250,234 residential electric measures or units in Idaho in PY 2018 and reported total electric energy savings of 5,400,520 kWh, not including participation and savings from Fuel Efficiency measures, which are included below in the *Fuel Efficiency Impact Evaluation* section. The residential programs comprise two primary paths—Prescriptive and MFDI. The Prescriptive path includes Simple Steps, Smart Savings, which encourages consumers to purchase and install high-quality LEDs, light fixtures, and energy-efficient showerheads; the Residential HVAC program, which incents high-efficiency heating and cooling equipment; the Residential Shell program, which provides rebates to encourage customers to install high-efficiency windows and storm windows; and the ENERGY STAR Homes program, which offers 15% to 25% energy savings relative to state energy code. Through the MFDI program, Avista provides free direct-install measures to multifamily residences (of five units or more) and common areas.

Program Participation Summary

This section summarizes residential sector participation and progress toward PY 2018 goals for the residential Prescriptive and residential MFDI programs.

Residential Prescriptive Programs

Table 13 shows savings goals assigned to Avista's residential sector Prescriptive programs for PY 2018, as well as reported savings and the goal portion achieved in PY 2018.

Table 13. Residential Prescriptive Reported Electric Savings (PY 2018)

Program	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Simple Steps, Smart Savings	1,326,717	3,693,056	278%
HVAC	730,543	765,230	105%
Shell	60,854	95,748	157%
ENERGY STAR Homes	46,144	116,567	253%
Residential Prescriptive Total	**2,164,258**	**4,670,601**	**216%**

Table 14 summarizes participation goals and reported participation in Avista's residential sector Prescriptive programs for PY 2018, along with the percentage of goal achieved.

Table 14. Residential Prescriptive Participation (PY 2018)

Program	Participation Goals	Participation Reported	Percentage of Goal
Simple Steps, Smart Savings[a]	88,465	240,437	272%
HVAC[b]	518	462	89%
Shell[c]	5,016	7,979	159%
ENERGY STAR Homes[b]	14	26	186%
Residential Prescriptive Total	**94,013**	**248,904**	**265%**

[a] Participation is defined as the number of purchased units.

[b] Participation is defined as the number of rebates.

[c] Participation is defined as square feet of installed windows or storm windows.

Multifamily Direct Install Program

Table 15 shows reported savings and participation for the MFDI program in PY 2018. Avista launched this program as a pilot in PY 2018 and did not set annual program goals, then transitioned this from a pilot to an ongoing study in September 2018.

Table 15. Multifamily Direct Install Reported Electric Savings

Program Path	Savings Reported (kWh)	Participation Reported
Multifamily Direct Install	729,920	1,330

Evaluation Goals and Objectives

For the PY 2018 quarterly, semiannual, and annual reports, Cadmus verified savings for most programs through a combination of database review and document review, which are described below.

Residential Impact Evaluation Methodology

To determine the residential sector verified savings for PY 2018, Cadmus employed two impact evaluation methods for most residential programs:[3]

- Database review
- Document review

Similar to previous practice, Cadmus calculated adjusted savings based on results of the database review and applied realization rates from our document reviews. Verified savings represented adjusted savings multiplied by the document review realization rates, as shown in Figure 1.

[3] With approval from Avista, Cadmus ceased performing a third impact activity—verification surveys—in the third quarter of PY 2018 to eliminate redundancy between verification surveys and document review.

Figure 1. Residential Impact Process

Database Review

For the impact evaluation database review, Cadmus used UES values, as provided in the TRM, to calculate savings for measures reported in the measure tracking database. This impact activity may help identify incorrect UES values used to calculate reported savings. Savings calculated during the database review are defined as *adjusted savings*.

Document Review

For the document review, Cadmus compared information from rebate forms and other supporting documents to measure tracking data for a random sample of projects. This impact activity may identify installed measures that did not meet eligibility requirements, quantities that did not match the measure tracking database, and other discrepancies. Following our review of all projects, we calculated a realization rate for the document review by dividing savings calculated for the sample (using the revised information) by reported savings for the sample. We then multiplied this realization rate by adjusted savings for the entire program to determine verified savings.

Cadmus conducted document reviews for the programs shown in Table 16, drawing roughly equal samples from participants in each quarter.

Table 16. Residential Prescriptive Electric Impact Document Review

Program	Completed for PY 2018
HVAC	34
Shell	34

Residential Impact Evaluation Results

The following sections summarize findings and provide verified savings for both of Cadmus' impact evaluation methodologies. The database review resulted in the largest number of adjustments to reported savings.

Database Review

Table 17 shows database review findings, with adjusted savings being higher than reported savings for some programs and lower for others. Adjusted savings differed from reported savings because reported UES values differed from TRM values for several measures. Avista determined that the reported savings for these measures used values from an older customer database that did not align with those in the current TRM. For measures with reported savings based on measure-specific parameters, Cadmus could not confirm the reported savings calculations, which depended on inputs that were not included in the tracking data (such as air infiltration and duct sealing).

Table 17. Residential Prescriptive Database Review Electric Impact Findings

Program	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Percentage Change
Simple Steps, Smart Savings	3,693,056	3,454,438	-6%
HVAC	765,230	786,170	3%
Shell	95,748	100,535	5%
ENERGY STAR Homes	116,567	83,738	-28%
Residential Prescriptive Total	**4,670,601**	**4,424,881**	**-5%**

Document Review

Table 18 summarizes document review findings to date. The HVAC program had a 96% electric realization rate and the Shell program had an 85% electric realization rate.

Table 18. Residential Prescriptive Electric Impact Document Review Realization Rates

Program	Document Audit Count	Sample Reported Savings (kWh)	Sample Verified Savings (kWh)	Document Audit Realization Rate
HVAC	34	32,997	31,691	96%
Shell	34	49,224	41,915	85%

Cadmus identified several discrepancies during the document review through PY 2018:

- For two window measures, documentation showed a square footage for installed windows that differed from that reported. In both cases, the documented square footage was lower than that reported and resulted in lower verified savings based on the corrected area.
- For four window measures reported at sites with electric heating, project documents identified heating fuels other than electricity. Cadmus added natural gas savings and removed electricity savings at two sites identified as using natural gas heating. Documentation for the other two sites identified the heating fuel as liquid propane for one site and wood pellets for the other, so Cadmus removed electricity savings for these sites.
- One heat pump water heater measure had a tank capacity of 80 gallons per the documentation. To qualify for the measure, however, the heat pump water heater had to have a tank size below 55 gallons, so Cadmus removed savings for this measure.

Table 19 shows verified savings, which apply the realization rates shown in Table 18 to the adjusted savings calculated based on the database review. The verified savings represent Cadmus' best estimate of savings without conducting a billing analysis.

Table 19. Residential Prescriptive Electric Impact Findings

Program	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Verified Electric Savings (kWh)[a]	Realization Rates
Simple Steps, Smart Savings	3,693,056	3,454,352	3,454,352	94%
HVAC[b]	765,230	786,170	755,054	99%
Shell	95,748	100,535	85,608	89%
ENERGY STAR Homes	116,567	83,738	83,738	72%
Residential Prescriptive Total	**4,670,601**	**4,424,796**	**4,378,753**	94%

[a] Verified savings represents adjusted savings only for Simple Steps, Smart Savings and ENERGY STAR Homes.

[b] Includes heat pump water heater installations not included in Table 17 of the *PY 2018 Idaho Annual Conservation Report*. Table 19 of that report includes heat pump water heater savings.

Residential Conclusions and Recommendations

Verified electricity savings show a realization rate of 94% on realized savings of 4,378,753 kWh for the residential Prescriptive programs, which is 202% of the savings goal for the year, due largely to program participation that was 265% of goal. Reported savings for the MFDI program added 729,920 kWh, for total acquired savings of 5,108,673 kWh.

Lighting measures account for a high percentage of residential sector program path savings: Simple Steps, Smart Savings provided 68% of residential savings, mostly through lighting measures, and MFDI provided 14% of savings, also mostly through lighting measures. The HVAC program accounted for 15% of savings, with Shell and ENERGY STAR Homes accounting for a combined 3% of residential sector savings.

During the evaluation, Avista confirmed that the UES values used to calculate reported savings for numerous residential sector measures had not been updated to match 2018 TRM UES values. This was especially pronounced in the Residential HVAC program, where reported savings under-represented savings for heat pump measures. Under the direction of Avista, Cadmus adjusted reported savings for these measures to match the 2018 TRM UES values.

Based on reported savings, the ENERGY STAR Homes program achieved 253% of goal, but reported participation and verified savings both showed that the program achieved approximately 72% of goal, which indicates that reported savings values are well over the 2018 TRM UES values.

Cadmus offers three recommendations regarding Avista's residential sector electric programs:

- Ensure that reported savings for all Prescriptive measures are calculated using current TRM or RTF UES values.
- Continue to encourage the adoption of efficient lighting through the Simple Steps, Smart Savings program. The Northwest Energy Efficiency Alliance *Residential Building Stock Assessment II*

shows that roughly 40% of installed lamps in single family homes in Washington and Idaho are based either on incandescent or halogen technology.

- The MFDI program has proven to be an efficient, effective mechanism for installing high-efficiency lighting and aerators in multifamily units. The Northwest Energy Efficiency Alliance *Residential Building Stock Assessment II* "Multifamily Buildings Report" estimated that 44% of lighting in multifamily units use incandescent or halogen technology. Cadmus recommends to focus on replacing high-use, low-efficiency lamps where practical, to maximize program cost-effectiveness while keeping savings high.

Low Income Impact Evaluation

Cadmus designed the Low Income programs' impact evaluation to verify reported program participation and energy savings. We used data collected and reported in the tracking database and conducted a TRM savings review.

Program Summary

Avista leverages the infrastructure of a single Community Action Partnership agency to deliver energy effiicency programs for the company's low-income residential customers in the Idaho service territory. The program is designed to serve Avista residential customers in Idaho whose income falls between 175 percent and 250 percent of federal poverty level. For PY 2018, the program achieved 228,498 kWh of reported electric savings in Idaho, not including savings for the Low Income Fuel Efficiency measures, which are reported separately in the *Fuel Efficiency Impact Evaluation* section.

Program Participation Summary

Table 20 shows Avista savings goals for the Low Income sector for PY 2018, as well as reported savings and goal portions achieved in PY 2018.

Table 20. Low Income Reported Savings (PY 2018)

Program	Savings Goals (kWh)	Reported Savings (kWh)[a]	Percentage of Goal
Low Income	159,162	228,498	144%

[a] Reported savings do not include Low Income Fuel Efficiency savings, shown in the *Fuel Efficiency Impact Evaluation* section.

Table 21 summarizes participation goals for the Low Income programs, along with participation reported and achieved in PY 2018.

Table 21. Low Income Participation (PY 2018)

Program	Participation Goals[a]	Participation Reported[a]	Percentage of Goal
Low Income	16,419	63,436	386%

[a] Participation numbers do not include Low Income Fuel Efficiency participation, shown in the *Fuel Efficiency Impact Evaluation* section, or recipients of LED bulbs at giveaway events. Participation is defined as the number of installed units or square feet of installed insulation or windows.

Evaluation Goals and Objectives

For quarterly and semiannual reports in PY 2018 and PY 2019, Cadmus will determine verified savings for the Low Income programs through a database review (described above in the *Database Review* section). This approach will provide a strong estimate of achieved savings until Cadmus can perform billing analysis at the end of the two-year evaluation cycle.

Low Income Impact Evaluation Methodology

Cadmus' impact evaluation for the Low Income programs' measures consisted of database review (described above in the *Database Review* section). We used UES values provided in the TRM to calculate

savings for measures reported in the measure tracking database. Cadmus labeled savings calculated during the database review as *adjusted savings*.

Low Income Impact Evaluation Results

Table 22 shows reported and adjusted electric savings for Low Income conservation measures. The table does not include savings for Low Income programs Fuel Efficiency path measures (shown in the *Low Income Fuel Efficiency Impact Findings* section below).

Table 22. Low Income Electric Impact Findings

Program	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Verified Electric Savings (kWh)	Realization Rate
Low Income	228,498	252,699	252,699	111%

Low Income Conclusions and Recommendations

With a realization rate of 111% for electricity savings, the Low Income programs achieved savings of 252,699 kWh in PY 2018, or about 159% of goal. Reported program participation reached 386% of the expected value. Cadmus recommends that Avista adjust its participation goal to better align with PY 2018 findings, and also adjust savings per participant, as the participation goal was exceeded by a much larger margin than the total savings goal.

Roughly one third of verified Low Income program savings resulted from LED bulbs given out at events.

Cadmus understands that Avista relies on a Community Action Partnership to deliver Low Income savings in Idaho. Cadmus' PY 2019 evaluation activities will include a process review of the Low Income programs, which may help identify opportunities to improve program performance.

Fuel Efficiency Impact Evaluation

Cadmus designed the Fuel Efficiency sector impact evaluation to verify reported program participation and energy savings. We used data collected and reported in the tracking database and details from online application forms, as well as reviewed TRM and RTF savings and applicable updated deemed savings values.

Program Summary

Fuel Efficiency measures replace electric space heating or water heating systems with equipment using natural gas. These measures are offered within the Nonresidential Site Specific path, Residential Prescriptive programs, and Low Income programs. Across these programs, the Fuel Efficiency measures reported participation of 190 in PY 2018 and electric energy savings of 1,824,345 kWh.

Fuel Efficiency measures provide positive electricity savings and negative natural gas savings, reflecting negative avoided costs. Cadmus incorporated these negative avoided costs in the electric cost-effectiveness calculations. We report the negative natural gas savings in the *PY 2018 Idaho Natural Gas Impact Evaluation Report*.

Program Participation Summary

This section summarizes Fuel Efficiency sector participation and progress toward PY 2018 goals for the Nonresidential Site Specific path, Residential Prescriptive programs, and Low Income programs.

Nonresidential Site Specific Path

The Nonresidential sector Site Specific program path includes Fuel Efficiency measures that replace electric space heating or water heating systems with natural gas equipment. Fuel Efficiency measures provide positive electricity savings and negative natural gas savings, reflecting negative avoided costs. Two types of measures are considered Fuel Efficiency in the PY 2018 Idaho Nonresidential sector database:

- Site Specific HVAC combined
- Site Specific multifamily

Table 23 shows electric savings goals and reported electric savings for the Nonresidential sector Fuel Efficiency measures. There were only five participants in PY 2018. Avista confirmed that it did not set participation goals for Site Specific Fuel Efficiency measures outside the Multifamily Market Transformation program.

Table 23. Nonresidential Site Specific Fuel Efficiency Electric Savings (PY 2018)

Fuel Efficiency Measure	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Nonresidential Site Specific	N/A	65,061	N/A
Multifamily Market Transformation	299,574	207,408	69%

Residential Prescriptive Programs

Table 24 shows Avista PY 2018 savings goals for Residential Prescriptive Fuel Efficiency measures as well as reported savings and percentage of goal through PY 2018.

Table 24. Residential Prescriptive Fuel Efficiency Reported Electric Savings (PY 2018)

Fuel Efficiency Measure	Savings Goals (kWh)	Reported Savings (kWh)	Percentage of Goal
Residential Prescriptive Fuel Efficiency	2,727,600	1,449,994	53%

Table 25 shows the Avista PY 2018 participation goal and reported participation for Residential Prescriptive Fuel Efficiency measures, as well as the participation percentage of goal through PY 2018.

Table 25. Residential Prescriptive Fuel Efficiency Reported Participation (PY 2018)

Fuel Efficiency Measure	Participation Goals[a]	Participation Reported[a]	Percentage of Goal
Residential Prescriptive Fuel Efficiency	271	170	63%

[a] Participation is defined as the number of rebates.

Low Income Programs

Table 26 shows Avista PY 2018 savings goals for Low Income Fuel Efficiency measures, as well as reported savings and percentage of goal through PY 2018.

Table 26. Low Income Fuel Efficiency Reported Electric Savings (PY 2018)

Fuel Efficiency Measure	Savings Goals (kWh)	Reported Savings (kWh)	Percentage of Goal
Low Income Fuel Efficiency	344,850	101,882	30%

Table 27 summarizes participation goals for Low Income Fuel Efficiency measures, as well as participation reported and achieved through PY 2018.

Table 27. Low Income Fuel Efficiency Participation (PY 2018)

Fuel Efficiency Measure	Participation Goals[a]	Participation Reported[a]	Percentage of Goal
Low Income Fuel Efficiency	46	15	33%

[a] Participation is defined as the number of rebates.

Evaluation Goals and Objectives

For quarterly and semiannual reports in PY 2018 and PY 2019, Cadmus will determine verified savings for Nonresidential Site Specific and Residential Prescriptive Fuel Efficiency measures through database review (described above in the *Database Review* section) and document review (described above in the *Document Review* section). For Low Income Fuel Efficiency measures, Cadmus will determine adjusted savings through database review. These approaches will provide strong estimates of achieved savings until Cadmus can perform billing analysis at the end of the two-year evaluation cycle.

Fuel Efficiency Impact Evaluation Methodology

The impact methodology for Fuel Efficiency measures is outlined below for the Nonresidential Site Specific path, Residential Prescriptive programs, and Low Income programs.

Nonresidential Site Specific Fuel Efficiency Impact Methodology

Cadmus followed the same impact evaluation methodology for Fuel Efficiency measures as outlined in the *Nonresidential Impact Evaluation Methodology* section. We selected six Multifamily Market Transformation program projects for our evaluation of the Nonresidential sector Fuel Efficiency measures, all of which were in Washington. Of the sampled applications, we selected five for certainty review based on the scale of savings, measure type, or location, and selected the remaining application randomly.

Cadmus performed site visits at five unique Nonresidential locations to assess electric savings for the six unique Multifamily Market Transformation program measures. Site visits involved verifying installed equipment type, make and model numbers, operating schedules, and set points, as applicable.

Residential Prescriptive Fuel Efficiency Impact Methodology

For our impact evaluation of Residential Prescriptive Fuel Efficiency measures, we followed the methodology described in the *For the PY 2018* quarterly, semiannual, and annual reports, Cadmus verified savings for most programs through a combination of database review and document review, which are described below.

Residential Impact Evaluation Methodology section and conducted database review and document review. We completed document reviews for 34 Fuel Efficiency participants in PY 2018.

Low Income Fuel Efficiency Impact Methodology

For our impact evaluation of Low Income Fuel Efficiency measures, we focused on a database review (described above in the *Database Review* section). We used unit savings values provided in the TRM to calculate savings for measures reported in the measure tracking database. Savings calculated during the database review are *adjusted savings*. For Low Income programs' measures in general (including Low Income Fuel Efficiency measures), these savings are also considered *verified savings*.

Fuel Efficiency Impact Evaluation Results

The following sections summarize findings for the Nonresidential Site Specific path, Residential Prescriptive programs, and Low Income programs Fuel Efficiency measures. All Fuel Efficiency measures provide positive electricity savings and negative natural gas savings because these measures replace electric space heating or water heating systems with equipment that uses natural gas. Negative savings, reflecting negative avoided costs, are incorporated in the electric cost-effectiveness calculations. We also report these negative savings in the *PY 2018 Idaho Natural Gas Impact Evaluation Report*.

Nonresidential Fuel Efficiency Impact Findings

Table 28 shows reported and verified electric energy savings for Avista's Nonresidential sector Fuel Efficiency measures—along with realization rates—through PY 2018.

Table 28. Nonresidential Fuel Efficiency Electric Impact Findings

Fuel Efficiency Measure	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate
Nonresidential Site Specific	65,061	65,061	100%
Multifamily Market Transformation	207,408	202,324	98%
Total	**272,469**	**267,385**	**98%**

Of the evaluated applications, Cadmus identified discrepancies in the randomly-sampled Multifamily Market Transformation program measure based on the evaluation site visit and project documentation review. The site installed more efficient furnaces than reported, which resulted in lower natural gas energy consumption of the installed units versus baseline efficiency units, meaning that less electricity was offset for this measure than reported.

Residential Prescriptive Fuel Efficiency Impact Findings

Table 29 shows reported, adjusted, and verified electric energy savings for the Residential Prescriptive Fuel Efficiency measures. Database review yielded higher savings than reported because of discrepancies in the UES values used.

Table 29. Residential Prescriptive Fuel Efficiency Electric Impact Findings

Fuel Efficiency Measure	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Verified Electric Savings (kWh)	Realization Rate
Residential Prescriptive Fuel Efficiency	1,449,994	1,508,360	1,442,640	100%

In reviewing documentation for 34 Residential Fuel Efficiency measures, Cadmus found an issue with two measures. Both were natural gas furnaces installed at sites where the furnace replaced an oil-fired heating system. We eliminated the electricity savings for the natural gas furnaces, because the replaced system did not heat using electricity. These adjustments led to a document review realization rate of 96%, as shown in Table 30.

Table 30. Residential Prescriptive Fuel Efficiency Electric Impact Document Review Realization Rate

Fuel Efficiency Measure	2018-2019 Target Document Audit Count	Document Audit Count Achieved to Date	Sample Reported Savings (kWh)	Sample Verified Savings (kWh)	Document Audit Realization Rate
Residential Prescriptive Fuel Efficiency	68	34	343,579	328,609	96%

Low Income Fuel Efficiency Impact Findings

Table 31 shows reported and adjusted electric energy savings for Low Income Fuel Efficiency measures.

Table 31. Low Income Fuel Efficiency Program Electric Impact Findings

Fuel Efficiency Measure	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Verified Electric Savings (kWh)	Realization Rate
Low Income Fuel Efficiency	101,882	103,054	103,054	101%

Fuel Efficiency Conclusions and Recommendations

Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency measures achieved verified savings of 267,385 kWh, yielding a 98% realization rate. The Multifamily Market Transformation Fuel Efficiency measures achieved only 69% of the electric energy savings goal of 299,574 kWh.

Residential Prescriptive Fuel Efficiency measures achieved verified savings of 1,442,640 kWh, yielding a 99% realization rate and achieving 53% of savings goal. Cadmus recommends that Avista update reported savings to use current TRM UES values, particularly for measures where the differences are especially notable, such as conversions to natural gas water heaters and conversions to natural gas wall furnaces.

For Low Income Fuel Efficiency measures, verified savings fell short of Avista's savings goals, achieving 30% of the savings target and 33% of the participation target.

APPENDIX B – 2018 IDAHO NATURAL GAS IMPACT EVALUATION REPORT

CADMUS

PY 2018 Idaho Natural Gas Impact Evaluation Report

June 1, 2019

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CADMUS

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Portfolio Executive Summary

For several decades, Avista Corporation has been administering demand-side management programs to reduce electricity and natural gas energy use for its portfolio of customers. Most of these programs have been implemented in-house, but a few have external implementers. Avista contracted with Cadmus to complete process and impact evaluations of its PY 2018 and PY 2019 natural gas demand-side management programs in Idaho. This report presents our natural gas impact evaluation findings for PY 2018. Cadmus did not apply net-to-gross adjustments to savings values, except in cases where deemed energy savings values already incorporate net-to-gross as a function of the market baseline.

Evaluation Methodology and Activities

Cadmus conducted the Idaho portfolio evaluation using a variety of methods and activities, shown in Table 1.

Table 1. PY 2018 Natural Gas Program Evaluation Activities

Sector	Program	Document/ Database Review	Verification/ Metering Site Visit
Nonresidential	Prescriptive (Multiple)	✓	✓
	Site Specific	✓	✓
Residential	Simple Steps, Smart Savings™	✓	--
	HVAC	✓	--
	Shell	✓	--
	ENERGY STAR® Homes	✓	--
	Multifamily Direct Install	✓	--
Low Income	Low Income	✓	--
Fuel Efficiency	Site Specific (nonresidential)	✓	--
	Prescriptive (Residential)	✓	--
	Low Income	✓	--

Summary of Impact Evaluation Results

Overall, the Idaho portfolio achieved a 100% realization rate and acquired 247,756 therms in annual gross savings (Table 2) Cadmus calculated the Avista reported savings through database extracts from Avista's Customer Care and Billing (residential) and InforCRM (nonresidential) databases and from data provided by third-party implementers. We used the label *verified savings* for our findings. Following the end of the two-year evaluation cycle, Cadmus will conduct utility billing regression analyses to evaluate the most accurate energy savings for most residential programs.

Table 2. PY 2018 Reported and Gross Verified Natural Gas Savings

Sector	Reported Savings (therms)	Gross Verified Savings (therms)	Realization Rate
Nonresidential	38,613	34,992	91%
Residential	205,001	207,992	101%
Low Income	5,185	4,772	92%
Total	**248,799**	**247,756**	**100%**

Conclusions and Recommendations

During the course of the PY 2018 evaluation, Cadmus identified the following areas for improvement by sector.

Nonresidential Conclusions and Recommendations

The nonresidential sector achieved total verified natural gas energy savings of 34,992 therms in PY 2018 with a combined realization rate of 91%. The nonresidential sector fell short of the combined Prescriptive and Site Specific program paths' natural gas savings goal of 79,605 therms by 56%.

Cadmus has one recommendation for improving the nonresidential sector natural gas savings:

- Revisit the Prescriptive ENERGY STAR food service equipment calculator workbook and review the default assumptions for hours of use and pounds of food cooked per day. During three food service project verifications, the feedback provided by site contacts for these calculator inputs differed significantly from the calculator default values. We also recommend adjusting future rebate application forms to ask for site-specific hours of use and load estimates. Cadmus will review the RTF calculation methods to determine whether the deemed RTF values are more appropriate for these measures. RTF savings values will be more consistent with regional savings estimates.

Residential Conclusions and Recommendations

Verified natural gas savings show a realization rate of 101% on savings of 205,978 therms for residential Prescriptive programs, which is 125% of the savings goal for the year. Reported savings for the Multifamily Direct Install (MFDI) program add 2,014 therms of savings, for a total of 207,992 therms in acquired savings.

The HVAC program accounts for most verified residential natural gas savings—79%—followed by the Shell program with 19% of natural gas savings. Simple Steps, Smart Savings; MFDI; and ENERGY STAR Homes account for a combined 2% of savings, primarily through water-saving measures.

Avista confirmed during evaluation that natural gas unit energy savings (UES) values for several measures throughout the portfolio mistakenly had not been updated to 2018 TRM values. Initially, the Shell natural gas program grossly unreported savings, which were based on 2017 TRM values. Under Avista direction, Cadmus adjusted reported savings for the Shell windows measures to use 2018 TRM values.

Cadmus offers three recommendations regarding Avista's residential natural gas programs:

- Ensure that reported savings on Prescriptive measures are calculated using current TRM UES values or RTF methods. For Simple Steps, Smart Savings showerhead measures, Avista has moved to an RTF methodology for PY 2019, which Cadmus will also adopt for its evaluation.
- Continue to encourage installations of high-efficiency natural gas equipment through the HVAC program, which provides nearly three-quarters of natural gas savings for residential programs. The Northwest Energy Efficiency Alliance *Residential Building Stock Analysis II* estimates that roughly 70% of natural gas furnaces in Washington single-family homes and 50% in Idaho single-family homes have an annual fuel utilization efficiency (AFUE) rating under 90%, indicating plenty of remaining opportunity for savings.
- Continue to emphasize windows measures through the Shell program, given their contribution of 19% of residential program path natural gas savings.

Fuel Efficiency Conclusions and Recommendations

Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency measures achieved verified natural gas penalties of 10,441 therms, yielding an 87% realization rate.

Residential Prescriptive Fuel Efficiency measures achieved verified natural gas penalties of 71,430 therms, yielding a 116% realization rate. Low Income Fuel Efficiency measures contributed natural gas penalties of 4,668 therms, with a realization rate of 115%.

Residential Prescriptive natural gas measures more than offset the natural gas penalty of Residential Prescriptive Fuel Efficiency measures, with verified natural gas savings of 205,978 therms. Similarly, Low Income natural gas measures also more than offset the Low Income Fuel Efficiency natural gas penalties, with verified savings of 4,772 therms.

Cadmus recommends that Avista adjust reported natural gas penalties on all residential Prescriptive and Low Income Fuel Efficiency measures to match current TRM values.

Nonresidential Impact Evaluation

Through its nonresidential portfolio of programs, Avista promotes the purchase of high-efficiency equipment for commercial and industrial utility customers. Avista provides rebates to partially offset the difference in cost between high-efficiency equipment and standard equipment.

Program Summary

Avista completed and incented 40 nonresidential natural gas measures in Idaho in PY 2018 and reported total natural gas energy savings of 38,613 therms. Through the nonresidential sector, Avista offers incentives for high-efficiency equipment and controls through three program paths: Prescriptive, Site Specific, and Fuel Efficiency.

The Prescriptive program path is selected for smaller, straightforward equipment installations that generally have similar operating characteristics (such as simple HVAC systems, food service equipment, and envelope upgrades).

The Site Specific program path is reserved for more unique projects that require custom savings calculations and technical assistance from Avista's account executives (such as compressed air, process equipment and controls, and comprehensive HVAC retrofits).

Fuel Efficiency measures are part of the Site Specific program path, but they involve a combination of electric savings and natural gas penalties. These measures typically involve replacing electric space heating or water heating systems with natural gas equipment. Please refer to the *Fuel Efficiency Impact Evaluation* section for evaluation methodology and results discussion of the nonresidential Fuel Efficiency measures.

Program Participation Summary

This section summarizes nonresidential sector participation and progress toward PY 2018 goals through the Prescriptive and Site Specific program paths.

Nonresidential Prescriptive Programs

Table 3 shows natural gas energy savings goals assigned to Avista's nonresidential Prescriptive programs for PY 2018 as well as reported savings and a comparison between reported savings and goals.

Table 3. Nonresidential Prescriptive Natural Gas Savings (PY 2018)

Program Type	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
HVAC	8,054	3,956	49%
Shell	9,400	1,149	12%
Food Service Equipment	14,903	12,492	84%
Energy Smart Grocer[a]	6,248	0	0%
Total	**38,605**	**17,597**	**46%**

[a] The Energy Smart Grocer savings goal includes Site Specific Energy Smart Grocer measures. The Site Specific portion constitutes approximately 10% of the overall goal.

Table 4 shows participation goals by rebated equipment quantity, as provided by Avista. The PY 2018 nonresidential tracking database extract listed individual projects, but it did not include rebated equipment quantity. For reference, Table 5 provides participation by unique application numbers.

Table 4. Nonresidential Prescriptive Participation Goals by Equipment Rebated

Program Type	Participation Goal
HVAC	2,700
Shell	50,000
Food Service Equipment	23
Energy Smart Grocer	N/A

Table 5. Nonresidential Prescriptive Participation by Project (PY 2018)

Program Type	Participation Reported[a]
HVAC	11
Shell	4
Food Service Equipment	20
Energy Smart Grocer	0
Total	**35**

[a] A participant is defined as a unique application number.

Nonresidential Site Specific Program

Table 6 shows natural gas savings goals assigned to the Site Specific program path in Avista's nonresidential sector for PY 2018, as well as reported savings. Note that the table does not include reported natural gas penalties for the Fuel Efficiency sector, such as those associated with the Multifamily Market Transformation program.

Table 6. Nonresidential Site Specific Natural Gas Savings (PY 2018)

Program	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
Site Specific	41,000	21,016	51%

Evaluation Goals and Objectives

For the PY 2018 quarterly, semiannual, and annual reports, Cadmus conducted nonresidential impact activities to determine verified savings for most programs.

Nonresidential Impact Evaluation Methodology

To evaluate impact evaluation savings for the PY 2018 nonresidential sector, Cadmus performed several activities in two waves:

- Selected an evaluation sample and requested project documentation from Avista
- Performed project documentation review
- Prepared on-site M&V plans

- Performed site visits and on-site data collection (such as trend data, photos, and operating schedules)
- Used site visit findings to calculate verified savings by measure
- Applied realization rates to total reported savings population to determine overall verified savings

The program context, along with Cadmus' sample design, document review, and on-site verification activities, is described in more detail below.

Program Context

As the first step of our evaluation activities, we gained an understanding of the programs and measures being evaluated. Specifically, Cadmus explored documents and data records:

- Avista's annual business plans, which detail processes and energy savings justifications
- Project documents from external sources (customers, program consultants, and implementation contractors)

Based on the initial review, Cadmus outlined the distribution of program contributions to the overall portfolio of programs. In addition, the review allowed us to understand the sources for UES for each measure offered through the programs, along with the sources for energy-savings algorithms and the internal quality assurance and quality control processes for large nonresidential program projects.

Following this review, Cadmus designed the sample strategy for the impact evaluation activities, as discussed in the following section.

Sample Design

We based the first evaluation sample on program data from January 2018 to April 2018, and we based the second evaluation sample on program data from May 2018 through December 2018. As a guideline, Cadmus used the proposed, overall PY 2018 and PY 2019 nonresidential sample sizes by subprogram in the M&V plan, seeking to complete approximately one-quarter of the sample during the first wave and another one-quarter during the second wave.

For each activity wave, we broke down submitted program applications by path and measure (such as Site Specific shell measure, Prescriptive HVAC), allowing us to select the highest-savings applications in each category with certainty. For applications with reported savings greater than 1% of total savings by category, Cadmus assigned random numbers and sampled randomly. We removed applications with less than 1% of total savings by category from the sample consideration, except where another application at the same location or facility was previously selected (and where we could assess both applications with one site visit, which is a cost-effective verification strategy even if the second application represents minimal claimed savings).

Cadmus sampled randomly selected sites across both Washington and Idaho since Avista's programs are implemented similarly in both states. We pooled the results from the randomly selected sites to calculate a realization rate by stratum that we applied to projects in both states. We applied verified savings for sites selected with certainty only to the state in which they had been implemented.

Table 7 summarizes the Idaho nonresidential Prescriptive program path natural gas evaluation sample. Across both states, Cadmus sampled 21 Prescriptive applications at 19 unique sites. Of the sampled applications, we selected five for certainty review based on the scale of savings, measure type, or location, and selected the remaining 16 applications randomly.

Table 7. Idaho Nonresidential Prescriptive Natural Gas Evaluation Sample

Program Type	Applications Sampled	Sampled Savings (therms)	Percentage of Reported Savings
HVAC	2	646	16%
Shell	1	198	17%
Food Service Equipment	4	3,761	30%
Nonresidential Prescriptive	**7**	**4,605**	**26%**

Table 8 summarizes the Idaho nonresidential Site Specific program path natural gas evaluation sample. Across both states, Cadmus sampled five Site Specific applications at five unique sites. Of the sampled applications, we selected four for certainty review based on scale of savings, measure type, or location, and selected the remaining application randomly.

Table 8. Idaho Nonresidential Site Specific Natural Gas Evaluation Sample

Program	Applications Sampled	Sampled Savings (therms)	Percentage of Reported Savings
Site Specific	3	19,750	94%

Document Review

Cadmus requested and reviewed project documentation for each sampled application and prepared M&V plans to guide the site visits. Project documentation typically included incentive applications, calculation tools (usually based on the 2017 Regional Technical Forum [RTF]),[1] invoices, equipment specification sheets, and post-inspection reports.

On-Site Verification

Cadmus performed site visits at 23 unique nonresidential locations to assess natural gas energy savings for 26 unique Prescriptive and Site Specific measures (not including Fuel Efficiency measures). Site visits involved verifying the installed equipment type, make and model numbers, operating schedules, and setpoints, as applicable. Cadmus used the project documentation review and on-site findings to adjust the reported savings calculations where necessary.

Nonresidential Evaluation Results

This section summarizes the nonresidential sector Prescriptive and Site Specific program paths' natural gas impact evaluation results for PY 2018.

[1] Regional Technical Forum. 2017. *Standard Protocols*. https://rtf.nwcouncil.org/standard-protocols

Nonresidential Prescriptive Programs

Table 9 shows reported and verified natural gas energy savings for Avista's nonresidential sector Prescriptive program path and the realization rates between verified and reported savings for PY 2018. The overall nonresidential sector Prescriptive program path natural gas realization rate was 79%.

Table 9. Nonresidential Prescriptive Natural Gas Impact Findings

Program Type	Reported Savings (therms)	Verified Savings (therms)	Realization Rate
HVAC	3,956	3,956	100%
Shell	1,149	1,149	100%
Food Service Equipment	12,492	8,871	71%
Nonresidential Prescriptive	**17,597**	**13,976**	**79%**

Of the evaluated applications, Cadmus identified discrepancies for four based on the site visit and project documentation review (with one application having two discrepancies). Table 10 summarizes the reasons for discrepancies between reported and verified savings.

Table 10. Nonresidential Prescriptive Evaluation Summary of Discrepancies

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Food Service Equipment	3	↓	• Cadmus reduced the pounds of food cooked per day for three fryer measures from the value in the savings calculator based on the site manager interview.
	1	↓	• Cadmus decreased operating hours for a fryer measure from the value in the savings calculator based on the site manager interview.
	1	↓	• Cadmus reduced the pounds of food cooked per day and operating hours for a steam cooker measure from the value in the savings calculator based on the site manager interview.

Nonresidential Site Specific Program

Table 11 shows reported and verified natural gas energy savings for Avista's PY 2018 nonresidential sector Site Specific program path, as well as a comparison between verified and reported savings for PY 2018. The overall Site Specific program path natural gas realization rate was 100%. Note that the table does not include reported and verified natural gas penalties for measures in the Fuel Efficiency path. Cadmus did not identify discrepancies in any of the three evaluated applications.

Table 11. Nonresidential Site Specific Natural Gas Impact Findings (PY 2018)

Program	Reported Savings (therms)	Verified Savings (therms)	Realization Rate
Site Specific	21,016	21,016	100%

Nonresidential Conclusions and Recommendations

The nonresidential sector achieved total verified natural gas energy savings of 34,992 therms in PY 2018 with a combined realization rate of 91%. The nonresidential sector fell short of the combined Prescriptive and Site Specific program paths' natural gas savings goal of 79,605 therms by 56%.

Cadmus has one recommendation for improving the nonresidential sector natural gas savings:

- Revisit the Prescriptive ENERGY STAR food service equipment calculator workbook and review the default assumptions for hours of use and pounds of food cooked per day. During three food service project verifications, the feedback provided by site contacts for these calculator inputs differed significantly from the calculator default values. We also recommend adjusting future rebate application forms to ask for site-specific hours of use and load estimates. Cadmus will review the RTF calculation methods to determine whether the deemed RTF values are more appropriate for these measures. RTF savings values will be more consistent with regional savings estimates.

Residential Impact Evaluation

Cadmus designed the residential sector impact evaluation to verify reported program participation and energy savings. We used data collected and reported in the tracking database, online application forms, Avista TRM and RTF savings review, and applicable updated deemed savings values.

Program Summary

Avista completed and incented 23,974 residential natural gas measures in Idaho in PY 2018 and reported total natural gas energy savings of 205,001 therms, not including participation and savings from Fuel Efficiency measures, which are included below in the *Fuel Efficiency Impact Evaluation* section. The residential programs comprise two primary paths—Prescriptive and MFDI. The Prescriptive path includes Simple Steps, Smart Savings, which encourages consumers to purchase and install high-efficiency showerheads and other equipment, such as LEDs and clothes washers; the residential HVAC program, which incents high-efficiency heating and cooling equipment; the residential Shell program, which provides rebates to encourage customers to install high-efficiency windows and storm windows; and the ENERGY STAR Homes program, which offers 15% to 25% energy savings relative to state energy code. Through the MFDI program, Avista provides free direct-install measures to multifamily residences (of five units or more) and common areas.

Program Participation Summary

This section summarizes residential sector participation and progress toward PY 2018 goals for the residential Prescriptive and residential MFDI programs.

Residential Prescriptive Programs

Table 12 shows savings goals assigned to Avista's residential sector Prescriptive programs for PY 2018, as well as reported savings and the goal portion achieved in PY 2018. Reported savings for the Simple Steps, Smart Savings program achieved only 19% of goal, but an extremely high realization rate (see Table 17) brought verified savings much closer to goal.

Table 12. Residential Prescriptive Reported Natural Gas Savings (PY 2018)

Program	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
Simple Steps, Smart Savings	2,328	445	19%
HVAC	145,850	164,165	113%
Shell	16,687	37,567	225%
ENERGY STAR Homes	406	811	200%
Residential Prescriptive Total	**165,271**	**202,987**	**123%**

Table 13 summarizes participation goals and reported participation in Avista's residential sector Prescriptive programs for PY 2018, along with the percentage of goal achieved.

Table 13. Residential Prescriptive Participation (PY 2018)

Program	Participation Goals	Participation Reported	Portion Achieved
Simple Steps, Smart Savings[a]	864	897	104%
HVAC[b]	1,825	2,080	114%
Shell[c]	11,400	19,665	173%
ENERGY STAR Homes[b]	2	2	100%
Residential Prescriptive Total	**14,091**	**22,644**	**161%**

[a] Participation is defined as the number of purchased units.

[b] Participation is defined as the number of rebates.

[c] Participation is defined as square feet of installed windows or storm windows.

Multifamily Direct Install Program

Table 14 shows reported savings and participation for the MFDI program in PY 2018. Avista launched this program as a pilot in PY 2018 and did not set annual program goals, then transitioned this from a pilot to an ongoing study in September 2018.

Table 14. Multifamily Direct Install Reported Natural Gas Savings

Program	Savings Reported (therms)	Participation Reported
Multifamily Direct Install	2,014	1,330

Evaluation Goals and Objectives

For the PY 2018 quarterly, semiannual, and annual reports, Cadmus verified savings for most programs through a combination of database review and document review, which are described below.

Residential Impact Evaluation Methodology

To determine the residential sector verified savings for PY 2018, Cadmus employed two impact evaluation methods for most residential programs:[2]

- Database review
- Document review

Similar to previous practice, Cadmus calculated adjusted savings based on results of the database review and applied realization rates for document reviews. Verified savings represented adjusted savings multiplied by the document review realization rates, as shown in Figure 1.

[2] With approval from Avista, Cadmus ceased performing a third impact activity—verification surveys—in Q3 PY 2018 to eliminate redundancy between verification surveys and document review.

Figure 1. Residential Impact Process

Database Review

For the impact evaluation database review, Cadmus used UES values, as provided in the TRM, to calculate savings for measures reported in the measure tracking database. This impact activity may help identify incorrect UES values used to calculate reported savings. Savings calculated during the database review are defined as *adjusted savings*.

Document Review

For the document review, Cadmus compared information from rebate forms and other supporting documents to measure tracking data for a random sample of projects. This impact activity may identify installed measures that did not meet eligibility requirements, quantities that did not match the measure tracking database, and other discrepancies. Following the review of all projects, Cadmus calculated a realization rate for document review by dividing savings calculated for the sample (using the revised information) by reported savings for the sample. We then multiplied this realization rate by adjusted savings for the entire program to determine verified savings.

Cadmus conducted 34 document reviews for the HVAC and Shell programs, drawing roughly equal samples from participants in each quarter.

Residential Impact Evaluation Results

The following sections summarize findings and provide verified savings for both of Cadmus' impact evaluation methodologies. The database review resulted in the largest number of adjustments to reported savings.

Database Review

Table 15 shows database review findings, with adjusted savings being higher than reported savings for some programs and lower for others. Adjusted savings differed from reported savings because reported UES values differed from TRM values for several measures. In most cases, Avista determined that the reported savings for these measures used values from an older customer database that did not align with those in the current TRM. For measures with reported savings based on measure-specific

parameters, Cadmus could not confirm the reported savings calculations, which depended on inputs that were not included in the tracking data (such as air infiltration and duct sealing).

Table 15. Residential Prescriptive Database Review Natural Gas Impact Findings

Program	Reported Savings (therms)	Adjusted Savings (therms)	Percentage Change
Simple Steps, Smart Savings	445	2,202	395%
HVAC	164,165	163,356	0%
Shell	37,567	37,502	0%
ENERGY STAR Homes	811	406	-50%
Residential Prescriptive Total	**202,987**	**203,466**	**0%**

Document Review

Table 16 summarizes document review findings to date. The HVAC program had a 100% natural gas document review realization rate and the Shell program had a 107% natural gas document review realization rate.

Table 16. Residential Prescriptive Natural Gas Impact Document Review Realization Rates

Program	PY 2018-PY 2019 Target Document Audit Count	Document Audit Count Achieved to Date	Sample Reported Savings (therms)	Sample Verified Savings (therms)	Document Audit Realization Rate
HVAC	68	34	5,791	5,791	100%
Shell	68	34	1,928	2,057	107%

Cadmus identified several discrepancies during the document review through Q4 PY 2018:

- For two window measures, documentation showed a square footage for installed windows that differed from that reported. In one case the documented square footage was higher than the reported, and in the other case it was lower. Cadmus adjusted savings based on the corrected area for both measures.
- For two window measures reported at sites with electric heating, project documents identified the heating fuel as natural gas. Cadmus added natural gas savings and removed electricity savings at the sites.

Table 17 shows verified savings, which apply the realization rates shown in Table 16 to the adjusted savings calculated based on the database review. The verified savings represent Cadmus' best estimate of savings to date. With its high realization rate, the Simple Steps, Smart Savings program achieved 95% of goal based on verified savings, despite achieving reported savings of only 19% of goal.

Table 17. Residential Prescriptive Natural Gas Impact Findings

Program	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)[a]	Realization Rates
Simple Steps, Smart Savings	445	2,202	2,202	495%
HVAC	164,165	163,356	163,356	100%
Shell	37,567	37,502	40,014	107%
ENERGY STAR Homes	811	406	406	50%
Residential Prescriptive Total	**202,987**	**203,466**	**205,978**	**101%**

[a] Verified savings represents adjusted savings only for Simple Steps, Smart Savings and ENERGY STAR Homes.

Residential Conclusions and Recommendations

Verified natural gas savings show a realization rate of 101% on savings of 205,978 therms for residential Prescriptive programs, which is 124% of the savings goal for the year. Reported savings for the MFDI program add 2,014 therms of savings, for a total of 207,992 therms in acquired savings.

The HVAC program accounts for most verified residential natural gas savings—79%—followed by the Shell program with 19% of natural gas savings. Simple Steps, Smart Savings; MFDI; and ENERGY STAR Homes account for a combined 2% of savings, primarily through water-saving measures.

Avista confirmed during evaluation that natural gas UES values for several measures throughout the portfolio mistakenly had not been updated to 2018 TRM values. Initially, the Shell natural gas program grossly unreported savings, which were based on 2017 TRM values. Under Avista direction, Cadmus adjusted reported savings for the Shell windows measures to use 2018 TRM UES values.

Cadmus offers three recommendations regarding Avista's residential natural gas programs:

- Ensure that reported savings on Prescriptive measures are calculated using current TRM UES values or RTF methods. For Simple Steps, Smart Savings showerhead measures, Avista has moved to an RTF methodology for PY 2019, which Cadmus will also adopt for its evaluation.
- Continue to encourage installations of high-efficiency natural gas equipment through the HVAC program, which provides nearly three-quarters of natural gas savings for residential programs. The Northwest Energy Efficiency Alliance *Residential Building Stock Analysis II* estimates that roughly 70% of natural gas furnaces in Washington single-family homes and 50% in Idaho single-family homes have an AFUE under 90%, indicating plenty of remaining opportunity for savings.
- Continue to emphasize windows measures through the Shell program, given their contribution of 19% of residential program path natural gas savings.

Low Income Impact Evaluation

Cadmus designed the Low Income programs' impact evaluation to verify reported program participation and energy savings. We used data collected and reported in the tracking database and conducted a TRM savings review.

Program Summary

Avista leverages the infrastructure of a single Community Action Partnership agency to deliver energy effiicency programs for the company's low-income residential customers in the Idaho service territory. The program is designed to serve Avista residential customers in Idaho whose income falls between 175 percent and 250 percent of federal poverty level. For PY 2018, the program achieved 5,185 therms reported natural gas savings in Idaho.

Program Participation Summary

Table 18 shows Avista savings goals for the Low Income sector for PY 2018 as well as reported savings and goal portions achieved in PY 2018.

Table 18. Low Income Reported Savings (PY 2018)

Program	Savings Goals (therms)	Reported Savings (therms)[a]	Portion Reported
Low Income	7,837	5,185	66%

[a] Reported savings do not include Low Income Fuel Efficiency savings, shown in the *Fuel Efficiency Impact Evaluation* section.

Table 19 summarizes participation goals for the Low Income programs, along with participation reported and achieved in PY 2018.

Table 19. Low Income Participation (PY 2018)

Program	Participation Goals[a]	Participation Reported[a]	Portion Achieved
Low Income	56,784	12,635	22%

[a] Participation numbers do not include Low Income Fuel Efficiency participation, shown in the *Fuel Efficiency Impact Evaluation* section. Participation is defined as the number of installed units or square feet of installed insulation or windows.

Evaluation Goals and Objectives

For quarterly and semiannual reports in PY 2018 and PY 2019, Cadmus will determine verified savings for the Low Income programs through database review (described above in the *Database Review* section). This approach will provide a strong estimate of achieved savings until Cadmus can perform billing analysis at the end of the two-year evaluation cycle.

Low Income Impact Evaluation Methodology

Cadmus' impact evaluation for the Low Income programs' measures included a database review (described above in the *Database Review* section). We used UES values provided in the TRM to calculate savings for measures reported in the measure tracking database. Cadmus labeled savings calculated during the database review as *adjusted savings*.

Low Income Impact Evaluation Results

Table 20 shows reported and adjusted natural gas savings for Low Income conservation measures. The table does not include savings for Low Income programs Fuel Efficiency path measures (shown in the *Low Income Fuel Efficiency Impact Findings* section below).

Table 20. Low Income Natural Gas Impact Findings

Program	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)	Realization Rate
Low Income	5,185	4,772	4,772	92%

Low Income Conclusions and Recommendations

With a realization rate of 92% for natural gas savings, the Low Income programs achieved savings of 4,772 therms in PY 2018, or about 61% of the goal. Verified savings were less than reported savings because reported savings did not match the UES values listed in the Avista TRM. The 39% gap between verified savings and the goal results largely from relatively low program participation: Reported program participation reached 22% of the participation goal.

Cadmus understands that Avista relies on Community Action Program agencies and tribal weatherization organization to deliver Low Income savings. Cadmus' PY 2019 evaluation activities will include a process review of the Low Income programs, which may help identify opportunities to improve program performance.

Fuel Efficiency Impact Evaluation

Cadmus designed the Fuel Efficiency sector impact evaluation to verify reported program participation and energy savings. We used data collected and reported in the tracking database and details from online application forms, as well as reviewed TRM and RTF savings and applicable updated deemed savings values.

Program Summary

Fuel Efficiency measures replace electric space heating or water heating systems with equipment using natural gas. These measures are offered within the nonresidential Site Specific path, residential Prescriptive programs, and Low Income programs. Across these programs, the Fuel Efficiency measures achieved reported participation of 190 in PY 2018 and a natural gas energy penalty of 77,852 therms.

Fuel Efficiency measures provide positive electricity savings and negative natural gas savings, reflecting negative avoided costs. We report the electric energy savings in the *PY 2018 Idaho Electric Impact Evaluation Report*.

Program Participation Summary

This section summarizes Fuel Efficiency sector participation and progress toward PY 2018 goals for the nonresidential Site Specific path, residential Prescriptive programs, and Low Income programs.

Nonresidential Site Specific Path

The nonresidential sector Site Specific program path includes Fuel Efficiency measures that replace electric space heating or water heating systems with natural gas equipment. Fuel Efficiency measures provide positive electricity savings and negative natural gas savings, reflecting negative avoided costs. Three types of measures are considered Fuel Efficiency in the PY 2018 nonresidential sector database:

- Site Specific HVAC combined
- Energy Smart Grocer Site Specific case doors
- Site Specific multifamily

Only five Fuel Efficiency measures were incentivized in Idaho in PY 2018. Avista confirmed that it did not set natural gas participation goals for nonresidential Fuel Efficiency measures.

Residential Prescriptive Programs

Table 21 shows Avista PY 2018 natural gas savings goals for residential Prescriptive Fuel Efficiency measures as well as reported savings and percentage of goal through PY 2018.

Table 21. Residential Prescriptive Fuel Efficiency Reported Natural Gas Savings (PY 2018)

Program	Savings Goals (therms)	Reported Savings (therms)	Percentage to Goal
Residential Prescriptive Fuel Efficiency	N/A	-61,755	N/A

Table 22 shows the Avista PY 2018 participation goal and reported participation for residential Prescriptive Fuel Efficiency measures, as well as the participation percentage of goal through Q4 PY 2018.

Table 22. Residential Prescriptive Fuel Efficiency Reported Participation (PY 2018)

Program	Participation Goals[a]	Participation Reported[a]	Percentage to Goal
Residential Prescriptive Fuel Efficiency	271	170	63%

[a] Participation is defined as the number of rebates.

Low Income Programs

Table 23 shows Avista PY 2018 natural gas savings goals for Low Income Fuel Efficiency measures, as well as reported savings and percentage of goal through PY 2018.

Table 23. Low Income Fuel Efficiency Reported Natural Gas Savings (PY 2018)

Program	Savings Goals (therms)	Reported Savings (therms)	Percentage to Goal
Low Income Fuel Efficiency	N/A	-4,042	N/A

Table 24 summarizes participation goals for Low Income Fuel Efficiency measures, as well as participation reported and achieved through PY 2018.

Table 24. Low Income Fuel Efficiency Participation (PY 2018)

Program	Participation Goals[a]	Participation Reported[a]	Percentage to Goal
Low Income Fuel Efficiency	46	15	33%

[a] Participation is defined as the number of rebates.

Evaluation Goals and Objectives

For quarterly and semiannual reports in PY 2018 and PY 2019, Cadmus will determine verified savings for nonresidential Site Specific and residential Prescriptive Fuel Efficiency measures through database review (described above in the *Database Review* section) and document review (described above in the *Document Review* section). For Low Income Fuel Efficiency measures, Cadmus will determine adjusted savings through database review. These approaches will provide strong estimates of achieved savings until Cadmus can perform billing analysis at the end of the two-year evaluation cycle.

Fuel Efficiency Impact Evaluation Methodology

The impact methodology for Fuel Efficiency measures is outlined below for the nonresidential Site Specific path, residential Prescriptive programs, and Low Income programs.

Nonresidential Site Specific Fuel Efficiency Impact Methodology

Cadmus followed the same impact evaluation methodology for Fuel Efficiency measures as outlined in the *For the PY 2018 quarterly*, semiannual, and annual reports, Cadmus conducted nonresidential impact activities to determine verified savings for most programs.

Nonresidential Impact Evaluation Methodology section. We sampled six Multifamily Market Transformation program projects for our evaluation of the nonresidential sector Fuel Efficiency measures, all of which were in Washington. Of the sampled applications, we selected five for certainty review based on scale of savings, measure type, or location, and selected the remaining application randomly.

Cadmus performed site visits at five unique nonresidential locations to assess natural gas penalties for the six unique Multifamily Market Transformation program measures. Site visits involved verifying installed equipment type, make and model numbers, operating schedules, and set points, as applicable.

Residential Prescriptive Fuel Efficiency Impact Methodology

For our impact evaluation of residential Prescriptive Fuel Efficiency measures, we followed the methodology described in the *Residential Impact Evaluation Methodology* section and conducted database review and document review. We completed document reviews for 34 Fuel Efficiency participants in PY 2018.

Low Income Fuel Efficiency Impact Methodology

For our impact evaluation of Low Income Fuel Efficiency measures, we focused on a database review (described above in the *Database Review* section). We used unit savings values provided in the TRM to calculate savings for measures reported in the measure tracking database. Savings calculated during the database review are *adjusted savings*. For Low Income programs' measures in general (including Low Income Fuel Efficiency measures), these savings are also considered *verified savings*.

Fuel Efficiency Impact Evaluation Results

The following sections summarize findings for the nonresidential Site Specific path, residential Prescriptive programs, and Low Income programs Fuel Efficiency measures. All Fuel Efficiency measures provide positive electricity savings and negative natural gas savings because these measures replace electric space heating or water heating systems with equipment that uses natural gas. Negative savings, reflecting negative avoided costs, are incorporated in the electric cost-effectiveness calculations. We report the positive electric savings in the *PY 2018 Idaho Electric Impact Evaluation Report*.

Nonresidential Site Specific Fuel Efficiency Impact Findings

Table 25 shows reported and verified natural gas penalties for Avista's nonresidential sector Fuel Efficiency measures—along with realization rates—through PY 2018.

Table 25. Nonresidential Fuel Efficiency Natural Gas Impact Findings

Fuel Efficiency Measure	Reported Savings (therms)	Verified Savings (therms)	Realization Rate
Nonresidential Site Specific	-2,701	-2,701	100%
Multifamily Market Transformation	-9,354	-7,740	83%
Total	**-12,055**	**-10,441**	**87%**

Cadmus identified discrepancies in the randomly-sampled application based on the evaluation site visit and project documentation review. The site installed more efficient furnaces than reported, resulting in

lower natural gas energy consumption of the installed units versus baseline efficiency units and a reduced natural gas energy penalty.

Residential Prescriptive Fuel Efficiency Impact Findings

Table 26 shows reported, adjusted, and verified natural gas energy savings for the residential Prescriptive Fuel Efficiency measures.

Table 26. Residential Prescriptive Fuel Efficiency Natural Gas Impact Findings

Fuel Efficiency Measure	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)	Realization Rate
Residential Prescriptive Fuel Efficiency	-61,755	-71,430	-71,430	116%

In reviewing documentation for 34 residential Fuel Efficiency measures, Cadmus found no issues that affected natural gas savings. This led to a document review realization rate of 100% for natural gas energy savings. Table 27 shows the natural gas results of our impact document review for residential Prescriptive Fuel Efficiency measures.

Table 27. Residential Prescriptive Fuel Efficiency Natural Gas Document Review Realization Rates

Fuel Efficiency Measure	PY 2018-PY 2019 Target Document Audit Count	Document Audit Count Achieved to Date	Sample Reported Savings (therms)	Sample Verified Savings (therms)	Document Audit Realization Rate
Residential Prescriptive Fuel Efficiency	68	34	-14,630	-14,630	100%

Low Income Fuel Efficiency Impact Findings

Table 28 shows reported and adjusted natural gas energy savings for Low Income Fuel Efficiency measures.

Table 28. Low Income Fuel Efficiency Program Natural Gas Impact Findings

Fuel Efficiency Measure	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)	Realization Rate
Low Income Fuel Efficiency	-4,042	-4,668	-4,668	115%

Fuel Efficiency Conclusions and Recommendations

Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency measures achieved verified natural gas penalties of 10,441 therms, yielding an 87% realization rate.

Residential Prescriptive Fuel Efficiency measures achieved verified natural gas penalties of -71,430 therms, yielding a 116% realization rate. Low Income Fuel Efficiency measures contributed natural gas penalties of 4,668 therms, with a realization rate of 115%.

Residential Prescriptive natural gas measures more than offset the natural gas penalty of residential Prescriptive Fuel Efficiency measures, with verified natural gas savings of 205,978 therms. Similarly, Low Income natural gas measures also offset of Low Income Fuel Efficiency natural gas penalties, with verified savings of 4,772 therms.

APPENDIX C – 2018 IDAHO PROCESS EVALUATION

CADMUS

Avista 2018 Idaho Process Evaluation

2018 Annual Report

April 29, 2019

Prepared for:

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CADMUS

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Executive Summary

Cadmus conducted process evaluation activities for 2018 as part of the Avista 2018–2019 DSM portfolio evaluation. This process evaluation focused on four fundamental objectives:

- Assess program delivery channel and marketing methods
- Assess participant and market actor program journey including barriers to participation, satisfaction with the program, and effectiveness of rebate levels
- Assess Avista and implementer staff experiences including organizational structure, communication, and program processes
- Document areas of success, challenge, and changes to the program

The report describes our data collection and process methods, presents analysis results, summarizes findings, draws conclusions, and recommends possible improvements for all of Avista's nonresidential programs (except Energy Smart Green Grocer) and Avista's residential HVAC, Shell, and Fuel Efficiency programs.

Summary of Milestones and Deliverables

Cadmus conducted the evaluation by reviewing documents, interviewing program and implementation staff and contractors, and surveying participants. Table 1 lists the process evaluation activities.

Table 1. 2018 Completed Milestones and Deliverables

Milestones and Deliverables	2018			
	Q1	Q2	Q3	Q4
Process				
Document and Database Review	✓			
Avista and Implementer Interviews	✓			
Contractor Interviews			✓	
Participant Surveys	✓	✓	✓	✓
Multifamily Direct Install (MFDI) Pilot				
Scope of Work	✓			
Avista and Implementer Interviews		✓		
Participant Interviews		✓		

Key Findings

Nonresidential

- **Two-thirds of nonresidential survey respondents have participated in past business energy-efficiency programs.** Most site specific (17 of 19) survey respondents have previously participated in an Avista business energy efficiency program compared with 56% of prescriptive respondents (23 of 41).

- **Participants most often learn about the program from Avista or a contractor, vendor, or retailer.**
  - Most site specific survey respondents (32%; n=13) first learned about the program from their Avista account executive or from an Avista email
  - Prescriptive survey respondents first learned about the program from a contractor, vendor, or retailer (50%; n=44).
- **Participants are motivated by saving energy and money.**
  - The top two motivators both site specific and prescriptive survey respondents (n=19 and n=46, respectively) cited for participating were to save energy (42% and 67%, respectively) and save money (37% and 83%, respectively).
  - Participants of both programs said saving money and using less energy were the top benefits of program participation.
- **Most survey respondents (89%; n=56) received a check directly from Avista rather than an instant discount from their contractor.**
  - Six of the respondents (two of 19 site specific and four of 37 prescriptive) received an instant discount from their contractor.
  - Two of them said this was an easier way to receive the rebate, one was not given a choice in how to receive the rebate, and three did not provide a reason.
- **Participants are highly satisfied with the program, but a small number did indicate some dissatisfaction.**
  - All site specific survey respondents (n=19) and 91% (n=46) of prescriptive survey respondents were satisfied with the program overall.
  - Site specific respondents were satisfied with all components of the program except for the time it took to process the application; two of 19 were *not too satisfied* with this component because of delays caused by incorrect rebate calculations and the time it took to complete site inspections.
  - Prescriptive survey respondents were highly satisfied with the pre-project inspection, the rebate amount, and the process of completing and submitting their application. Several survey respondents provided reasons for their dissatisfaction with the program and some of its components. They stated they were dissatisfied with communication with an account executive and their trade ally because there was not enough communication (4 responses). One respondent expressed dissatisfaction because the rebate check had not yet arrived at the time of the survey and one felt the equipment was not as effective as expected, which led to low energy savings. One respondent reported concerns about their contractor that Avista did not address.
- **Site-specific survey respondents said the program was successful because of Avista staff (7 of 12) while prescriptive survey respondents said the program was easy to use (31%; n=29).**

  - Site specific program participants also cited the rebate (two of 12); rebate delivery time (two of 12); and overall process, communication, and energy savings (one response each) as working well.
  - Prescriptive survey respondents also cited quick turnaround (28%) and customer service (24%) as program elements that were working particularly well.
- **Participation challenges differed by program.**
  - The top challenge for participating in the site specific program was determining whether a project was eligible for a rebate.
  - Prescriptive survey respondents said their top challenges were knowing about the program and its offerings, completing application paperwork, and finding the time needed to apply and complete the project. The application paperwork was of particular concern among lighting participants.
- **Avista's rebate was important in the decision to complete the energy efficiency project.** All site specific and all but one prescriptive survey respondent said the rebate provided by Avista was important in their decision to complete the project.
  - The most important criteria for making energy efficiency improvements for site specific respondents were return on investment (14 of 19) and initial cost of equipment (14 of 19).
  - Prescriptive survey respondents said the most important criteria were maintenance costs (77%; n=43) and energy or operating costs (74%; n=43).

Residential

- **Residential program delivery went smoothly, per both Avista and implementer staff.** Except for a couple of small changes to the rebate levels outlined in the 2018 DSM Business Plan, the HVAC, Shell, and Fuel Efficiency programs were delivered and performed as expected.
- **More than half of residential program participants heard about the program in which they participated through their contractor, installer, or trade ally** (53%, n=73). Although a significant portion of respondents (n=60) said contractors are the best way to spread information about Avista programs (27%), more respondents said bill inserts are the best way to spread information (32%).
- **Residential program participants were motivated to participate primarily to save money** (56%, n=75). Survey respondents reported that the main benefits of Avista's residential programming were saving energy (83%, n=72), increasing the comfort of their homes (78%), lowering maintenance costs (74%), and taking advantage of Avista rebates (72%).
- **At least 93% of survey respondents were *very satisfied* or *somewhat satisfied* with every element of the program in which they participated as well as with Avista overall.** Rebates received the lowest satisfaction rating, specifically among survey respondents who participated in the Shell program (n=28), who were much less satisfied with rebate levels than were survey respondents in the HVAC (n=32) and Fuel Efficiency (n=16) programs.

- **HVAC contractors Cadmus interviewed said the HVAC Program plays an important role in "leveling the playing field"** because it enabled them to install more-costly high-efficiency equipment in the homes of customers who might otherwise not be able to afford them.
- **HVAC contractors took varying approaches to helping customers complete their rebate application forms.** Some contractors completed forms entirely on their own, some worked with customers to complete their forms, and some provided no help to customers. Contractors reported occasional issues with submitting applications online because Avista's website could not verify customers' mailing addresses.
- **The eight HVAC contractors Cadmus interviewed rated their satisfaction with various elements of the HVAC Program from 4.4 to 4.8** on average, on a scale of 1 to 5. They also provided an average rating of 4.6 for the program's ability to influence customers' decisions to purchase new energy-efficient equipment.

Multifamily Direct Install Pilot

- **Avista facilitated the MFDI Pilot delivery by mimicking the design of the Small Business Direct Install (SBDI) program and recruiting its implementer to assume the same role for the pilot.** Per Avista and implementer staff, the pilot, like Avista's residential program, was delivered smoothly and as expected. Avista overcame barriers to participation by engaging in a highly targeted marketing campaign.
- **Pilot participants were generally highly satisfied with the pilot and direct-install measures provided to their tenants**, per Avista reports and direct feedback from multifamily residence property managers. Although some property managers relayed to Avista reports by tenants of problems with certain measures installed through the pilot, these issues occurred very infrequently and were all resolved by the implementer.
- **Participating property managers were unclear about the timing of the supplemental lighting phase of the pilot** at the time of interviews with Cadmus. Interviewees were not dissatisfied with the supplemental phase but expressed confusion about the timing of its rollout.
- **Pre- and post-pilot per-unit energy savings differed significantly because of substantial differences in algorithm inputs such as hours of use (HOU).** Avista originally calculated energy-savings estimates using broad characterizations of building stock in its service territory and intended to use the pilot to collect more-refined information about its customers' households. Thus, differences between estimated and finalized energy savings were not an unexpected outcome for Avista.

Recommendations

Nonresidential

Nonresidential Recommendation 1: A small number of survey respondents said they received an instant discount from their contractor because it was easier to have their contractor apply the discount to the total cost of the project. If Avista wants to promote the instant discount option to nonresidential customers, it should educate customers about the ease of using this option.

Nonresidential Recommendation 2: While Avista is implementing a new tracking database, they should review the data that is being recorded in the database from prescriptive lighting participants to determine if it is sufficient for accurate planning in the future. If current data being gathered is not sufficient, Avista should review what is needed for planning purposes and modify the database to include these detailed measure-level data.

Nonresidential Recommendation 3: According to some survey respondents, the lighting application paperwork was challenging because it was confusing and did not provide precise instructions for completing the application. Although the Avista website provides several ways for customers to contact Avista for additional information, Avista should create and post a document on its website with answers to frequently asked questions about the application to decrease customer challenges. The FAQ document could focus on ways to avoid the application being rejected.

Residential

Residential Recommendation 1: Consider adjusting the constraints used to verify mailing addresses for customers trying to submit their rebate application forms online. While this system works most of the time – per HVAC contractors interviewed by Cadmus, it was usually a non-issue – it can create frustration for customers who ultimately can't complete the process online and must mail in their forms. A system that relies on something simpler, such as account number and/or mailing zip code or house number could still validate customer eligibility without rejecting certain mailing address formats.

Multifamily Direct Install Pilot

MFDI Pilot Recommendation 1: Increase communication with participants to sustain interest in the pilot to prepare for a possible full program rollout that includes a supplemental lighting phase as well as in general for similar future pilots.

Introduction

In 2018, Avista provided rebates and services to its nonresidential and residential electric and natural gas customers throughout its Washington and Idaho service territories. The purpose of the 2018–2019 portfolio process evaluation was to identify and document areas of success and challenge for the programs by reviewing program materials, conducting interviews with program and implementation staff and residential HVAC contractors, and conducting surveys with nonresidential and residential program participants. The evaluation focused on all nonresidential programs (except Energy Smart Green Grocer) and the residential HVAC, Shell, and Fuel Efficiency programs.[1] Cadmus also evaluated the Multifamily Direct Install (MFDI) pilot, designed to benefit hard-to-reach customers.

Methodology

This section describes the interview and survey methodology.

Program Administrator and Implementer Interviews

Cadmus conducted five telephone interviews with program staff and two with third-party implementers as listed in Table 2. The interviews focused on these program topics:

- Program roles and responsibilities
- Program goals and objectives
- Program design and implementation
- Data tracking
- Program participation
- Marketing and outreach
- Program successes
- Market barriers
- Program impact on the market
- Future program changes including redesign

[1] Cadmus did not evaluate the residential ENERGY STAR® Homes program, the third-party "Simple Steps, Smart Savings" regional program, or the Community Energy Efficiency Program (CEEP) in 2018.

Table 2. Stakeholder Interviews

Program	Avista Staff	Implementer Staff
Nonresidential		
Lighting	✓	N/A
HVAC, Shell, VFD, Food Service Equipment	✓	N/A
Green Motors		*
AirGuardian		✓
Fleet Heat		N/A
Site Specific	✓	N/A
Residential		
HVAC	✓	N/A
Shell		
Fuel Efficiency		
Multifamily Direct Install	✓	✓

* Cadmus was unable to reach the Green Motors implementer in Q1 despite support from Avista.

Residential HVAC Contractor Interviews

Cadmus conducted eight interviews with contractors who specialize in HVAC equipment and serve residential customers.[2] Avista provided to Cadmus a list of 76 contractors, eight of whom Avista had highlighted as high-volume contractors for Cadmus to prioritize. Cadmus successfully contacted five of the eight high-volume contractors and also spoke with three other contractors to meet the target quota of eight interviews.

The telephone interviews focused on these HVAC program topics:

- Program awareness and motivation
- Program benefits
- Program delivery experience, including marketing and fulfilling rebates
- Effects of program on success of business
- Interaction with Avista staff
- Perception of customer experience, including awareness and satisfaction
- Successes and challenges
- Feedback and recommendations
- Demographic information

Multifamily Residence Manager Interviews

Cadmus conducted 10 interviews with managers of multifamily residences that participated in the MFDI Pilot. Cadmus met its target quota of 10 interviews from a list of 36 pilot participants provided to Cadmus by Avista. The telephone interviews focused on these pilot topics:

[2] Seven of the eight contractors Cadmus interviewed also serve commercial customers.

- Pilot awareness
- Satisfaction with pilot elements
- Pilot benefits
- Successes and challenges
- Additional energy efficiency actions taken because of pilot participation
- Feedback and recommendations
- Demographic information

Participant Surveys

Cadmus completed 76 phone residential participant surveys and 65 online nonresidential participant surveys. Residential surveys were completed in May and October 2018 and nonresidential surveys were completed from May through August 2018 and February through March 2019. Cadmus leveraged site visits to increase nonresidential survey participation.

The participant survey guides gathered critical insights into participants' program journey, covering the following topics:

- Program awareness
- How respondents learned about the program
- General program participation
- Reasons for participation
- Program benefits
- Program delivery experience
- Overall program satisfaction
- Satisfaction with Avista
- Current energy-efficient behaviors and purchases
- Suggestions for program improvements

Sampling

To prepare the contact lists for each of the nonresidential and residential surveys, Cadmus removed duplicate records and records with incorrect or missing email addresses. Cadmus sent an email invitation to a census of all participants in each program except nonresidential prescriptive exterior and interior lighting participants. Because of the larger number of participants in these two programs, Cadmus randomly selected a sample of 20 participants and sent email invitations in batches of 20 records until the target was met. Following the initial email invitation, Cadmus sent a reminder email. To increase the number of survey responses, the field engineers urged participants during on-site visits to complete the survey if they had not yet done so.

Nonresidential Sampling

As shown in Table 3, of the 138 surveys targeted for the 2018 evaluation year, 65 were completed. Cadmus made several efforts to reach nonresidential participants. First, Cadmus sent email invitations to all eligible participants and one reminder email to any participants who did not respond to the initial email invitation. Cadmus field engineers also encouraged participants to complete the survey following the site visits. Despite these efforts, we did not meet the survey target. Cadmus will review the 2019 evaluation plan with Avista to determine whether efforts such as telephone calls or enlisting Avista's help with outreach should be considered to increase response rates within individual nonresidential programs.

Table 3. Nonresidential Participant Survey Sample Frame, Target, and Completes by Program

Program	Wave 1 (May and June 2018)			Wave 2 (Feb. and March 2019)			2018 Total		
	Sample*	Target	Completes	Sample*	Target	Completes	Sample*	Target	Completes
Nonresidential Site Specific									
Electric	56	7	7	71	20	10	127	27	17
Gas	2	2	0	3	3	2	5	5	2
Nonresidential Prescriptive									
Exterior Lighting	133	4	6	169	12	9	302	16	15
Interior Lighting	173	4	5	226	12	9	399	16	14
HVAC Motor Controls	7	3	2	3	5	0	10	8	2
Food Service Equipment (Electric)	8	5	0	4	4	1	12	9	1
Food Service Equipment (Gas)	21	6	1	38	16	3	59	22	4
Commercial HVAC	18	6	4	17	12	2	35	18	6
Green Motors Rewind	2	2	1	8	6	0	m10	8	1
Fleet Heat	0	0	0	1	1	0	1	1	0
AirGuardian Compressed Air	0	0	0	0	0	0	0	0	0
Insulation	3	3	2	7	5	1	10	8	3
Total	**423**	**42**	**28**	**547**	**96**	**37**	**970**	**138**	**65**

*The sample population included only 2018 nonresidential participants.

Residential Sampling

Cadmus completed the targeted number of surveys for each program in both May and October: 16 for HVAC, 14 for Shell, and eight for Fuel Efficiency. Overall, Cadmus collected 76 responses for process evaluation purposes, as shown in Table 4, and 114 responses for installation verification purposes in 2018.

Table 4. Residential Process Evaluation Participant Survey Sample Frame, Target, and Completes by Program

Program	Wave 1 (May 2018)			Wave 2 (Oct. 2018)			Total		
	Sample	Target	Completes	Sample	Target	Completes	Sample	Target	Completes
Residential									
HVAC	2,094	16	16	2,097	16	16	4,191	32	32
Shell	277	14	14	335	14	14	612	28	28
Fuel Efficiency	459	8	8	323	8	8	782	16	16
Total	**2,830**	**38**	**38**	**2,755**	**38**	**38**	**5,585**	**76**	**76**

Description of Programs

Table 5 provides a summary of the programs included in this evaluation of Avista's 2018 DSM portfolio.

Table 5. 2018 Evaluated Program Descriptions

Program	Measure(s)	Implementer	Program Summary
Nonresidential			
Site Specific	Custom measure(s)	Avista	Customers design energy efficiency projects with documented energy savings and a minimum 10-year measure life for a technical review and possible rebates.
Prescriptive	Lighting, HVAC, VFDs, food service equipment, and shell	Avista	Customers identify potential energy efficiency projects, submit paperwork and receive prescriptive rebates for projects.
Fleet Heat	Smart block heating system	Avista	Electric customers are provided with a smart block heating system to install on vehicles. The device controls both the water temperature in the block and the air temperature outside the block. Installation help is available from HOTSTART.
Green Motor Rewind	Repair/rewind of motors	The Green Motors Practices Group (CMPG)	Electric customers who receive a green motor rewind at a participating service will receive a rebate. The rebate applies to 15 HP to 5,000 HP industrial motors.
AirGuardian Compressed Air	Compressed air leak reduction device	Sight Energy Group	Direct installation of compressed air leak reduction device to electric customers following a compressed air audit
Residential			
HVAC	Space heat, water heat, and smart thermostats	Avista	Customers identify potential energy efficiency projects, submit paperwork, and receive prescriptive rebates for projects.
Shell	Standard and storm windows		
Fuel Efficiency	Natural gas space and water heat		
Multifamily Direct Install Pilot	Lighting, water-saving measures, water heater insulation, VendingMisers	SBW Consulting	Direct installation of energy-saving measures, on-site audits to identify opportunities and interest in existing Avista programs, and follow-up visits to install supplemental lighting measures.

Findings

Nonresidential Site Specific

This section outlines the findings from the interview Cadmus completed with the program manager and the surveys completed with 19 site-specific participants.

Program Changes

No design, implementation, or rebate changes were made to the site specific program in 2018. The program manager did not report any problems or issues of concern implementing this program. She noted that communication between implementation staff, account executives, and engineers who provide technical guidance has been working very well. Engineers were involved in the initial and final

cost and savings reports, which provided customers with more-accurate predictions of expected rebate levels.

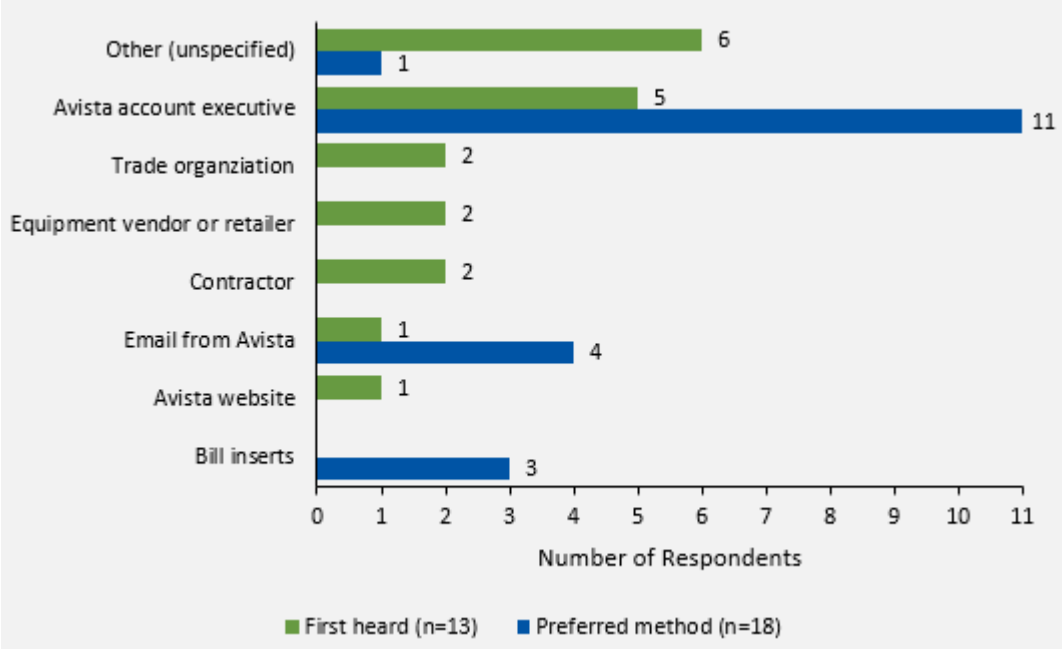
Marketing and Outreach

The program used a direct, customer-centered approach for outreach: marketing the program through established relationships with account executives (AE). AEs most commonly reach out to customers through email blasts. In addition, the Avista website provided preliminary information about the site-specific program and encouraged customers to reach out to their account executive or a trade ally when they had questions. In 2018, the program created and published on the Avista website a case study targeted at the multifamily sector as a method of engagement. AEs and trade allies cross-promoted all nonresidential programs when discussing energy efficiency improvement projects with customers. To answer questions and promote all nonresidential programs to trade allies, Avista hosted informational breakfasts throughout the year.

Customer Awareness

Seventeen of the 19 survey respondents previously participated in an Avista business energy efficiency program. As shown in Figure 1, survey respondents learned about the site specific program from a variety of sources. Most respondents indicated that the best way for Avista to inform customers about rebate amounts and rebate programs is via their Avista account executive (11 responses).

Figure 1. Program Awareness

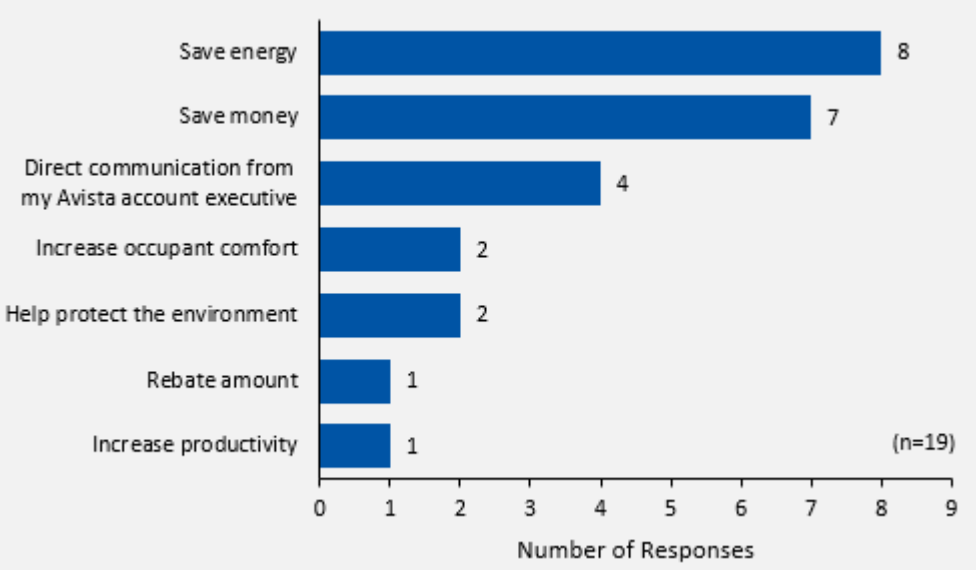


Source: Site specific survey questions C2 and C3: "How did you first hear about the site specific program?" and "What is the best way for Avista to inform commercial customers like you about their rebates and incentives for energy efficiency improvements?"

Motivation and Benefits of Participation

As shown in Figure 2, survey respondents said they were motivated to participate in the site specific program to save energy (8 responses) and save money (7 responses).

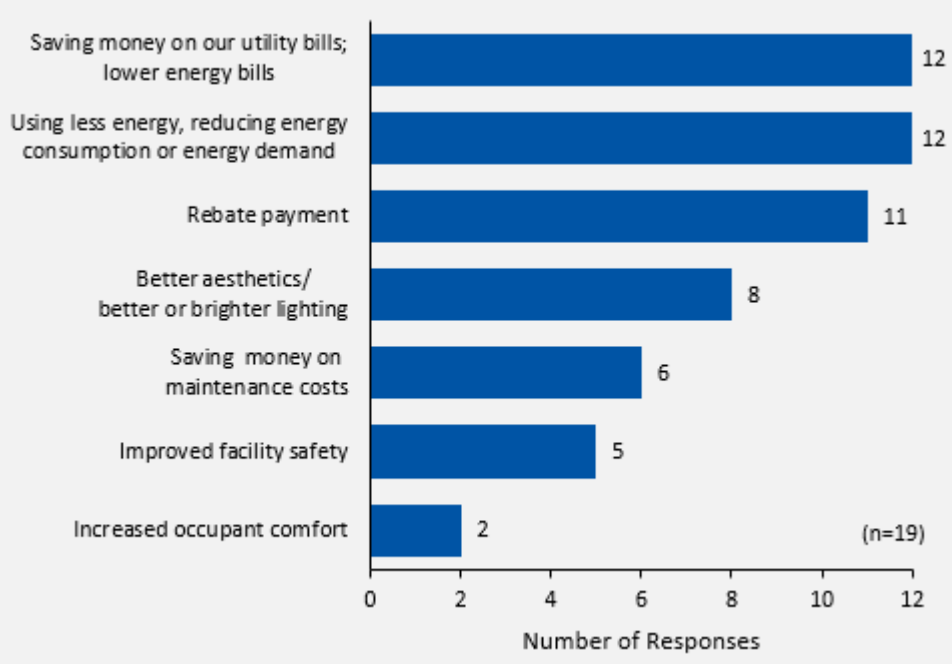
Figure 2. Site Specific Participation Motivation



Source: Site specific survey question C4: "What motivated you to participate in the Site specific Program?" Multiple responses allowed.

Additionally, survey respondents said the main benefits for participating in the program are to save money (12 responses), use less energy (12 responses), and receive a rebate (11 responses) as shown in Figure 3.

Figure 3. Site Specific Participation Benefits



Source: Site specific survey question C5: "What would you say are the main benefits your company has experienced as a result of participation?" Multiple responses allowed.

Customer Experience

Program Delivery

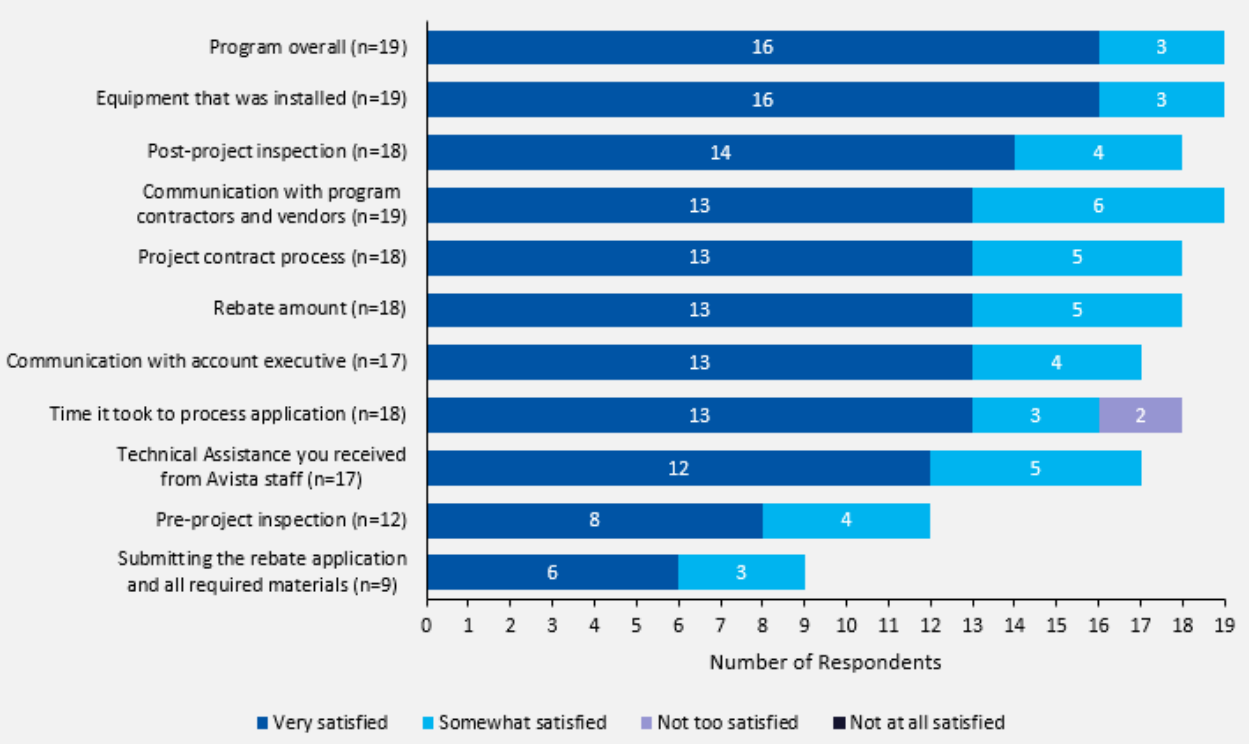
Survey respondents answered questions about how they designed and implemented their projects. Eight survey respondents (n=19) said they received design and implementation support from their contractor; four said they received support from Avista staff; two said they relied on internal resources for design and implementation; and five said they received support from both Avista staff and a contractor, vendor, or retailer.

Two of the 19 survey respondents said their contractor provided an instant discount toward the cost of the project. One of them said they requested the instant discount because it was easier to have their contractor handle the details. The other respondent did not provide a reason.

Program Satisfaction

All respondents (n=19) were satisfied with the program overall and satisfied with Avista (n=19). Respondents were most satisfied with equipment that was installed, as shown in Figure 4. Two respondents were *not too satisfied* with the time it took to process their application: one reported issues with correct calculations during the rebate process and one said the check was delayed because of delays with site inspections.

Figure 4. Satisfaction with Site Specific Program Components



Source: Site specific survey question E1: "In terms of the site specific program, how satisfied were you with the following aspects? Please think about each item individually as you select your answer."

All survey respondents reported being either *very* or *somewhat satisfied* (n=19) with the rebate amount and all respondents (n=19) said the rebate was *very* or *somewhat important* in their decision to complete the project as it was implemented. Additionally, the program manager said the program was more attractive to customers because Avista is using a flat rebate structure rather than a tiered rebate structure.

Program Challenges and Successes

Twelve respondents reported a variety of program participation challenges (Table 6). Two respondents said they did not encounter challenges with the program, and the remaining five did not provide a response to this question.

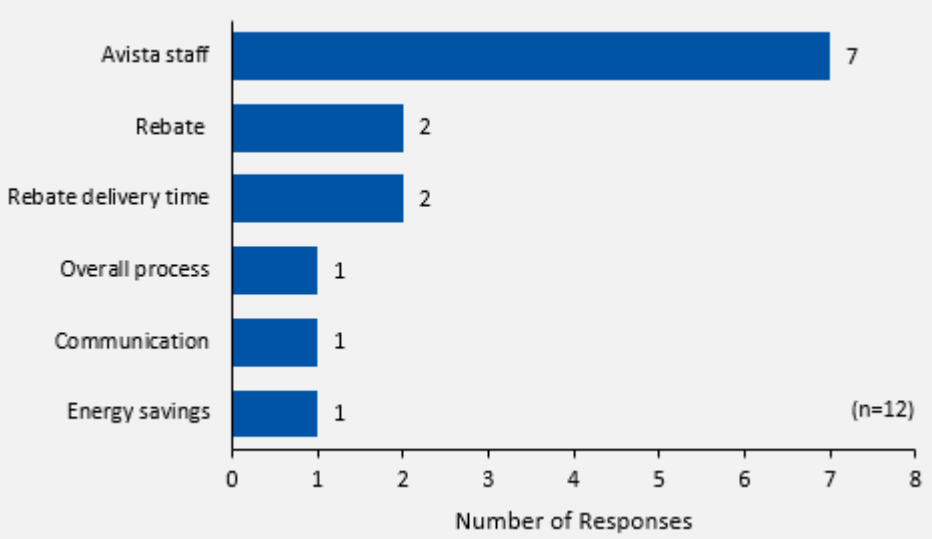
Table 6. Participation Challenges

Challenge	Number of Responses (n=12)
Determining program eligibility	3
Determining the correct rebate amount	1
Deciding when to engage Avista engineers and vendors	1
Cost of the project	1
Getting internal buy-in	1
Reminding installers about taking pre- and post-installation photos	1
Vendor availability	1
Working with multiple internal and external staff to complete the project	1
Time needed to complete the project	1
Rebate availability for large, multi-year projects in apartment complexes	1

Source: Site specific survey question E3. What do you see as the biggest challenges to participating in Avista's site specific program?"

Despite these issues, 12 respondents called out several program areas that they viewed as working well (Figure 5).

Figure 5. Site Specific Program Successes



Source: Site specific survey question E5: "What would you say is working particularly well with Avista's Site specific Program?" Multiple responses allowed.

Five survey respondents provided recommendations to improve the program:

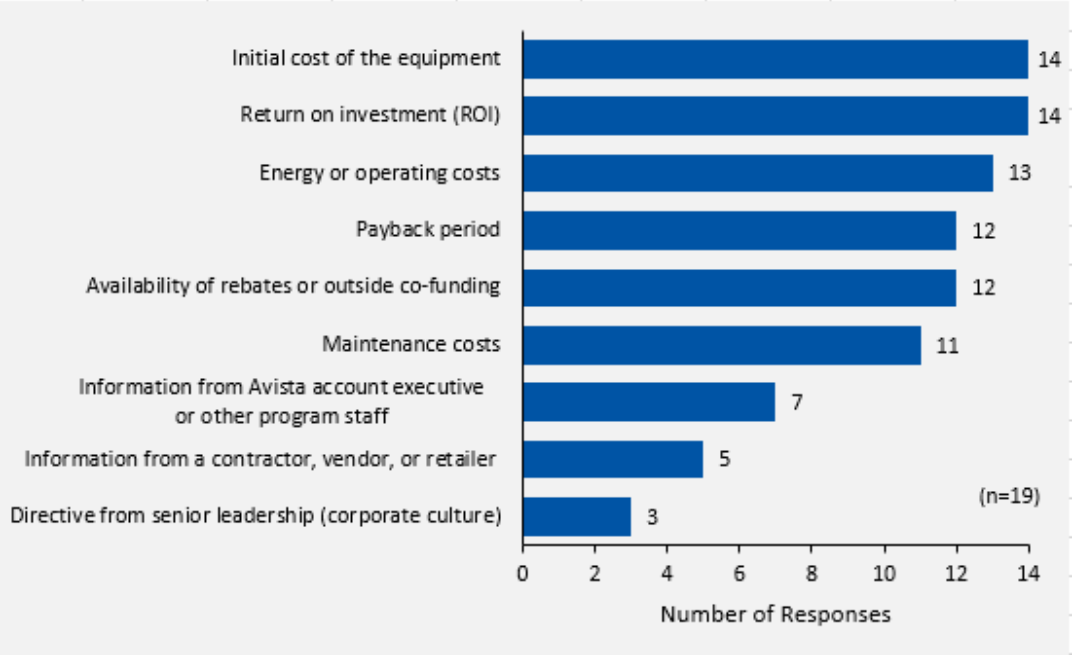
- Provide more education about the program
- Come to a final agreement about the rebate amount at the beginning of the project
- Less cost
- Pay rebates more quickly

- Guarantee that rebate money would still be available when the project is completed because making improvements to an apartment building can take multiple years to complete

Energy Efficiency Attitudes and Behaviors

All respondents (n=19) said the rebate provided by Avista was *very* or *somewhat important* in their decision to complete their project, and almost all respondents (18 of 19) said energy efficiency was *very* or *somewhat important* when making capital upgrades or improvements. As shown in Figure 6, initial equipment cost and return on investment (ROI) were the most important criteria in the decision to make energy efficiency improvements.

Figure 6. Important Criteria for Making Energy Efficiency Improvements



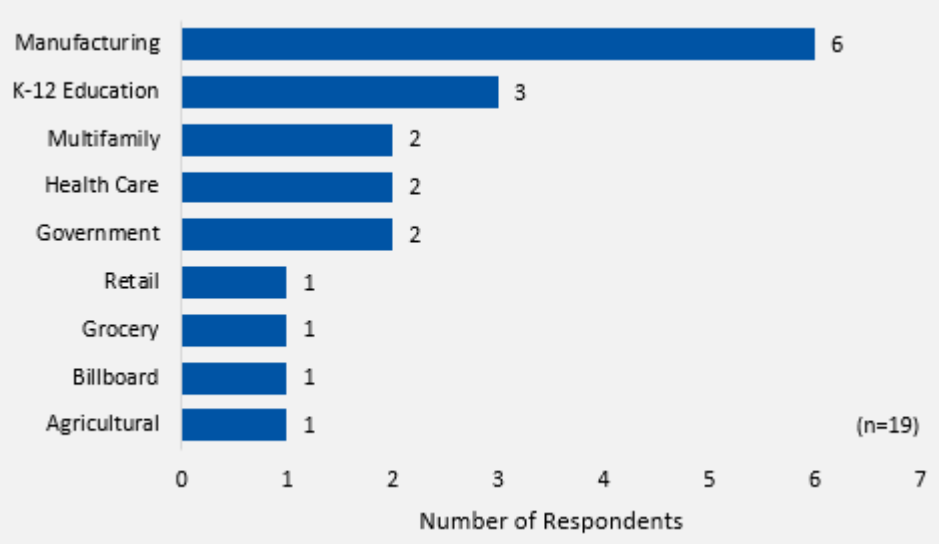
Source: Site specific survey question F3: "Which of the following criteria are important in deciding whether your company makes energy efficiency improvements?" Multiple responses allowed.

Since participating in the site specific program, four respondents have purchased energy-efficient equipment: two have installed more boilers, one has completed an LED lighting project and one did not provide details about the project. Two respondents have adopted new protocols such as staging start and end times on production and using unspecified energy-management protocols.

Survey Respondent Profile

Three respondents lease their facilities while 15 own their facility. The number of employees at each facility ranged from one to 3,500: eight had between one and 200 employees, three had between 200 and 500 employees, and three had more than 500 employees (n=14). Eleven facilities primarily used gas to heat their facility while two used electricity and one used steam. As shown in Figure 7, the largest group of survey respondents completed a manufacturing project.

Figure 7. Site Specific Project Type

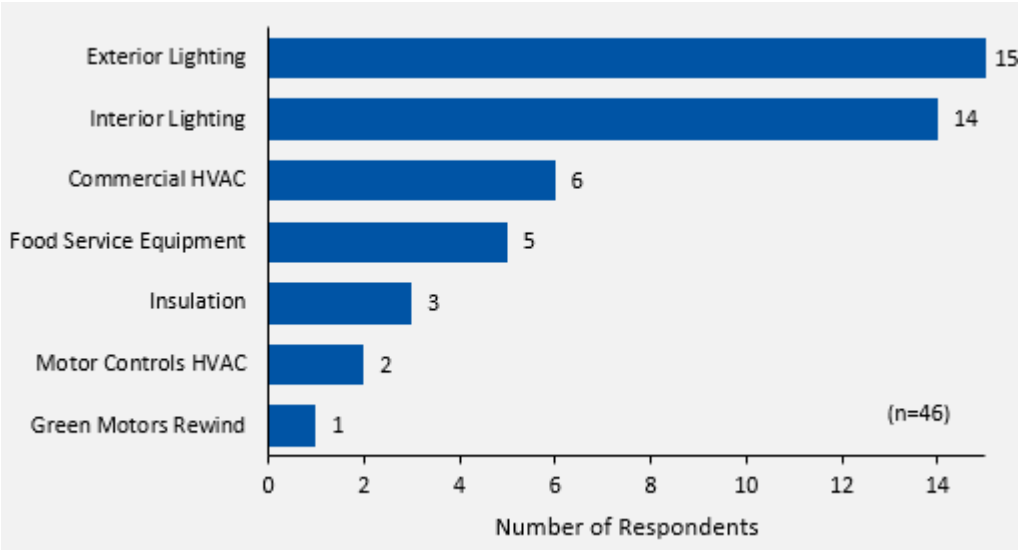


Source: 2018 Program participant data.

Nonresidential Prescriptive

This section outlines the findings from the three interviews Cadmus completed with Avista and implementation staff and the 46 online surveys completed with prescriptive participants. Figure 8 lists the prescriptive programs in which survey participants participated.

Figure 8. Prescriptive Programs



Source: 2018 Program participant data.

Program Changes

Avista made several changes to commercial lighting program rebates in 2018, as summarized in Table 7. In addition to the changes to the rebate amounts, Avista modified the wattage range on most interior and exterior lighting products.[3]

Table 7. 2018 Prescriptive Program Rebate Changes[4]

Program	Change	2017	2018
Lighting	Interior 4-Foot 4-Lamp T12/T8 Fixture to 2-Lamp HP T8 Fixture or Retrofit Kit	$35	$0*
	Interior 4-Foot 3-Lamp T12/T8 Fixture to 2-Lamp HP T8 Fixture or Retrofit Kit	$25	$0*
	Interior 4-Foot 2-Lamp T12/T8 Fixture to 1-Lamp HP T8 Fixture/Retrofit Kit	$18	$0*
	Interior 250 watt HID to ≤ 140-watt DLC approved LED Fixture	$180	$155
	Exterior New Construction 320 & 400 Watt HID to ≤ 175-watt DLC LED Fixture	$175	$250

* measure discontinued

When rebates or other program changes occur, Avista holds webinars or other events to explain the changes. Additionally, program staff for the lighting program attend trade ally meetings to discuss program changes with contractors and vendors.

Program managers said Avista planned to revise the customer relationship management system, InforCFM, in mid- to late-2018 but this had not happened at the time of the program staff interviews. The current tracking system was working well for most programs, however, the lighting program manager indicated that being able to track more measure level detail would be helpful for future planning purposes.

Marketing and Outreach

According to the program and implementer interviews, most customers learn about the program from the contractor or vendor they work with to implement the project, from Avista's account executives, or from email messages sent to customers. Customers may also learn about energy efficiency programs through Avista's monthly newsletters targeted at commercial customers. Bill statements also include messages about energy efficiency in general and sometimes highlight specific energy efficiency programs. To answer questions and promote all nonresidential programs to trade allies, Avista hosts informational breakfasts throughout the year.

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[3] A comparison of 2017 and 2018 Prescriptive Lighting rebates is found in the 2018 Avista DSM Standard Operating Procedures Manual, p. 36–37.

[4] Source: 2017 Avista DSM Standard Operating Procedures Manual and 2018 Avista DSM Standard Operating Procedures Manual.

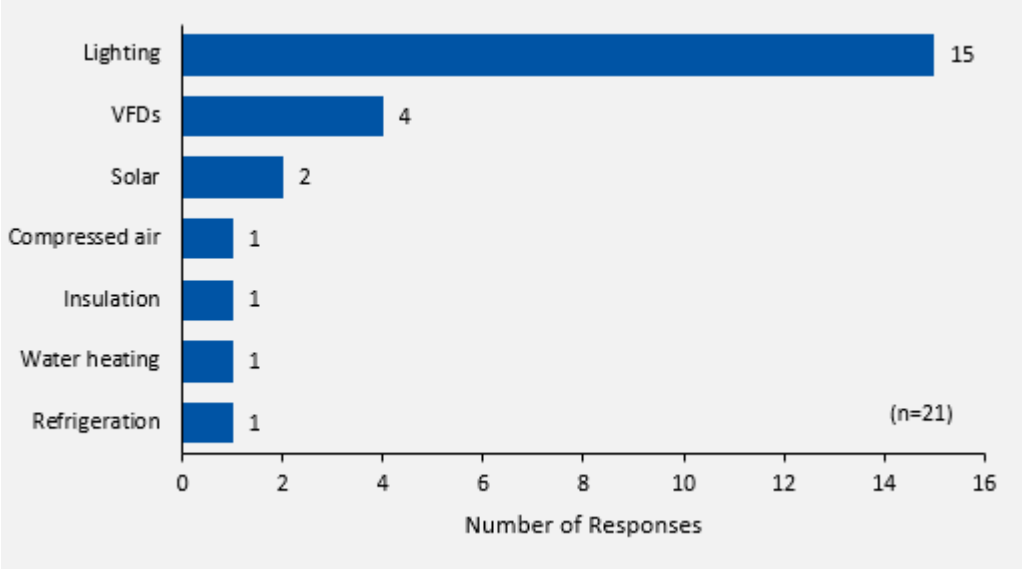
While outreach remained the same for most 2018 nonresidential programs, the implementer said a slight change was made to outreach for the Green Motors Initiative in 2018. In the past, the implementer, Green Motors Practice Group (GMPG), placed cold calls to Avista customers to find and recruit participants. In 2018, they focused outreach efforts on interested and eligible customers identified by Avista account executives.

Customer Awareness

Over half of survey respondents (58%; 23 of 40) have previously participated in an Avista business energy efficiency program. None of the 2018 insulation program survey respondents (n=3) had participated in an Avista business energy efficiency program before 2018.

Twenty-one of the 23 respondents who had participated previously provided details about the types of equipment they installed. The most common type of equipment respondents installed while participating in an Avista business energy efficiency program was lighting (Figure 9; 15 responses). No notable differences emerged across participant types.

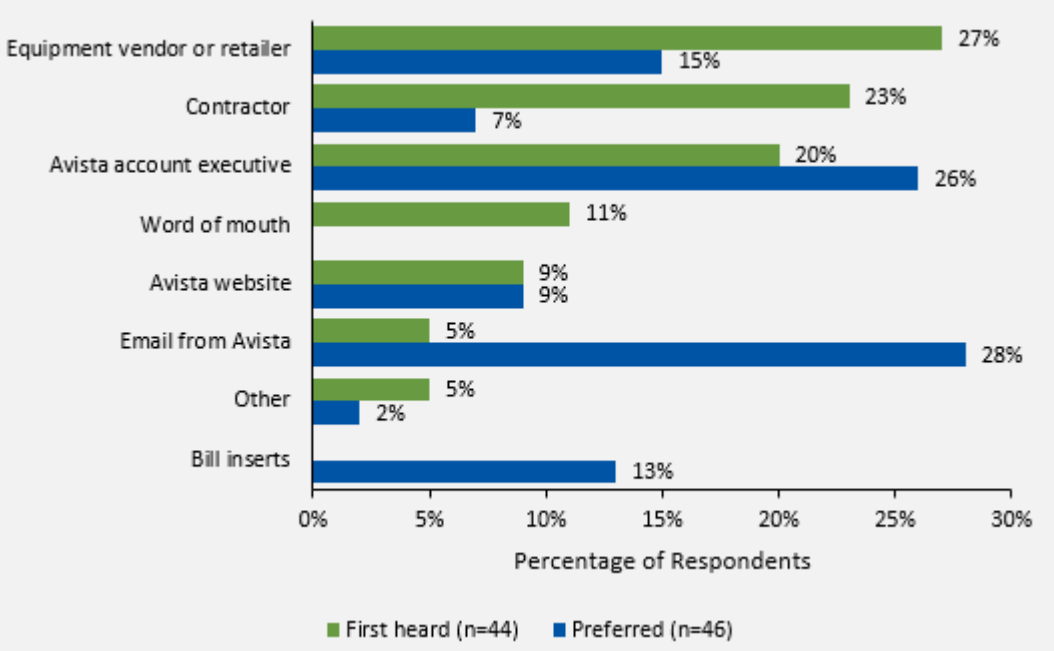
Figure 9. Equipment Installed by Previous Avista Program Participants



Source: Prescriptive survey question C1.2: "What other Avista nonresidential energy efficiency programs has your business participated in?" Multiple responses accepted.

As shown in Figure 10, the most common way survey respondents first learned of the program was from an equipment vendor or retailer (27%). Over one-quarter of respondents indicated that the best way for Avista to inform them about rebate programs is by email from Avista (28%) or directly from their Avista account executive (26%).

Figure 10. Program Awareness

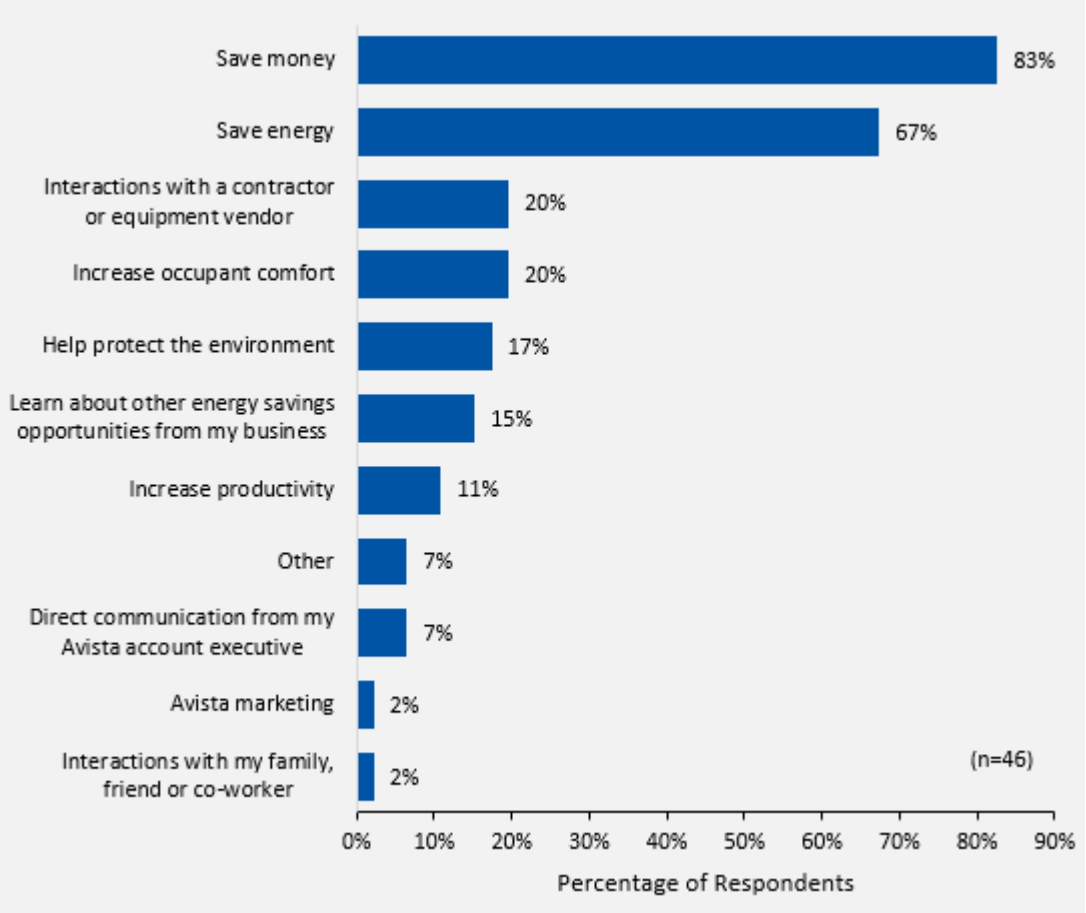


Source: Prescriptive survey questions C2 and C3: "How did you first hear about the program?" and "What is the best way for Avista to inform commercial customers like you about their rebates and incentives for energy efficiency improvements?" Percentages may not total 100% due to rounding.

Motivation and Benefits of Participation

As shown in Figure 11, survey respondents said they were motivated to participate in the program to save money (83%) and save energy (67%). The Green Motors Rewind respondent was motivated by his interactions with the contractor or vendor, and respondents in the food services equipment program were motivated by saving energy. There were no other notable differences among participant groups.

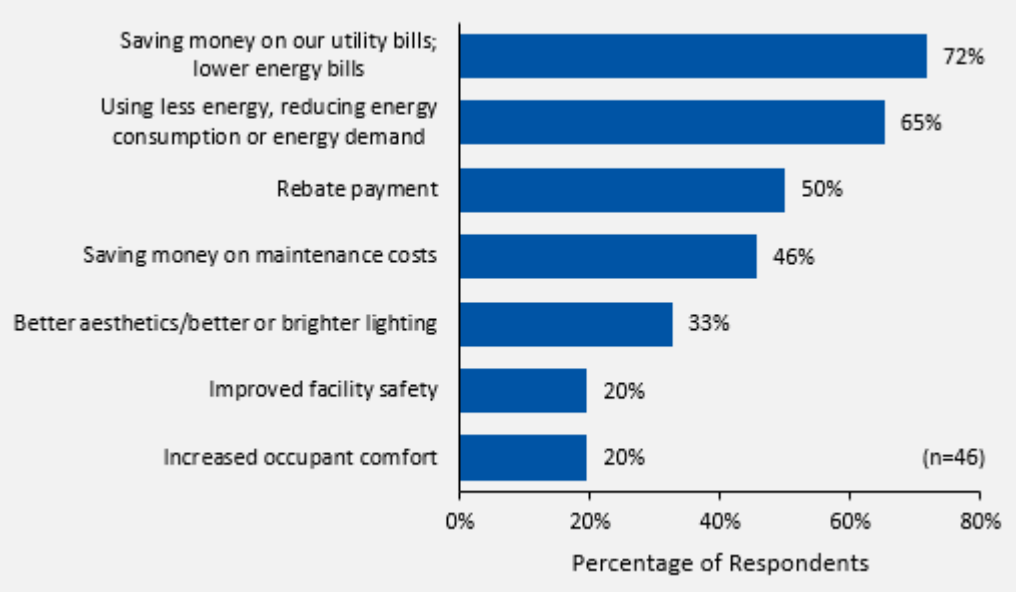
Figure 11. Prescriptive Participation Motivation



Source: Prescriptive survey question C4: "What motivated you to participate in the program?" Multiple responses accepted.

Additionally, survey respondents said the main benefits for participating in the program were to save money on utility bills (72%) and use less energy (65%; Figure 12). These top benefits were consistent across all programs except the Green Motors Rewind participant who said the main benefit was saving money on maintenance costs.

Figure 12. Prescriptive Participation Benefits



Source: Prescriptive survey question C5: "What would you say are the main benefits your company has experienced as a result of participation?" Multiple responses accepted.

Customer Experience

Program Delivery

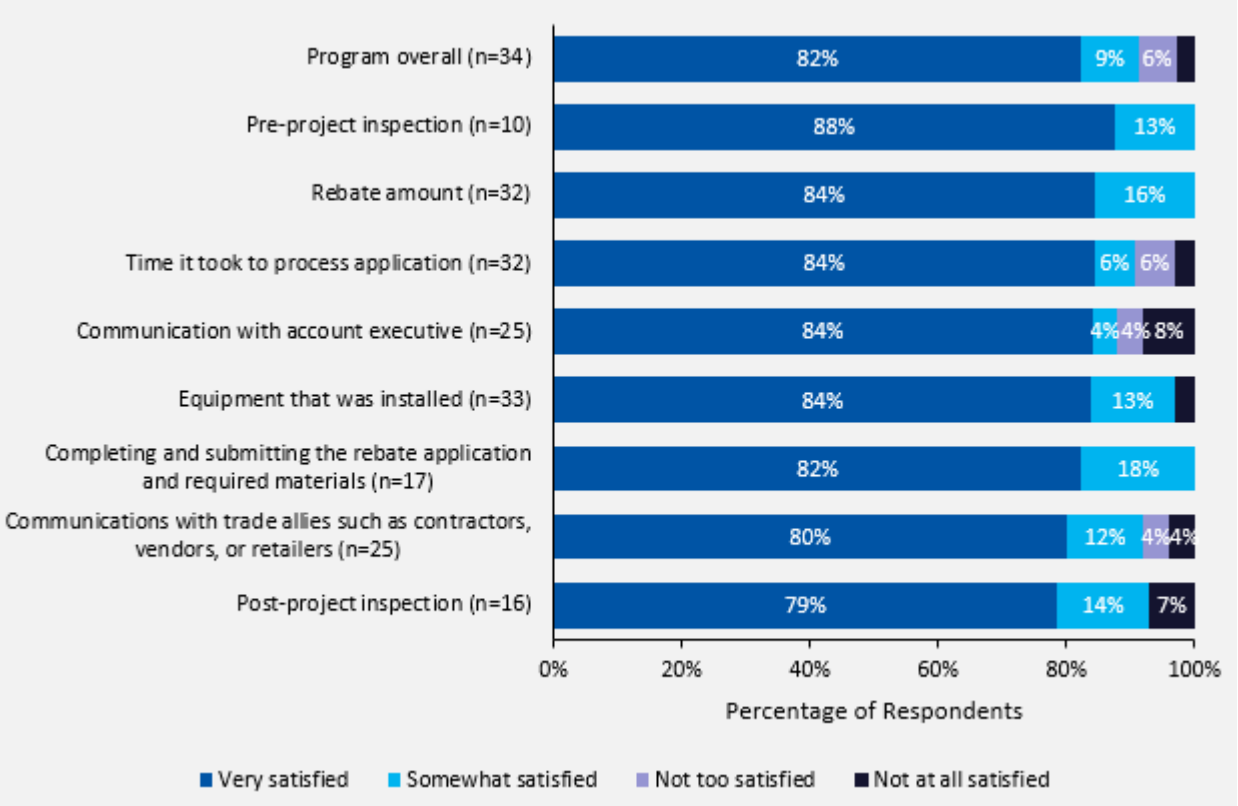
Most survey respondents (82%; n=38) used a third-party consultant such as a contractor or vendor to design or implement their project while 18% used only internal resources. In addition to using a contractor or vendor, 13% used Avista staff to design or implement their project. Over half of organizations (68%; n=38) in the survey took the lead role in completing the application for the rebate.

Most respondents received the rebate check directly (89%; n=37), however, 11% (4 of 37) received an instant discount from their contractor. Two respondents who received an instant discount from their contractor said they opted for this method of payment because their contractor did not offer another option for receiving the rebate, one respondent said it was easier to have the contractor submit the necessary paperwork, and one respondent did not provide a reason for selecting this option.

Program Satisfaction

Almost all respondents (98%; n=45) were satisfied with Avista and 91% (n=34) were satisfied with the program. All respondents were *very* or *somewhat satisfied* with the pre-project inspection and the rebate amount, as shown in Figure 13. Program staff said that if rebate levels were reduced, participation would decrease, especially in the lighting and insulation programs. The lighting program manager said current rebates for exterior lighting motivated customers to participate while current interior lighting rebates were less motivating.

Figure 13. Satisfaction with Prescriptive Program Components



Source: Prescriptive survey questions H1 and H7: "In terms of the [PROGRAM], how satisfied were you with the following aspects? Please think about each item individually as you select your answer."

While almost all survey respondents were satisfied with the program and its components, four respondents provided reasons for their dissatisfaction as shown in Table 8. Other respondents who were dissatisfied with a program component did not provide a reason for their dissatisfaction.

Table 8. Reasons for Program Dissatisfaction

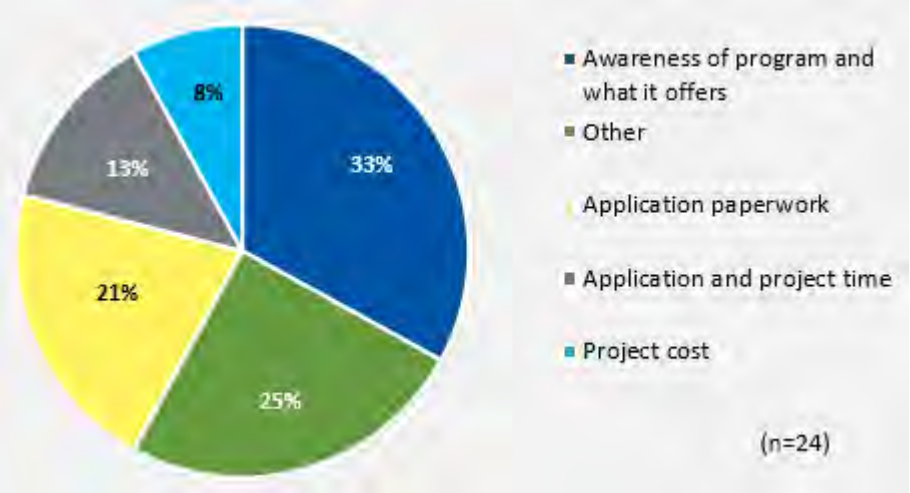
Component	Reason for Dissatisfaction	Program
Communication with account executive	Have not received the rebate	HVAC
	Very little communication	Interior Lighting
	Have not received much email communication and it takes a long time for rebate to be approved	Exterior Lighting
Communication with trade ally	Unresponsive and misled organization about effectiveness of the equipment	Interior Lighting
Equipment installed	Equipment not as effective as the lighting it replaced	Interior Lighting
Overall satisfaction	Have not received the rebate	HVAC
	No energy reduction	Interior Lighting
	Concerns with contractor that were not addressed by Avista	Interior Lighting

Program Challenges and Successes

Over half of respondents (52%; n=46) reported program participation challenges. The most common challenge, as shown in Figure 14, was being aware of the program and what it offers. "Other" responses include contractor availability, receiving rebate, getting buy-in, prioritizing projects, getting a quality result, and no more improvements to make.

Five of the eight respondents who said program awareness was a challenge were interior or exterior lighting participants. Three lighting participants said the rebate paperwork was challenging. They said the form was confusing and it did not provide precise directions. Additionally, they said identifying fixtures that qualified for the program was challenging. These customer challenges were reinforced by the program manager who said the biggest challenge for lighting participants was understanding the terminology especially around DesignLights Consortium certification. The program manager also said there have been fewer application rejections in the past year or two because of an improved rebate application form. The AirGuardian implementer said the biggest challenge for this program is assuring participants that there is no cost to them to participate. When customers are skeptical, the implementer refers them to Avista for confirmation.

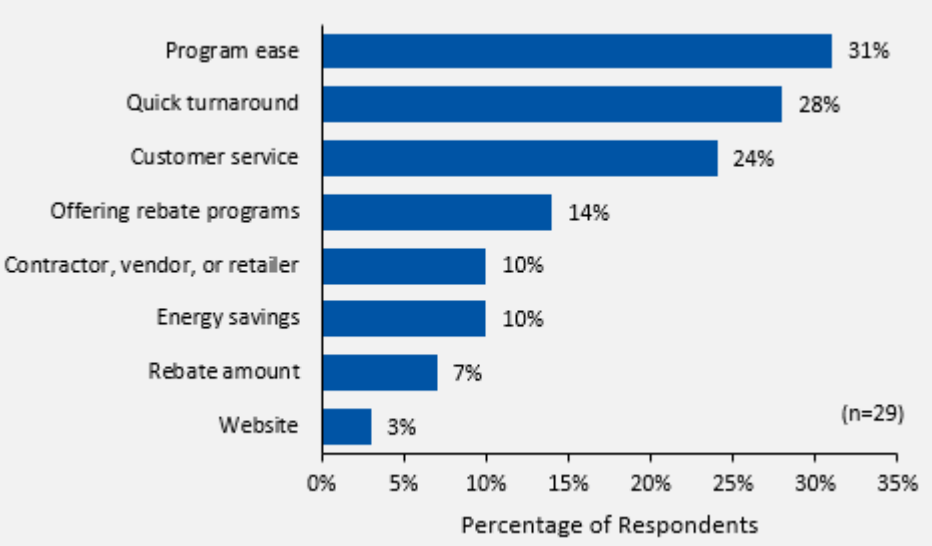
Figure 14. Participation Challenges



Source: Prescriptive survey question H9: "What do so see as the biggest challenges to participating in Avista's [PROGRAM_NAME]?"

Despite these issues, 29 respondents called out several program areas that they viewed as working well (Figure 15).

Figure 15. Prescriptive Program Successes



Source: Prescriptive survey question H11: "What would you say is working particularly well with Avista's Program?" Multiple responses allowed.

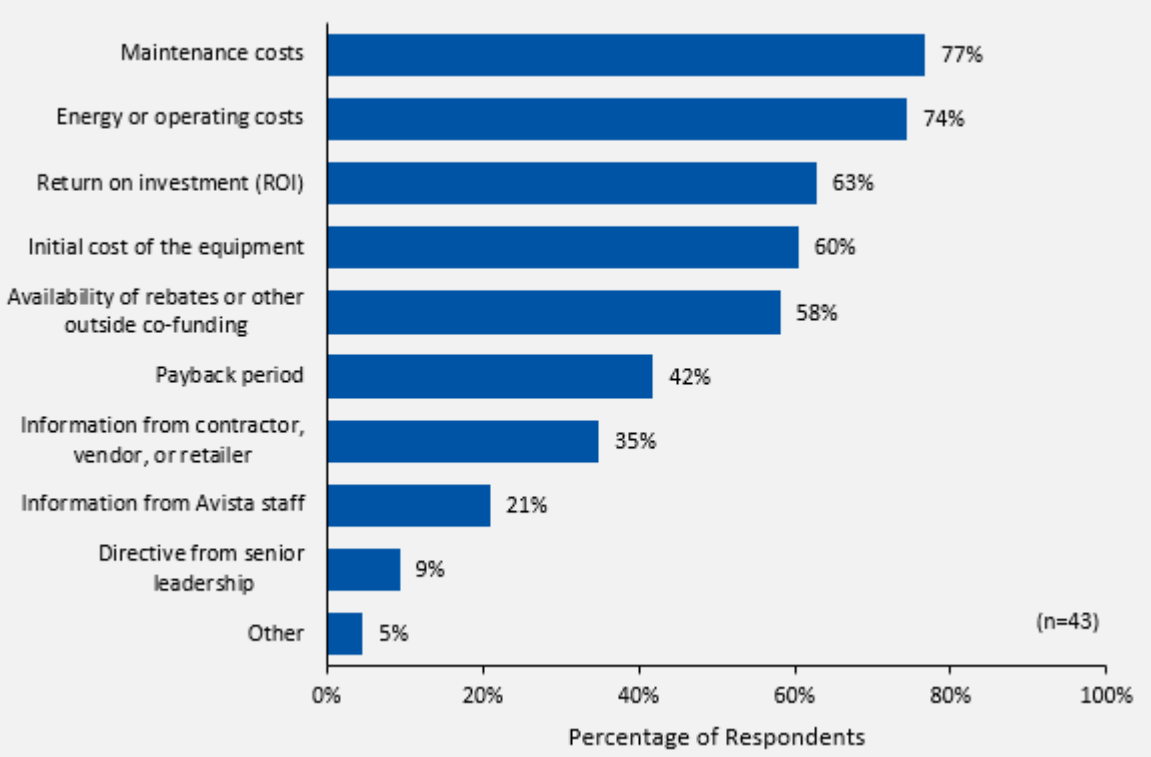
Sixteen participants provided recommendations to improve the program. Six of these participants suggested more outreach or different types of outreach, two would like the programs to continue, and two suggested Avista provide more information when program changes are made. Additional responses (one each) included:

- Better communication
- Easier application process
- Allow online application submittal
- Do not allow contractors to receive the rebate
- Provide a contractor list
- Electronic reporting

Energy Efficiency Attitudes and Behaviors

All but one of the respondents (n=46) said the rebate provided by Avista was *very* or *somewhat important* in their decision to complete their project. As shown in Figure 16, maintenance costs (77%) and energy or operating costs (74%) were the most important criteria in their decision to make energy efficiency improvements. While maintenance costs were the most important criteria among all prescriptive program participants, the most-important criteria differed by program (Table 9).

Figure 16. Important Criteria for Making Energy Efficiency Improvements



Source: Prescriptive survey question K2: "Which of the following criteria are important in deciding whether your company makes energy efficiency improvements?" Multiple responses allowed.

Table 9 shows the criteria most commonly selected when deciding whether to make energy efficiency improvements for each of the prescriptive programs.

Table 9. Important Energy Efficiency Project Criteria by Prescriptive Program

Program	Most Selected Criteria	Percentage of Respondents
Commercial HVAC (n=6)	Maintenance costs	100%
Food Service (n=5)	Initial cost of the equipment	100%
Green Motors (n=1)*	ROI, payback period, availability of rebates, and information from Avista staff	100%
Insulation (n=3)	Energy or operating costs	100%
Exterior Lighting (n=14)	Maintenance costs	79%
Interior Lighting (n=12)	ROI, energy or operating costs, and maintenance costs	67%
HVAC Motor Controls (n=2)*	ROI, payback period, availability of rebates, energy costs, maintenance costs and availability of rebates	100%

*Multiple criteria selected by 100% of survey respondents.

Nine respondents suggested other energy savings programs Avista could offer:

- Solar for commercial and residential customers (2 responses)
- Energy audit (2 responses)
- Multi-stage air conditioning (1 response)
- Scheduling evening/weekend setbacks and HVAC schedule improvements (1 response)
- Equipment performance improvements (1 response)
- Energy efficient windows (1 response)
- Renewal energy projects for rural customers (1 response)

Survey Respondent Profile

Most survey respondents' primary heating fuel was electricity (83%; n=41), and 70% own their facility. Facility sizes ranged from 1,600 square feet to 550,000 square feet with an average of 60,617 square feet (n=36). Number of employees ranged from three to 500 with an average of 77 employees (n=34).

Residential Programs

For its 2018 process evaluation, Cadmus conducted stakeholder interviews with Avista and implementer staff, phone interviews with HVAC contractors, and phone surveys with residential program participants. Each data collection task informed its own set of research objectives and covered the HVAC, Shell, and Fuel Efficiency programs together.

Stakeholder Interviews

Cadmus interviewed Avista program staff about its residential programming in April 2018. Avista staff said the HVAC, Shell, and Fuel Efficiency programs ran smoothly and were delivered mostly as described in Avista's 2017 Plan Washington & Idaho Demand Side Management Standard Operating Procedures, with the following small changes to rebates:[5]

- **HVAC:** Staff reduced rebates for smart thermostats to $60 if self-installed (originally $75) and $75 if contractor-installed (originally $100) to stay within budget. Despite lower rebate levels, rebate applications increased from those in 2017, according to Avista staff.
- **Fuel Efficiency:** Staff increased rebates to $500 for ductless heat pumps (originally $450). Avista discontinued stand-alone rebates for natural gas water heaters because of a lack of interest in the measure but still incentivized them as part of a $2,250 combined rebate for converting to natural gas for both space and water heating.

At the time of the interview, the Avista team said customers had responded most strongly to smart thermostats during Q1 despite reduced rebates. Conversely, Shell program participants had been

[5] These changes are reflected in the Avista 2018 Washington & Idaho Demand Side Management Standard Operating Procedures.

inclined to replace existing windows with regular windows rather than storm windows, leading Avista to consider but ultimately not follow through on retiring rebates for storm windows.

Avista staff did not note any structural barriers to participation or challenges in delivering the programs.

Participant Phone Surveys

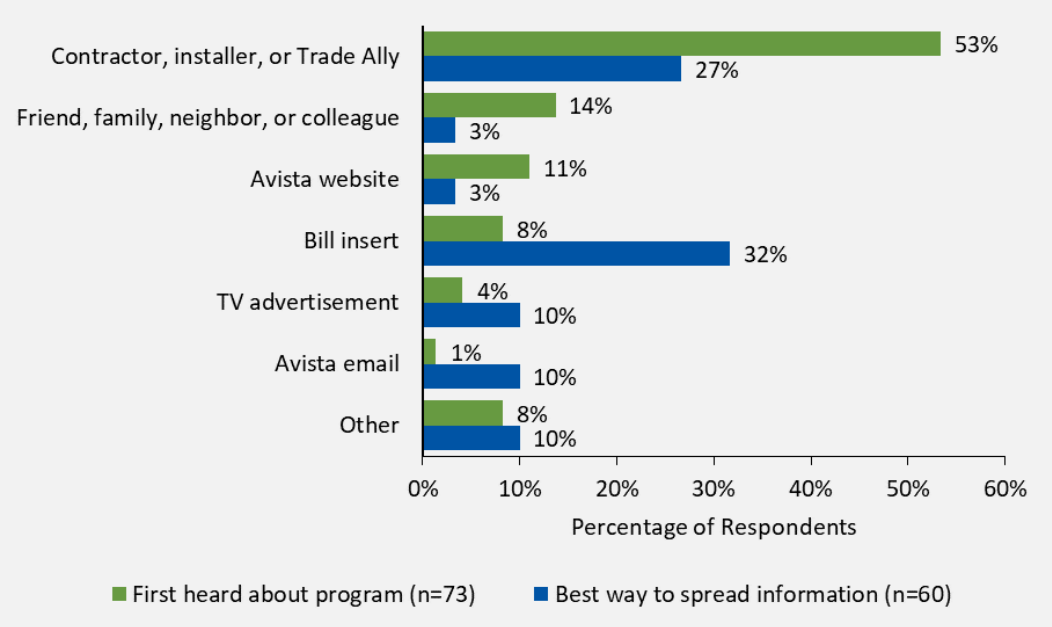
Cadmus completed 76 phone surveys with HVAC, Shell, and Fuel Efficiency program participants in May and October 2018 (38 respondents each month). The following sections synthesize the results from both waves of surveys and detail the findings below.

Customer Awareness

Cadmus asked survey respondents where they remembered learning about the program in which they participated.

Respondents most commonly learned about Avista programs through contractors (53%), followed distantly by word of mouth (14%) and Avista's website (11%), as shown in Figure 17. Respondents preferred to hear about Avista energy efficiency programs through word of mouth (27%) but also cited bill inserts (32%) as an effective way to spread information. A small portion of respondents also preferred to learn about programming via Avista emails (10%) or TV advertisements (10%).

Figure 17. Awareness of Avista Energy Efficiency Programming

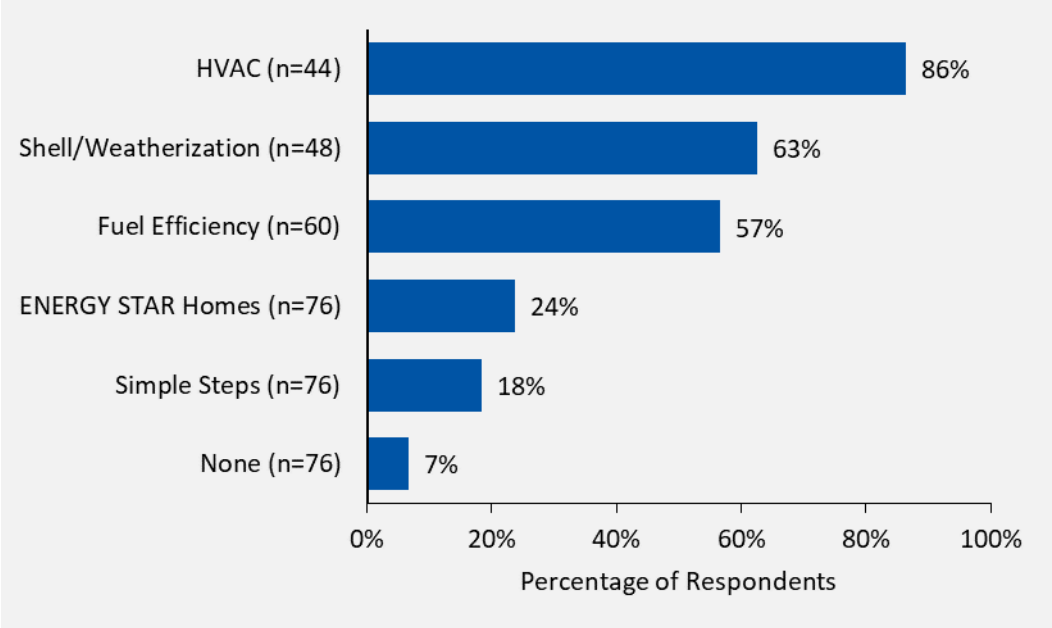


Source: Residential Programs Participant Survey, Question B1: "How did you first hear about the [PROGRAM NAME] Program?"; Question B2: "What is the best way for Avista to inform residential customers like you about their energy efficiency improvement rebates?"

Ninety-three percent of respondents reported that they had heard about at least one Avista energy efficiency program in 2018, other than the program in which they participated. Respondents most frequently reported hearing about the HVAC program (86%), followed by the Shell (63%) and Fuel

Efficiency (57%) programs,[6] as shown in Figure 18. ENERGY STAR® Homes and Simple Steps, Smart Savings, two programs run by third-party implementers, garnered much lower levels of awareness from survey respondents (24% and 18%), respectively.

Figure 18. Awareness of Other Avista Residential Programs



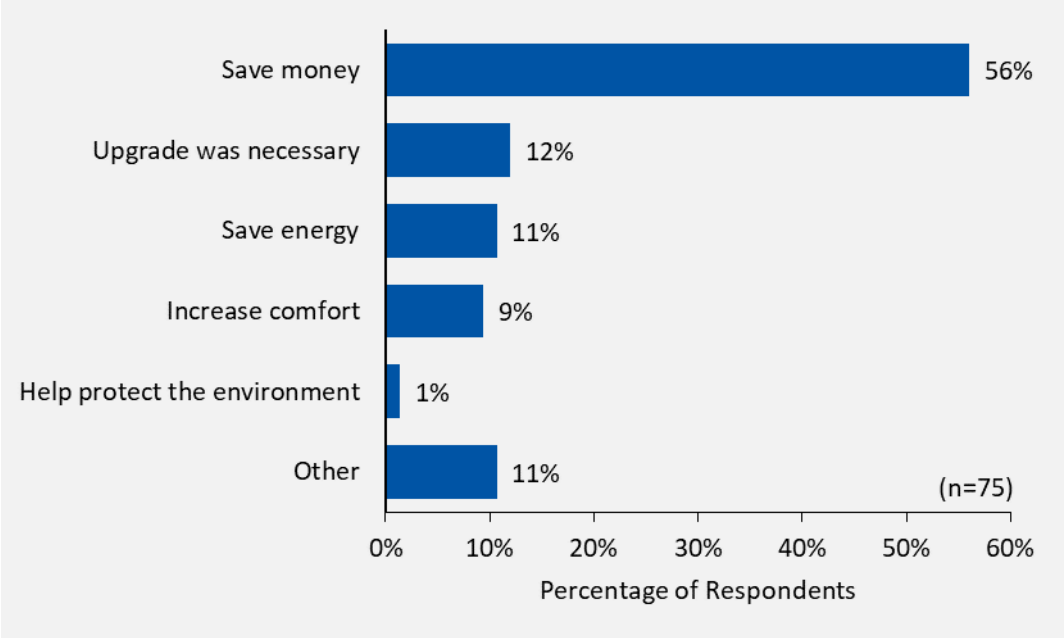
Source: Residential Programs Participant Survey, Question D1: "What other Avista energy efficiency programs have you heard of?"

Motivation and Program Benefits

As shown in Figure 19, more than half of respondents said their primary motivation to participate in Avista residential energy efficiency programming was to save money (56%). Respondents also wanted to save energy (11%) and increase the comfort of their homes (9%). Twelve percent said they participated only because it was necessary (for example, the existing furnace or windows were broken).

[6] Cadmus did not ask respondents about programs in which they participated (e.g., no Shell participants were asked cross-promotion questions about Shell). Multiple responses were allowed.

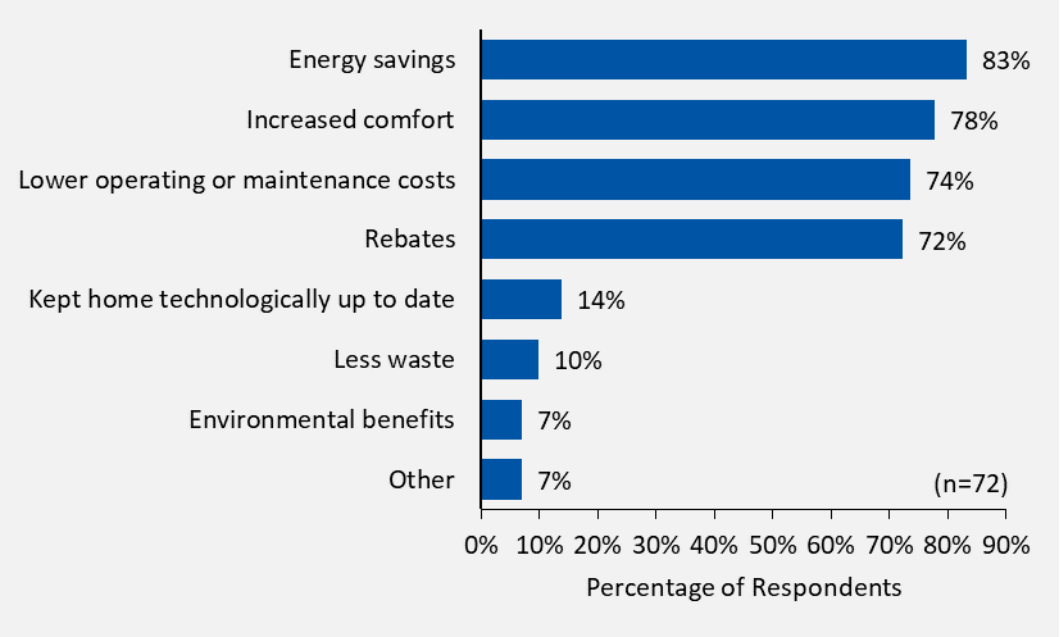
Figure 19. Motivation to Participate in Residential Programs



Source: Residential Programs Participant Survey, Question B3: "What motivated you to participate in the [PROGRAM NAME] Program?"

Cadmus asked survey respondents a multiple-response question about what benefits were associated with participating in Avista residential programs. Most respondents cited energy savings (83%), increased comfort (78%), lower operation/maintenance costs (74%), and rebates (72%) (Figure 20). A small portion of respondents like keeping up with technological trends, and another 7% to 10% saw value in producing less waste and better environmental outcomes.

Figure 20. Benefits of Participation in Residential Programs



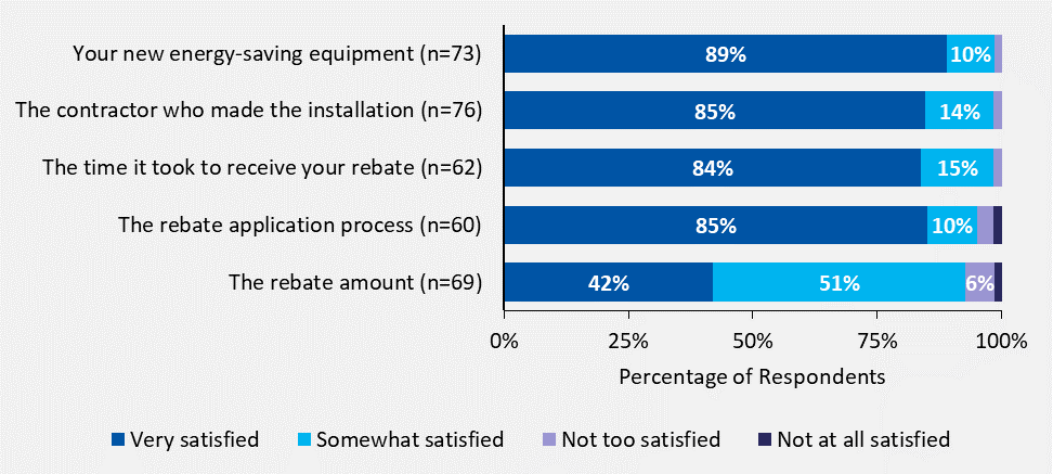
Source: Residential Programs Participant Survey, Question B5. "What benefits come to mind when thinking about your participation in the [PROGRAM NAME] Program?" Multiple responses allowed.

Program Satisfaction

Cadmus asked survey respondents to indicate their levels of satisfaction with various program elements associated with their rebate, their new equipment, and the installing contractor. Respondents were anywhere from 93% to 99% satisfied[7] with the five program elements shown in Figure 21. Respondents were least satisfied with the rebate amount, measured by the percentage of *very satisfied* responses (42%, whereas *very satisfied* percentages for other program elements were at least twice as large). Lower satisfaction with rebates, as self-reported by customers via survey, is a common trait among prescriptive programs; Cadmus does not find this result out of the ordinary.

[7] The combination of *very satisfied* and *somewhat satisfied* responses.

Figure 21. Satisfaction with Residential Program Elements

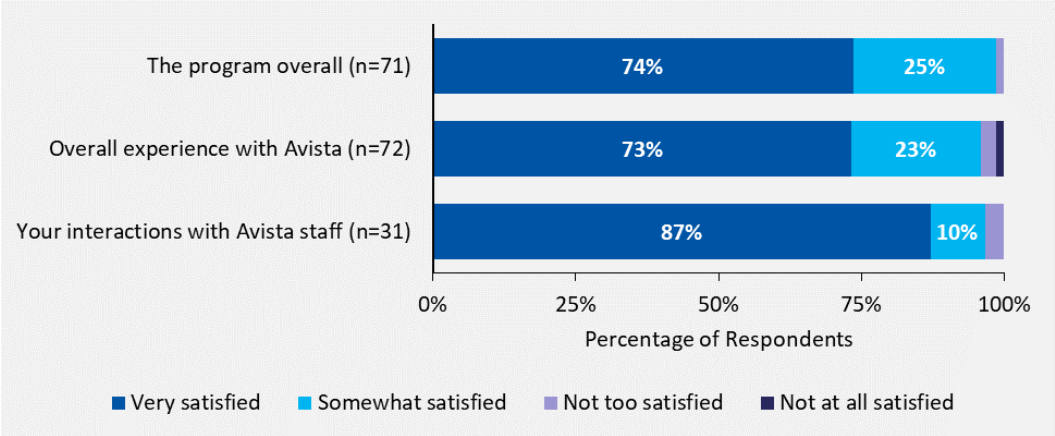


Source: Residential Programs Participant Survey, Question C2: "How would you rate your overall experience with..."

Cadmus found detectable differences in rebate satisfaction by program. Despite small sample sizes, only five of 28 Shell program participants were *very satisfied* with the rebate amount (18%), compared with 16 of 32 HVAC and eight of 16 Fuel Efficiency program survey respondents (50% each). Cadmus found each of these differences to be statistically significant at 95% confidence. It is not clear, beyond feedback that rebates were "too low," why the percentage of *very satisfied* respondents was dramatically lower for Shell program rebates than for HVAC and Fuel Efficiency program rebates.

Overall, 96% to 99% of respondents were satisfied with their residential program participation and experiences with Avista (Figure 22).

Figure 22. Satisfaction with Avista and Residential Programs Overall



Source: Residential Programs Participant Survey, Question C2: "How would you rate your overall experience with..."

After asking respondents about their satisfaction with the programs and their elements, Cadmus solicited recommendations and feedback from respondents regarding possible program improvements. Across both survey waves, 62% of respondents (47 of 76) provided feedback, consisting mostly of the following recommendations:

- Increase rebates (23 of 47)
- Increase advertising (16 of 47)
- Simplify rebate applications (7 of 47)

Energy Efficiency Behaviors

Eleven of 75 survey respondents (15%) purchased and installed other high-efficiency equipment after participating in an Avista residential program in 2018. Four of the 11 respondents considered their program participation a *very important* influence on their purchasing decisions. Among the four respondents, two purchased tankless water heaters and applied for rebates. One respondent installed a natural gas furnace and also applied for a rebate. The fourth respondent installed lighting and reported not applying for a rebate because the equipment was ineligible.

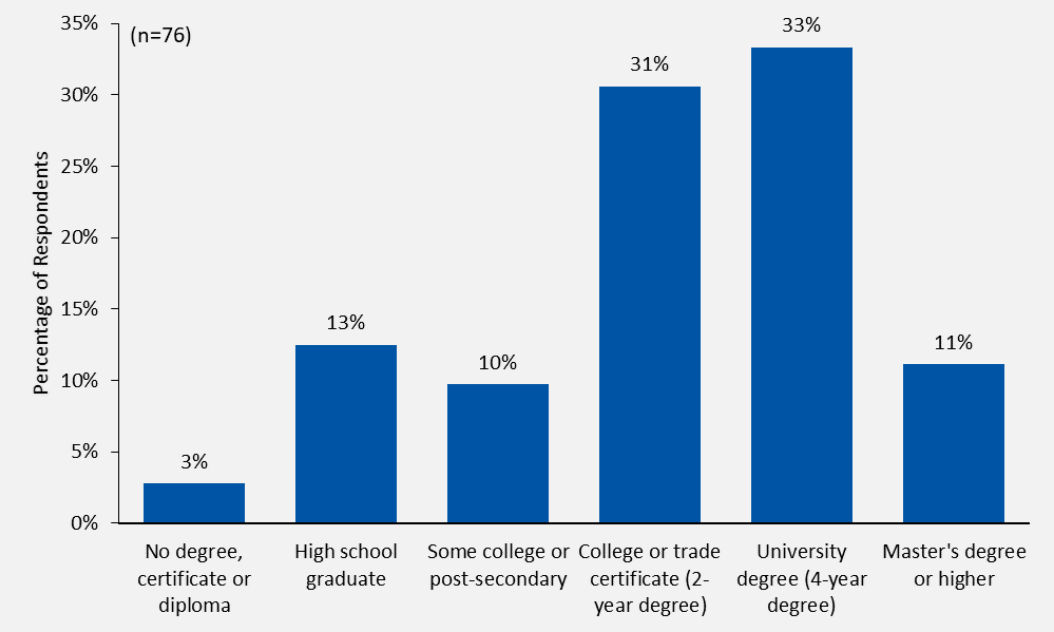
One respondent purchased two rebate-eligible appliances (a tankless water heater and a natural gas furnace) and applied for rebates for both measures. The respondent said the program was *somewhat important* to the decisions to purchase and install these appliances.

The remaining six respondents who purchased efficient equipment did not apply (or did not know if they applied) for Avista rebates. Installed equipment, as self-reported by the respondents, included a smart thermostat, natural gas stoves, a dishwasher, a water heater, and connected LED lighting. None of the six indicated their participation in Avista programming was *very important* to their purchases.

Survey Respondent Profile

As shown in Figure 23, most survey respondents completed a two- or four-year college or university degree (31% and 33%, respectively).

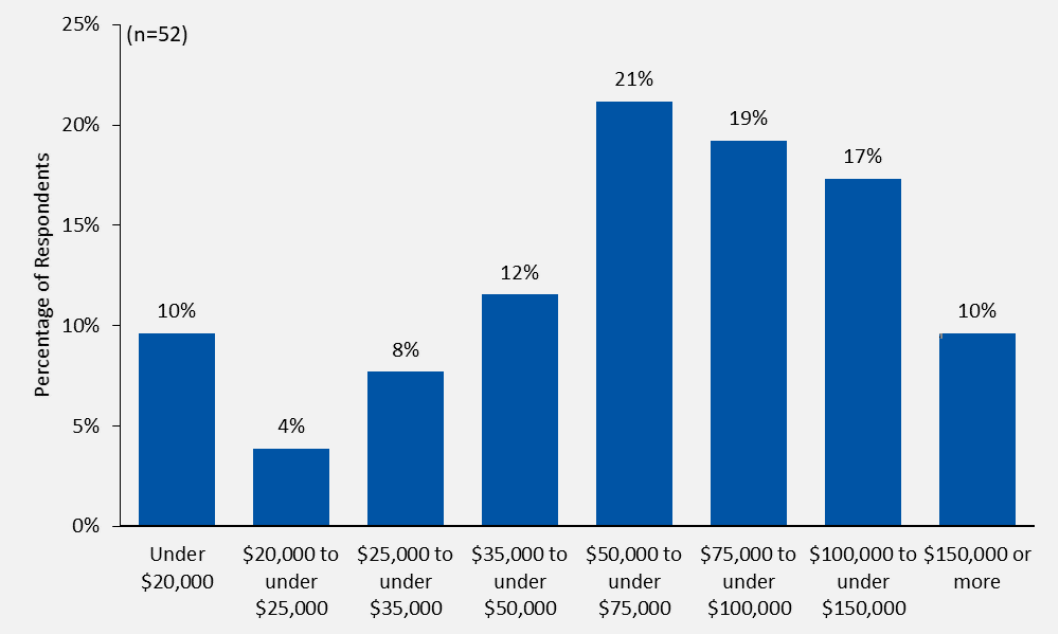
Figure 23. Residential Program Participant Education



Source: Residential Programs Participant Survey, Question F1: "What is the highest level of education that you have completed?"

Two-thirds of respondents earned at least $50,000 annually, with most respondents earning between $50,000 and $75,000 (21%). Figure 24 shows the breakdown of income.

Figure 24. Residential Program Participant Income Ranges



Source: Residential Programs Participant Survey, Question F8: "Please tell me which of the following categories applies to your total household income for the year 2017."

The average household size among survey respondents was roughly 2.5 residents (n=73). Almost 99% of respondents owned their homes (n=73), and 85% have wireless internet access (n=74).

HVAC Program Contractor Interviews

In October 2018, Cadmus interviewed eight HVAC contractors to collect information about their awareness of and motivation to participate in the HVAC program as well as their standard business practices, experiences with the program, and perceptions of customers' experiences with the program.

Program Awareness

Six of the eight contractors were unsure how they heard about the HVAC program; oftentimes, their firms were involved with the program before they joined the company. The last two contractors heard about the program through an Avista employee and a local heating association.

Motivation to Participate

Seven contractors were involved with the program so they could help their customers afford heating by getting the best deals on high-efficiency equipment. Two contractors said the program drove business for the company.[8]

[8] One contractor mentioned both helping customers and driving business as motivations.

Program Benefits

Six contractors said the program benefitted their customers by allowing them to upgrade to more-efficient equipment that provided greater comfort and savings for the price of standard equipment. Two contractors emphasized that the program particularly benefitted lower-income customers by making equipment more affordable and by lowering energy bills. One contractor said energy savings generated by the program benefitted the community, and another said the program proved very profitable for his or her firm.

Marketing

Five contractors said most of their business was generated through word-of-mouth, supplemented by a social media presence or by traditional advertising through newspapers, radio, and television. Three contractors relied on traditional advertising such as television and radio advertising, fliers, and door hangers. None of the contractors promoted Avista's HVAC program exclusively; their marketing included information about Avista programming alongside rebates from manufacturers and other utilities. Every contractor mentioned the HVAC program to customers who qualified to participate in it.

Rebate Application Process

Five contractors handled the entire rebate application process for their customers; two other contractors had customers complete their applications but provided help during the process. Only one contractor had his customers complete and submit their rebate applications entirely on their own.

Contractors offered a variety of ways for customers to redeem their rebates:

- **Direct discount:** The contractor subtracted the rebate amount up front and invoiced the customer for remaining costs; the contractor then kept the rebate.
- **Contractor-delivered rebate:** The contractor invoiced the customer for the full project cost, received the rebate from Avista, and passed the amount of the rebate along to the customer after the work was completed.
- **Utility-delivered rebate:** The contractor invoiced the customer for the full project cost, and Avista delivered the rebate directly to the customer.

Contractor Experience

Cadmus spoke to contractors about their satisfaction with various program elements and how much the program influenced their businesses' success.

Satisfaction

Contractors rated all program elements shown in Table 10 with high satisfaction marks, ranging from 4.4 to 4.9 on a scale of 1 to 5, where 1 meant *not at all satisfied* and 5 meant *very satisfied*.

Table 10. Satisfaction Ratings by Program Element

Program Element	Satisfaction Ratings					Average
	1 – Not at all Satisfied	2	3	4	5 – Very Satisfied	
Interaction with Avista	0	0	0	1	7	**4.9**
Rebate application process	0	0	1	1	6	**4.6**
Rebate levels	0	0	0	4	4	**4.5**
Equipment covered by rebates	0	0	2	1	5	**4.4**
Program overall	**0**	**0**	**0**	**2**	**6**	**4.8**

Additional details related to contractors' ratings for each program element above include the following:

- **Interaction with Avista**: Contractors rated their interactions with Avista the highest of the five discussed program elements (4.9), although some said they did not contact Avista very often. The one contractor who did not give a '5' rating still praised Avista's customer service team but said it seemed understaffed at times.
- **Rebate application**: All contractors said the application process was simple, straightforward, and user-friendly. Three contractors experienced problems submitting applications online, primarily because the website could not verify a customer's mailing address, so they submitted application forms by mail instead.
- **Rebate levels**: Contractors were generally satisfied with the rebate levels, although four said they could be higher to provide further benefits to customers.[9]
- **Equipment**: Contractors were mostly satisfied with equipment covered by the program's rebates but suggested other types of high-efficiency equipment (such as air conditioners, water heaters, and side-arm heat exchangers for boilers and furnaces) that could benefit customers.

Program Influence

Contractors were anywhere from neutral to very positive about the program's influence on driving business. Two contractors said the program enabled them to sell more higher-efficiency equipment, and two other contractors said customers more frequently upgraded or bought new equipment specifically to take advantage of program rebates. No contractors reported negative impacts on their businesses.

Perceived Customer Experience

Cadmus asked contractors about their perceptions of customers' experiences with the program, including its influence on customers' decisions to purchase high-efficiency equipment.

Awareness

The eight contractors Cadmus interviewed estimated that, on average, 59% of customers already knew about the program and, of the customers who were already aware, roughly 89% qualified for a rebate.

[9] This feedback is commonly provided regarding prescriptive rebate programs like Avista's HVAC program.

An estimated 79% of all customers (those who were aware of the program and those who were not aware of the program) qualified for and received a rebate.

Influence on Purchases

Contractors rated the HVAC program's influence on a customer's decision to purchase new equipment as a 4.6 on average, using a scale from 1 to 5, where 1 meant *not at all influential* and 5 meant *very Influential*. Contractors who gave a '5' rating said the program provided incentives to offset job costs and educated customers about energy efficiency.[10] Contractors who provided a '4' rating said Avista branding increased the program's effectiveness, and the rebates sold customers on the program.

Feedback and Recommendations

Six contractors provided the following recommendations:[11]

- Increase rebate amounts (n=4)
- Provide rebates for air conditioners, water heaters, and side-arm heat exchangers for boilers and furnaces (n=2)
- Hire more customer service representatives to answer rebate questions (n=1)
- Provide contractors with a list of customers to target (n=1)

Contractors praised the program's ability to help customers, especially those who are low-income or elderly. They provided the following recommendations to improve the contractor and customer experiences:

- Increase rebates (n=2)
- Inform contractors better and work with them more (n=2)
- Include reference numbers with or on rebate checks to make it easier for contractors to assign rebates already processed to specific projects and disburse those rebates to the appropriate customers (n=1)
- Broaden the requirements to qualify for a rebate (n=1)
- Make it easier for customers and contractors to find information about rebates and the status of their applications through Avista's website (n=1)
- Simplify the application process/paperwork (n=1)

[10] One contractor made a distinction that the program was a '5' when influencing customers to install new equipment, but only a '2 or 3' when influencing customers to upgrade.

[11] Two contractors were satisfied with the program and declined to provide feedback.

Multifamily Direct Install

For its process evaluation of the MFDI Pilot, Cadmus conducted stakeholder interviews with Avista pilot and implementer staff as well as phone interviews with multifamily property managers who participated in the pilot.

Stakeholder Interviews

Cadmus interviewed Avista and program implementer staff about the MFDI pilot in April 2018. The 2018 DSM Business Plan specified that the program implementer would recruit MFDI Pilot participants through door-to-door visits, as with the SBDI program that preceded it but was discontinued. Instead, Avista targeted multifamily property managers based on SBDI program rosters. The implementer noted that the success of the targeted marketing made it difficult to control recruitment efforts. Some property managers oversee multiple properties, making it difficult to anticipate the scale of individual projects. Ultimately, Avista and the program implementer established a waitlist from which it selected new projects. The design of the MFDI Pilot closely resembled Avista's SBDI Program, helping pilot delivery to run smoothly.

The program implementer reported high levels of satisfaction for direct-install measures. Avista staff thought the program implementer used good judgment in choosing the best measures to install based on each unit's or property's characteristics (such as building age or existing measure vintage).

The implementer faced challenges managing large amounts of data used to refine *ex ante* energy savings and demand reduction estimates for the direct-install measures. While the pilot achieved its initial participation and therms savings targets, it fell short of its kWh savings targets.[12] The implementer attributed the shortfall in kWh savings to its use of rough characterizations of the building stock in Avista's territory. The implementer used the pilot to collect more-granular building stock data to improve multifamily sector estimates of per-unit savings for direct-install measures. The implementer designed forms that installers used in individual units and common areas to record details—such as the upgrade measures installed, retrofit (baseline) measures replaced, and hours of use (HOU)—used in energy savings algorithms. Overall, these data collection challenges did not inhibit the pilot's success.

Following the initial phase of the pilot—accepting Avista's offer to participate, scheduling and completing an on-site audit, and installing select direct-install measures as appropriate—Avista and the implementer initiated a supplemental lighting phase for the pilot. Installers subcontracted by the implementer revisited multifamily properties to install additional common area lighting with participants who expressed interest. While completing installations of direct-install measures, the implementer identified and reviewed opportunities for common area lighting with Avista and the pilot participant, all subject to Avista's approval. At the time of the interview, the supplemental phase was in progress and running smoothly.

[12] Because of its status as a pilot, the MFDI pilot did not set formal annual energy-saving goals.

Throughout the MFDI Pilot, Avista and the implementer met weekly to discuss the progress of and issues with the pilot's delivery. Both were highly satisfied with their working relationship.

Participant Interviews

In May 2018, Cadmus interviewed 10 multifamily residence managers who participated in the MFDI Pilot to ascertain their awareness of, motivation to participate in, and satisfaction with the pilot as well as barriers to participation and the pilot's influence on other energy-saving behavior.

Awareness and Motivation

Nine of the 10 participants Cadmus interviewed learned that the properties they managed were participating in the MFDI Pilot through their corporate offices. The last interviewee learned about the pilot directly from Avista.

In terms of motivations, three participants said they pay attention to ways to save energy, including one who looked out for flyers and mailings from Avista. Four participants make energy-saving changes to their properties when instructed to do so by their corporate offices. The remaining three generally do not think about or conduct research on ways to save energy.

Four participants responded to awareness questions Cadmus asked. Three respondents were aware of other Avista incentives or rebate programs.[13] Two of the four planned to install other energy efficiency measures or equipment through the supplemental lighting phase of the MFDI Pilot, which at the time of interviews, was still in its initial phase.

Measure Satisfaction

Eight participants were *very satisfied* with the energy-saving measures installed at their multifamily properties. Three participants noted the benefit of saving energy and reducing utility costs, and six were excited about the brightness and longevity of the LED bulbs installed. The two participants who were less than *very satisfied* (one *somewhat satisfied*, one *not at all satisfied*) with certain water-saving measures provided feedback regarding their satisfaction ratings, outlined below:

Showerheads

- Disliked the water pressure (n=2)
- Measure broke (n=1)

Kitchen faucet aerator

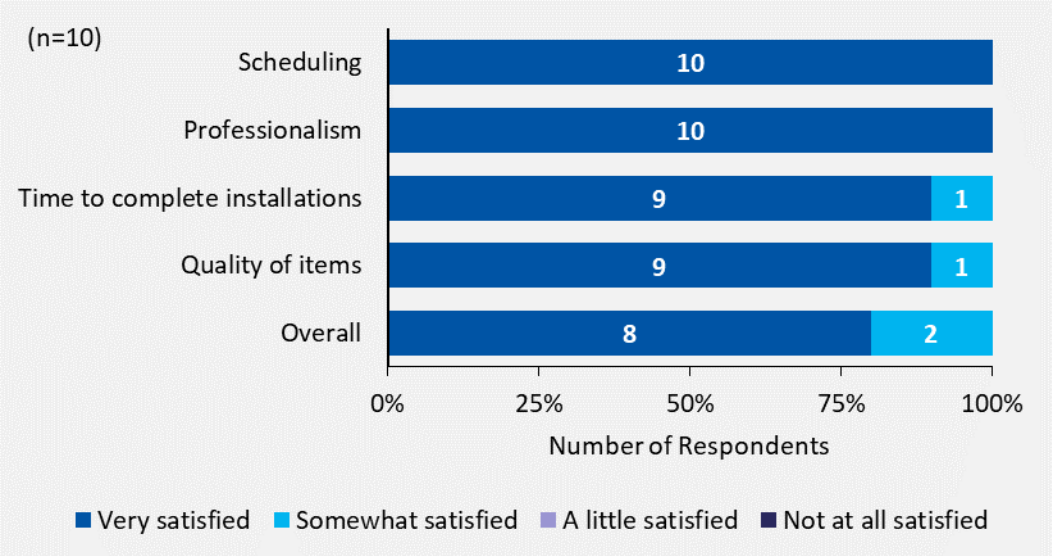
- Disliked the water pressure (n=1)
- Incompatible with the sinks (n=2)
- Measures broke (n=1)

[13] Respondents were not asked to identify programs by name or description.

Satisfaction

All 10 participants were *very satisfied* or *somewhat satisfied* with their MFDI Pilot experiences. Similarly, all but one or two participants were *very satisfied* with every element of the pilot, as shown in Figure 25. (These results were also supported anecdotally by the follow-up survey Avista administered to property managers. At the time of Cadmus' interviews with participants, Avista's survey had collected four responses. All four respondents rated their experience with the installer as *excellent*.)

Figure 25. Satisfaction Ratings with Pilot Elements and Overall



Source: MFDI Pilot Participant Interview, Question C3:
"Using the same scale as before, how satisfied were you with…"

Barriers to Participation

No participants Cadmus interviewed reported any barriers to their participation in the pilot. One reported having difficulty scheduling the assessment and installation appointment but eventually working out the timing with the implementer. Avista and the implementer also did not observe significant barriers preventing multifamily property managers or tenants from participating in the MFDI Pilot. By using targeted marketing to approach a select group of multifamily properties for the pilot's launch, Avista effectively prescreened properties as potential participants, thereby eliminating barriers to participation in advance.

Pilot Influence

Cadmus asked participants if they took energy-saving actions after participating in the MFDI Pilot and, if so, how important the pilot was in influencing that behavior. Three participants installed additional energy-saving items and said the pilot was *very important*[14] in influencing their actions, all stating they

[14] Using the following scale: *not at all important*, *a little important*, *somewhat important*, *very important*.

were only *a little likely*[15] to pursue energy-saving actions in the absence of the pilot. The other seven participants had not taken additional energy-saving actions, but all said they were *very likely* to seek out energy-saving items.

Successes

Cadmus identified three areas of success for the MFDI Pilot through its interviews with Avista, the implementer, and participating property managers:

- **High customer interest** generated through a targeted outreach campaign was enough to require a waitlist for program participation.
- **High participant satisfaction** reported by participating property managers on the direct-install measures and general elements of the pilot. The implementer said only a small number of tenants requested returns of their original items, confirming the high satisfaction ratings reported by the interviewed participants.
- **Enhanced relationship with multifamily sector** through the successful launch and delivery of a no-cost, direct-install pilot. Avista thought the pilot's delivery, which carefully targeted multifamily properties, branded installers as Avista representatives, and obtained approval from property managers, helped build trust among multifamily tenants.

Challenges

Cadmus identified four minor challenges for the MFDI Pilot through its primary data collection:

- **Delayed pilot launch** to finalize important elements such as marketing collateral, on-site audit content and structure, and field data collection forms. The delay was slight; Avista planned to launch the pilot in early January but formally launched in late January.
- **Unexpected demand for pilot services** made it difficult for Avista to accommodate all interested property managers in a timely manner and resulted in a waitlist for participation. For example, some property managers manage or own several properties, which made it more difficult than with the SBDI Program to anticipate the scale of individual projects.
- **Inaccurate initial per-unit measure savings assumptions** caused the pilot to not meet its estimated energy (kWh) savings per measure unit. The implementer said it produced rough calculations based on broad characterizations of measure-level details and the building stock in Avista's service territory. The implementer intended to use the pilot to compile more-granular data regarding household characteristics and measure-level details (such as baselines and HOU for all measure types) from every multifamily property unit and common area to improve *ex ante* savings estimates for a full program rollout.
- **Unclear lighting phase communication.** Two multifamily property managers Cadmus interviewed said they had yet to hear from the implementer's subcontractor regarding the supplemental lighting phase of the pilot. Although not necessarily dissatisfied with the delay,

[15] Using the following scale: *not at all likely*, *a little likely*, *somewhat likely*, *very likely*.

they were growing impatient having no further correspondence about a follow-up appointment at the time of Cadmus' interviews with participants.

Despite these minor start-up challenges, the pilot ran smoothly.

Conclusions

Nonresidential

- **Two-thirds of nonresidential survey respondents have participated in past business energy-efficiency programs.** Most site specific (17 of 19) survey respondents have previously participated in an Avista business energy efficiency program compared with 56% of prescriptive respondents (23 of 41).
- **Participants most often learn about the program from Avista or a contractor, vendor, or retailer.**
  - Most site specific survey respondents (32%; n=13) first learned about the program from their Avista account executive or from an Avista email
  - Prescriptive survey respondents first learned about the program from a contractor, vendor, or retailer (50%; n=44).
- **Participants are motivated by saving energy and money.**
  - The top two motivators both site specific and prescriptive survey respondents (n=19 and n=46, respectively) cited for participating were to save energy (42% and 67%, respectively) and save money (37% and 83%, respectively).
  - Participants of both programs said saving money and using less energy were the top benefits of program participation.
- **Most survey respondents (89%; n=56) received a check directly from Avista rather than an instant discount from their contractor.**
  - Six of the respondents (two of 19 site specific and four of 37 prescriptive) received an instant discount from their contractor.
  - Two of them said this was an easier way to receive the rebate, one was not given a choice in how to receive the rebate, and three did not provide a reason.
- **Participants are highly satisfied with the program, but a small number did indicate some dissatisfaction.**
  - All site specific survey respondents (n=19) and 91% (n=46) of prescriptive survey respondents were satisfied with the program overall.
  - Site specific respondents were satisfied with all components of the program except for the time it took to process the application; two of 19 were *not too satisfied* with this component because of delays caused by incorrect rebate calculations and the time it took to complete site inspections.

  - Prescriptive survey respondents were highly satisfied with the pre-project inspection, the rebate amount, and the process of completing and submitting their application. Several survey respondents provided reasons for their dissatisfaction with the program and some of its components. They stated they were dissatisfied with communication with an account executive and their trade ally because there was not enough communication (4 responses). One respondent expressed dissatisfaction because the rebate check had not yet arrived at the time of the survey and one felt the equipment was not as effective as expected, which led to low energy savings. One respondent reported concerns about their contractor that Avista did not address.

- **Site-specific survey respondents said the program was successful because of Avista staff (7 of 12) while prescriptive survey respondents said the program was easy to use (31%; n=29).**
  - Site specific program participants also cited the rebate (two of 12); rebate delivery time (two of 12); and overall process, communication, and energy savings (one response each) as working well.
  - Prescriptive survey respondents also cited quick turnaround (28%) and customer service (24%) as program elements that were working particularly well.
- **Participation challenges differed by program.**
  - The top challenge for participating in the site specific program was determining whether a project was eligible for a rebate.
  - Prescriptive survey respondents said their top challenges were knowing about the program and its offerings, completing application paperwork, and finding the time needed to apply and complete the project. The application paperwork was of particular concern among lighting participants.
- **Avista's rebate was important in the decision to complete the energy efficiency project.** All site specific and all but one prescriptive survey respondent said the rebate provided by Avista was important in their decision to complete the project.
  - The most important criteria for making energy efficiency improvements for site specific respondents were return on investment (14 of 19) and initial cost of equipment (14 of 19).
  - Prescriptive survey respondents said the most important criteria were maintenance costs (77%; n=43) and energy or operating costs (74%; n=43).

Residential

- **Residential program delivery went smoothly, per Avista and implementer staff.** Except for a couple of small changes to the rebate levels outlined in the 2018 DSM Business Plan, the HVAC, Shell, and Fuel Efficiency programs were delivered and performed as expected.
- **More than half of residential program participants heard about the program in which they participated through their contractor, installer, or trade ally** (53%, n=73). While a significant portion of respondents said contractors are the best way to spread information about Avista programs (27%, n=60), more respondents said bill inserts are the best way to spread information (32%).

- **Residential program participants were motivated to participate primarily to save money** (56%, n=75). Survey respondents perceived the main benefits of Avista's residential programming to be saving energy (83%, n=72), increasing the comfort of their homes (78%), lowering maintenance costs (74%), and taking advantage of Avista rebates (72%).
- **At least 93% of survey respondents were *very satisfied* or *somewhat satisfied* with every element of the program in which they participated as well as with Avista overall.** Rebates received the lowest satisfaction rating, specifically among survey respondents who participated in the Shell program (n=28), who were much less satisfied with rebate levels than HVAC (n=32) and Fuel Efficiency (n=16) program survey respondents.
- **HVAC contractors Cadmus interviewed said the HVAC Program plays an important role in "leveling the playing field"** by installing costlier high-efficiency equipment in the homes of customers who might otherwise not be able to afford them.
- **HVAC contractors took varying approaches to helping customers complete their rebate application forms.** Some contractors completed forms entirely on their own, some worked with customers to complete their forms, and some provided no help to customers. Contractors reported occasional issues with submitting applications online because Avista's website could not verify a customer's mailing address.
- **The eight HVAC contractors Cadmus interviewed rated their satisfaction with various elements of the HVAC Program from 4.4 to 4.8** on average, on a scale of 1 to 5. They also provided an average rating of 4.6 to the program's ability to influence customers in their decisions to purchase new energy-efficient equipment.

Multifamily Direct Install Pilot

- **Avista facilitated MFDI Pilot delivery by mimicking the design of the SBDI program and recruiting its implementer to assume the same role for the pilot.** Per Avista and implementer staff, the pilot, like Avista's residential program, was delivered smoothly and as expected. Avista overcame barriers to participation by engaging in a highly targeted marketing campaign.
- **Pilot participants were generally highly satisfied with the pilot and direct-install measures provided to their tenants**, per Avista reports and direct feedback from multifamily residence property managers. Although some property managers relayed to Avista reports by tenants of problems with certain measures installed through the pilot, these issues occurred very infrequently and were all resolved by the implementer.
- **Participating property managers were unclear about the timing of the supplemental lighting phase of the pilot** at the time of interviews with Cadmus. Interviewees were not dissatisfied with the supplemental phase but expressed confusion about the timing of its rollout.
- **Pre- and post-pilot per-unit energy savings differed significantly due to substantial differences in algorithm inputs such as hours of use (HOU).** Avista originally calculated energy savings estimates using broad characterizations of building stock in its service territory and intended to use the pilot to collect more refined information about its customers' households. Thus,

differences between estimated and finalized energy savings, while not intended, were not an unexpected outcome for Avista.

Recommendations

Nonresidential

Nonresidential Recommendation 1: A small number of survey respondents said they received an instant discount from their contractor because it was easier to have their contractor apply the discount to the total cost of the project. If Avista wants to promote the instant discount option to nonresidential customers, it should educate customers about the ease of using this option.

Nonresidential Recommendation 2: While Avista is implementing a new tracking database, they should review the data that is being recorded in the database from prescriptive lighting participants to determine if it is sufficient for accurate planning in the future. If current data being gathered is not sufficient, Avista should review what is needed for planning purposes and modify the database to include these detailed measure-level data.

Nonresidential Recommendation 3: According to some survey respondents, the lighting application paperwork was challenging because it was confusing and did not provide precise instructions for completing the application. Although the Avista website provides several ways for customers to contact Avista for additional information, Avista should create and post a document on its website with answers to frequently asked questions about the application to decrease customer challenges. The FAQ document could focus on ways to avoid the application being rejected.

Residential

Residential Recommendation 1: Consider adjusting the constraints used to verify mailing addresses for customers trying to submit their rebate application forms online. While this system works most of the time – per HVAC contractors interviewed by Cadmus, it was usually a non-issue – it can create frustration for customers who ultimately can't complete the process online and must mail in their forms. A system that relies on something simpler, such as account number and/or mailing zip code or house number could still validate customer eligibility without rejecting certain mailing address formats.

Multifamily Direct Install Pilot

MFDI Pilot Recommendation 1: Increase communication with participants to sustain interest in and satisfaction in the event of a full program rollout that includes a supplemental lighting phase as well as in general for similar future pilots.

APPENDIX D – 2018 TARIFF RIDER ACTIVITY

	Electric	Natural Gas	Total
2018 Beginning Balance (Underfunded)/Overfunded	**$ (9,574,630)**	**$ 180,889**	**$ (9,393,741)**
Energy-Efficiency Funding	$ 10,177,172	$ 1,332,964	$ 11,510,136
Net Funding of Operations	$ 602,542	$ 1,513,854	$ 2,116,396
Energy-Efficiency Expenditures	$ 7,736,789	$ 1,279,666	$ 9,016,455
2018 Ending Balances (Underfunded)/Overfunded	**$ (7,134,247)**	**$ 234,188**	**$ (6,900,059)**

APPENDIX E – 2018 EXPENDITURES BY PROGRAM

	Electric	Natural Gas	Total
Energy Efficiency			
Low-Income			
Low-Income	$ 426,400	$ 317,326	$ 772,260
Low-Income Fuel Conversions	$ 97,057	$ 0	$ 97,057
Residential			
ENERGY STAR Homes	$ 26,000	$ 2,000	$ 28,000
Fuel Efficiency	$ 291,437	$ 0	$ 291,437
HVAC	$ 97,240	$ 441,818	$ 539,058
Water Heat	$ 800	$ 36,000	$ 36,800
Multifamily Direct Install	$ 411,148	$ 16,080	$ 427,228
Shell	$ 11,969	$ 29,417	$ 41,386
Simple Steps, Smart Savings	$ 224,050	$ 0	$ 224,050
Misc	$ 363	$ 25	$ 388
Commercial/Industrial			
Site-Specific	$ 1,396,587	$ 61,547	$ 1,458,134
AirGuardian	$ 0	$ 0	$ 0
EnergySmart Grocer	$ 560	$ 0	$ 560
Food Services	$ 930	$ 28,185	$ 29,115
Green Motors	$ 5,290	$ 0	$ 5,290
HVAC	$ 0	$ 6,985	$ 6,985
Shell	$ 68	$ 2,444	$ 2,512
Exterior Lighting	$ 759,662	$ 0	$ 759,662
Interior Lighting	$ 813,570	$ 0	$ 813,570
Motor Control HVAC	$ 14,365	$ 0	$ 14,365
Fuel Conversion (MFMT)	$ 301,000	$ 0	$ 301,000
Total Energy Efficiency	**$ 4,878,494**	**$ 941,827**	**$ 5,820,322**
Market Transformation			
NEEA	$ 422,241	$ 49,712	$ 471,953
Total Market Transformation	**$ 422,241**	**$ 49,712**	**$ 471,953**
Other Programs and Activities			
General Implementation	$ 1,688,014	$ 194,548	$ 1,882,561
Pilot Programs	$ 46,594	$ 0	$ 46,594
EM&V/CPA	$ 334,059	$ 93,579	$ 427,638
Idaho Research	$ 367,387	$ 0	$ 367,387
Total Other Programs and Activities	**$ 2,436,054**	**$ 288,127**	**$ 2,724,181**
Grand Total	**$ 7,736,789**	**$ 1,279,666**	**$ 9,016,455**

APPENDIX F – 2018 PROGRAM ACTIVITY

Energy Efficiency Program	Electric				Natural Gas			
	Participants		Evaluated Savings (kWh)	Utility Cost	Participants		Evaluated Savings (Therms)	Utility Cost
Low-Income								
Weatherization	1,833	SqFt/ Units	63,727	$ 157,305	864	SqFt/ Units	2,173	$ 52,391
HVAC	271	Units	100,175	$ 207,271	358	Units	2,410	$ 166,203
Water Heat	43	Units	3,219	$ 2,753	209	Units	189	$ 71,511
Outreach/Giveaways	10,264	LEDs	85,578	$ 10,509	-	-	-	$ 0
Health and Human Safety	552	HHS	-	$ 143,675	226	HHS	-	$ 47,255
Fuel Conversions	156	Units	103,054	$ 108,161	-	NA	-	$ 0
Total Low-Income			**355,753**	**$ 629,674**			**4,772**	**$ 365,895**
Residential								
ENERGY STAR Homes	26	Homes	83,738	$ 37,958	2	Homes	406	$ 2,083
Fuel Efficiency	170	Units	1,442,640	$ 515,055	-	NA	-	$ 0
HVAC	458	Furnace, Tstats	750,709	$ 213,605	1,900	Furnace, Tstats	150,936	$ 472,608
Multifamily Direct Install	1,330	Units	729,920	$ 524,290	1,330	Units*	2,014	$ 16,491
Shell	64	Windows	85,608	$ 25,238	156	Windows	40,014	$ 37,580
Water Heat	4	Units	4,345	$ 1,473	180	Units	12,420	$ 38,534
Simple Steps, Smart Savings	240,437	LEDs, Washers, SH	3,454,352	$ 759,496	897	SH	2,202	$ 449
Total Residential			**6,551,312**	**$ 2,077,116**			**207,992**	**$ 567,745**
Commercial/Industrial								
Site-Specific	77	Projects	10,205,592	$ 1,717,120	5	Projects	21,016	$ 82,850
AirGuardian	-	Units	-	$ 0	-	NA	-	$ 0
EnergySmart Grocer (PSC)	1	Projects	3,402	$ 666	-	Projects	-	$ 0
Food Services	4	Projects	8,527	$ 1,196	20	Projects	8,871	$ 37,178
Green Motors	11	Motor Rewinds	42,870	$ 6,628	-	NA	-	$ 0
HVAC	-	Units	-	$ 0	11	Units	3,956	$ 10,995
Shell	3	Projects	929	$ 97	4	Projects	1,149	$ 3,609
Exterior Lighting	273	Projects	4,243,826	$ 892,106	-	NA	-	$ 0
Interior Lighting	315	Projects	8,012,238	$ 1,063,621	-	NA	-	$ 0
Motor Control HVAC	3	Projects	113,171	$ 17,897	-	Projects	-	$ 0
Fuel Conversion (MFMT)	3	Projects	267,385	$ 307,314	-	NA	-	$ 0
Total Comm/Industrial			**22,897,942**	**$ 4,006,645**			**34,992**	**$ 134,632**
Total Energy Efficiency			**29,805,007**	**$ 6,713,436**			**247,757**	**$ 1,068,271**

Note: For purposes of Schedule F, Washers and Showerheads were included in the Simple Steps, Smart Savings total rather than in the Residential Water Heat program as provided in Table 38 and Table 44.

APPENDIX G – 2018 UES MEASURE LIST

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Residential Prescriptive – Natural Gas						
G Windows Single Pane <0.30 U-value	$ 20.50	-	1.87	40	$ 0.00	$ 0.00
Web Tstat Gas DIY	$ 240.35	-	26.00	15	$ 0.00	$ 0.00
Web Tstat Gas Cont	$ 294.25	-	26.00	15	$ 0.00	$ 0.00
NG FURNACE/BOILER 90% AFUE	$ 682.00	-	102.00	20	$ 0.00	$ 0.00
TANKLESS WH (0.82+)	$ 450.00	-	69.00	20	$ 0.00	$ 0.00
NG Storm Windows	$ 9.90	-	0.34	20	$ 0.00	$ 0.00
E STAR HOME - GAS ONLY	$ 3,000.00	-	203.00	25	$ 0.00	$ 0.00
Residential Prescriptive – Electric						
E --> NG Space and DHW	$ 4,588.21	11,280.00	(216.00)	20	$ 0.00	$ 0.00
E --> NG DIRECT VENT WALL HEAT	$ 3,873.33	10,624.00	(466.00)	20	$ 0.00	$ 0.00
ELEC RES --> CENTRAL NG	$ 3,988.18	7,524.00	(498.00)	20	$ 0.00	$ 0.00
ELEC RESISTANCE TO ASHP	$ 4,172.89	5,945.58	-	18	$ 0.00	$ 0.00
Ductless Heat Pump	$ 3,822.37	4,621.50	-	15	$ 0.00	$ 87.81
E ESTAR HOME - MANUF, ELEC/DF	$ 2,441.65	3,296.00	-	25	$ 0.00	$ 42.85
Tier3 0-55Gallon HPWH	$ 932.77	1,610.00	-	13	$ 0.00	$ 0.00
Tier2 0-55Gallon HPWH	$ 932.00	1,520.00	-	13	$ 0.00	$ 0.00
Tier1 0-55Gallon HPWH	$ 840.92	1,131.00	-	13	$ 0.00	$ 0.00
Web Tstat Elec DIY	$ 240.35	749.00	-	15	$ 0.00	$ 0.00
Web Tstat Elec Cont	$ 294.25	749.00	-	15	$ 0.00	$ 0.00
VARIABLE SPEED MOTOR ASHP	$ 275.00	420.00	-	20	$ 0.00	$ 0.00
VARIABLE SPEED MOTOR FURNACE	$ 275.00	414.00	-	20	$ 0.00	$ 0.00
ELEC WINDOWS SP/MDP --> <0.30 U	$ 20.50	12.60	-	45	$ 0.00	$ 0.01
ElEC Storm Windows	$ 9.90	8.50	-	20	$ 0.00	$ 0.01
Residential – Simple Steps, Smart Savings						
Clothing Washer	$ 55.00	108.58	-	11	$ 0.00	$ 0.00
LED Exterior Porch Light Fixture 2000-7999 Lumens	$ 7.47	104.00	-	20	$ 0.00	$ 0.00
LED Exterior Security Fixture 2000-7999 Lumens	$ 10.05	104.00	-	20	$ 0.00	$ 0.00
LED Track Light Fixture 2000-7999 Lumens	$ 16.47	103.50	-	20	$ 0.00	$ 0.00
LED Hard Wired (4 Lamp)	$ 0.00	86.16	-	20	$ 0.00	$ 0.00
Showerhead 1.5 GPM Gas	$ 0.00	83.82	4.00	10	$ 0.17	$ 0.00
LED Reflectors and Outdoor 1490-2600 lumens	$ 5.24	72.00	-	13	$ 0.00	$ 0.00
Showerhead 1.75 GPM Gas	$ 6.00	54.51	3.00	10	$ 0.17	$ 0.00
LED Decorative Ceiling Flush Mount Fixture 2000-7999 lumens	$ 7.11	51.50	-	20	$ 0.00	$ 0.00
LED Retro-Fit Fixture 2000-7999 Lumens	$ 9.94	50.04	-	20	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
LED Hard Wired (3 Lamp)	$ 0.00	48.69	-	20	$ 0.00	$ 0.00
LED Bathroom Vanity 2000-7999 Lumens	$ 13.19	42.00	-	20	$ 0.00	$ 0.00
LED Hard Wired (2 Lamp)	$ 0.00	40.22	-	20	$ 0.00	$ 0.00
LED Exterior Security Fixture 500-1999 Lumens	$ 2.82	36.00	-	20	$ 0.00	$ 0.00
LED Bi-pin Multifaceted Reflector (MR) 500-999 Lumens	$ 14.85	32.00	-	12	$ 0.00	$ 0.00
LED Track Light Fixture 500-1999 lumens	$ 4.62	29.00	-	20	$ 0.00	$ 0.00
LED Exterior Porch Light Fixture 500-1999 Lumens	$ 2.10	29.00	-	20	$ 0.00	$ 0.00
LED Bi-pin Non-Multifaceted Reflector (MR) 500-999 lumens	$ 11.99	29.00	-	12	$ 0.00	$ 0.00
LED Reflectors and Outdoor 250-1049 lumens	$ 1.04	24.00	-	13	$ 0.00	$ 0.00
LED Bi-pin Multifaceted Reflector (MR) 250-499 Lumens	$ 5.73	23.00	-	12	$ 0.00	$ 0.00
LED Reflectors and Outdoor 1050-1489 lumens	$ 3.41	21.00	-	13	$ 0.00	$ 0.00
LED Bi-pin Non-Multifaceted Reflector (MR) 250-499 Lumens	$ 10.11	21.00	-	12	$ 0.00	$ 0.00
LED Hard Wired (1 Lamp)	$ 0.00	20.08	-	20	$ 0.00	$ 0.00
Showerhead 2.0 GPM Gas	$ 2.20	19.96	2.00	10	$ 0.17	$ 0.00
LED General Purpose and Dimmable 1050-1489 lumens	$ 4.32	18.00	-	13	$ 0.00	$ 0.00
LED Globe 1050-1489 lumens	$ 2.88	15.00	-	13	$ 0.00	$ 0.00
LED Decorative Ceiling Flush Mount Fixture 500-1999 lumens	$ 2.00	14.50	-	20	$ 0.00	$ 0.00
LED Retro-Fit Fixture 500-1999 Lumens	$ 2.79	14.02	-	20	$ 0.00	$ 0.00
LED Globe 1490-2600 lumens	$ 2.73	14.00	-	13	$ 0.00	$ 0.00
LED Decorative and Mini-Base 250-1049 lumens	$ 2.82	13.00	-	13	$ 0.00	$ 0.00
LED Globe 250-1049 lumens	$ 2.67	12.00	-	13	$ 0.00	$ 0.00
LED Bathroom Vanity 500-1999 Lumens	$ 3.70	12.00	-	20	$ 0.00	$ 0.00
LED General Purpose and Dimmable 1490 -2600 lumens	$ 3.72	11.00	-	13	$ 0.00	$ 0.00
LED Exterior Security Fixture 0-499 Lumens	$ 0.81	10.50	-	20	$ 0.00	$ 0.00
LED General Purpose and Dimmable 250-1049 lumens	$ 1.18	10.00	-	13	$ 0.00	$ 0.00
LED Track Light Fixture 0-499 Lumens	$ 2.66	8.00	-	20	$ 0.00	$ 0.00
LED -Exterior Porch Light Fixture 0-499 Lumens	$ 0.60	8.00	-	20	$ 0.00	$ 0.00
LED TLED 2000-3999 Lumens	$ 6.40	8.00	-	13	$ 0.00	$ 0.00
LED TLED 1000-1999 Lumens	$ 3.78	7.00	-	13	$ 0.00	$ 0.00
LED Decorative Ceiling Flush Mount Fixture 0-499 lumens	$ 0.37	4.50	-	20	$ 0.00	$ 0.00
LED Linear Flush Mount Fixture 2000-7999 lumens	$ 9.33	4.50	-	20	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
LED Retro-Fit Fixture 0-499 Lumens	$ 0.00	4.03	-	20	$ 0.00	$ 0.00
LED Bathroom Vanity 0-499 Lumens	$ 1.07	3.50	-	20	$ 0.00	$ 0.00
LED Linear Flush Mount Fixture 500-1999 lumens	$ 2.60	3.00	-	20	$ 0.00	$ 0.00
LED Linear Flush Mount Fixture 0-499 lumens	$ 0.76	0.50	-	20	$ 0.00	$ 0.00
LED Decorative and Mini-Base 1490-2600 lumens	$ 0.01	-	-	13	$ 0.00	$ 0.00
LED Decorative and Mini-Base 1050-1489 lumens	$ 0.01	-	-	13	$ 0.00	$ 0.00
Commercial/Industrial – VFDs						
Prescriptive VFDS - HVAC Heating Pump or combo	$ 200.00	1,756.00	-	16	$ 0.00	$ 0.00
Prescriptive VFDs - HVAC Cooling Pump	$ 200.00	1,091.00	-	16	$ 0.00	$ 0.00
Prescriptive VFDs - HVAC Fan	$ 200.00	1,022.00	-	16	$ 0.00	$ 0.00
Commercial/Industrial – Site-Specific						
Site Specific	$274,700.00	-	41,000.00	16	$ 0.00	$ 0.00
Commercial/Industrial – Shell						
Less than R4 wall insulation (E/E) to R19+ Wall Insulation	$ 0.65	4.11	-	22	$ 0.00	$ 0.00
Less than R4 wall insulation (E/E) to R11-R18 Wall Insulation	$ 0.61	2.82	-	22	$ 0.00	$ 0.00
Less than R11 attic insulation (E/E) to R45+ Attic Insulation	$ 0.86	1.39	-	22	$ 0.00	$ 0.00
Less than R11 roof insulation (E/E) to R30+ Roof Insulation	$ 0.62	1.36	-	22	$ 0.00	$ 0.00
Less than R11 attic insulation (E/E) to R30-R44 Attic Insulation	$ 0.76	1.02	-	22	$ 0.00	$ 0.00
Less than R11 attic insulation (E/G) to R30-R44 Attic Insulation	$ 0.76	-	0.09	22	$ 0.00	$ 0.00
Less than R11 attic insulation (E/G) to R45+ Attic Insulation	$ 0.86	-	0.13	22	$ 0.00	$ 0.00
Less than R11 roof insulation (E/G) to R30+ Roof Insulation	$ 0.62	-	0.12	22	$ 0.00	$ 0.00
Less than R4 wall insulation (E/G) to R11-R18 Wall Insulation	$ 0.61	-	0.24	22	$ 0.00	$ 0.00
Less than R4 wall insulation (E/G) to R19+ Wall Insulation	$ 0.65	-	0.36	22	$ 0.00	$ 0.00
Commercial/Industrial – MFMT						
Multifamily NG Market Transformation (per unit)	$ 6,000.00	5,874.00	(258.00)	20	$ 1,000.00	$ 0.00
Commercial/Industrial – Interior Lighting						
1000 watt HID =< 400 watt LED	$ 999.00	2,966.00	(40.60)	12	$ 0.00	$ 0.54
400 watt HID =< 75 watt LED	$ 454.40	1,244.00	-	15	$ 0.00	$ 26.66
250 watt HID to =< 140 LED	$ 480.00	773.00	(10.60)	15	$ 0.00	$ 2.51
Over 150 watt Incandescent to 50-60W LED	$ 130.00	326.00	(4.50)	15	$ 0.00	$ 10.16
4-Lamp T12/T8 Fixture to 2-Lamp LED	$ 120.00	217.00	(3.00)	15	$ 0.00	$ 0.39

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
75-100 watt Incandescent to LED* 12-20 watt Fixture	$ 30.00	210.02	(2.67)	15	$ 0.00	$ 7.94
Occupancy sensors built in with relays for room control (not switch sensors)	$ 64.00	204.83	(2.61)	20	$ 0.00	$ 1.80
3-Lamp T12/T8 Fixture to LED Qualified 2x4 Fixture	$ 100.00	187.61	(1.35)	12	$ 0.00	$ 1.09
50 watt MR16 (GU10 Base) to MR16 LED 6-9 watt	$ 14.49	140.01	(1.78)	15	$ 0.00	$ 31.37
75-100 watt Incandescent to 12-20 watt LED lamp	$ 13.00	117.61	(1.50)	15	$ 0.00	$ 7.94
T5HO - T5 TLED	$ 35.48	86.40	(1.50)	15	$ 0.00	$ (0.05)
40 watt Incandescent to 6-10 watt LED lamp	$ 13.00	84.01	(1.07)	15	$ 0.00	$ 6.90
60 watt Incandescent to 9-13 watt LED lamp	$ 13.00	84.01	(1.07)	15	$ 0.00	$ 9.11
20 watt MR16 (GU10 Base) to MR16 LED 2-4 watt	$ 24.00	56.00	(0.71)	15	$ 0.00	$ 21.53
35 watt MR16 (GU10 Base) to MR16 LED 4-6 watt	$ 15.94	42.00	(0.53)	15	$ 0.00	$ 26.17
T12/T8 to 8-20 W TLED	$ 15.00	31.68	(0.55)	12	$ 0.00	$ 0.38
Commercial/Industrial – HVAC						
Gas Boiler <300kBtu .85-.89 AFUE	$ 12.31	-	1.77	16	$ 0.00	$ 0.00
Gas Boiler <300kBtu .90+ AFUE AFUE	$ 14.77	-	2.87	16	$ 0.00	$ 0.00
Multistage Furnace <225 kBtu .90-.95 AFUE	$ 8.61	-	3.67	16	$ 0.00	$ 0.00
Multistage Furnace <225 kBtu .95+ AFUE	$ 10.76	-	4.22	16	$ 0.00	$ 0.00
Singlestage Furnace <225 kBtu .90-.95 AFUE	$ 6.66	-	2.87	16	$ 0.00	$ 0.00
Singlestage Furnace <225 kBtu .95+ AFUE	$ 8.61	-	3.67	16	$ 0.00	$ 0.00
Commercial/Industrial – Grocer						
Multiplex - Efficient/oversized Air-cooled Condenser for Multiplex	$ 106.83	2,061.00	-	15	$ 0.00	$ 0.00
Multiplex - Compressors - Air-cooled Condenser	$ 515.71	1,968.00	-	15	$ 0.00	$ 0.00
Multiplex - Compressors - Evaporative Condenser	$ 515.71	1,968.00	-	15	$ 0.00	$ 0.00
Special Doors with Low/No ASH for Low Temperature Reach-in	$ 88.45	1,700.00	-	15	$ 0.00	$ 0.00
Cases - Low Temp Open to Reach-in	$ 282.84	1,674.00	-	15	$ 0.00	$ 0.00
Multiplex - Efficient/oversized Water-cooled Condenser for Multiplex	$ 106.83	1,550.00	-	15	$ 0.00	$ 0.00
Evap motors: shaded pole to ECM in Walk-in - Greater than 23 watts	$ 287.47	1,458.00	-	15	$ 0.00	$ 0.00
Cases - Low Temp Coffin to High Efficiency Reach-in	$ 84.00	1,074.00	-	15	$ 0.00	$ 0.00
Cases - Low Temp Reach-in to High Efficiency Reach-in	$ 282.84	963.00	-	15	$ 0.00	$ 0.00
VFD - Condenser Fan Motors - Air Cooled	$ 191.18	930.00	-	15	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
VFD - Condenser Fan Motors - Evap Cooled	$ 191.18	930.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure Control w/ VFD- Air Cooled	$ 200.00	915.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure for Single Compressor Systems, LT Condensing Unit	$ 306.99	855.00	-	15	$ 0.00	$ 0.00
Efficient Compressors - Low Temperature	$ 287.47	798.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure for Single Compressor Systems, MT Condensing Unit	$ 404.29	757.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure Control - Evap Cooled	$ 51.87	708.00	-	15	$ 0.00	$ 0.00
Evap motors: shaded pole to ECM in Display Case	$ 287.47	685.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure for Single Compressor Systems, LT Remote Condenser	$ 163.25	685.00	-	15	$ 0.00	$ 0.00
Advanced Floating Controls: Floating Head and Suction Pressure with Electronic Expansion Valves (EEXVs)	$ 404.29	676.80	-	15	$ 0.00	$ 0.00
Evap motors: shaded pole to ECM in Walk-in - less than 23 watts	$ 287.47	592.00	-	15	$ 0.00	$ 0.00
Cases - Medium Temp Open Case to New Reach In	$ 88.45	585.00	-	15	$ 0.00	$ 0.00
Strip Curtains for Supermarket Walk-in Freezers	$ 10.14	535.00	-	2	$ 0.00	$ 0.00
Add doors to Open Medium Temp Cases	$ 385.00	533.00	49.00	20	$ 0.00	$ 0.00
Floating Head Pressure for Single Compressor Systems, MT Remote Condenser	$ 214.50	473.00	-	15	$ 0.00	$ 0.00
Gaskets for Walk-in Freezer - Main Door	$ 125.93	347.00	-	4	$ 0.00	$ 0.00
Floating Head Pressure Control - Air Cooled	$ 51.87	332.00	-	15	$ 0.00	$ 0.00
Anti-Sweat Heater Controls - Low Temp	$ 47.90	305.00	-	12	$ 0.00	$ 0.00
Evaporated Fan - Walk-In ECM Controller - Medium Temp - 1/10-1/20 HP	$ 247.90	264.00	-	16	$ 0.00	$ 0.00
Gaskets for Medium Temp Reach-in Glass Doors	$ 89.95	248.00	-	4	$ 0.00	$ 0.00
Gaskets for Low Temp Reach-in Glass Doors	$ 111.12	243.00	-	4	$ 0.00	$ 0.00
Advanced Floating Controls: Floating Head and Suction Pressure with Balanced Port Valves	$ 404.29	238.40	-	15	$ 0.00	$ 0.00
Multiplex - Controls - Floating suction pressure - evaporative condenser	$ 106.83	231.00	-	15	$ 0.00	$ 0.00
Multiplex - Controls - Floating suction pressure - air cooled condenser	$ 106.83	227.00	-	15	$ 0.00	$ 0.00
Cases - Medium Temp Open Case to New High Efficiency Open Case	$ 88.45	222.00	-	15	$ 0.00	$ 0.00
Anti-Sweat Heater Controls - Med Temp	$ 47.90	217.00	-	12	$ 0.00	$ 0.00
Evaporated Fan - Walk-In ECM Controller - Low Temp - 1/10-1/20 HP	$ 162.26	207.00	-	16	$ 0.00	$ 0.00
Gaskets for Walk-in Cooler - Main	$ 84.66	204.00	-	4	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Advanced Floating Controls: Increase Suction Temperature with Electronic Expansion Valves (EEXVs)	$ 404.29	203.60	-	15	$ 0.00	$ 0.00
Strip Curtains for Restaurant Walk-in Freezers	$ 10.14	129.00	-	2	$ 0.00	$ 0.00
Strip Curtains for Supermarket Walk-in Coolers	$ 10.14	123.00	-	2	$ 0.00	$ 0.00
LT Case: T12 to LP LED Inside Lamp	$ 15.02	112.00	-	8	$ 0.00	$ 0.00
MT Case: T12 to LP LED Inside Lamp	$ 15.02	81.00	-	8	$ 0.00	$ 0.00
LT Case: T8 to LP LED Inside Lamp	$ 15.02	66.00	-	8	$ 0.00	$ 0.00
T12 to LP LED Outside Lamp	$ 15.02	59.00	-	8	$ 0.00	$ 0.00
MT Case: T8 to LED Inside Lamp	$ 15.02	48.00	-	8	$ 0.00	$ 0.00
T8 to LP LED Outside Lamp	$ 15.02	35.00	-	8	$ 0.00	$ 0.00
Strip Curtains for Convenience Store Walk-in Freezers	$ 10.14	31.00	-	2	$ 0.00	$ 0.00
Commercial/Industrial – Green Motors						
5000 HP Ind	$ 8,840.29	116,183.00	-	7	$ 0.00	$ 0.00
4500 HP Ind	$ 8,281.68	104,783.00	-	7	$ 0.00	$ 0.00
4000 HP Ind	$ 7,684.64	93,334.00	-	7	$ 0.00	$ 0.00
3500 HP Ind	$ 6,883.09	81,667.00	-	7	$ 0.00	$ 0.00
3000 HP Ind	$ 6,228.79	70,147.00	-	7	$ 0.00	$ 0.00
2500 HP Ind	$ 5,327.46	58,823.00	-	7	$ 0.00	$ 0.00
2250 HP Ind	$ 4,869.35	53,051.00	-	7	$ 0.00	$ 0.00
2000 HP Ind	$ 4,469.67	47,454.00	-	7	$ 0.00	$ 0.00
1750 HP Ind	$ 3,984.53	41,697.00	-	7	$ 0.00	$ 0.00
1500 HP Ind	$ 3,491.07	35,891.00	-	7	$ 0.00	$ 0.00
1250 HP Ind	$ 3,047.56	29,973.00	-	7	$ 0.00	$ 0.00
1000 HP Ind	$ 2,551.17	24,172.00	-	7	$ 0.00	$ 0.00
900 HP Ind	$ 2,367.26	21,847.00	-	7	$ 0.00	$ 0.00
800 HP Ind	$ 2,147.26	19,461.00	-	7	$ 0.00	$ 0.00
700 HP Ind	$ 1,935.29	17,065.00	-	7	$ 0.00	$ 0.00
600 HP Ind	$ 1,773.87	14,689.00	-	7	$ 0.00	$ 0.00
500 HP Ind	$ 1,203.74	9,804.00	-	9	$ 0.00	$ 0.00
450 HP Ind	$ 1,114.23	8,811.00	-	9	$ 0.00	$ 0.00
400 HP Ind	$ 1,019.35	7,848.00	-	9	$ 0.00	$ 0.00
350 HP Ind	$ 912.65	6,919.00	-	9	$ 0.00	$ 0.00
300 HP Ind	$ 870.76	5,935.00	-	9	$ 0.00	$ 0.00
250 HP Ind	$ 861.45	4,972.00	-	9	$ 0.00	$ 0.00
200 HP Ind	$ 670.26	4,088.00	-	8	$ 0.00	$ 0.00
150 HP Ind	$ 556.76	3,089.00	-	8	$ 0.00	$ 0.00
125 HP Ind	$ 499.83	2,598.00	-	8	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
100 HP Ind	$ 445.05	2,005.00	-	9	$ 0.00	$ 0.00
75 HP Ind	$ 358.76	1,519.00	-	9	$ 0.00	$ 0.00
60 HP Ind	$ 331.91	1,476.00	-	9	$ 0.00	$ 0.00
50 HP Ind	$ 281.42	1,418.00	-	8	$ 0.00	$ 0.00
40 HP Ind	$ 254.21	1,319.00	-	8	$ 0.00	$ 0.00
30 HP Ind	$ 208.02	1,133.00	-	8	$ 0.00	$ 0.00
25 HP Ind	$ 189.41	1,052.00	-	8	$ 0.00	$ 0.00
20 HP Ind	$ 165.77	804.00	-	8	$ 0.00	$ 0.00
15 HP Industrial	$ 148.59	601.00	-	8	$ 0.00	$ 0.00
Commercial/Industrial – Food						
10 or larger pan electric steamer	$ 3,956.16	71,333.00	-	9	$ 0.00	$ 1,569.33
6 pan electric steamer	$ 349.00	42,754.00	-	9	$ 0.00	$ 1,838.42
5 pan electric steamer	$ 349.00	35,659.00	-	9	$ 0.00	$ 1,925.59
4 pan electric steamer	$ 349.00	28,564.00	-	9	$ 0.00	$ 2,056.61
3 pan electric steamer	$ 349.00	21,470.00	-	9	$ 0.00	$ 0.00
Efficient combination oven (>= 16 pan and <= 20 pan) electric	$ 1,577.76	17,877.00	-	10	$ 0.00	$ 160.89
Efficient combination oven (>= 6 pan and <= 15 pan) electric	$ 431.07	12,990.00	-	10	$ 0.00	$ 389.70
High temp electric hot water dishwasher	$ 2,297.00	4,110.00	-	12	$ 0.00	$ 1,068.60
Low temp electric hot water dishwasher	$ 2,297.00	3,801.00	-	12	$ 0.00	$ 1,482.39
Electric fryer	$ 761.70	2,449.00	-	8	$ 0.00	$ 0.00
Efficient convection oven half size	$ 998.06	1,683.00	-	10	$ 0.00	$ 0.00
Efficient convection oven full size	$ 785.76	1,661.00	-	10	$ 0.00	$ 0.00
Standard Efficiency Appliance to H.E. electric griddle, 70% effic. or better	$ 1,000.00	1,636.00	-	12	$ 0.00	$ 0.00
Refrigerator - Glass Door, 50 or greater cuft Federal Standard to ENERGY STAR Refrigerator - Glass Door, 50 or greater cuft	$ 1,760.66	1,598.00	-	12	$ 0.00	$ 0.00
0.61 to 0.80 GPM electric pre-rinse sprayer	$ 71.63	891.00	-	4	$ 0.00	$ 119.39
Efficient hot food holding cabinet, full size	$ 825.25	820.00	-	20	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door - 50 cu.ft. and greater	$ 2,156.05	741.00	-	12	$ 0.00	$ 0.00
Freezer - Solid Door, 50 ≤ cuft Federal Standard to ENERGY STAR Freezer - Solid Door, 50 ≤ cuft	$ 1,985.91	741.00	-	12	$ 0.00	$ 0.00
Refrigerator - Glass Door, 30 to 49.9 cuft Federal Standard to ENERGY STAR Refrigerator - Glass Door, 30 to 49.9 cuft	$ 1,080.55	572.00	-	12	$ 0.00	$ 0.00
0.81 to 1.00 GPM electric pre-rinse sprayer	$ 71.63	552.00	-	4	$ 0.00	$ 73.97
Freezer - Energy Star Glass Door - 30 to 49.9 cu.ft	$ 1,554.77	462.00	-	12	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Freezer - Solid Door, 30 ≤ V < 49.9 cuft Federal Standard to ENERGY STAR Freezer - Solid Door, 30 ≤ V < 49.9 cuft	$ 1,317.74	462.00	-	12	$ 0.00	$ 0.00
Refrigerator - Solid Door, 50 or greater cuft Federal Standard to ENERGY STAR Refrigerator - Solid Door, 50 or greater cuft	$ 1,571.21	422.00	-	12	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door - 15 to 29.9 cu.ft.	$ 640.39	360.00	-	12	$ 0.00	$ 0.00
Freezer - Solid Door, 15-29.9 cuft Federal Standard to ENERGY STAR Freezer - Solid Door, 15-29.9 cuft	$ 563.81	360.00	-	12	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door Chest Freezer	$ 559.37	310.00	-	12	$ 0.00	$ 0.00
Refrigerator - Solid Door, 15to 29.9 cuft Federal Standard to ENERGY STAR Refrigerator - Solid Door, 15 to 29.9 cuft	$ 479.48	268.00	-	12	$ 0.00	$ 0.00
Refrigerator - Glass Door, 15 to 29.9 cuft Federal Standard to ENERGY STAR Refrigerator - Glass Door, 15 to 29.9 cuft	$ 486.77	264.00	-	12	$ 0.00	$ 0.00
Refrigerator - Solid Door, 30 to 49.9 cuft Federal Standard to ENERGY STAR Refrigerator - Solid Door, 30 to 49.9 cuft	$ 1,035.39	255.00	-	12	$ 0.00	$ 0.00
Efficient hot food holding cabinet, 1/2 size	$ 320.13	253.00	-	20	$ 0.00	$ 0.00
Freezer - Energy Star Solid Door Chest Freezer	$ 1,036.59	233.00	-	12	$ 0.00	$ 0.00
Refrigerator - Solid Door, < 15 cuft Federal Standard to ENERGY STAR Refrigerator - Solid Door,< 15 cuft	$ 208.95	231.00	-	12	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door - Less than 15 cu.ft.	$ 359.66	215.00	-	12	$ 0.00	$ 0.00
Freezer - Solid Door, < 15 cuft Federal Standard to ENERGY STAR Freezer - Solid Door, < 15 cuft	$ 331.28	215.00	-	12	$ 0.00	$ 0.00
Refrigerator - Glass Door,< 15 cuft Federal Standard to ENERGY STAR Refrigerator - Glass Door, < 15 cuft	$ 191.59	166.00	-	12	$ 0.00	$0.00
Energy Star 50% effic.gas fryer	$ 2,500.00	-	505.00	12	$ 0.00	$ 0.00
0.61 to 0.80 GPM gas pre-rinse sprayer	$ 108.42	-	16.81	4	$ 0.00	$ 0.00
3 pan gas steamer	$ 1,867.00	-	586.22	9	$ 0.00	$ 0.00
4 pan gas steamer	$ 2,489.00	-	779.91	9	$ 0.00	$ 0.00
5 pan gas steamer	$ 3,111.00	-	973.63	9	$ 0.00	$ 0.00
6 pan gas steamer	$ 3,733.00	-	1,167.36	9	$ 0.00	$ 0.00
10 or larger pan gas steamer	$ 4,287.16	-	3,043.24	9	$ 0.00	$ 0.00
Efficient combination oven (>= 16 pan and <= 20 pan) gas	$ 5,717.00	-	500.00	10	$ 0.00	$ 0.00
Efficient combination oven (>= 6 pan and <= 15 pan) gas	$ 5,717.00	-	403.00	10	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Efficient convection oven full size	$ 5,717.00	-	450.00	10	$ 0.00	$ 0.00
Gas rack oven	$ 4,933.00	-	1,034.00	8	$ 0.00	$ 0.00
Energy Star 50% effic.gas fryer	$ 2,500.00	-	505.00	12	$ 0.00	$ 0.00
H.E. gas griddle, 40% effic. or better	$ 491.00	-	88.00	12	$ 0.00	$ 0.00
High temp gas hot water dishwasher	$ 2,297.00	-	102.82	12	$ 1,068.60	$ 0.00
Low temp gas hot water dishwasher	$ 2,297.00	-	140.10	12	$ 1,482.39	$ 0.00
Commercial/Industrial – Fleet Heat						
Idaho Fleet Heat	$ 520.50	8,000.00	-	12	$ 0.00	$ 0.00
Commercial/Industrial – Exterior Lighting						
1000W HID to 300W-400W LED	$ 1,198.80	3,058.00	-	12	$ 0.00	$ 11.76
400 W HID to 100-175W LED Fixture	$ 543.19	1,282.40	-	12	$ 0.00	$ 27.49
320 & 400 watt HID New Construction Fixture =< 175 watt LED Fixture	$ 520.50	1,282.40	-	12	$ 0.00	$ 27.49
320 W HID to 100-160W LED Fixture	$ 480.00	896.40	-	12	$ 0.00	$ 16.47
250 W HID to 80-140W LED Fixture	$ 495.00	711.93	-	12	$ 0.00	$ 24.18
250 watt HID New Construction Fixture =< 99 watt LED Fixture	$ 520.50	711.90	-	12	$ 0.00	$ 24.18
175 watt HID New Construction Fixture to =< 79 watt LED Fixture	$ 175.00	665.00	-	12	$ 0.00	$ 26.75
175 W HID to 30-79W LED Fixture	$ 277.24	664.76	-	12	$ 0.00	$ 26.75
150 W HID to 30-50W LED Fixture	$ 257.61	643.31	-	12	$ 0.00	$ 19.83
90 - 100 W HID to 25-30W LED Fixture	$ 272.00	416.00	-	12	$ 0.00	$ 22.53
70-89 watt HID Fixture =< 25 watt LED Fixture	$ 265.00	321.70	-	12	$ 0.00	$ 22.68
Sign Lighting LED	$ 24.00	125.00	-	10	$ 0.00	$ 27.90
Commercial/Industrial – AirGuardian						
Idaho AirGuardian	$ 1,440.00	6,000.00	-	10	$ 0.00	$ 0.00
Low Income – Natural Gas						
G AIR INFILTRATION	$ 730.00	-	16.00	20	$ 13.81	$ 0.00
G ENERGY STAR DOORS	$ 596.40	-	12.60	40	$ 628.00	$ 0.00
G ENERGY STAR WINDOWS	$ 13.40	-	0.28	40	$ 8.72	$ 0.00
G HE FURNACE	$ 698.00	-	80.34	20	$ 698.00	$ 0.00
G HE WH 50G	$ 529.00	-	7.05	13	$ 500.00	$ 0.00
G INS - CEIL/ATTIC	$ 2.14	-	0.02	45	$ 0.00	$ 0.00
G INS - DUCT	$ 6.70	-	0.41	45	$ 0.00	$ 0.00
G INS - FLOOR	$ 2.14	-	0.08	45	$ 0.00	$ 0.00
G INS - WALL	$ 2.20	-	0.07	45	$ 0.00	$ 0.00
G duct sealing	$ 608.58	-	47.00	20	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 kWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Low Income – Electric						
E TO G COMBO CONVERSION	$ 8,408.56	9,075	(402.00)	25	$ 0.00	$ 0.00
E TO G FURNACE CONVERSION	$ 5,566.10	5,999.00	(240.00)	25	$ 0.00	$ 0.00
E to Air Source HP conversion	$ 3,297.00	4,795.00	-	15	$ 0.00	$ 0.00
Ductless HP (Average RTF of HZ2 & CZ 1-3)	$ 3,822.37	4,621.50	-	15	$ 0.00	$ 0.00
E HE AIR HPUMP	$ 4,172.89	3,645.00	-	20	$ 0.00	$ 0.00
E TO G H2O CONVERSION	$ 2,842.45	3,076.00	(162.00)	15	$ 0.00	$ 0.00
Duct sealing	$ 608.58	1,374.00	-	20	$ 0.00	$ 0.00
Tier1 0-55Gallon HPWH	$ 854.23	1,073.00	-	13	$ 0.00	$ 0.00
E AIR INFILTRATION	$ 730.00	1,000.00	-	20	$ 0.00	$ 0.00
E ENERGY STAR DOORS	$ 439.44	224.67	-	40	$ 0.00	$ 0.00
9 watt A19 bulbs - 60W replacement - (6 units)	$ 16.92	78.00	-	13	$ 0.00	$ 0.00
E ENERGY STAR REFRIGERATOR	$ 100.23	39.00	-	20	$ 0.00	$ 0.00
E ENERGY STAR WINDOWS	$ 15.90	6.94	-	45	$ 0.00	$ 0.00
E INS - WALL	$ 1.54	2.00	-	45	$ 0.00	$ 0.00
E INS - DUCT	$ 1.23	0.72	-	18	$ 0.00	$ 0.00
E INS - FLOOR	$ 1.41	0.67	-	45	$ 0.00	$ 0.00
E INS - CEIL/ATTIC	$ 0.90	0.49	-	45	$ 0.00	$ 0.00

APPENDIX H – 2018-2019 EVALUATION WORK PLAN

Avista Utilities 2018–2019 Evaluation Work Plan

March 30, 2018

Avista Utilities
1411 East Mission Avenue
Spokane, WA 99252

The Cadmus Group LLC
An Employee-Owned Company • www.cadmusgroup.com

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CADMUS

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Introduction and Goals

Avista Utilities contracted with Cadmus to evaluate its portfolios of residential, non-residential, and low-income demand-side management (DSM) programs during the 2018–2019 cycle. As identified in Avista's Request for Proposals (RFP), primary goals for the evaluation are these:

- Independently verify, measure and document energy savings impacts from each of electric and natural gas energy efficiency programs, or for program categories representing consolidated small-scale program offerings, from January 1, 2018, through December 31, 2019
- Analytically substantiate the measurement of those savings
- Calculate the cost-effectiveness of the portfolio and component programs
- Identify program improvements, if any
- Identify possible future programs

Evaluation, measurement, and verification (EM&V) research will also support the following:

- Avista's development of a best-of-class evaluation infrastructure for its DSM programs
- Communicate with and provide timely information to the stakeholder group (particularly the Avista Energy-Efficiency Advisory Group and Technical Committee)

In its original proposal to Avista, Cadmus presented a general approach to conducting the overall evaluation. We have prepared this evaluation work plan to reflect the programs as we understand them based on final (Washington) and draft (Idaho) plans for 2018 as well as the project kickoff. We anticipate further revisions to this work plan after additional discussions with program staff. Because the programs could change during the evaluation period, we may further revise the proposed evaluation approaches. We view the evaluation plan as a living document, which can change in response to program modifications throughout the 2018–2019 cycle.

This document presents proven methods to conduct full impact and process evaluations for Avista's three sector portfolios (low-income, residential, and non-residential). The plans address 16 individual programs across the portfolios.

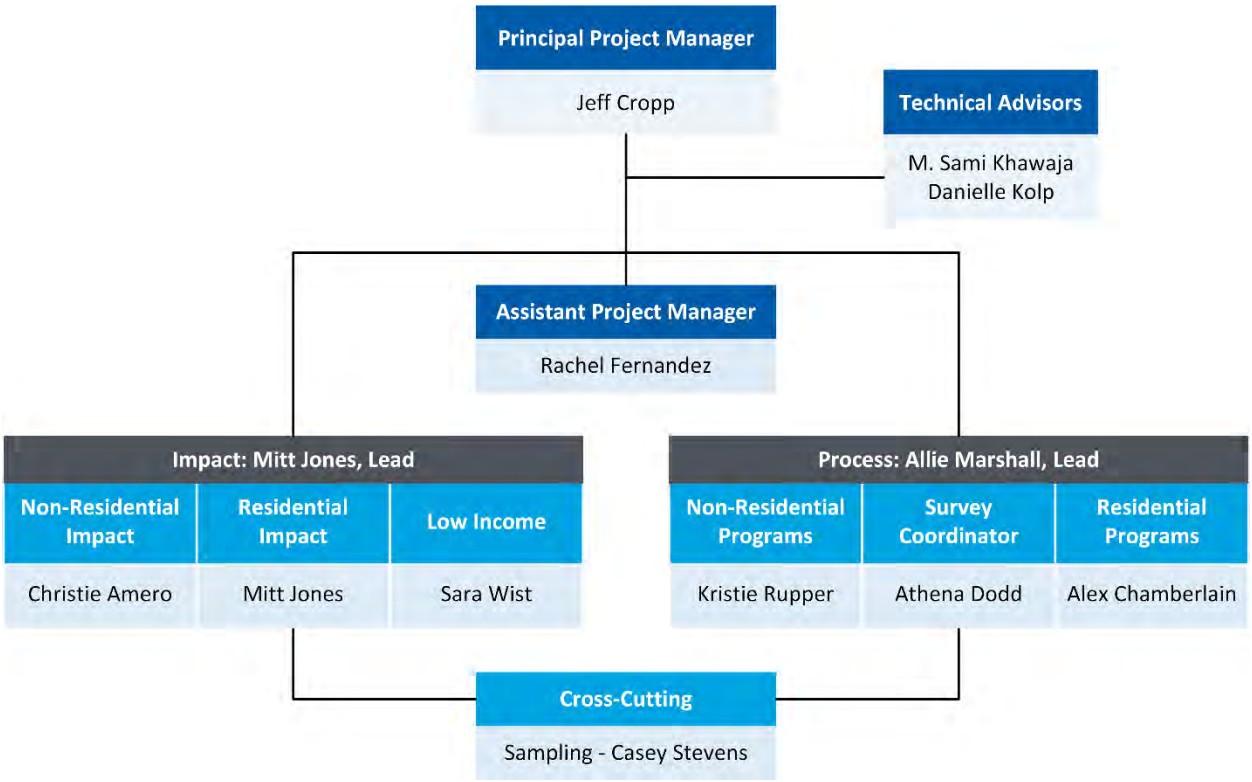
The following chapter summarizes the overall evaluation effort, followed by a chapter providing details of cross-cutting evaluation tasks (that is, general descriptions of the EM&V approaches applied as appropriate across individual programs). The remainder of this document addresses program-specific evaluation plans.

Evaluation Work Plan Overview

Evaluation Team

The Cadmus evaluation team is organized as shown in Figure 1.

Figure 1. Cadmus Evaluation Team Organizational Chart



Timeline and Deliverables

The overall timeline presented in Table 1 broadly depicts progress for each of the work tasks. The work plans for each program cluster include their own specific evaluation timelines. Deliverable reports associated with work tasks are specified in the *Communication and Reporting* section.

Table 1. 2018-2019 Task and Deliverable Schedule

Task	2018				2019				2020	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Kickoff Meeting										
Work Plan										
Project Management										
Advisory Group Meetings, as needed										
Residential NTG/Verification Surveys										
Non-Residential NTG/Verification Surveys										
Non-Residential On-Site M&V and Analysis										
Residential Modeling and Billing Analysis										
Low Income Billing Analysis										
Cost-Effectiveness Analysis										
Document and Database Review										
Avista and Implementer Interviews										
Participant Surveys and Interviews (Process)										
Contractor Interviews										
Quarterly Reports										
Semiannual Reports										
Annual Reports										
Electric Impact Memos and Reports										
Natural Gas Impact Memos and Reports										
Process Memo and Report										

Communication and Reporting

Avista expects multiple communication and reporting activities to be performed as part of this evaluation effort.

Communication

Cadmus will design our project communications based on the following recommendations:

- The Avista DSM Planning and Analytics team should serve as the lead contact for all evaluation aspects (impact and process) and, for contract purposes, is the client. Amber Gifford of the DSM Planning and Analytics team will serve as the contract manager and primary contact for the Cadmus team.
- The Avista DSM Planning and Analytics team may work with the Cadmus team to facilitate incorporation of Avista's implementation team's input into the final product. Avista may encourage the implementation team to actively participate in the evaluations, seeking to deliver the best product possible, consistent with the evaluation's independent character.
- Avista would likely prefer to have a DSM Planning and Analytics team member present (in person, by phone, or copied on e-mails) during any interactions between the Cadmus team and Avista's DSM implementation team.

Cadmus expects to hold biweekly conference calls with the Avista DSM Planning and Analytics team. These calls will provide updates about the project's status and issues. *Ad hoc* calls may be required to

address specific project issues and activities. Cadmus anticipates attending and occasionally facilitating in-person, telephone, or web-based meetings in addition to regular and *ad hoc* project meetings and a final close-out meeting.

Throughout the evaluation process, Cadmus will remain highly engaged with Avista's regional stakeholders, participating as requested in DSM Advisory Group and Technical Committee meetings. We anticipate providing the following support to Avista through these meetings:

- Presenting evaluation plans
- Presenting interim or final results on energy savings, realization rates, and cost-effectiveness
- Acting as a technical resource to explain the details of evaluation methodology and the rationale behind the methods employed for Avista
- Exploring opportunities for new or expanded techniques to evaluate programs or inform program design

Reporting

The Cadmus team plans the following reporting activities:

- ***Monthly memos.*** Provided in conjunction with monthly invoices to the Avista contract manager, these reports will include the following:
  - Summary of accomplishments during the previous month
  - The current month's activities/plans, including any outstanding data requests
  - Variances in schedule and budget, including any necessary explanations
  - Any issues or concerns to be addressed (along with Cadmus-proposed solutions)
- **Ad hoc *reports*** will document problems, resolutions, and urgent issues, as they arise.
- ***Quarterly reports.*** Beginning in May 2018, these reports will document project status over the previous three months, progress toward completing milestones for each deliverable, percentage toward completion by deliverable and task, percentage of budget spent to date, preliminary findings, and any other relevant information.
- ***Semiannual reports.*** Beginning in September 2018, these reports will expand on the quarterly reports with a focus on preliminary estimates of energy savings results from the previous six months and cost-effectiveness by program.
- ***Annual reports.*** As specified in the RFP, annual reporting for this project will consist of the following Cadmus team deliverables:
  - 2018 program year electric impact evaluation memorandums for Washington by April 15, 2019, and for Idaho by April 30, 2019
  - 2018 program year DSM Annual Report and Cost Effectiveness Analysis for Washington by April 15, 2019, and for Idaho by April 30, 2019
  - 2018 program year natural gas impact evaluation memorandums for Washington and Idaho by May 15, 2019

- 2018 program year process evaluation statement of effort with notable observations and recommendations by June 1, 2019
- Combined 2018-2019 process evaluation report by April 15, 2020
- Combined 2018–2019 electric impact evaluation report for Washington by April 15, 2020, and for Idaho by April 30, 2020
- 2019 program year DSM Annual Report and Cost Effectiveness Analysis for Washington by April 15, 2020, and for Idaho by April 30, 2020
- 2019 program year natural gas impact evaluation reports for Washington and Idaho by May 15, 2020

For these annual reports, we will prepare a comprehensive outline and ask Avista for comments and approval. The final reports will describe our data collection and process methods, present the results of the analysis and summarize findings, draw conclusions, and recommend possible improvements. We will include data collection instruments used for the process evaluation as appendices to the final report.

Overview of Evaluation Methods

Cadmus will apply the methods described below to develop findings that will determine the impacts and cost-effectiveness of Avista's programs and guide the development of current and future programs.

Impact Evaluation Methods

Our analyses will use standard engineering approaches such as those defined by the International Performance Measurement and Verification Protocols (IPMVP) and the Uniform Methods Project (UMP). We will employ the following primary methods:

- Simple verification (phone, on-line, or on-site)
- Energy calculation models
- Metering (IPMVP A and B)
- Whole building billing analysis (IPMVP Option C)
- Simulation modeling (IPMVP Option D)

Table 2 summarizes the impact evaluation data collection and analysis activities by program. We will conduct the low-income and residential billing analyses in early 2020. We will conduct the online, phone, and on-site measurement and verification activities on a quarterly basis in both 2018 and 2019 to obtain a reasonable sample from each program year to provide early feedback to Avista.

Table 2. PY 2018–2019 Natural Gas and Electric Impact Evaluation Activities

Sector	Program	Database/ Document Review	Phone Verification	Site Visits	Metering	Billing Analysis	Modeling
Residential	Simple Steps, Smart Savings™	✓					
	HVAC	✓	✓			✓	
	Shell	✓	✓			✓	
	Fuel Efficiency	✓	✓			✓	
	ENERGY STAR Homes	✓	✓				✓
	MF Direct Install	✓				✓	
Nonresidential	Interior Lighting	✓	✓	✓	TBD		
	Exterior Lighting	✓	✓	✓			
	Shell	✓	✓	✓		TBD	
	Green Motors	✓	✓	✓			
	Motor Control (VFD)	✓	✓	✓	TBD	TBD	
	Fleet Heat	✓	✓	✓			
	Food Service Equip.	✓	✓	✓			
	AirGuardian	✓	✓	✓	TBD		
	MFMT	✓	✓	✓			
	Site-Specific	✓		✓	✓	✓	✓
	EnergySmart Grocer	✓	✓	✓	TBD		
Low-Income	Low-Income	✓				✓	

Simple Verification

Cadmus will verify some prescriptive measures (particularly those with relatively small reported savings) on site, by phone, or through an on-line questionnaire to confirm that measures are installed in the reported quantity and operating in a manner consistent with deemed-savings assumptions. We will also verify recorded nameplate efficiency data against manufacturer's specifications. We will accept the reported savings without further investigation if we can confirm that these details match the assumptions used for Regional Technical Forum (RTF) or Avista technical reference manual (TRM) unit energy savings. If we identify inconsistencies, we will adjust the savings based on the equipment and operating parameters found at the site.

Engineering Calculation Models

For some nonresidential site-specific measures, Avista uses spreadsheets to calculate the estimated energy savings for a variety of measures based on relevant inputs, such as quantity, fixture wattage, square footage, efficiency value, HVAC system details, and location details. For each spreadsheet, we will review input requirements and outputs to determine if the approach is reasonable. We will discuss any concerns about the approach with Avista's implementation team and explain why we think a different method may yield more accurate results. Where applicable, we will update calculations using on-site verification data, energy management system (EMS) trend data, spot measurements, and metering data.

Metering Analysis (IPMVP Options A and B)

To estimate the relevant operational parameters needed to inform engineering calculation models, Cadmus will perform any necessary data logging for a period of days, weeks, or months. During the site visits, we will confirm relevant information such as installation of the efficient equipment, set points, sequence of operations, operating schedules, and ambient conditions. We will also estimate the baseline energy performance, according to program documentation, on-site conditions, facility interviews, and relevant energy code requirements.

After downloading the meter data, we will clean it—checking key fields for missing data, correcting bad data, and removing sites with insufficient data. We will flag anomalies and send them to a senior engineer who will determine if the data should be used, corrected, or excluded from the analysis. Next, we will analyze the key variables in the metering data using spreadsheet tools or Python.[1] We will use the resulting information to calculate savings (as input variables in an engineering model) or for comparison to consumption estimates.

Whole Building Analysis (IPMVP Option C)

Residential billing analysis. For programs in the residential portfolio, Cadmus will perform billing analyses to develop the most accurate estimate of energy and demand savings. Where practical, we will

[1] More information about Python software is available online at: https://www.python.org/

rely on consumption data analysis, targeting a census of participants, which will maximize accuracy by preventing sampling bias.

We will perform billing analyses to quantify the electric- and gas-savings impacts associated with several of the residential programs. For each of these program, we will test several different regression models, including household-level Princeton Score-Keeping Method (PRISM)-like models (aligned with IPMVP Option C), as well as fixed effects panel models (discussed in UMP protocols). Running several different regression models is an effective way to test the robustness of the savings estimates.

We will tailor our billing analysis approach and research design to each program. When conducting experimental and quasi-experimental design of a billing analysis, a control or comparison group should be selected that accurately represents the counterfactual and accounts for the naturally occurring changes in consumption. For most programs, we propose constructing a ***comparison*** group of nonparticipants who are similar to participants, either selected from future program periods or through matching (using preprogram energy consumption, demographics, or home characteristics). In the latter case, we would use a propensity-scoring model to match nonparticipants to similar participants and to test the validity of the matches. In a randomized experiment, participants are put into test and ***control*** groups at the outset.

Nonresidential billing analysis. Cadmus can use monthly billing or interval data to conduct site-specific regression analyses for nonresidential retrofit projects, particularly in the site-specific and HVAC-related prescriptive programs (for example, HVAC and shell). This analysis method is particularly useful for accurately assessing the energy savings from comprehensive retrofit projects, especially those involving custom HVAC or controls measures.

Using the pre- and post-modeling approach, Cadmus will develop retrofit-savings estimates for the sampled sites, accounting for cooling degree days (CDDs) and heating degree days (HDDs). We will match the participant-consumption data to the nearest weather station by zip code. We will then calculate the building balance-point temperature by correlating monthly energy use with monthly average temperature.

Cadmus will use the balance-point temperature to calculate the CDDs and HDDs then match that to the monthly billing data. We will use the resulting regression estimates to extrapolate average energy savings based on normalized weather conditions. (For this calculation, we will use typical meteorological year, 15-year normal weather averages from 1991–2005, which we will obtain from the National Oceanic and Atmospheric Administration.)

For each project, Cadmus will model the average daily consumption in kilowatt hours (kWh) and/or therms as a function of base load, HDDs and CDDs, and, where appropriate, daily production. For the evaluated sites, we will estimate two demand models—one for the pre-period and one for the post-period. We typically choose this methodology over a single standard-treatment-effects model to account for structural changes in demand that can occur with retrofits, such as changes in occupancy or usage patterns. We will then estimate the annual consumption based these values.

Simulation Model Analysis (IPMVP Option D)

Residential simulation model analysis. For the ENERGY STAR® Homes program, Cadmus anticipates that Avista relies on simulation models developed through Simplified Energy Enthalpy Model (SEEM) or REM/Rate. Home Energy Rating System (HERS) raters should inspect each home during construction to create an energy analysis model to estimate the home's energy savings, as compared to the reference home. These models predict savings for homes in comparison to state energy code.

We will review the inputs to the simulation models for a sample of homes to make sure the homes adhere to program requirements. We will first compare program-tracking records against the HERS raters' home characterizations in the simulation models to verify participation and appropriate incentive levels. Then we will utilize simulation model-predicted savings to compute the gross program electricity and gas energy savings.

Nonresidential simulation model analysis. In past years, Avista's implementation team relied extensively on eQuest models to estimate energy savings for complex site-specific HVAC projects. Cadmus will review and verify the savings calculated from simulation models for a portion of the projects. Our simulation approach, which is based on *in situ* observations and measurements, is calibrated to the best available energy-use indices. It entails the use of well-developed, sophisticated building-simulation tools, such as DOE-2, and follows methods described in the U.S. Department of Energy M&V Guideline and ASHRAE Guideline 14.[2,3]

We will obtain the existing as-built and baseline models, utility billing data, and any available documentation for each simulated measure project in the sample. Step one will be to conduct a side-by-side comparison of the existing baseline and as-built models. Because different versions of the same software (mainly eQuest and EnergyPlus) can return conflicting results, we will open models only in the software-build version in which they were developed.

Our goal for the on-site visit will be to gather all data necessary to improve and calibrate the model. Using our on-site data collection form and following our facility operator interview guide, we will verify all necessary assumptions and obtain any available EMS data needed to further inform the calibration process.

Following the site visit, Cadmus will update the model with the verified values. We will input verified values and actual meteorological year (AMY) weather data for the appropriate location and time period into the model then test statistical calibration, comparing model results with utility and metered data. In accordance with ASHRAE Guideline 14, we will target a monthly accuracy within a mean bias error (MBE) of ±5% and a coefficient of variation root mean square error (CVRMSE) of ±15%. We will make logical improvements, based on engineering judgment where anomalies are identified. In our analysis, we will

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2 U.S. Department of Energy. *M&V Guidelines: Measurement and Verification for Performance-Based Contracts (Version 4.0).* Available online at: http://energy.gov/sites/prod/files/2016/01/f28/mv_guide_4_0.pdf

3 ASHRAE. *Measurement of Energy, Demand, and Water Savings.* Atlanta, GA. 2014.

account for fluctuations, such as those from initial building commissioning or first-year occupancy changes.

Once the adjusted as-built model has achieved the accuracy requirements, the remaining steps are fairly straightforward. We will replace the AMY data used for calibration purposes with typical meteorological year (TMY) data. To develop the baseline model, we will back out the conservation measures based on incentive documentation, changes between existing models documented during the initial comparison, and any measure stipulations, such as code requirements. Unless instructed otherwise by Avista, we will calculate measure savings in the same order and manner suggested by the existing models and documentation (that is, first measure in, last measure out, and so on). We will determine savings by comparing results from the calibrated typical year as-built and baseline models.

Rolling Net-to-Gross

One of the most challenging questions in DSM evaluation in general is the assessment of what would have happened absent the program (the counterfactual). This poses many challenges, chief among them determining what participants would have done had they not participated in the program. The most common approach is to determine the net-to-gross (NTG) values of a program or an offering within a program through a self-reporting approach. However, this approach is problematic in that it requires inquiry into a hypothetical situation.

In the Northwest, many have argued that it is best to use market practice (current practice) as the baseline and thus avoid the self-reporting issue altogether. This approach is not without merit but has created its own difficulties. In areas outside the Northwest, the EM&V process assumes the baseline to be the least expensive legal option. This produces a *gross* estimate of savings. Later in the process, this may be discounted for what people may have done on their own (for example, exceeded the least expensive legal option for some reason) through a self-reported NTG value. Although this market practice does have its problems, it has become the standard, and many industry standard EM&V protocols are constructed around its logical flow.

The Northwest has created its own challenge through the market baseline approach. Through previous work with Avista, Cadmus knows that for measures using unit energy savings (UES) from the RTF, no NTG adjustment is necessary. For measures with no RTF UES, we will estimate and apply a NTG ratio.

Given the differing needs and definitions of “net” within Avista’s territory, Cadmus suggests using a rolling NTG analysis. NTG analyses, which estimate the influence of program activities on the customer’s decision to participate, often are conducted at the end of a program cycle. The information provided may be of little use to program managers because much time has elapsed since the program ran, the delivery has changed sufficiently to make the findings not applicable, or the program is not offered anymore.

Another concern with traditional NTG analysis is that the customer is asked a hypothetical—that is, what the customer would have done absent the program—and often has difficulty recalling the decision if

significant time has elapsed. It stands to reason that, although the question continues to be difficult to answer, the closer in time it is asked to the actual decision, the easier it will be to answer accurately.

In large commercial and industrial (C&I) evaluations, other questions are often asked related to the decision—for example, what was already considered, was anything similar ever done in the past, was the work budgeted for, was it discussed with anyone else. All of these questions are better asked as close as possible in time to the actual decision, that is, soon after participation.

A rolling NTG study will deliver near real-time feedback regarding freeridership rates. Using quarterly participation information, we will survey participants for freeridership with a mix of on-site, web-based, and phone surveys to minimize potential bias and maximize response rate.

We will analyze data in real-time and deliver quarterly freeridership summaries to Avista. Collecting these data concurrent with program implementation activities not only increases the data accuracy (for example, reduced recall bias), it also closes the feedback loop between customers, program managers, and evaluators to allow program managers to react to findings during the program year.

Table 3 shows the proposed sample sizes for the residential and non-residential participant surveys. As discussed above, different timing and survey samples can maximize the efficiency and quality of responses. The 585 surveys that will determine freeridership and spillover will be spread out across quarters of calendar year 2018 and 2019 beginning with 2Q 2018..

Table 3. NTG Survey Sampling

Program	Surveys
Residential Programs	
HVAC	150
ENERGY STAR Homes (builder surveys)	6
Shell	150
Fuel Efficiency	75
Non-Residential Programs	
Prescriptive	129
Site-Specific	52
Energy Smart Grocer	23
Total	**585**

Freeriders are defined as participants who would have purchased and installed measures without the support of the program. Participant spillover indicates additional unrebated measures that customers have installed due to program influence, and nonparticipant spillover is defined as installed measures without program participation but still resulting from Avista influence. The equation to calculate NTG is as follows:

$$NTG = 100\% - Freeridership + Participant\ Spillover + Nonparticipant\ Spillover$$

Freeridership

Cadmus will determine freeridership through the participant online and phone survey using a participant self-report approach. Before we field our survey, we will submit it to Avista for review and refinement of the freeridership questions and scoring methodology. Using the survey results, we will calculate a freeridership rate and, where appropriate, apply it to evaluated savings to estimate net gas and electric impacts attributed to programmatic effects. The standard survey battery we use for determining freeridership includes these questions:

- Would the participant have installed the same measures without the program?
- Would the participant have installed products that were just as energy-efficient without the program?
- Would the participant have installed the same quantity of item?
- Would the participant have installed the item within the same year, within two years, within five years, or in more than five years?

Participant and Nonparticipant Spillover

Participant spillover will also be gathered through the customer surveys. Spillover measures must satisfy the following conditions to be counted:

- The measure could not have received a rebate from Avista or another entity.
- Respondents must indicate that Avista programs positively influenced their decision to install the measure.

As with our last evaluation in 2013, we will add any spillover that can be attributed to measures using RTF savings values to produce a true net savings value and not merely a "net of freeridership" value.

Calculating Cost-Effectiveness

Cadmus will calculate and report the program's cost-effectiveness using evaluated savings, avoided energy costs, and actual incurred implementation costs. We will use Portfolio ProPlus to provide cost-effectiveness assessments by portfolio, program, fuel type, year, measure, and state level.

We will determine the economic performance of a program from five standard perspectives—a combination of the utility and program participants, the utility, program participants, all ratepayers (including nonparticipants). Cadmus will evaluate these perspectives using five cost-effectiveness tests—total resource cost (TRC) test, utility cost test (UCT), participant cost test (PCT), rate impact measure (RIM) test, and Resource Valuation Test (RVT).

We will populate a database with Avista's utility data common to all programs (such as discount rates, avoided costs, load shapes, and retail rates) so that we can maintain a consistent approach to cost-effectiveness valuation across all programs and portfolios.

Process Evaluation Methods

We designed the process evaluation approach based on past evaluation findings, as well as on the draft and final 2018 electric and natural gas Washington and Idaho Annual Conservation Plans (ACPs)

For all programs, our research methods will consider these four fundamental objectives:

- Assess program delivery channel and marketing methods
- Assess participant and market actor program journey including barriers to participation, satisfaction, and effectiveness of incentive levels
- Assess Avista and implementer staff experiences including organizational structure, communication, and program processes
- Document areas of success, challenge, and changes to the program

To address these research objectives, we will conduct implementation and customer research. Our implementation research will include a document and database review for each program, in-depth interviews with key Avista and implementation staff and with participating contractors. Our customer research will include participant surveys and interviews for customers, as well as builder, retailer and manufacturer interview for relevant programs (Figure 2). We discuss each of these research areas and the associated tasks in more detail below.

Figure 2. Process Evaluation Research Areas and Tasks

Table 4 shows the research areas by program and year confirmed during the kick off on January 17, 2018.

Table 4. PY 2018–2019 Process Evaluation Activities

Program Name	Implementation Research		Customer Research	
	2018	2019	2018	2019
Residential Portfolio				
ENERGY STAR Homes		✓		✓
HVAC	✓		✓	✓
Shell	✓		✓	
Fuel Efficiency	✓		✓	✓
Simple Steps Smart Savings		✓		✓
Multifamily Market Transformation		✓		✓
Multifamily Direct Install (Pilot)	✓		✓	
Low Income Portfolio				
Low Income		✓		
Non-Residential Portfolio				
EnergySmart Grocer		✓		
Site-Specific	✓		✓	✓
Prescriptive*	✓		✓	✓

*Prescriptive: Lighting, HVAC, Shell, Variable Frequency Drive (VFD), Food Service Equipment, Green Motors, AirGuardian, and Fleet Heat.

The next sections describe the task methods for each research area.

Implementation Research

Cadmus will assess program processes and provide timely and actionable recommendations for continuous implementation improvement by reviewing the database and program documentation and conducting interviews with program staff and contractors. Our reviews of key program documents and corresponding databases will inform what data we collect to meet the research objectives.

We anticipate conducting interviews with critical program staff, such as these:

- DSM Analytical Manger
- Direct of Policy
- Manger of Energy Solutions
- DSM Marketing Communications Manager
- Utility Resources Analyst
- Low Income Program manger
- Residential Program Manager(s)
- Non-Residential Program Manager(s)

We will also interview key third-party implementers, such as CLEAResult, the Green Motors Practices Group (GMPG), and the Community Action Partner (CAP) agencies.

Finally, for programs in which contractors play a vital role, we will conduct contractor interviews. Because contractors may provide services for more than one program, we will work with Avista to determine the appropriate target audience within each sector, such as high impact contractors.

Table 5 lists the implementation research by program.

Table 5. Implementation Research by Program

Program	Implementation Research			
	Implementer Interviews	Avista Interviews	Contractor Interviews	Document & Database Review
Residential Programs				
ENERGY STAR Homes		✓		✓
HVAC		✓	✓	✓
Shell		✓		✓
Fuel Efficiency		✓		✓
Simple Steps Smart Savings	✓	✓		✓
Multifamily Market Transformation		✓		✓
Multifamily Direct Install (Pilot)	✓	✓		✓
Low Income Programs				
Low Income	✓	✓		✓
Nonresidential Programs				
EnergySmart Grocer	✓	✓	✓	✓
Site-Specific		✓	✓	✓
Prescriptive Lighting		✓	✓	✓
Prescriptive HVAC		✓	✓	✓
Prescriptive Shell		✓	✓	✓
Prescriptive VFD		✓	✓	✓
Food Service Equipment		✓	✓	✓
Green Motors	✓	✓	✓	✓
AirGuardian	✓	✓	✓	✓
Fleet Heat	✓	✓	✓	✓

The following sections describe each of the implementation research tasks. Program-level details are provided in the *We will conduct in-depth interviews* with one manufacture and up to three retailers participating in the Simple Steps program, up to ten builders participating in the Multifamily Market Transformation program, and up to 10 participants of the Multifamily Hard-to-Reach pilot.

Individual Program Process Evaluation Activities section of this work plan.

Document and Database Review

Cadmus will review program materials—such as operation manuals, program theory and objectives documents, marketing plans, logic models, and the program website, as well as program databases—to gain a thorough understanding of the processes and identify trends in measures, savings, and overall performance. In our database review, we will also assess the accuracy and quality of program tracking data and its adherence to Avista's program and regulatory policies and will explore any anomalies in evaluation results. We propose to review the database once per program, within the two-year

evaluation period, so Avista has time to incorporate recommendations before assessing the database again.

We also will review Avista's most recent process and impact evaluation results to learn how Avista has incorporated earlier recommendations and to identify trends in program performance. We will apply our findings from the program document and database reviews to refine program-specific research objectives and develop data-collection instruments.

Avista Staff and Third-Party Implementer Interviews

Avista and its third-party implementers hold critical insight into program administration and delivery processes. Telephone interviews with these key stakeholders will focus on these topics:

- Program roles and responsibilities
- Program goals and objectives
- Program design and implementation
- Data tracking
- Program participation
- Marketing and outreach
- Program successes
- Market barriers
- Program impact on the market
- Future program changes including redesign

During the interview, we will be conscientious of staff members' time. Because we know they sometimes oversee multiple programs, our interview guides will avoid repetitive questions for programs with similar processes, such as data tracking. For example, we may cover all programs overseen by one or more staff members in one interview. We anticipate conducting five Avista program manager interview sessions and an additional three interviews with Avista senior DSM managers.

We will build on our early findings from the program staff interviews to focus the interviews with third-party staff about areas of interest, such as how the CAP agencies address decreasing participation in the Low Income program or how CLEAResult continues to spur manufacturer and retailer participation in the Simple Steps Smart Savings program.

Contractor Interviews

For many customers, contractors are an important source of program awareness and their involvement, cooperation, and understanding can be an indicator of program success. Cadmus proposes to conduct in-depth interviews to gain insights into contractors' motivations, experience, marketing strategies, how contractors identify customers, their standard business practices, knowledge about customer perceptions and experience, and perspectives on program processes, the program's influence on business, and the opportunities for improvement.

The exact number of interviews will depend on the number and type of contractors and overlap in participation across programs; however, for this work plan we estimate conducting up to nine residential and up to 30 non-residential contractor interviews. As discussed during the kick-off meeting and confirmed on February 8, 2017, we will concentrate the residential contractor interviews on the HVAC program. For all contractor interviews, we will consult with Avista program managers and account

executives to identify target contactors, such as those with a high impact and who serve customers participating in specific programs, as well as to ensure that communication to program contractors is coordinated.

Customer Research

As shown in Table 6, Cadmus will conduct online participant surveys, as well as interviews with participants where smaller populations exist.[4]

Table 6. Customer Research by Program

Program	Customer Research	
	Participant Surveys	Participant Interviews
Residential Programs		
HVAC	✓	
Shell	✓	
Fuel Efficiency	✓	
Simple Steps Smart Savings (Manufactures and Retailers)		✓
Multifamily Market Transformation (Builders)		✓
Multifamily Direct Install (Pilot)		✓
Non-Residential Programs		
Site-Specific	✓	
Prescriptive*	✓	

*Prescriptive: Lighting, HVAC, Shell, VFD, Food Service Equipment, Green Motors, AirGuardian, and Fleet Heat.

Participant Online Surveys and Interviews

Cadmus will prepare survey and interview guides for participants in all of Avista's programs except the EnergySmart Grocer and ENERGY STAR Homes programs. Questions will focus on topics that can help Avista understand trends in measure adoption and overall program performance and that gather critical data to inform the impact evaluation.

[4] As discussed in the kick off meeting, we will not conduct customer research for the ENERGY STAR Homes or EnergySmart Grocer programs under this scope of work.

Our participant survey and interview guides will gather critical insights into participants' program journey, such as these aspects:

- Program awareness
- How respondents learned about the program
- General program participation
- Reasons for participation
- Program benefits
- Program delivery experience
- Overall program satisfaction
- Satisfaction with Avista
- Current energy-efficient behaviors and purchases
- Participant freeridership and spillover
- Suggestions for program improvements including testing pilot program concepts

For all process evaluations, we will use an online survey, which involves emailing a link to the survey to a random sample of participating customers for whom an email address is available. Because online surveys can be administered at low costs, we could consider emailing the survey to all participants.

We typically recommend simple random sampling when the population is sufficiently large but will finalize the sampling plan according to the target sample sizes and expected response rates and after receiving comprehensive participant tracking data. For programs with unique populations (Simple Steps, Multifamily Market Transformation, and Multifamily Hard-to-Reach) we will conduct participant (manufacturer, retailers, builders, and small pilot populations) telephone interviews to allow for a greater range of topic exploration. See Table 10. Participant Survey Sample Design for Washington and Idaho CombinedTable 10 in the *Sampling Plans* section for sampling details.

Our team will follow these three practices to manage and implement high-quality data collection:

- **Data-collection instruments that conform to best practices.** Our team is dedicated to the quality and rigor of primary research. Project managers will review questionnaires to ensure they are consistent with best practices (for example, do not use double-barreled questions and use appropriate scales) and, whenever possible, use consistent questions across programs to enable trend analysis. We will provide all instruments to Avista for review prior to launch and will provide a final copy of the instrument with the final report.
- **Online survey coordinator for streamlined and efficient data collection.** We will designate a single survey coordinator who manages all survey activities to ensure consistent data collection across all research efforts and who is the primary contact for online programming and survey administration for our team. The coordinator will review each survey instrument, oversee the secure exchange of data with Avista and/or survey vendor, monitor data-collection results on a daily basis, and report progress to Avista and our team.
- **Expert survey oversight and quality assurance.** Cadmus' survey research specialists will supervise every step of survey programming, testing, and data-collection process. We always check programming for errors before fielding the survey to ensure skip patterns work as intended and that responses show the appropriate understanding of the survey questions.

Natural Gas and Electric Impact Evaluations

Cadmus will apply best practices based on our previous experience with Avista's programs and other portfolio evaluations to evaluate the natural gas and electric impacts for the relevant programs.

Impact Sampling Plan

Our approach to developing impact evaluation sampling plans is consistent with the methods described in the UMP. Specifically, we will include these guidelines in our approach:

- **Determine confidence and precision requirements for key metrics.** Within each program, our team will use key metrics to support our gross and net energy estimates for each program. For programs with more complex or comprehensive offerings, we typically expect variation between customers to be larger than for programs with fewer variables or more streamlined installations. We will rely on our experience evaluating Avista's programs to estimate the homogeneity or heterogeneity of the population of participants. When possible, we will design a sample for each program so that we can estimate the overall portfolio energy savings with 90% confidence and ±10% precision.
- **Develop the sample design.** We will apply sample designs including simple random sampling, stratified sampling, and cluster sampling and will employ the method most appropriate to the program and the population of interest. The optimal design depends on the homogeneity or heterogeneity of the population of participants within each program as well as any targeted research we plan to perform (that is, if we are particularly interested in evaluating savings for a particular measure or collection of measures, we will stratify accordingly to ensure ample sample sizes from that population). We will sample large projects with certainty, when the expected savings among them is expected to differ substantially from the rest of the population.
- **Calculate sample sizes.** We will calculate sample sizes based on the confidence and precision requirements, expected variation, sample design, and population size for each program. Sample sizes will be sufficient to estimate gross and net savings for each program and the portfolio as a whole.

For most residential program energy savings (except Simple Steps, Smart Savings and ENERGY STAR Homes), we will not need to identify a sample because we will conduct a billing analysis on the whole program population. However, we will conduct a random sample of residential program participants on a quarterly basis to determine measure verification rates and conduct NTG surveys.

For non-residential programs, Cadmus proposes a stratified sample design, with strata defined based on fuel type (electric and natural gas) and project savings. Within each program and fuel type, we will identify large- or small-savings projects and conduct site visits with a census of the largest-saving projects and a simple random sample of the small projects.

We will determine sample sizes for each program and fuel type. We will use a combined sample for because Avista programs are substantially the same in Washington and Idaho. Data obtained during site

visits will inform calculation of realization rates used to estimate population savings for each program and fuel type. We will report these results and the corresponding state-specific program savings results.

We determined sample sizes according to the most recent evaluation results, actual participant and project population sizes, additional stratification variables, and/or alternative sampling approaches (for example, probability proportional to size), with portfolio-level target confidence of 90% and precision of 10%. If possible, we will apply a finite correction to sample sizes to decrease the sample sizes. Table 7 shows the sample design for Washington and Idaho combined.

Table 7. Sample Design for Verification Surveys and Site Visits for Washington and Idaho Combined

Sector/ Evaluation Activity	Program	Fuel Type	Confidence	Precision	Expected Population Size*	Sample Size
Residential/ Verification Surveys	HVAC	Electric	90%	10%	4,000	75
		Natural Gas	90%	10%	10,000	75
	Shell	Electric	90%	10%	100	75
		Natural Gas	90%	10%	2,000	75
	Fuel Efficiency	Electric	90%	10%	N/A	N/A
		Natural Gas	90%	10%	3,000	75
	ENERGY STAR Homes	Electric	90%	10%	44	N/A
		Natural Gas	90%	10%	40	
Total Residential Verification Surveys			**90%**	**10%**		**428**
Non-Residential/Site Visits	Site-Specific	Electric	90%	20%	300	23
		Natural Gas	90%	20%	110	20
	EnergySmart Grocer	Electric	90%	20%	100	23
	Prescriptive Lighting	Electric	90%	20%	689	29
	Green Motors	Electric	90%	20%	20	10
	AirGuardian	Electric	90%	20%	20	10
	Fleet Heat	Electric	90%	20%	6	6
	Prescriptive VFD	Electric	90%	20%	18	12
	Prescriptive HVAC	Natural Gas	90%	20%	79	18
	Prescriptive Shell	Electric	90%	20%	49	11
		Natural Gas	90%	20%	54	13
	Food Service Equipment	Electric	90%	20%	52	10
		Natural Gas	90%	20%	68	10
Total Nonresidential Site Visits/Verification Surveys			**90%**	**10%**		**190**

*Population size is our best estimate of the number of residential program participants and nonresidential programs projects. We will update these and adjust sample sizes, based on 2018–2019 Avista program data across both states.

As in the previous evaluations we have conducted for Avista, we do not believe site visits are necessary for residential participants and plan to use surveys to confirm verification of program records and savings. We will field the survey quarterly (discussed in greater detail in the *Rolling Net-to-Gross*

section), and the sample sizes will cover both program years. The state and fuel mix will be random for each program and proportional to the mix of gas and electric rebates for Washington and Idaho.

Impact Evaluation Activities by Program

Cadmus will conduct the verification activities in four waves and provide interim results on program progress to Avista after each semiannual wave. The four waves will occur in summer 2018, January 2019, summer 2019, and January 2020. The site visits and phone surveys will collect baseline data, operations data, and other information that inform the energy savings analyses.

The following sections describe each Avista program and the proposed impact evaluation activities.

Low Income Program

A group of seven CAP agencies delivers energy efficiency programs to low-income communities. With annual funding of $2,000,000, these CAP agencies qualify low-income customers, generate referrals through energy assistance efforts, and make funding resources available to meet customers' home energy needs.

As in the previous evaluation cycles, Cadmus will assess the energy savings of Avista's Low Income program using statistical billing analyses, which is industry best practice for estimating the impacts associated with whole-building programs, as noted in the UMP. In our experience, smaller program populations pose challenges in the analysis of billing data that could demonstrate more robust results given larger sample sizes. We will also develop fixed effects conditional-savings regression models, with paired pre- and post-participation months as needed, to estimate actual changes in energy consumption in participating homes from energy efficiency and behavioral improvements. We will populate the model using detailed installation data collected through the program tracking system for a census of available program participants.

Cadmus will also estimate home-specific performance by running multiple regression models similar to PRISM. If these models do not produce similar results, as we expect, we will use additional diagnostics to detect anomalies.

ENERGY STAR Homes Program

The ENERGY STAR Homes program offers 15% to 25% savings relative to state energy code requirements. The program relies on the partnership of Avista and other member utilities of the Northwest Energy Efficiency Alliance (NEAA) to develop and implement the program and train contractors to provide third-party verification of qualifying stick-built and manufactured homes. NEAA administers the program, and Avista pays the rebate for homes that successfully achieve the designation of ENERGY STAR Home or ENERY STAR/ECO-Rated Manufactured Home.[5]

[5] Cadmus understands that ENERY STAR Homes with electric heating built in Washington will not be eligible for rebate in 2018.

As noted in the *Impact Evaluation Methods* section, Cadmus will review program records and simulation model inputs for a sample of homes, which we estimate at 46. We will first compare program-tracking records against the HERS raters' home characterizations in the simulation models to verify participation and appropriate incentive levels. We will then use simulation model-predicted savings to compute the gross program electricity and gas energy savings. We will apply average program savings by HERS level to the program population to estimate overall program savings.

We will calculate the NTG ratio for Idaho through participant builder surveys to gather information about participant builder practices when not incented by the program (that is, building practices used for non-program homes represent the baseline for that particular builder). This contrasts with most other programs, which will rely on participant surveys to determine the NTG ratio. We will attempt to understand the extent to which participant builders construct homes outside the ENERGY STAR Homes program different than inside it. If we learn that participating builders construct homes above the baseline for nonparticipating homes, the NTG for those builders will be based on the difference in energy consumption between a non-program home and a program home. If non-program homes were built to the same standards as the simulation model baseline home, net savings would be equal to gross savings. We will weight results up to the population based on the number of homes built in Avista service territory by each builder contacted.

Residential HVAC Program

The Residential HVAC program encourages residential customers to choose high-efficiency home energy upgrade solutions. Avista offers incentives for such upgrades through the prescriptive rebates, which are paid to the customer after installation. Vendors' use of the rebate as a sales tool generates participants. The program is advertised through utility websites, vendor training sessions, and customer presentations at retail events.

Cadmus will conduct 70 document reviews to assess the quality of HVAC program tracking data (noting missing, duplicate, and out-of-range values) and will verify that values of key metrics are within expected limits. We will also review Avista's reported gross *ex ante* savings estimates and assumptions, particularly for increasingly significant equipment such as air source heat pump measures, and benchmark these against similar programs in the Northwest.

We will determine verified net savings using a billing analysis of participant and comparison groups where practical. If obtaining a comparison group for one or more of the measures or measure groups in the HVAC program groups proves infeasible, because of the difficulty of identifying a sufficient nonparticipating population using the same baseline equipment, we will estimate gross savings with the billing analysis for those measures and apply a separate NTG based on data from online surveys.

Residential Shell Program

Avista's Residential Shell program offers prescriptive rebates to encourage residential customers to improve the energy efficiency of their homes' shell by upgrading windows and storm windows. The

program is advertised through utility websites, vendor training sessions, and customer presentations at retail events.

As with the Residential HVAC program, Cadmus will conduct 70 document reviews to assess the quality of program tracking data. We will also review Avista's reported gross *ex ante* savings estimates and assumptions about per-home consumption and benchmark these against similar programs in the Northwest.

We will determine verified net savings using a billing analysis of participant and nonparticipant groups. We will estimate savings for each participant using two modeling approaches—monthly fixed effects panel modeling and customer-specific regression—and summarize the results by measure.

Residential Fuel Efficiency Program

The Residential Fuel Efficiency program encourages customers to convert their electric space and water heater to natural gas. Although natural gas is an efficient fuel choice with decreasing prices over the years, the cost of infrastructure continues to increase for the utility and the customer. However, for the 2018–2019 biennium, conversions to natural gas water heaters will no longer have a stand-alone rebate; Avista now combines the rebate for water heaters with conversions to natural gas furnaces.

Cadmus will assess the quality of program tracking data and review Avista's reported gross *ex ante* savings estimates and assumptions. We will use the most recent data from the Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment (RBSA) to analyze the saturation of the water heater fuel type in the territory and update the allocation of energy savings to electric and natural gas accordingly. Cadmus recently completed site visits for the RBSA and is compiling the data for regional stakeholders. We will work with Avista to determine the most appropriate programs to which we can apply this new regional residential data and benchmark these against similar programs in the Northwest.

We will determine verified net savings using a billing analysis of participant and nonparticipant groups. We will estimate savings for each participant using two modeling approaches—monthly fixed-effects panel modeling and customer-specific regression—and will summarize results by measure type. We will also perform a gas billing analysis to better estimate the increase in the gas usage from fuel conversion.

Simple Steps, Smart Savings

Simple Steps, Smart savings, a collaborative program between Avista and Bonneville Power Administration, is designed to increase adoption of energy-efficient residential products, partly through influencing retail stocking practices and consumer purchasing. Residential customers are encouraged to purchase and install high-quality LEDs, light fixtures, and energy-efficient showerheads

For the Simple Steps, Smart Savings program, Cadmus will calculate *ex post* savings using RTF UES and primary data gathered by Avista's vendors regarding units sold.[6] Savings calculated using RTF UES can be considered net savings values because the RTF uses a market average baseline, which effectively accounts for freeridership. We will determine appropriate spillover values using primary or secondary research as necessary.

For any lighting measures without RTF UES, Cadmus will calculate savings using an annual savings algorithm with these variables—lamp wattage, delta watt multiplier, hours of use, days-per-year, waste heat factor, and in-service rate—and apply RTF assumptions where practical. This algorithm is derived from industry-standard engineering practices and is consistent with the methodology used by the RTF for calculating energy use and savings for residential lighting.

Multi-Family Hard to Reach Pilot

Cadmus will conduct document reviews on the census of projects installed through the pilot program through May 1, 2018. We will assess the quality of program tracking data (noting missing, duplicate, and out-of-range values) and will verify that values of key metrics are within expected limits. We will verify measure installation through an on-line survey with building managers and tenants, to the extent that contact information is available.

Cadmus will then compare the *ex post* measure savings for each project against the most recent 12 months of energy consumption to confirm the magnitude of savings is reasonable. We will request the most granular consumption data associated with each building. In the best case scenario, that would represent separate utility accounts for the multifamily common spaces and each individual living unit. In many cases, we anticipate one combined account for common spaces and living spaces.

We will aggregate the *ex post* energy savings associated with the appropriate level of billing data (e.g., full building, individual living areas), based on the granularity of information provided by the direct install vendor. We will calculate the portion of consumption that the direct install measures are expected to offset. We will then benchmark the portion of consumption expected as savings against similar measures and expected savings for other regional utilities, based on resources such as impact evaluations and resource potential studies.

We will provide Avista with *ex post* savings values by measure, along with our assessment of the reasonableness of the deemed savings assumptions relative to building energy consumption. We will also calculate the pilot program's cost-effectiveness.

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[6] Cadmus has noted that the Avista TRM provided during the RFP process stated that matching lumens ranges for measures in the Simple Steps, Smart Savings program were not found in the RTF measures. Based on the lumens ranges in the Avista 2018 DSM Annual Conservation Plan and version 5.2 of the RTF ResLighting workbook, it appears RTF lumens values will match Simple Steps, Smart Savings values and that RTF UES values will be available.

Non-Residential Site-Specific Program

The Non-Residential Site-Specific program is a core element of Avista's C&I portfolio because it brings in the largest portion of savings. The program provides flexible opportunities to achieve energy savings for measures that do not fit a prescriptive path. In the past, these projects have included compressed air, custom lighting, process improvement, and complex HVAC measures, among others. The Multifamily Market Transformation projects are also included within this program.

Cadmus will calculate participants' gross reductions in electricity and natural gas consumption using data collected through on-site visits, customer billing histories (as needed), and engineering models and calculations.

We will conduct site visits to all the largest projects (typically defined as greater than 500,000 kWh or 30,000 therms in expected savings) and a sample of smaller projects. The number of site visits will depend on actual enrollment and sample-size calculations, based on expected variability and the desired confidence and precision of evaluated savings. During the site visits, we will verify measure installations, collect baseline and equipment data, and identify addressable enrollment or installation issues. We will also examine new or emerging technologies that have been given incentives through the program because the newness of such measures may lead to more issues with installation or operation.

We will analyze gross program impacts using data collected from site visits and from tracking data. We will verify reported *ex ante* savings by recalculating energy savings using Excel spreadsheet analysis tools, site-specific data, and standard engineering analysis methods. Data may include savings calculations, manufacturers' specification sheets, and commissioning reports. We may also conduct regression analyses, as needed for measures whose savings impact cannot readily be evaluated through other means (for example, a comprehensive HVAC controls measure). Information collected during our site visits will determine if the sample projects reasonably address the measure's operating parameters and accurately reflect operating conditions.

Because we will not inspect all participant sites, we need a mechanism to extrapolate the difference between reported and evaluated to the population. To resolve this, we will apply a correction factor based on the realization rates to reported savings to calculate evaluated *ex post* gross savings. We will document the reasons and impacts on savings of all adjustments and will review these with Avista's implementation team during a presentation before committing results to the draft reports.

Non-Residential Prescriptive Programs

Avista implements these eight prescriptive programs that provide incentives directly to customers for a variety of measures supported by RTF UES or Avista's TRM:

- AirGuardian
- Fleet Heat
- Food Service
- HVAC
- Prescriptive Lighting
- Prescriptive Shell
- Prescriptive Variable Frequency Drive (VFD)

- Green Motors

Cadmus will first work with Avista to prioritize and review prescriptive measures in the TRM. We will identify those measures that have the most variance based on previous impact evaluation results. These measures may benefit from primary data collection and analysis during the 2018–2019 impact evaluation. This review requires in-depth knowledge and understanding about the specifics of each measure to ensure that the baseline and savings calculations reflected the best possible *ex ante* values for the region. Cadmus and Avista engineers will coordinate to ensure consistency in inputs and calculations and to ensure that the TRM uses the most up-to-date sources for Avista's engineering calculations. Additionally, our knowledge and understanding of federal minimum codes and standards will augment our review. Ultimately, we will provide recommendations for examined measures, including references, algorithms, and inputs.

Cadmus will design a sample for verification activities to include all prescriptive programs, with primary emphasis on those that contribute the most savings or represent the highest level of uncertainty. Although we anticipate that most participants will have installed lighting, our desk reviews, phone interviews, and site inspections will include lighting and non-lighting projects. Our sample will represent both distributions, and we will apply sampling weights accordingly as part of the correction factor.

We will conduct on-site inspections during the initial round of impact data collection to confirm Avista's quality-assurance processes have been maintained. This is particularly relevant for any new programs or those with updated program processes. If in these initial site visits, we find a high correlation between the reported and evaluated results, we will likely use less intrusive data collection methods, such as desk reviews and phone interviews with participants.

We will review project documents, verify assumptions, adjust reported calculations, and compute evaluated savings using Excel spreadsheet analysis tools or by approving installation rates for RTF measures with well-defined UES. We will derive baseline data from on-site visits, customer interviews, and Avista's program data. We will calculate evaluated savings using site visit data and standard engineering analysis practices. We will also calculate a realization rate based on sampled sites and will apply this rate to the project population to estimate program total evaluated savings.

As with the site-specific program, we will document all reasons and impacts on savings for adjustments and will review these with Avista's implementation team during a presentation before committing the results to the draft reports.

Non-Residential EnergySmart Grocer

The EnergySmart Grocer program is designed to provide customers with a comprehensive overview of their refrigeration systems and the savings that can be achieved by increasing the energy efficiency of their cases and grocery equipment. Through the program, customers are encouraged to increase energy efficiency through direct financial incentives. As a benefit, customers receive a no-cost audit of their facility's refrigeration, a detailed savings report, and technical assistance.

Like the non-residential prescriptive programs and others described above, Cadmus will review project documents, verify assumptions, adjust *ex ante* calculations, and compute *ex post* evaluated. We will collect baseline data and calculate *ex post* savings and realization rate. As with the site-specific program, we will document all reasons and impacts on savings of adjustments and review these with Avista's implementation team before committing results to the draft reports.

Real-Time Evaluation and Measurement

Cadmus will coordinate with Avista's implementation team to identify projects with both relatively large expected energy savings and relatively high uncertainty (for example, demand-controlled ventilation, multi-stage compressed air retrofit). In comparison, projects such as a large lighting retrofit may not require real-time EM&V because the savings should be relatively certain if the operating hours are well-characterized. Once Avista identifies the most likely projects for real-time EM&V, we will coordinate with implementation engineers and/or contractors to track project installation progress and estimate the completion date.

We will develop a site-specific M&V plan for each project. Our metering engineer will be prepared to travel to the site to install meters during a time frame estimated by Avista's implementation team. Upon meter removal, we will follow our standard analysis procedures for metered data. We will summarize our methodology and results for further discussion with Avista before finalizing the energy savings.

M&V for Advanced Metering Infrastructure (AMI)

Where relevant, Cadmus will conduct measurement and verification for projects with advanced metering infrastructure (AMI) data. This section describes our general approach for this type of analysis. We assume that electricity interval consumption data will be available for the pre-treatment, or *baseline*, and treatment, or *reporting,* periods.

The approach to calculating energy savings starts with building a predictive statistical model using baseline data, which includes baseline weather conditions and facility operating conditions as explanatory variables in the model. By applying the baseline model to the explanatory data measured during the reporting period, the model outputs represent the expected energy usage during the reporting period that would have occurred without the influence of the energy-saving measures. Therefore, subtracting the observed energy usage and predicted energy usage at each point in time results in the evaluated energy savings (adjusted for reporting period weather and facility operations).

Our proposed method has several advantages over other approaches:

- The method allows for ***flexible modeling*** of each facility's energy consumption. Because we conduct a separate analysis for each facility, it is possible to select a set of variables that are specific to that facility.
- Baseline models are ***uncontaminated*** by project treatment effects. Because the model is fit with baseline period data, the parameters of the adjusted baseline consumption reflect only baseline period operation.

- The model-building process is ***objective***. Because we rely on automated machine-learning to select the model variables, we can identify relevant variables affecting a facility's consumption from a larger set of candidate variables based on pre-determined criteria, which reduces time and the possibility for idiosyncratic analyst choice in building a model.
- The proposed approach is ***versatile, scalable, and cost-effective***. Much of the estimation can be automated and applied to a variety of commercial building types and samples with large numbers of facilities.

AMI M&V Analysis Details

Our proposed analysis approach has four main steps, which are described in the next sections—data collection and pre-processing, modeling, savings estimation, and reporting.

Data Collection and Pre-Processing

Cadmus will collect the following data for the evaluation:

- Interval data of facility energy consumption
- Project implementation data including installation dates, project description, and *ex ante* savings estimate
- Building systems data from the facility's energy management system (if available)
- Interval weather data from nearest weather station

Cadmus will then conduct a quality review of the raw data. This process involves a visual inspection by a domain expert and automated checks for max and min values, consumption per square footage, rates of change, completeness of the data, etc. Once the validity of the data is established, we will define the facility's baseline and reporting periods from documentation about the project implementation.

Modeling

Cadmus will develop models using these steps:

- **Identify candidate model inputs**. Cadmus will begin by plotting energy usage against all explanatory variables and identify trends. Trends identified from visual inspection will be linear, non-linear, or periodic; they will require evaluation in the context of Cadmus' physical understanding of the systems involved and experience modeling similar facilities. We will also consider derived variables, such as day of week or degree days, and will assess correlations of these inputs and interactive effects between variables.
- **Select model type**. Cadmus has applied a range of modeling techniques and methods and understands that the performance of an algorithm can depend on the dataset it is attempting to fit. Our approach is to select a class of models based on a specific use case and test various model types within that class for performance (that is, predictive accuracy, minimization of prediction error, minimal data requirements, etc.). Table 8 summarizes the collection of models we have used.

Table 8. Model Selection

Model Class	Model Type	Use Case
Linear	Single and multiple linear, ridge, Lasso regression	Low temporal resolution usage data, known physical relationships, observed linear trends
Time Series	Autoregressive integrated moving average (ARIMA), error term models, transfer functions	High temporal periodicity and seasonality, predicting future response
Bayesian	Decision trees, random forests, neural networks	Non-linear relationships, complex systems, large amounts of data

Model validation and testing. Cadmus will create a set of candidate models based on prior experience and understanding of energy-savings projects. We will rigorously evaluate these models against the facility-specific data, with the objective of choosing the best model in the energy-savings calculations. We will apply graphical analysis of the relationship between energy usage and possible explanatory variables as a starting point in selecting best model. We will then use evaluation of existing seasonality or temporal changes in selecting model types. In this initial step, we will consider using the model that is the simplest, has the fewest explanatory variables, and can be interpreted based on good engineering judgment.

To select a set of candidate models, Cadmus will test model prediction ability using a procedure that minimizes selection bias. We begin by randomly splitting the baseline period data into training and testing sets, giving us two datasets of independent variables and measured energy consumption. Models are fit to the training data, applied to the test data, and scored on bias, model fit, and prediction accuracy metrics, such as the mean prediction error, relative root mean-squared error of prediction, mean absolute percentage error of prediction, and the median and other percentiles of prediction errors, r-square, and Akaike information criterion (AIC).

Randomly splitting the data does introduce bias and to fully understand a model we repeat this process for each model a large number of times. These simulations build distributions of test statistics for each model that inform the selection of a final model.

Furthermore, we will identify patterns in the prediction errors by plotting or regressing the errors against variables such as hour of the day and day of the week. Also, we will investigate the evolution of errors over weeks and months to determine if there are prolonged trends that require further investigation.

Once a final model has been selected, Cadmus will fit that model to the entire set of baseline data. In the model validation and testing phase, we may find that several models provide relatively good fit and predictions. In this case, we will calculate energy savings using several models and provide the results to Avista. For any given model that is chosen during the validation and testing phase, we will calculate the uncertainty in energy savings obtained using the entire dataset.

Additionally, Cadmus expects that a variety of factors could confound the savings analysis. For example, a facility may undertake energy efficiency projects that are not funded through Avista during the reporting period. If these other projects are unaccounted for, it is likely that the estimate of electricity savings will be biased upward. Table 9 lists possible confounding factors and the strategies for addressing them.

Table 9. Potential Confounding Variables

Confounding Variable	Problem	Solution Strategy
Other energy efficiency projects	Unaccounted savings from other energy efficiency projects during the reporting period may bias the savings estimate.	Develop an engineering estimate of savings for the other project(s) and subtract validated savings estimates from Cadmus' regression-based estimate.
Floor space additions or changes in use of facility space	These changes can bias the savings estimates.	Cadmus will review project documentation and available energy management system data to identify significant changes. Cadmus may make engineering-based adjustments to the savings estimates or model energy intensity instead of consumption.

Savings Estimation

After developing a model, estimating savings is straightforward. Cadmus will fit the model to the baseline data and apply it to the conditions present during the reporting period, generating facility consumption at each interval, and subtract these estimates from the actual measured consumption. To calculate "typical year" savings, Cadmus fits a baseline model and a reporting period model, applies each of these models to TMY3 data, and takes the difference in the estimated energy consumption. Savings are provided on a per-site basis in each of these cases.

Conduct Process Evaluation Tasks and Reporting

In this section, Cadmus describes its program-specific research plan to assess Avista's administrative processes and delivery of DSM programs in Washington and Idaho and identify areas for improvements.

Sampling Plans

Cadmus will calculate sample sizes for each program and fuel type and based on participant and project population sizes, expected variation, and confidence and precision targets. We will select one combined sample for electric service because Avista programs are the same in Washington and Idaho. For this work plan, we have described the sample design and estimated sample sizes but can revise them according to actual participant and project population sizes if program data indicate these factors could improve the accuracy or precision of the sample.

In Table 10, we provide the finite survey sample sizes for each program and fuel type, determined based on target 90% confidence and 15% precision for each program and to far exceed 90% confidence and 10% precision for the portfolio overall with error ratios of 0.5 within program and fuel type. We will apply a finite population correction to the sample sizes to decrease the number of survey completes if possible.

Table 10. Participant Survey Sample Design for Washington and Idaho Combined

Program	Fuel Type	Estimated Population Size*	Survey Completes
HVAC	Electric	4,000	30
	Natural Gas	10,000	30
Shell	Electric	100	24
	Natural Gas	2,000	30
Fuel Efficiency	Natural Gas	3,000	30
Residential Total		**~19,100**	**144**
Site-Specific	Electric	300	28
	Natural Gas	110	24
Prescriptive Lighting	Electric	689	29
Prescriptive HVAC	Natural Gas	79	22
Prescriptive Shell	Electric	49	19
	Natural Gas	54	20
Prescriptive VFD	Electric	18	12
Food Service Equipment	Electric	52	20
	Natural Gas	68	21
Green Motors	Electric	20	10
AirGuardian	Electric	20	10
Fleet Heat	Electric	6	6
Non-Residential Total		**~1,465**	**247**
Portfolio Total		**~20,565**	**391**

***** Population size is the number of residential program participants and non-residential program projects. Note EnergySmart Grocer are not included as surveys for these programs are not part of this scope of work.

We will conduct in-depth interviews with one manufacture and up to three retailers participating in the Simple Steps program, up to ten builders participating in the Multifamily Market Transformation program, and up to 10 participants of the Multifamily Hard-to-Reach pilot.

Individual Program Process Evaluation Activities

This section describes the process evaluation activities by program. Although many of the process research activities are similar, such as reviewing program documents and tracking database to assess roles and responsibilities, marketing and outreach, participation trends, and informing subsequent interview and survey questions, the descriptions below note more program-specific focus areas.

Low Income Program Evaluation

The process evaluation of the Low Income program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to assess how Avista and the CAP agencies conduct marketing and outreach focusing on how they strive to increase participation in hard-to-reach areas and data-tracking transparency.
- **Interview Avista staff** about coordination with and support of the CAPs overall and more specifically about measures selection including those that are not approved or on the State Priority Rebate List.
- **Interview (n=5) CAP agencies** to document their understanding of the program, including implementation challenges that lead to underspending, how CAP agencies allocate health and safety funding to help cover gas measures that are not cost-effective (that is, benefit-cost ratios are under 1.0 for the TRC or UCT).

ENERGY STAR Homes Program

The process evaluation of the ENERGY STAR Homes program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to assess marketing and outreach efforts and participation trends.
- **Interview Avista staff** to document regional communication and coordination with NEEA and other partnering utilities that offer contractor training and third-party verification of qualifying projects, explore future iterations for the program such as Build it Green (currently offered in areas in WA and being expanded to additional areas) and the DOE's Zero Ready Home program, or other residential new construction certification or labeling programs.

Residential HVAC Program

The process evaluation of the HVAC program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to assess participation trends, such as continuing trend of natural gas furnaces to provide a significant portion of gas savings.

- **Interview Avista staff** to discuss and document the inclusion of the energy-use component of program eligibility. Examine vendor training, rebate changes, and how visiting retailers and making presentations builds market awareness.
- **Interview participating contractors (n=9)**to assess program understanding, experience, and satisfaction, how contractors identify customers, use of rebates as a sales factor, customer awareness of the program prior to engaging the contractor, standard business practices, influence of the program on business, and of qualifying equipment offered.
- **Survey participating customers** to explore their experience, including application processing and influence of the contractor, continued levels of satisfaction, and marketing preferences.

Residential Shell Program

The process evaluation of the Residential Shell program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to document tactics used to drive the customer to the website, rebate changes, and contractor engagement strategies.
- **Interview Avista staff** to discuss and document the energy-usage component of program eligibility. Examine vendor training, rebate changes, and how visiting retailers and making presentations builds market awareness.
- **Survey participating customers** to explore customer experience, including application processing and influence of contractor, satisfaction, and marketing preferences.

Residential Fuel Efficiency Program

The process evaluation of the Fuel Efficiency program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to identify changes in eligibility requirements, rebate changes, and contractor support documentation.
- **Interview Avista staff** to confirm status of program in WA, document success and challenges of such items as confirming electric resistance heating and/or water heating for eligibility, no longer offering a stand-alone rebate for the conversion to a natural gas water heater, as well as other rebate changes. Examine vendor training, the role of retail location visits and presentations, and other efforts to build market awareness.
- **Survey participating customers** to explore awareness of fuel switching as an energy efficiency opportunity, motivation to participate, application processing, influence of contractor, satisfaction, and marketing preferences.

Simple Steps, Smart Savings

The process evaluation of the Simple Steps, Smart Savings program's design, delivery, and performance will include the following data collection activities:

- **Review program documents and database** to assess the roles and responsibilities of the implementer, manufacturer, retailer, and coordination with Bonneville Power Administration.
- **Interview Avista staff** to document the impact of rebate changes, engagement with internal stakeholders facilitating the implementation contract, and engagement with external stakeholders such as homeowners, landlords (renters), retailers, and contractor to increase participation.
- **Interview Implementer** to document program understanding, including coordination of program marketing, outreach to retailers, product tracking, development of measure costs and savings, and overall program experience, including satisfaction and suggestions for improvement.
- **Interview participating manufacturers** to document program understanding, participant motivation and experience, perceived impact of program on the market, and suggestions for improvement.
- **Interview participating retailers** to document program understanding, participant motivation and experience, including point-of-purchase marketing, impact of program on customer uptake of eligible products, and suggestions for improvement.

Multifamily Market Transformation

The process evaluation of the Multifamily Market Transformation program's design, delivery, and performance will include the following data collection activities:

- **Interview Avista staff** to document program design and delivery, roles and responsibilities confirm status of program in WA, identify program changes (delivery, rebates, etc.), and areas of success and challenges.
- **Interview Implementer** to document program understanding, including coordination of program marketing, outreach to retailers, product tracking, development of measure costs and savings, and overall program experience, including satisfaction and suggestions for improvement.
- **Interview participating builders (n=10)** to document their understanding of the program, experience including program influence on business practices, satisfaction, and suggestions for improvement

Multifamily Direct Install (Pilot)

The process evaluation of the Multifamily Direct Install pilot's design, delivery, and performance will include the following data collection activities:

- **Review program documents and database** to document the overarching topics described for all programs at the beginning of this process evaluation section including program processes, marketing efforts, and data tracking.
- **Interview Avista and implementer staff** to document pilot design including goal setting, delivery process, customer eligibility, incentive structure, and data tracking, as well as roles and responsibilities, areas of success, challenge, and if the pilot will transform into a full program.
- **Interview participating customers** to explore customer experience, including pilot awareness, satisfaction, energy efficiency actions, barriers to energy efficiency programs, and marketing preferences.

Non-Residential Site-Specific Program

The process evaluation of affect the Site-Specific program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to assess clarity of roles and responsibilities including technical assistance, marketing and outreach (for example, multifamily), data-tracking transparency, and participation trends, including types of measures installed.
- **Interview Avista staff**, including account executives, to document program changes; areas of success; and challenges, such as the effectiveness of the Avista website to communicate program requirements, incentives, and rebate forms, engagement of the multifamily sector (new construction of five or more units), and how potential changes in rebate levels may affect the program as a critical driver of portfolio savings.
- **Interview participating contractors** to document standard business practices, program influence, identification of customers, timing of projects, and impact of potential change in rebate levels. For lighting specific contactors, we will also assess their awareness of higher efficient lighting to inform new marking approach to target the replacement of T12 lamps.
- **Survey participating customers** to explore customer experience, such as if the program successfully addresses the split-incentive challenge and encourages adoption of energy-efficient equipment and behaviors, satisfaction with contractors and key program components such as incentive levels and technical assistance, and marketing preferences.

Non-Residential EnergySmart Grocer Program

The process evaluation of the EnergySmart Grocer program's design, delivery, and performance will include the following data-collection activities:

- **Review program documents and database** to document the overarching topics described for all programs at the beginning of this process evaluation section including program processes, marketing efforts, and data tracking.

- **Interview Avista staff**, including account executives, to document program changes; areas of success; and challenges, such as coordination with implementer and contractors, and data tracking and reporting, such as the monthly analysis of program measures.
- **Interview Implementer** to document coordination of field energy analyst, use of Grocer Smart modeling, marketing and outreach, contractor support, project tracking and processing, and overall program experience, including satisfaction and suggestions for improvement.
- **Interview participating contractors** to document program understanding, experience, and satisfaction. Examine standard business practices, as well as the program influence on business, identification of customers, and suggestions for improvement.

Non-Residential Prescriptive Programs

For the purposes of this plan, and for efficiencies of scale, Cadmus suggests combining these non-residential programs under the term "prescriptive": Lighting, HVAC, Shell, VFD, Food Service Equipment, Green Motors, AirGuardian, and Fleet Heat. We plan to conduct the same process tasks for all programs with the addition of interviews for the three programs with third-party implementers. The process evaluation will include the following data-collection activities for each program:

- **Review program documents and database** as described for all of the programs at the beginning of this process evaluation section. We will examine program documents to assess the clarity of roles and responsibilities, including overlap between programs, identify marketing and outreach efforts, and review the database for data tracking transparency and participation trends.
- **Interview Avista staff,** including account executives, to document program eligibility, vendor training, efforts to build program specific and across program market awareness, rebate changes, and implementer and contractor communication and coordination.
- **Interview participating contractors** to document program understanding, experience, and satisfaction, including program communication. We will assess how contractors identify customers, use of rebate as a sales factor, level of customer program awareness prior to engaging the contractor, standard business practices, and program influence on business.
- **Survey participating customers** to explore experience with eligibility, application processing, communications with implementers and/or contractors (as appropriate), satisfaction, and marketing preferences.
- **Interview implementers** to document program understanding, roles and responsibilities, experience, satisfaction, and suggestions for improvement.
  - GreenMotors: Green Motor Program Group
  - AirGuardian: Sight Energy Group LLC

Budget and Level of Effort

Table 11 outlines the budget by major deliverable for EM&V of Avista's 2018–2019 DSM portfolio, with a not-to-exceed amount of $971,762.

Table 11. Budget for 2018-2019 DSM Portfolio Evaluation

Deliverables	Total Budget
Kickoff and Work Plan	$35,755
Impact Evaluations	$443,914
Process Evaluation	$188,463
Annual Reports with Cost-Effectiveness	$70,590
Meetings and Interim Reporting	$67,710
Project Management	$127,940
Multi-Family Direct Install Pilot	$37,390
Total	**$971,762**

Cadmus developed the budget with the following assumptions. Material changes or circumstances that result in a departure from these conditions may result in delays or additional costs to the project:

- This pricing assumes one round of client review and revision for every deliverable. To help ensure that the project schedule is maintained, we ask that Avista provide any comments on deliverables within 10 business days.
- This work plan describes Cadmus' data needs to support Avista's 2018–2019 DSM Programs. Our budget assumed that data requests from Avista will be fulfilled within a reasonable time and will require no more cleaning than is reasonable and customary for the industry. If we encounter unexpected issues with the data received (for example, if the data requires extensive cleaning or reformatting or research to complete missing data components) that will affect our ability to evaluate program impacts, this could cause additional effort not accounted for in the work plan. Cadmus will work with the appropriate department at Avista to identify these issues early in the evaluation process to avoid unnecessary delays or obstacles to the work plan.
- The pricing for data collection is based on target quotas for surveys and interviews, estimated by Cadmus to maximize this effort, and summarized in this proposal. However, we are glad to work with Avista to adjust the targets as needed to reduce project costs or better achieve evaluation objectives.

Table 12 provides an estimate of hours and portion of budget associated with the various tasks and preparation required for each deliverable.

Table 12. Cadmus Expected Level of Effort by Task

Task	Expected Hours	Portion of Total Hours
Kickoff Meeting	78	1%
Work Plan	109	2%
Project Management	646	11%
Advisory Group Meetings, as needed	84	1%
Residential NTG/Verification Surveys	143	2%
Non-residential NTG/Verification Surveys	141	2%
Non-residential On-Site M&V and Analysis	1,833	32%
Residential Modeling and Billing Analysis	479	8%
Low Income Billing Analysis	100	2%
Cost-Effectiveness Analysis	260	5%
Database Review	56	1%
Interviews and Material Review	156	3%
Process Surveys	107	2%
Customer Research Analysis	123	2%
Program Implementation Process Review	180	3%
Quarterly Reports	100	2%
Semiannual Reports	151	3%
Annual Reports	130	2%
Electric Impact Reports	411	7%
Natural Gas Impact Reports	206	4%
Process Memo and Report	231	4%

An Avista lineman ascends a utility pole in North Idaho