2019 Idaho Annual Conservation Report

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: The sun rises over a new crop of winter wheat in the rolling hills of the Palouse (between Moscow and Potlatch, Latah County, Idaho)

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AVISTA

INTRODUCTION

Avista has spent more than four decades developing responsible and cost-effective energy-efficiency programs. This 2019 Annual Conservation Report provides a synopsis of those efforts for the company's electric and natural gas customers in the state of Idaho – efforts that are designed not only to provide a least-cost resource, but also to help these customers conserve energy, save money, and live more comfortably – and delivers the results of third-party assessments of Avista's efficiency program portfolio performance.

Recommendations from these assessments, as well as the application of lessons learned through each program year, are incorporated into Avista's annual business planning process to further refine program design and improve their chances of success.

In addition to offering a mix of programs implemented both by the company and by third-party contractors, Avista funds the regional market transformation effort through the Northwest Energy Efficiency Alliance (NEEA). 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 2019, the Idaho electric and natural gas (aggregate) tariff rider balances were underfunded by $6.9 million – due primarily to the high level of conservation achieved during the 2016-17 program years. During 2019, $11.8 million in tariff rider revenue was collected to fund energy efficiency, while $9.1 million was expended to operate energy-efficiency programs. The $2.7 million excess of collections over expenditures contributed to the decrease in the underfunded balance of the tariff riders, resulting in an underfunded balance of $4.3 million by year end.

Table 1 illustrates the 2019 tariff rider activity by fuel type.

TABLE 1 – TARIFF RIDER ACTIVITY

	Electric	Natural Gas	Total
Beginning Balance (Underfunded)/Overfunded	**$ (7,134,247)**	**$ 234,187**	**$ (6,900,060)**
Energy-Efficiency Funding	$ 10,332,033	$ 1,461,206	$ 11,793,239
Net Funding of Operations	$ 3,197,786	$ 1,695,394	$ 4,893,180
Energy-Efficiency Expenditures	$ 7,573,073	$ 1,617,320	$ 9,190,394
Ending Balances (Underfunded)/Overfunded	**$ (4,375,287)**	**$ 78,073**	**$ (4,297,214)**

IDAHO ACHIEVEMENTS

- ***Electric Conservation:*** For 2019, Avista's Energy Efficiency Program achieved 25,230,990 kWh of conservation.
- ***Natural Gas Conservation:*** For 2019, Avista's Natural Gas Energy Efficiency Program archived 216,962 therms of conservation.

Program Highlights

Avista continued to deliver cost-effective savings in 2019 and introduced several new program offerings to better serve Idaho customers. Several highlights include:

Launch of the Home Energy Audits Pilot: Avista launched a successful pilot program in which energy audits were provided to single-family home residents for a reduced cost. The company conducted informal process evaluations through customer surveys and follow-up conversations. The program was very popular with customers and will be offered as a full program in 2020. Avista expects to conduct around 200 home energy audits in the Idaho and Washington service territories combined in 2020.

Launch of Business Partner Program: Avista also launched a Business Partner pilot program, an outreach effort designed to target small business customers in Avista's rural service territories. The Business Partner Program outreach effort brings awareness of Avista's services to rural small business customers in Idaho and Washington and includes information on energy audits, incandescent lamp replacements to LED, budget billing plans, and energy efficiency rebates, as well as assistance planning for efficiency projects.

Increased Incentive Amounts for Residential Programs: During 2019, Avista worked with the Idaho Public Utilities Commission staff to modify its tariff rider language to allow more flexibility for incentive setting. Those modifications allowed a higher incentive to be offered to customers for projects that have been proven to be cost-effective. For 2019, incentive amounts were increased for residential home weatherization measures and the company's fuel efficiency program.

Ramp-Up of the Multifamily Direct Install Program: Avista moved its multifamily direct install program from pilot status to full implementation in 2019. The program exceeded its savings goals for the year and received praise from evaluators for being cost-effective, efficient, and well-run.

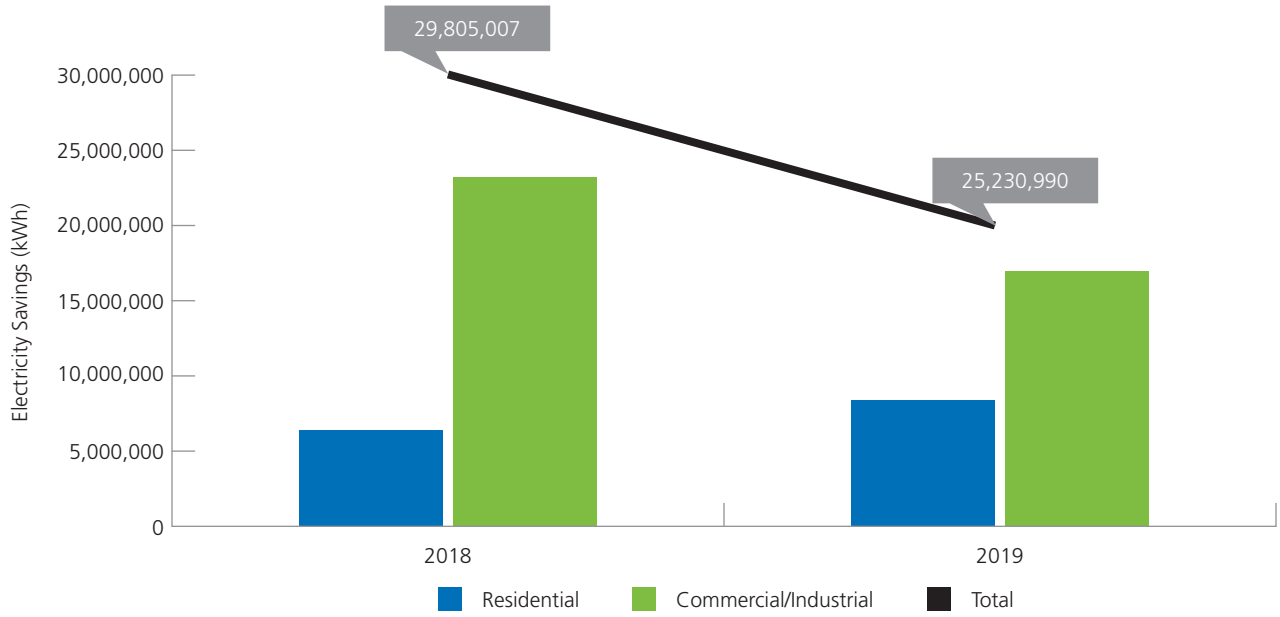
Very High Program Participation in Residential and Low-Income Programs: Residential and low-income programs exceeded kWh savings goals in 2019 by 57 percent and 60 percent, respectively. These higher-than-expected results were due to very high program participation in both sectors. Approximately 76 percent of savings in the residential sector came from lighting incentives.

Consistently High Customer Satisfaction Ratings in 2019: Customers surveyed and/or interviewed as part of the 2019 process evaluation reported very high rates of satisfaction with Avista efficiency programs. 98 percent of customers who participated in residential efficiency programs reported "very high" or "high" customer satisfaction, as did 98 percent of those who participated in commercial/industrial efficiency programs.

Portfolio Trends

As shown in *Figure 2*, Avista's energy savings achieved in 2019 were lower than in 2018 (25,230,990 kWh vs. 29,805,007 kWh). Much of this change is attributed to the downward trend in commercial/industrial lighting programs. Savings acquired through the company's residential program increased 23 percent, however, from 6,907,065 kWh in 2018 to 8,487,490 kWh in 2019. Commercial/industrial programs decreased from 22,897,942 kWh in 2018 to 16,743,500 kWh, or 27 percent in 2019.

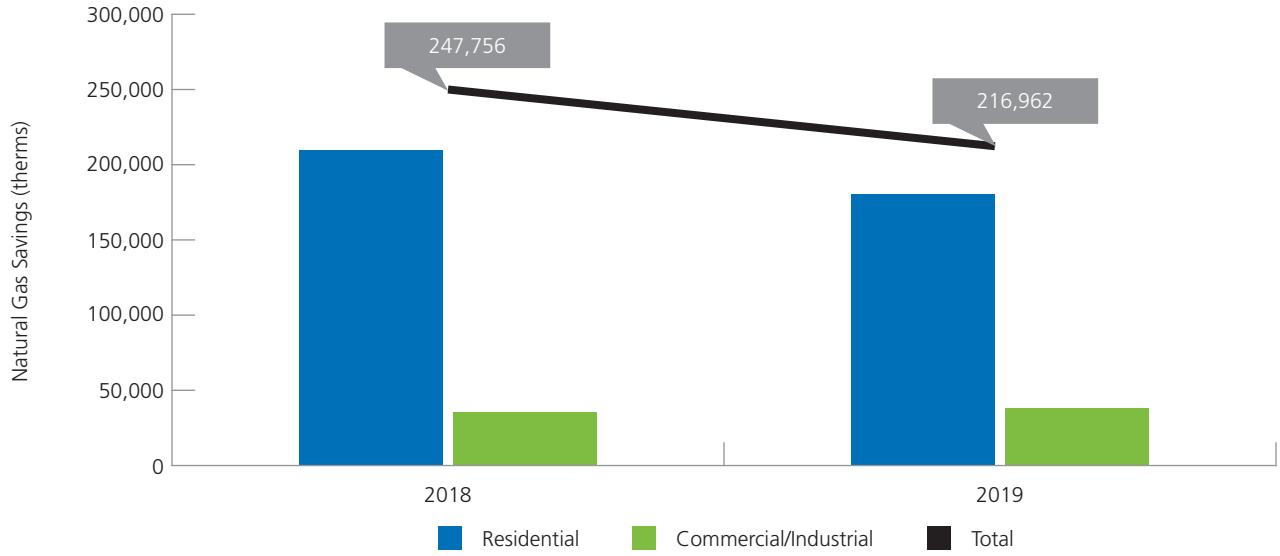
FIGURE 2 – ELECTRIC ENERGY SAVINGS (2018–2019)



	2018	2019
Residential	6,907,065	8,487,490
Commercial/Industrial	22,897,942	16,743,500
Total	**29,805,007**	**25,230,990**

As shown in *Figure 3*, Avista's natural gas portfolio had a decrease in savings in 2019 compared to the prior year. Both residential and commercial/industrial programs declined. Savings acquired through the company's residential programs decreased from 212,764 therms in 2018 to 183,691 in 2019, or 12 percent. Much of the change is attributed to commercial/industrial prescriptive programs and to residential HVAC and water heater programs, which declined in savings in 2019. Savings acquired through the company's commercial/industrial programs decreased 5 percent from 34,992 therms in 2018 to 33,271 in 2019. Overall natural gas portfolio savings declined by 12 percent. The lower residential therm savings can be attributed to fewer customers converting to natural gas due to the lower conversion incentive level.

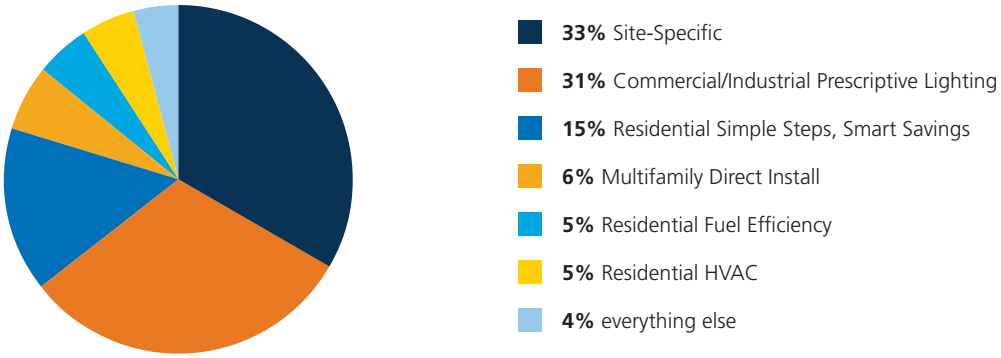
FIGURE 3 – NATURAL GAS ENERGY SAVINGS (2018–2019)



	2018	2019
Residential	212,764	183,691
Commercial/Industrial	34,992	33,271
Total	**247,756**	**216,962**

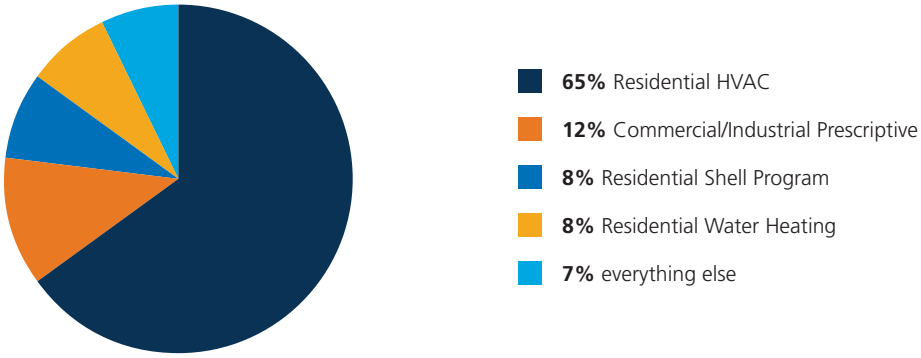
Of Avista's overall electric portfolio in 2019, the commercial/industrial prescriptive lighting and site-specific programs obtained 64 percent of the savings. All other programs combined achieved the remaining 36 percent (see *Figure 4*).

FIGURE 4 – ELECTRIC SAVINGS PORTFOLIO



Of Avista's overall natural gas savings portfolio, residential HVAC programs obtained 65 percent of the savings in 2019. The residential water heater, shell, and commercial/industrial prescriptive programs combined achieved 28 percent of the overall savings for 2019. Everything else obtained the remaining 7 percent (see *Figure 5*).

FIGURE 5 – NATURAL GAS SAVINGS PORTFOLIO



Verified Savings

Avista's targets are set through the *Integrated Resource Plan (IRP)* process. Targets for 2019 were 17,481 MWh and 320,830 therms.

For the 2019 electric target, Avista chose to use the Conservation Potential Assessment (CPA) obtained from its *2017 Electric IRP* as the basis for its Annual Conservation Plan (ACP) savings goals and targets. The company's 2019 conservation acquisition target identified in its *IRP* was 13,657 MWh of qualifying energy efficiency in Idaho. In addition to the *IRP*-identified conservation target, Avista further adjusted this number to an overall 2019 target of 17,481 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.

The 2019 natural gas target of 320,830 therms was identified in the *2018 Natural Gas IRP* and adopted in the *2019 Natural Gas Conservation Plan*.

In 2019, the electric energy-efficiency portfolio achieved first-year annual energy savings of 25,231 MWh and natural gas savings of 216,962 therms. Based on the target established in the electric and natural gas *IRPs*, Avista achieved 144 percent of the electric savings target and 68 percent of the natural gas savings target. *Table 2* shows 2019 savings by fuel and sector.

The Idaho electric portfolio achieved an overall 97 percent realization rate.

TABLE 2 – ENERGY EFFICIENCY SAVINGS BY SECTOR – ELECTRIC

Sector	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Commercial/Industrial	17,826,108	16,443,270	92%
Residential	6,426,003	7,035,960	109%
Low-Income	234,102	232,126	99%
Fuel Efficiency	1,494,614	1,519,634	102%
Total	**25,980,828**	**25,230,990**	**97%**

The Idaho natural gas portfolio achieved an overall realization rate of 78 percent as shown in *Table 3*.

TABLE 3 – ENERGY EFFICIENCY SAVINGS BY SECTOR – NATURAL GAS

Sector	Reported Savings (therms)	Gross Evaluated Savings (therms)	Realization Rate
Commercial/Industrial	36,965	33,271	90%
Residential	237,984	179,759	75%
Low-Income	3,828	3,932	103%
Total	**278,778**	**216,962**	**78%**

Expenditures

While the *2019 Annual Conservation Plan* provides an expectation for operational planning, Avista is required to pursue all cost-effective measures under Tariff 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
2019 Annual Conservation Plan		
Incentives Budget	$ 5,085,177	$ 938,554
Non-Incentives and Labor [a)]	$ 2,575,869	$ 393,336
Total Budgeted Expenditures	**$ 7,661,046**	**$ 1,331,890**
Actual 2019 Expenditures		
Incentives	$ 5,143,479	$ 1,321,862
Non-Incentives and Labor [a)]	$ 2,429,594	$ 295,458
Total Actual Expenditures	**$ 7,573,073**	**$ 1,617,320**
Variance	**$ (87,973)**	**$ 285,430**

a) The expenditure variance was minimal for 2019: electric program 1 percent, natural gas 21 percent.

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
Commercial/Industrial Lighting Interior	$ 1,392,250	$ 489,618	$ 902,632	65%
Low-Income	$ 319,302	$ 644,520	$ (325,219)	(102)%
Multifamily Direct Install	$ 534,306	$ 815,346	$ (281,040)	(53)%
Multifamily Market Transformation	$ 120,000	$ 455,000	$ (335,000)	(279)%
Commercial/Industrial Lighting Exterior	$ 751,000	$ 497,353	$ 253,647	34%

a) Planned values are estimated incentive costs from the *2019 Annual Conservation Plan.*

EVALUATION APPROACH

Because evaluation is a critical component of any successful energy conservation program, Avista employs Evaluation, Measurement and Verification (EM&V) protocols to validate and report verified energy savings related to its energy-efficiency measures and programs. Those protocols represent the comprehensive analyses and assessments necessary to supply useful information to both management and stakeholders. (EM&V includes impact and process, and, taken as a whole, are analogous with industry standard terms such as portfolio evaluation or program evaluation.) Avista also incorporates recommendations to improve program performance, enact changes to programs, and make decisions to phase out programs and measures.

Program evaluations are generally conducted by third-party EM&V firms, selected on a biennial basis through a competitive bidding process managed by Avista's supply chain management group. Scope of work for selected evaluators is defined and managed by the company's planning and analytics team. Third-party evaluators provide recommendations pertaining to specific programs and related processes in impact and process evaluation report outputs; Avista tracks those recommendations and uses them as inputs for the annual business planning process.

For 2019, Avista retained Cadmus to conduct impact and process evaluations of electric and natural gas programs in the utility's Idaho program portfolio. As in past reporting periods, Avista used a portfolio-wide evaluation approach to provide a benchmark to compare against future years. Impact and process evaluations for most programs were also completed at the program level, so that customer experience could be better delineated and realization rates understood.

Several guiding EM&V documents are maintained and published to support planning and reporting requirements. These include 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 to inform and benefit the DSM activities. These documents are reviewed and updated as necessary to improve the processes and protocols for energy-efficiency measurement, evaluation, and verification.

EM&V efforts are also used to evaluate emerging technologies and applications in consideration of their inclusion in Avista's energy-efficiency portfolio. In its 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 conservation portfolio passes the applicable cost-effectiveness test. These programs may include educational, behavioral change, and other 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.

Both Avista and its customers benefit from activities and resources related to energy efficiency and conservation. To contribute to regional efforts, one Avista employee has a voting role and a second a corresponding member role on the Regional Technical Forum (RTF) – the advisory committee to the Northwest Power and Conservation Council and a primary source of information regarding the standardization of energy savings and measurement processes for electric applications in the Pacific Northwest. This knowledge base provides Avista with energy efficiency data, metrics, non-energy benefits, and references for inclusion in the company's Technical Reference Manual (TRM) relating to acquisition planning and reporting. Avista also works with other northwest utilities and NEEA in a number of pilot projects and subcommittee evaluations; portions of the energy-efficiency savings acquired through the latter's regional programs are attributable to Avista's portfolio.

A focus on the development of best practices for its processes and reporting supports Avista's commitment to EM&V, while employing the principles of the International Performance Measurement and Verification Protocol guides measurement and verification plans applied to the company's programs. In addition, the recent compilation of EM&V protocols released under the U.S. Department of Energy's Uniform Methods Project are considered and applied – where possible – to support consistency and credibility. 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, a process that ensures Avista will manage its DSM portfolio in a manner consistent with both utility and public interests.

Evaluation Methodology and Activities

Cadmus conducted the 2019 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.

TABLE 6 – PROGRAM EVALUATION ACTIVITIES – ELECTRIC

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

Cadmus took a tailored approach to sample design for each of the three sectors above. 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 Visit	Billing Analysis
Commercial/Industrial	Prescriptive (Multiple)	✔	✔	--
	Site-Specific	✔	✔	✔
	Site-Specific Fuel Efficiency	✔	✔	--
Residential	Simple Steps, Smart Savings	✔	--	--
	HVAC	✔	--	✔
	Shell	✔	--	✔
	ENERGY STAR Homes	✔	--	--
	Multifamily Direct Install	✔	--	✔
	Multifamily Direct Install Supplemental Lighting	✔		--
	Residential Fuel Efficiency	✔	--	✔
Low-Income	Low-Income	✔	--	✔
	Low-Income Fuel Efficiency	✔	--	✔

Cadmus was also contracted for the 2018-19 biennium to conduct process evaluation activities. The process evaluation focused on four fundamental objectives:

- Assess program delivery channel and marketing methods
- Assess participant and market actor program journeys, including participation barriers, satisfaction levels, and rebate levels' effectiveness
- Assess Avista's and implementer's staff experiences, including organizational structures, communication levels, and program processes
- Document program successes, challenges, and changes

Process evaluation findings are included in this report for each sector and, where relevant, at the program level under "Customer Satisfaction" headings.

Impact Evaluation Results, Portfolio

Cadmus arrived at the following realization rates in the Idaho program portfolio:

- ***Electric:*** 97 percent realization rate and 25,230,990 kWh in annual verified savings
- ***Natural Gas:*** 78 percent realization rate and 216,962 therms in annual gross savings

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

Although some individual project results varied, both the residential and commercial/industrial sector performed strongly in 2018 and 2019.

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 for both the electric and natural gas program portfolios is to have a UCT above 1.00, which indicates that the benefits to the utility exceed the costs of implementing the program. In 2019, the UCT benefit/cost ratios were 2.39 for electric and 1.5 for natural gas.

TABLE 8 – ELECTRIC PORTFOLIO COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 18,817,954	$ 7,862,460	2.39
TRC	$ 20,699,749	$ 10,617,401	1.95
PCT	$ 33,013,052	$ 8,614,699	3.83
RIM	$ 18,817,954	$ 35,014,533	0.54

TABLE 9 – NATURAL GAS PORTFOLIO COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 1,833,525	$ 1,219,844	1.50
TRC	$ 1,833,525	$ 3,169,794	0.58
PCT	$ 3,096,822	$ 2,921,225	1.06
RIM	$ 1,833,525	$ 3,345,390	0.55

COMMERCIAL/INDUSTRIAL SECTOR

Downtown Wallace, 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.

- ***585 commercial/industrial electric measures in 2019:*** Total savings of 16,744 MWh, a decrease of 28 percent from the previous year (22,832,307 kWh). Most of this decrease was due to a year-over-year reduction in LED lighting measures.
- ***45 commercial/industrial natural gas measures in 2019:*** Total savings of 33,271 therms in 2019, a decrease of 14 percent from 2018 (38,613 therms). Prescriptive food service equipment and commercial HVAC measures combined accounted for 73 percent of savings achieved (24,211 therms). All other measures combined accounted for the remaining 27 percent of savings achieved.

TABLE 10 – COMMERCIAL/INDUSTRIAL VERIFIED SAVINGS BY PROGRAM

Commercial/Industrial	Program Type	Electric Savings (kWh)	Natural Gas Savings (Therms)
Prescriptive Commercial HVAC	Prescriptive	-	11,483
Prescriptive Food Service Equipment	Prescriptive	9,506	12,728
Prescriptive Green Motors Rewind	Prescriptive	38,828	-
Prescriptive Non-Res Insulation	Prescriptive	10,400	1,910
Prescriptive Exterior Lighting	Prescriptive	4,518,758	-
Prescriptive Interior Lighting	Prescriptive	3,303,660	-
Prescriptive Motor Controls HVAC	Prescriptive	375,100	-
Site-Specific EnergySmart Grocer Case Doors	Site-Specific	477,435	-
Site-Specific Compressed Air	Site-Specific	136,244	-
Site-Specific HVAC Combined	Site-Specific	41,975	6,724
Site-Specific HVAC Heating	Site-Specific		
Site-Specific Industrial Process	Site-Specific	6,462,541	-
Site-Specific Exterior Lighting	Site-Specific	216,516	-
Site-Specific Interior Lighting	Site-Specific	849,266	-
Site-Specific Shell	Site-Specific	3,041	426
Site-Specific Multifamily	Fuel Conv.	300,230	-
Total Commercial/Industrial		**16,743,500 kWh**	**33,271 Therms**
Interactive Effects (Therm Offsets)		-	(16,813)
Total Commercial/Industrial after Interactive Effects		**16,743,500 kWh**	**16,458 Therms**

Marketing

Avista increased awareness of energy-efficiency and related programs through an electronic newsletter to commercial customers. Vendors were also provided with updates about program information through mailings and webinars.

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

FIGURE 6 – COMMERCIAL/INDUSTRIAL ENERGY EFFICIENCY REBATES BROCHURE

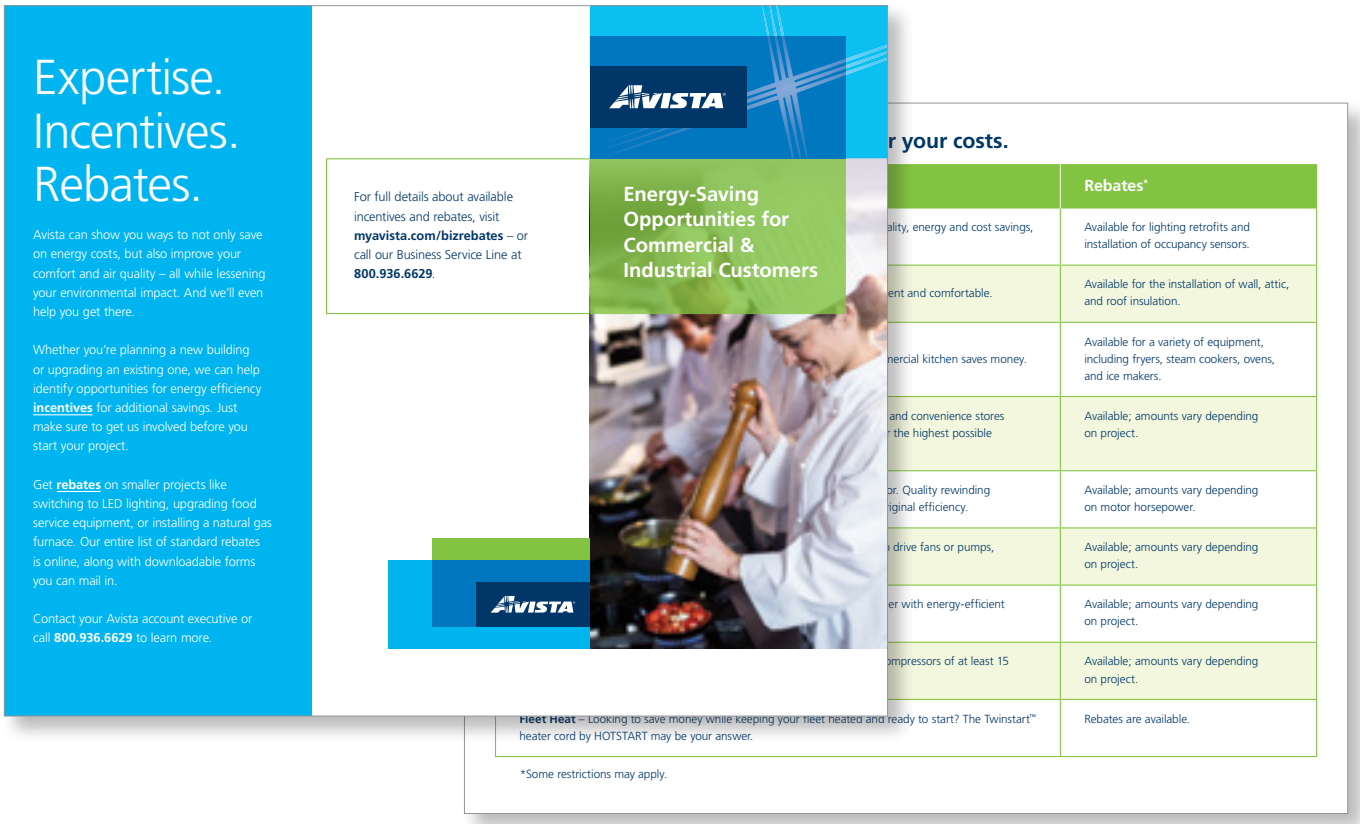


FIGURE 7 – COMMERCIAL/INDUSTRIAL ENERGY EFFICIENCY REBATES FORMS

Business Partner Program

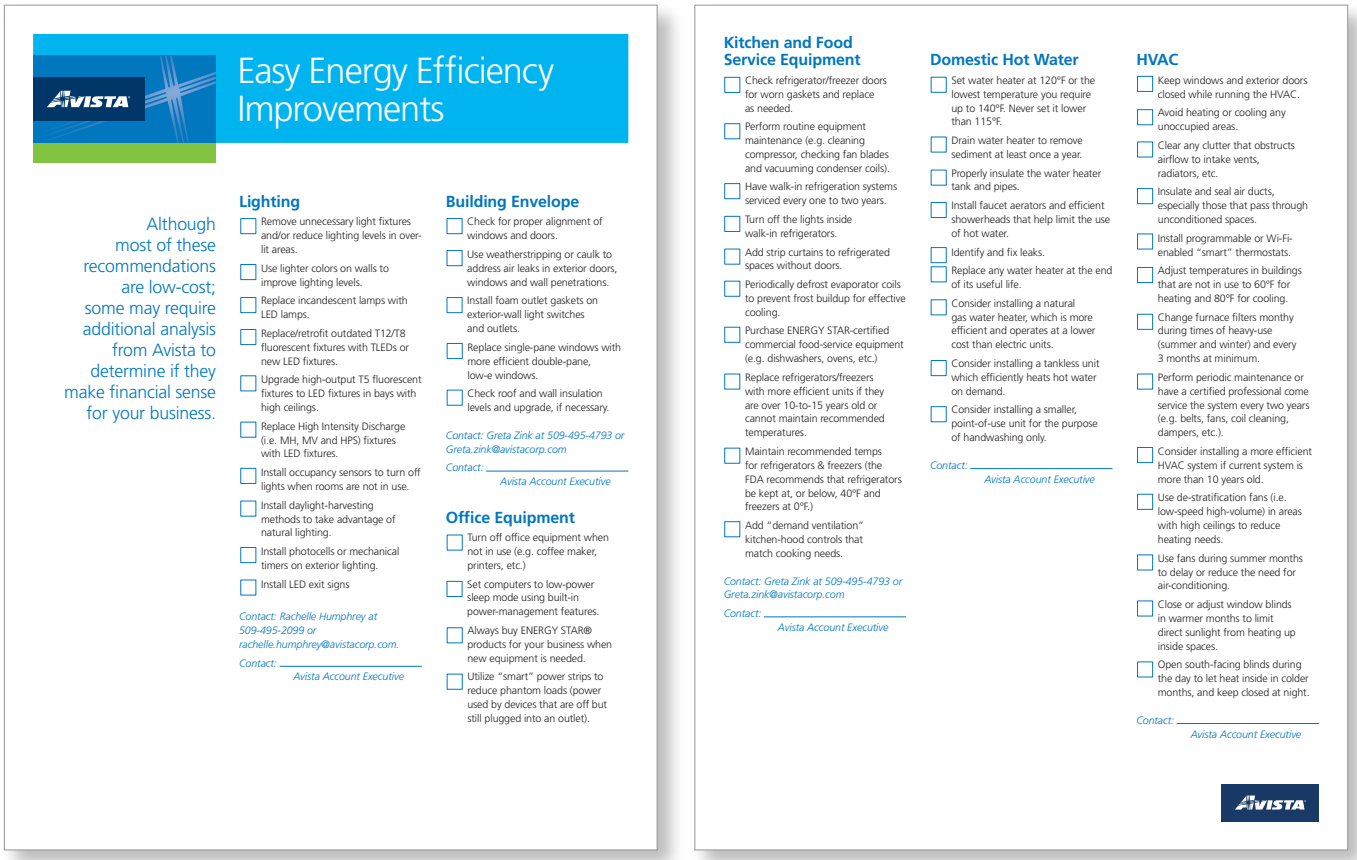
The business partner program pilot was launched in fall 2019 and began as an outreach effort designed to target small business customers in Avista's rural service territories. The business partner program outreach effort brings awareness of Avista's services to rural small business customers in Idaho and Washington and includes information on energy audits, LED replacements for incandescent lamps, budget billing plans, and energy-efficiency rebates.

By the end of 2019, the business partner program had reached 1,104 small businesses in 10 rural service territories. Outreach communication included mail, email, phone calls, and site visits. 11 audits were performed, and 113 incandescent lamps were replaced with LEDs for a savings of 15,056 kWh.

In 2020, Avista plans to introduce a trade ally concierge service, in which Avista will arrange for various vendors (e.g. lighting, HVAC, window, and insulation) to provide cost estimates to customers for energy-efficiency upgrades to their facilities. This service will also help educate and empower business owners and their employees to use less energy. Avista will take a hands-on approach to helping customers identify energy conservation projects by attending third-party audits, walking through the efficiency incentive process, and helping customers obtain bids for projects. Avista hopes that this program will reach small business customers who may not have the time, budget, or access to contractors to make efficiency improvements.

The outreach forecast for 2020 includes communication with 12 communities and 2,165 small businesses in Idaho. A mail campaign is planned for summer 2020.

FIGURE 8 – COMMERCIAL/INDUSTRIAL BUSINESS PARTNER ENERGY EFFICIENCY IMPROVEMENTS CHECK LIST



Easy Energy Efficiency Improvements

Although most of these recommendations are low-cost; some may require additional analysis from Avista to determine if they make financial sense for your business.

Lighting

- ☐ Remove unnecessary light fixtures and/or reduce lighting levels in over-lit areas.
- ☐ Use lighter colors on walls to improve lighting levels.
- ☐ Replace incandescent lamps with LED lamps.
- ☐ Replace/retrofit outdated T12/T8 fluorescent fixtures with TLEDs or new LED fixtures.
- ☐ Upgrade high-output T5 fluorescent fixtures to LED fixtures in bays with high ceilings.
- ☐ Replace High Intensity Discharge (i.e. MH, MV and HPS) fixtures with LED fixtures.
- ☐ Install occupancy sensors to turn off lights when rooms are not in use.
- ☐ Install daylight-harvesting methods to take advantage of natural lighting.
- ☐ Install photocells or mechanical timers on exterior lighting.
- ☐ Install LED exit signs

Contact: Rachelle Humphrey at 509-495-2099 or rachelle.humphrey@avistacorp.com.

Contact: _____
Avista Account Executive

Building Envelope

- ☐ Check for proper alignment of windows and doors.
- ☐ Use weatherstripping or caulk to address air leaks in exterior doors, windows and wall penetrations.
- ☐ Install foam outlet gaskets on exterior-wall light switches and outlets.
- ☐ Replace single-pane windows with more efficient double-pane, low-e windows.
- ☐ Check roof and wall insulation levels and upgrade, if necessary.

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Contact: _____
Avista Account Executive

Office Equipment

- ☐ Turn off office equipment when not in use (e.g. coffee maker, printers, etc.)
- ☐ Set computers to low-power sleep mode using built-in power-management features.
- ☐ Always buy ENERGY STAR® products for your business when new equipment is needed.
- ☐ Utilize "smart" power strips to reduce phantom loads (power used by devices that are off but still plugged into an outlet).

Kitchen and Food Service Equipment

- ☐ Check refrigerator/freezer doors for worn gaskets and replace as needed.
- ☐ Perform routine equipment maintenance (e.g. cleaning compressor, checking fan blades and vacuuming condenser coils).
- ☐ Have walk-in refrigeration systems serviced every one to two years.
- ☐ Turn off the lights inside walk-in refrigerators.
- ☐ Add strip curtains to refrigerated spaces without doors.
- ☐ Periodically defrost evaporator coils to prevent frost buildup for effective cooling.
- ☐ Purchase ENERGY STAR-certified commercial food-service equipment (e.g. dishwashers, ovens, etc.)
- ☐ Replace refrigerators/freezers with more efficient units if they are over 10-to-15 years old or cannot maintain recommended temperatures.
- ☐ Maintain recommended temps for refrigerators & freezers (the FDA recommends that refrigerators be kept at, or below, 40°F and freezers at 0°F.)
- ☐ Add "demand ventilation" kitchen-hood controls that match cooking needs.

Contact: Greta Zink at 509-495-4793 or Greta.zink@avistacorp.com

Contact: _____
Avista Account Executive

Domestic Hot Water

- ☐ Set water heater at 120°F or the lowest temperature you require up to 140°F. Never set it lower than 115°F.
- ☐ Drain water heater to remove sediment at least once a year.
- ☐ Properly insulate the water heater tank and pipes.
- ☐ Install faucet aerators and efficient showerheads that help limit the use of hot water.
- ☐ Identify and fix leaks.
- ☐ Replace any water heater at the end of its useful life.
- ☐ Consider installing a natural gas water heater, which is more efficient and operates at a lower cost than electric units.
- ☐ Consider installing a tankless unit which efficiently heats hot water on demand.
- ☐ Consider installing a smaller, point-of-use unit for the purpose of handwashing only.

Contact: _____
Avista Account Executive

HVAC

- ☐ Keep windows and exterior doors closed while running the HVAC.
- ☐ Avoid heating or cooling any unoccupied areas.
- ☐ Clear any clutter that obstructs airflow to intake vents, radiators, etc.
- ☐ Insulate and seal air ducts, especially those that pass through unconditioned spaces.
- ☐ Install programmable or Wi-Fi-enabled "smart" thermostats.
- ☐ Adjust temperatures in buildings that are not in use to 60°F for heating and 80°F for cooling.
- ☐ Change furnace filters monthy during times of heavy-use (summer and winter) and every 3 months at minimum.
- ☐ Perform periodic maintenance or have a certified professional come service the system every two years (e.g. belts, fans, coil cleaning, dampers, etc.).
- ☐ Consider installing a more efficient HVAC system if current system is more than 10 years old.
- ☐ Use de-stratification fans (i.e. low-speed high-volume) in areas with high ceilings to reduce heating needs.
- ☐ Use fans during summer months to delay or reduce the need for air-conditioning.
- ☐ Close or adjust window blinds in warmer months to limit direct sunlight from heating up inside spaces.
- ☐ Open south-facing blinds during the day to let heat inside in colder months, and keep closed at night.

Contact: _____
Avista Account Executive

Customer Satisfaction

Cadmus was contracted to conduct process evaluations on multiple commercial/industrial programs for the 2018-2019 biennium. The methodology consisted of a mix of 3 approaches: interviews with Avista staff, interviews with implementer staff, and an online participant survey. Programs were evaluated according to the chart below:

TABLE 11 – COMMERCIAL/INDUSTRIAL EVALUATION TECHNIQUE BY PROGRAM

Program	2018		2019	
	Avista Staff	Implementer Staff	Avista Staff	Implementer Staff
Commercial/Industrial				
Lighting	✔	N/A	–	N/A
HVAC, Shell, VFD, Food Service Equipment	✔	N/A	–	N/A
Green Motors		*	–	–
AirGuardian		✔	–	–
Fleet Heat		N/A	–	N/A
Site-Specific	✔	N/A	–	N/A
EnergySmart Grocer	–	–	✔	N/A
Multifamily				
Multifamily Direct Install	✔	✔	✔	✔
Multifamily Market Transformation	-	-	✔	-
Residential				
Heating and Ventilation (HVAC)	✔	N/A	–	N/A
Weatherization (Shell)			–	
Fuel Efficiency			–	
Residential Low-Income				
Low-Income	–	–	✔	N/A
Residential Third-Party Implementer				
Simple Steps, Smart Savings	–	–	✔	✔

* Cadmus could not reach the 2018 Green Motors implementer, despite support from Avista.

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 gathered valuable insights into participants' experience with the program and covered 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

Cadmus completed 65 online commercial/industrial participant surveys in 2018 and 107 online surveys in 2019, and relied on site visits to increase commercial/industrial survey participation.

Key Findings

Generally, **participants were highly satisfied with commercial/industrial programs**. All site-specific survey respondents (n=19) and 98 percent of prescriptive survey respondents (n=83) were satisfied with the program. In 2019, this satisfaction increased for prescriptive survey respondents over 2018 (98 percent and 91 percent, respectively).

Avista's rebate played an important role in the decision to complete the energy efficiency project. All site-specific and all but 2 prescriptive survey respondents said Avista's rebate proved important in their decision to complete the project. Site-specific respondents identified availability of rebates and/or other co-funding as the most important criteria for making energy-efficiency improvements, followed by energy or operating costs and the return on investment. Prescriptive survey respondents identified energy or operating costs as the most important criteria (72 percent; n=43).

Almost two-thirds of commercial/industrial survey respondents participated in past business energy efficiency programs. Most site-specific (17 of 21) survey respondents previously participated in an Avista business energy efficiency program, compared with 56 percent of prescriptive respondents (42 of 75).

Contractors and equipment vendors were more engaged with participation drivers in 2019. In contrast with 2018, more respondents in 2019 reported first learning about the prescriptive program from a contractor (an 8 percent increase) or an equipment vendor (4 percent). 2019 respondents were more likely to designate their contractor or vendor as a motivating factor in 2019, increasing to 34 percent from 20 percent in 2018.

Recommendations

Per some survey respondents, determining rebate eligibility proved challenging. Lighting survey participants specifically said that using the Design Lights Consortium (DLC) list or the ENERGY STAR-certified product list posed difficulties. Cadmus recommends that Avista consider conducting an internal review of eligibility requirements and messaging to determine additional educational materials that could be created for and provided to customers. For example, an FAQ pamphlet could be developed to answer common questions regarding eligibility, or a customer newsletter could provide information about determining eligibility.

Avista's plans to improve this customer experience are described in more detail in the program by program summaries (see pages 23-43).

Impact Evaluation: Commercial/Industrial Sector

While some individual project results varied, the overall commercial/industrial sector performed strongly in 2019. Most of the projects Cadmus sampled for evaluation were well-documented and matched what the team found during site visit verification. Savings realization rates were as follows:

- ***Electric:*** total verified savings of 16,422 MWh (excludes fuel conversions) in 2019 with a realization rate of 92 percent
- ***Natural Gas:*** total verified savings of 33,271 therms with a combined realization rate of 90 percent

Cadmus encountered some challenges evaluating the 2019 commercial/industrial program due to changes Avista made to its application tracking database system. The new iEnergy database stores and reports data in different formats and aggregation levels from the previous system.

As the transition occurred midyear and some applications were entered into both systems, Avista and Cadmus staff had to manually combine and recategorize data from the new database to match up with the format used for the old database. Cadmus identified several issues with exports from the new database as well as underlying errors with the way the new system calculated some savings. Avista has corrected the issues Cadmus identified, and the new iEnergy database has the potential to facilitate more accurate savings estimates, more detailed project tracking, and more thorough evaluations in the future.

Performance and Savings Goals

The commercial/industrial sector did not meet the combined prescriptive and site-specific program paths' electric savings goal of 21,215 MWh. While the site-specific program exceeded its goal by 9 percent, prescriptive electric programs achieved only 66 percent of the target. Overall, the sector achieved 73 percent of the kWh savings goal.

For natural gas programs, the commercial/industrial sector also fell short of the annual therm savings goal for combined prescriptive and site-specific programs, achieving 33,271 therms (43 percent of the combined prescriptive and site-specific program paths' natural gas savings goal of 76,944 therms).

Impact Evaluation Methodology

As the first step in evaluating 2019 electric and natural gas savings for the commercial/industrial sector, Cadmus explored the following documents and data records to gain an understanding of the programs and measures slated for evaluation:

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

Based on the initial review, Cadmus checked the distribution of program contributions with the overall program portfolio. The review provided insight into the sources for unit energy savings (UES) claimed for each measure offered in the programs, along with sources for energy-savings algorithms, internal quality assurance, and quality control processes for large commercial/industrial sector projects.

Following this review, Cadmus designed a sample strategy for impact evaluation activities and performed the following evaluation activities in two waves:

- Selected evaluation sample and requested project documentation from Avista
- Reviewed project documentation
- Prepared on-site measurement and verification plans
- Performed site visits and collected on-site data (such as trend data, photos, and operating schedules)
- Used site visit findings to calculate evaluated savings by measure
- Applied realization rates to the total reported savings population to determine overall program year evaluated savings

Sample Design

Cadmus created two sample waves for 2019. Sample 1 included program data from January through June; sample 2 included program data from July through December. As a guideline, Cadmus used the proposed overall 2019 commercial/industrial sample sizes by subprogram in the measurement and verification plan, seeking to complete approximately half of the sample in each wave.

For each activity wave, Cadmus organized submitted program applications by path and measure (such as the site-specific shell measure, prescriptive lighting, prescriptive motor controls, or prescriptive HVAC), allowing the team to select the highest-savings applications in each category with certainty. For non-certainty applications, the team assigned random numbers and developed a random sample. In some cases, Cadmus sampled another application at the same location or a facility that was previously selected (and where the team could assess both applications with one site visit). This was a cost-effective verification strategy even if the second application represented minimal claimed savings.

As Avista implements its programs similarly in both Idaho and Washington, Cadmus sampled randomly selected sites across both states. The team pooled results from the randomly selected sites to calculate a realization rate by stratum and applied that realization rate to projects in both states. Cadmus applied evaluated savings for sites selected with certainty only to the state in which they had been implemented.

Table 12 summarizes the Idaho commercial/industrial prescriptive program evaluation sample. In Idaho, Cadmus sampled 18 prescriptive applications at 14 unique sites. Of the sampled applications, the team selected 3 for certainty review based on the scale of savings, measure type, or location. Cadmus then selected the remaining 15 applications randomly. No customers participated in the fleet heat, motor control, and EnergySmart Grocer programs in Idaho in 2019.

TABLE 12 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE ELECTRIC EVALUATION SAMPLE

Program Type	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Interior Lighting	7	576,688	12%
Exterior Lighting	5	26,001	1%
Shell Measure	1	3,920	44%
Green Motors	4	19,706	51%
Food Service Equipment	2	4,393	46%
AirGuardian	1	136,244	100%
Commercial/Industrial Prescriptive	**18**	**766,951**	**10%**

Note: Totals may not sum due to rounding. Two applications contained both interior and exterior lighting measures.

Table 13 summarizes the Idaho commercial/industrial site-specific program path evaluation sample. In Idaho, Cadmus sampled 5 site-specific applications at 2 unique sites. Of the sampled applications, the team selected 4 for certainty review based on the scale of savings, measure type, or location. Cadmus selected the remaining application randomly.

TABLE 13 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC ELECTRIC EVALUATION SAMPLE

Program Path	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Site-Specific	5	7,737,047	79%

TABLE 14 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE NATURAL GAS EVALUATION SAMPLE

Program Type	Applications Sampled	Sampled Savings (therms)	Percentage of Reported Savings
HVAC	3	2,528	22%
Shell	1	3,920	67%
Food Service Equipment	3	3,030	24%
Commercial/Industrial Prescriptive	**7**	**9,478**	**32%**

Note: Totals may not sum due to rounding.

Table 15 summarizes the Idaho commercial/industrial site-specific program path natural gas evaluation sample. Cadmus sampled 1 site-specific application at 1 unique site in Idaho. The sampled application was selected randomly.

TABLE 15 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC NATURAL GAS EVALUATION SAMPLE

Program	Applications Sampled	Sampled Savings (therms)	Percentage of Reported Savings
Site-Specific	1	6,724	94%

Document Review

Cadmus requested and reviewed project documentation for each sampled application and prepared measurement and verification plans to guide its site visits. Typically, project documentation included incentive applications, calculation tools (usually based on the 2017 Regional Technical Forum [RTF]),[1] invoices, equipment specification sheets, and installation verification (IV) reports.

On-Site Verification

Cadmus performed site visits at 16 unique commercial/industrial locations to assess electric savings for 25 unique prescriptive and site-specific measures. To assess natural gas savings, Cadmus performed site visits at 8 unique commercial/industrial locations in Idaho and Washington for 8 unique prescriptive and site-specific measures. Fuel-efficiency measures were not included in site visits for either fuel portfolio. 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 reported savings calculations where necessary. The team did not consider it necessary to conduct power metering or light logging for 2019 site visits and used trend data provided by the participant to evaluate site-specific industrial process measures.

Cost-Effectiveness

Tables 16 and *17* show the commercial/industrial sector cost-effectiveness results by fuel type.

TABLE 16 – COMMERCIAL/INDUSTRIAL ELECTRIC COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 11,130,066	$ 3,754,425	2.96
TRC	$ 12,243,072	$ 5,602,120	2.19
PCT	$ 19,062,497	$ 4,779,657	3.99
RIM	$ 11,130,066	$ 19,883,741	0.56

TABLE 17 – COMMERCIAL/INDUSTRIAL NATURAL GAS COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 212,481	$ 204,102	1.04
TRC	$ 212,481	$ 386,893	0.55
PCT	$ 228,823	$ 267,091	0.86
RIM	$ 212,481	$ 348,624	0.61

1) Regional Technical Forum. 2017. "Standard Protocols." https://rtf.nwcouncil.org/standard-protocols

Program by Program Summaries

Commercial/Industrial Site-Specific Program

TABLE 18 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC PROGRAM METRICS

Site-Specific Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	50	77
Overall kWh Savings	8,425,874	10,205,592
Idaho Energy Efficiency Rider Spend	$ 1,933,928	$ 1,717,120
Site-Specific Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Conservation Projects	2	5
Overall Therm Savings	7,150	21,016
Idaho Energy Efficiency Rider Spend	$ 47,418	$ 82,850

Description

The commercial/industrial energy-efficiency market is delivered through a combination of prescriptive and site-specific offerings. Any measure not offered through a prescriptive program is automatically eligible for treatment through the site-specific program, subject to the criteria for participation in that program. Avista's account executives work with commercial/industrial customers to provide assistance in identifying energy-efficiency opportunities. Customers receive technical assistance in determining potential energy and cost savings as well as identifying and estimating incentives for participation. Site-specific projects include appliances, compressed air, HVAC, industrial process, motors (non-prescriptive), shell, and lighting, with the majority being HVAC, lighting, and shell.

Program Activities

- ***Electric:*** Savings of 8,425,874 kWh, or 33 percent of the overall electric savings – a decrease of approximately 17 percent from 2018 (10,205,592 kWh). The largest percentage of incentives went to process load reduction measures (72 percent) followed by interior lighting (11 percent).
- ***Natural Gas:*** Savings of 7,150 therms in 2019, or 50 percent of the overall natural gas savings. This is a 21 percent decrease in savings relative to the 21,016 therms achieved in 2018. 93 percent of incentives went to HVAC combined measures, with the remaining 7 percent going to building shell savings.

Measure type and savings are listed below:

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

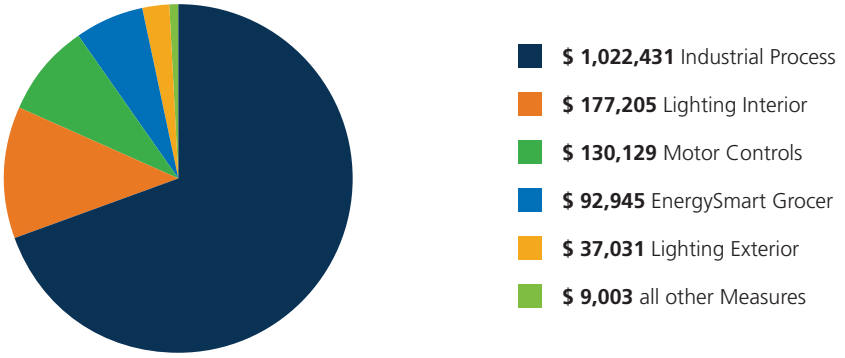
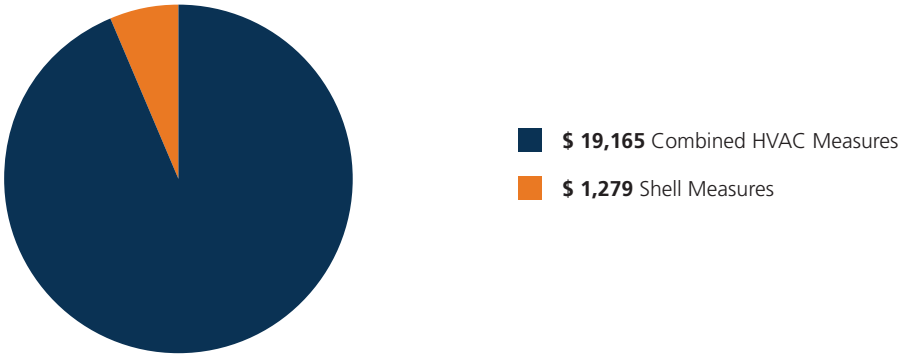


FIGURE 10 – COMMERCIAL/INDUSTRIAL SITE-SPECIFIC NATURAL GAS INCENTIVE DOLLARS BY MEASURE



Program Changes

In 2019, Avista made one change to the site-specific program, realigning the 15-year simple payback criteria. The company now offers an incentive for any qualifying electric or natural gas energy-saving improvement with a simple payback less than the life of the equipment installed.

In addition to this program change, Avista launched the business partner pilot program in July 2019, specifically to reach a larger percentage of small- and medium-sized business customers, reminding them about the availability of basic scoping energy audits, budget billing plans, and energy efficiency rebate programs.

Customer Satisfaction

Cadmus included site-specific customers in its 2019 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 succeeded due to Avista staff (6 of 11)
- Site-specific program participants also cited energy and cost savings (3 of 11), and reported that effective projects, easy processes, and multiple benefits (one response each) worked well.
- Prescriptive survey respondents also cited better lighting (23 percent) and energy and cost savings (21 percent) as program elements that worked particularly well.
- Site-specific respondents expressed satisfaction with all program components, except for the equipment installed; one of 19 was *not too satisfied* with this component as the customer "chose a weak vendor." Except for communication with contractors and vendors, 2019 respondents provided a higher number of *very satisfied* responses than in 2018.

Participation challenges differed by program:

- For the site-specific program, the top participation challenge was lack of program awareness. This differed from 2018's top challenge of determining rebate eligibility.
- Site-specific respondents identified availability of rebates and/or other co-funding as the most important criteria for making energy-efficiency improvements (14 of 18), followed by energy or operating costs (12 of 18), and the return on investment (12 of 18).
- Site-specific program participants identified saving money and using less energy as the top benefits from program participation, consistent with 2018 results.
- The program manager did not report problems or issues in implementing the site-specific program, noting that the program continues to work well for customers as they become more aware of energy efficiency.

Impact Evaluation

Table 19 shows reported and verified electric energy savings for Avista's 2019 commercial/industrial sector site-specific program path, as well as a comparison between verified and reported savings for 2019. 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)	Evaluated Savings (kWh)	Realization Rate
Site-Specific	9,771,192	8,425,874	86%

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
Green Motor Rewind	1	↑	◆ The reported savings reference for 2017 RTF. Cadmus applied deemed motor savings from the 2018 Technical Reference Manual (TRM) workbook.
Refrigerator Door Gaskets	1	↓	◆ The reported savings for one refrigerator door gasket project corresponded to 17 doors. Cadmus only received documentation for and verified installation of 15 doors at this site.
Interior Lighting	14	↓	◆ Cadmus reduced the fixture counts for three projects as the verified installed quantity on the site was lower than the quantity reported on the application. ◆ Cadmus reduced the hours of use (HOU) for four projects that reported 24/7 operations after determining that occupancy controls and schedule controls were in place to reduce the lighting runtime prior to and after the project. ◆ The Avista database categorized two projects as interior lighting that only had exterior fixtures. These savings were subtracted from interior lighting and added to exterior lighting. ◆ Cadmus reduced the lighting hours from 100% to 75% on one project, based on interviews with on-site staff. Cadmus also found a lower installed fixture quantity than that reported in the application. ◆ Cadmus could not replicate the reported savings on one project based on reported fixture types and quantities. The team retained the reported quantities, however, as they could not visit all spaces at the site for verification. ◆ Cadmus determined that 13 W fixtures were installed in place of the 9 W fixtures reported on the application.
	2	↑	◆ Cadmus determined that the store hours at one site were higher than reported on the application. The team also determined that new occupancy controls were added which were not reported on the application, further decreasing installed HOU relative to baseline HOU. ◆ Cadmus found that the installed fixtures for one project had a lower wattage than reported on the application.
Exterior Lighting	3	↓	◆ Cadmus reduced exterior lighting HOU from 8,760 to 4,288 for one project after determining that all exterior fixtures at the site were controlled by photocells. ◆ Cadmus reduced fixture counts and increased HOU at one site where the building underwent a remodel shortly after completing the project and no longer matched the conditions reported at the time the application was submitted. ◆ Cadmus calculated savings for an outdoor display sign using the actual quantity and wattage of the lamps inside the sign. The Avista calculator used an estimated watts-per-square-foot method for exterior sign lighting based on assumed typical values.
	4	↑	◆ Cadmus updated the savings calculations to use the actual verified fixture wattage instead of the assumed typical value for two projects. ◆ Cadmus determined that two exterior lighting measures were incorrectly categorized as interior lighting measures in the Avista database and transferred those savings to exterior lighting.
Motor Control (VFD)	2	↓	◆ Cadmus determined that two return air fans with VFDs and reported as 3.0 horsepower were actually 2.5 horsepower.

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Shell Measure	1	↓	◆ Cadmus determined there was no space cooling and space was heated with natural gas. As a result, the team removed electric savings from ceiling/wall insulation.
	2	↓	◆ Avista reported incorrect savings values for two shell insulation projects due to an error in their new database software. Cadmus reviewed all prescriptive shell measures to confirm that only two projects were affected by the bug. Cadmus treated the two affected projects as certainty projects and evaluated savings using the typical savings calculator methodology.
Industrial Process	2	↑	◆ Cadmus recalculated savings for two motor replacement and VFD installation projects in a paper mill based on trend data from the post-installation period. The team found that the average kilowatt consumption of some installed motors was lower than predicted.
Industrial Motor Controls	1	↓	◆ Cadmus determined that the baseline power consumption estimation for a motor replacement project included unrelated equipment from the same power distribution bus. Cadmus revised the analysis using additional trend data and updated assumptions to ensure the baseline and post-installation calculations were consistent. The team found the estimated power consumption in both periods to be lower than reported in the original analysis, but significantly lower in the baseline, resulting in reduced savings.

Table 21 shows reported and evaluated natural gas energy savings for Avista's 2019 commercial/industrial site-specific program path. The overall site-specific program path natural gas realization rate was 100 percent. The table does not include reported and evaluated natural gas penalties for measures in the fuel efficiency path. Cadmus did not identify discrepancies in the evaluated application.

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

Program	Reported Savings (therms)	Evaluated Savings (therms)	Realization Rate
Site-Specific	7,150	7,150	100%

Recommendations

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

- Review measurement and verification plans for site-specific projects carefully early in the process to ensure an appropriate measurement basis, and work with site contacts to establish trend logs for relevant building management system or industrial control system data points during the baseline period.

Plans for 2020

Avista plans to continue to offer the site-specific program in Idaho for both electric and natural gas customers in 2020. Avista will assess the current measurement and verification process and will determine if process improvements need to be made.

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	2019	2018
Participation, Savings, and Costs		
Conservation Projects	4	3
Overall kWh Savings	300,230	267,385
Idaho Energy Efficiency Rider Spend	$ 473,778	$ 307,314

Description

The site-specific program path also includes a market transformation initiative intended to encourage 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 the split incentive issue where developers are focused on low development costs, which can drive low-efficiency heating choices and place a higher cost burden on building tenants. The program intends to create developer confidence in natural gas as a heating option for multifamily construction, while also helping developers and building owners understand the added long-term value of natural gas space and water heating systems. Avista offers program incentives of $3,000 per unit for converting to natural gas by installing standard-efficiency space heat and water heaters.

Program Activities

In 2019, Idaho program performance was consistent with prior years. 4 projects with a total of 130 units were constructed. Savings totaled 300,230 kWh and $473,778 in total tariff rider spend.

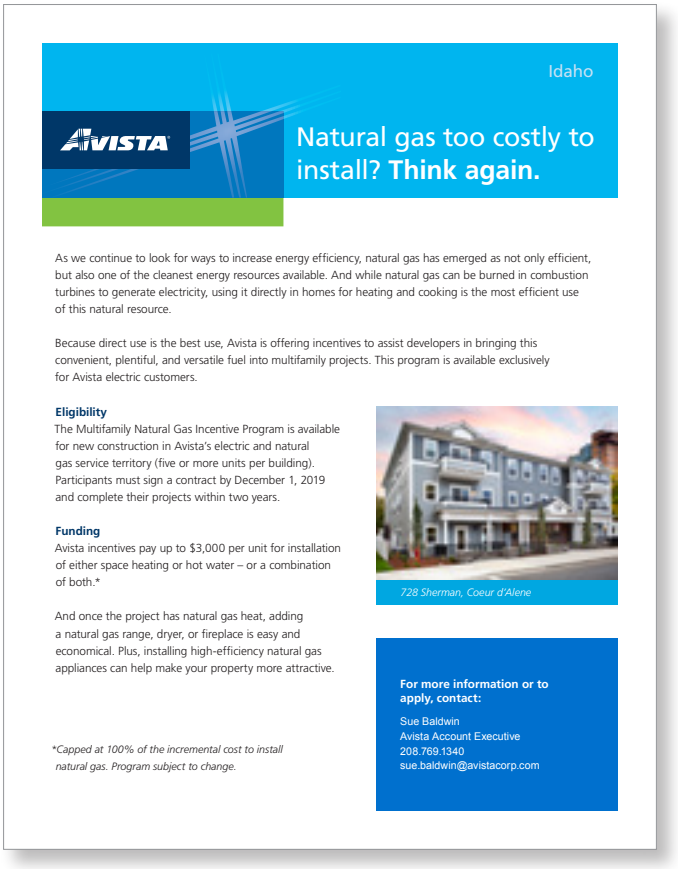
The multifamily market transformation program accounted for approximately 20 percent of fuel efficiency savings in 2019.

Marketing

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

Account executives also promoted the program with a direct mail campaign to developers. The mailer notified developers of the 2019 incentive decrease, and shared details about the program's continuation.

FIGURE 11 – COMMERCIAL/INDUSTRIAL MULTIFAMILY NATURAL GAS INCENTIVE PROGRAM FLIER



Idaho

Natural gas too costly to install? **Think again.**

As we continue to look for ways to increase energy efficiency, natural gas has emerged as not only efficient, but also one of the cleanest energy resources available. And while natural gas can be burned in combustion turbines to generate electricity, using it directly in homes for heating and cooking is the most efficient use of this natural resource.

Because direct use is the best use, Avista is offering incentives to assist developers in bringing this convenient, plentiful, and versatile fuel into multifamily projects. This program is available exclusively for Avista electric customers.

Eligibility
The Multifamily Natural Gas Incentive Program is available for new construction in Avista's electric and natural gas service territory (five or more units per building). Participants must sign a contract by December 1, 2019 and complete their projects within two years.

Funding
Avista incentives pay up to $3,000 per unit for installation of either space heating or hot water – or a combination of both.*

And once the project has natural gas heat, adding a natural gas range, dryer, or fireplace is easy and economical. Plus, installing high-efficiency natural gas appliances can help make your property more attractive.

Capped at 100% of the incremental cost to install natural gas. Program subject to change.

728 Sherman, Coeur d'Alene

For more information or to apply, contact:

Sue Baldwin
Avista Account Executive
208.769.1340
sue.baldwin@avistacorp.com

Impact Evaluation

Cadmus followed the same impact evaluation methodology for fuel-efficiency measures as outlined in the *Impact Evaluation Methodology* section on page 19. 6 multifamily market transformation program projects were selected from the Idaho and Washington service territories 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)	Evaluated Savings (kWh)	Realization Rate
Commercial/Industrial Site-Specific	0	0	N/A
Multifamily Market Transformation	300,230	300,230	100%
Total	**300,230**	**300,230**	**100%**

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.

Commercial/industrial site-specific multifamily market transformation fuel-efficiency measures achieved evaluated natural gas penalties of 16,813 therms, yielding a 99 percent realization rate.

Plans for 2020

The program will continue in the Idaho service area. Avista will also assess project documentation for this program and determine if process improvements need to be made or if incentive levels need to be adjusted.

Commercial/Industrial Prescriptive Lighting Programs

TABLE 24 – COMMERCIAL/INDUSTRIAL LIGHTING PRESCRIPTIVE PROGRAMS METRICS

Prescriptive Lighting Program Summary	2019	2018
Participation, Savings, and Costs		
Conservation Projects	509	588
Overall kWh Savings	7,822,418	12,256,065
Idaho Energy Efficiency Rider Spend	$ 1,318,785	$ 1,955,727

Description

This program is intended to prompt commercial electric customers to increase the energy efficiency of their lighting equipment through direct financial incentives. It indirectly supports the infrastructure and inventory necessary to ensure that the installation of high-efficiency equipment is a viable option for the customer.

There is opportunity for lighting improvements in commercial facilities – and, to streamline the process and make it easier for customers and vendors to participate, Avista developed a prescriptive approach in 2004. This program provides for many common retrofits to receive a predetermined incentive amount, which is calculated using a baseline average for existing wattages and the average replacement wattages from the previous year's project data. Claimed energy savings is calculated based on actual customer run times and qualified product lighting data.

This streamlined approach makes program participation easier, especially for smaller customers and vendors. The measures included in the prescriptive lighting program include fluorescent lamps and fixtures, HID, MR16, and incandescent can fixture retrofits to more energy-efficient LED light sources and controls.

Program Activities

2019 savings for prescriptive lighting were 7,822,418 kWh, or 47 percent of commercial/industrial electric savings – a 36 percent decrease in savings compared to 2018, which fell short of the goal of 11,713,411 by 33 percent. While the T12/T8 lamp replacement measure remained the most popular and achieved the highest kWh savings in 2019, there has been a continued shift toward more prescriptive exterior lighting projects in both 2018 and 2019 – specifically the sign lighting measure.

FIGURE 12 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE LIGHTING PROGRAM SAVINGS BY MONTH

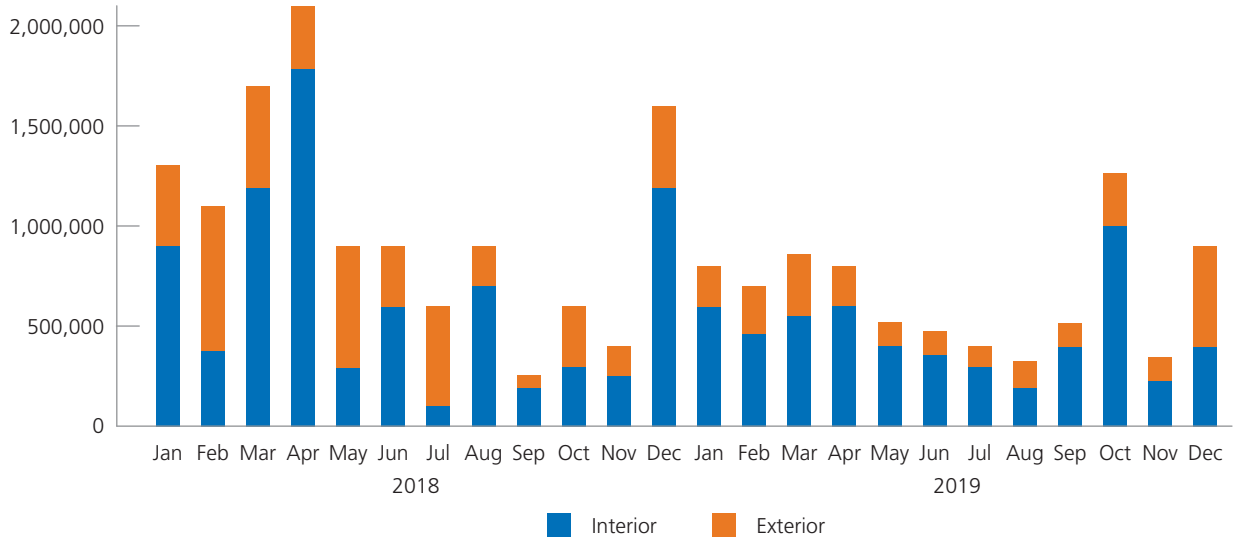


FIGURE 13 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE INTERIOR LIGHTING KWH SAVINGS BY MEASURE

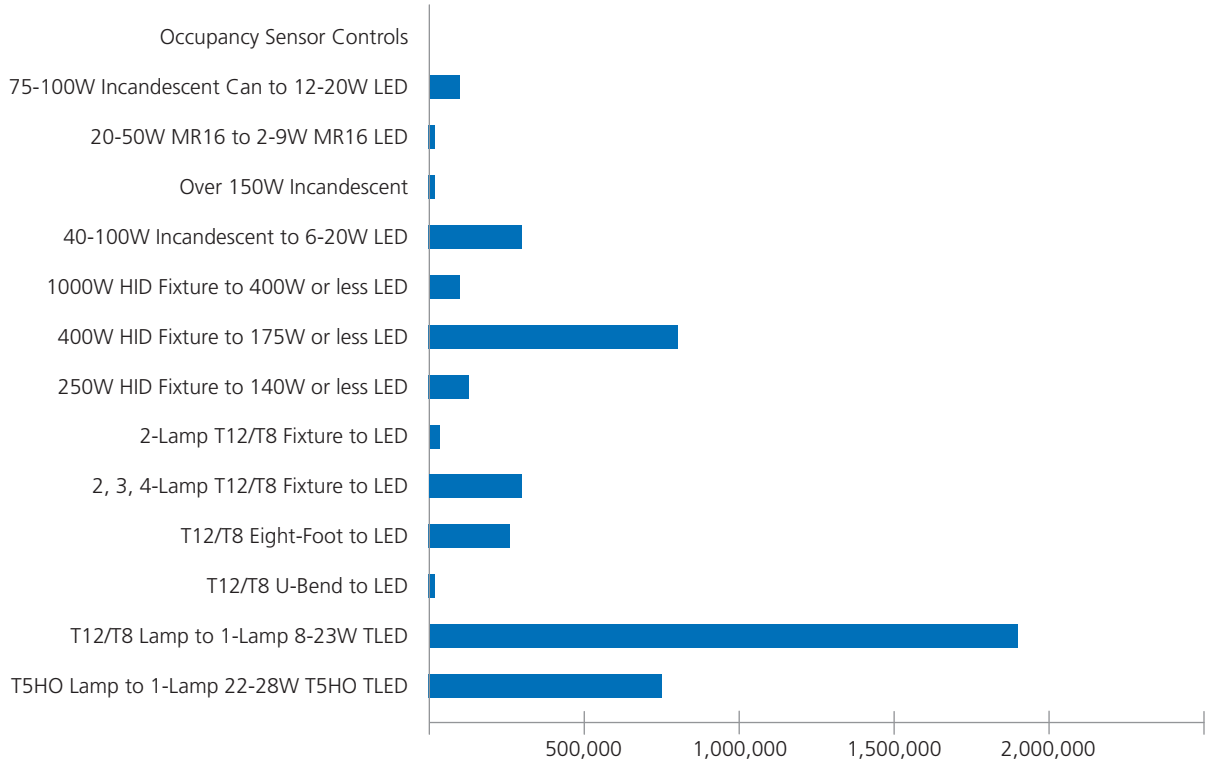
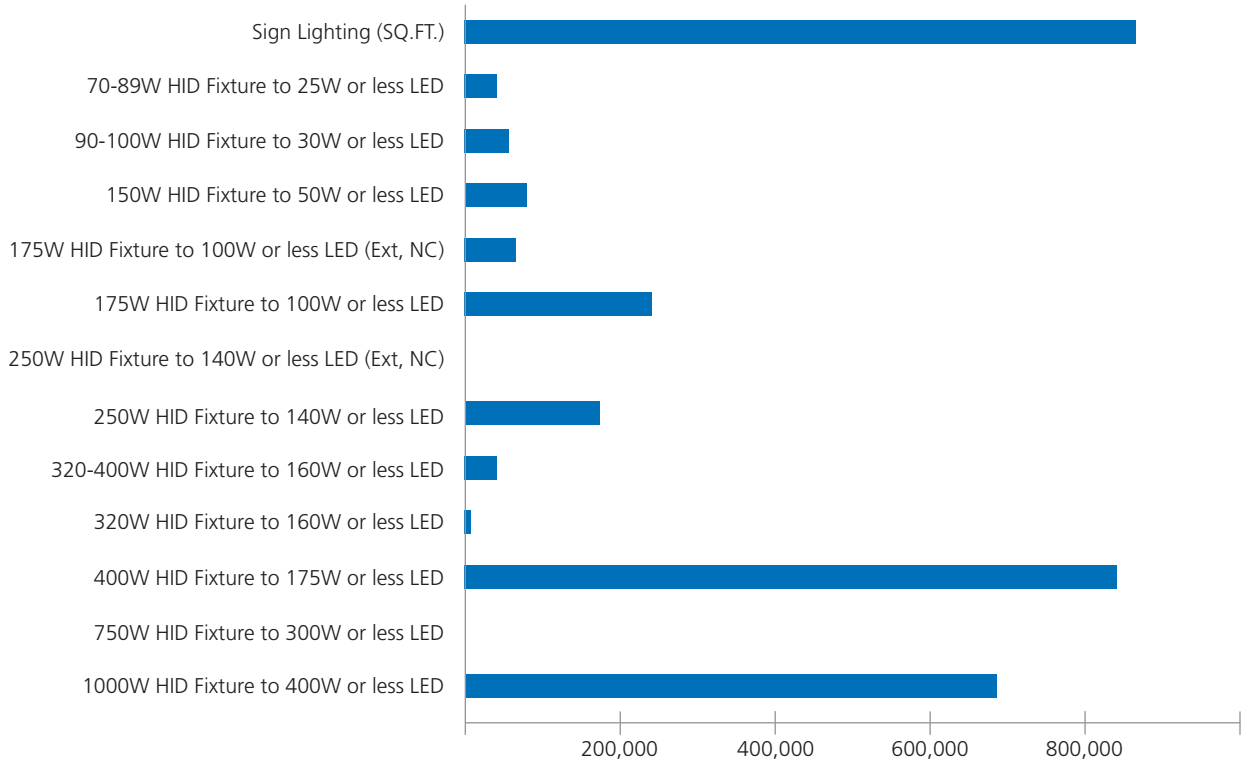


FIGURE 14 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE EXTERIOR LIGHTING KWH SAVINGS BY MEASURE



Program Changes

Avista made the following changes to the program in 2019:

TABLE 25 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE LIGHTING PROGRAM CHANGES

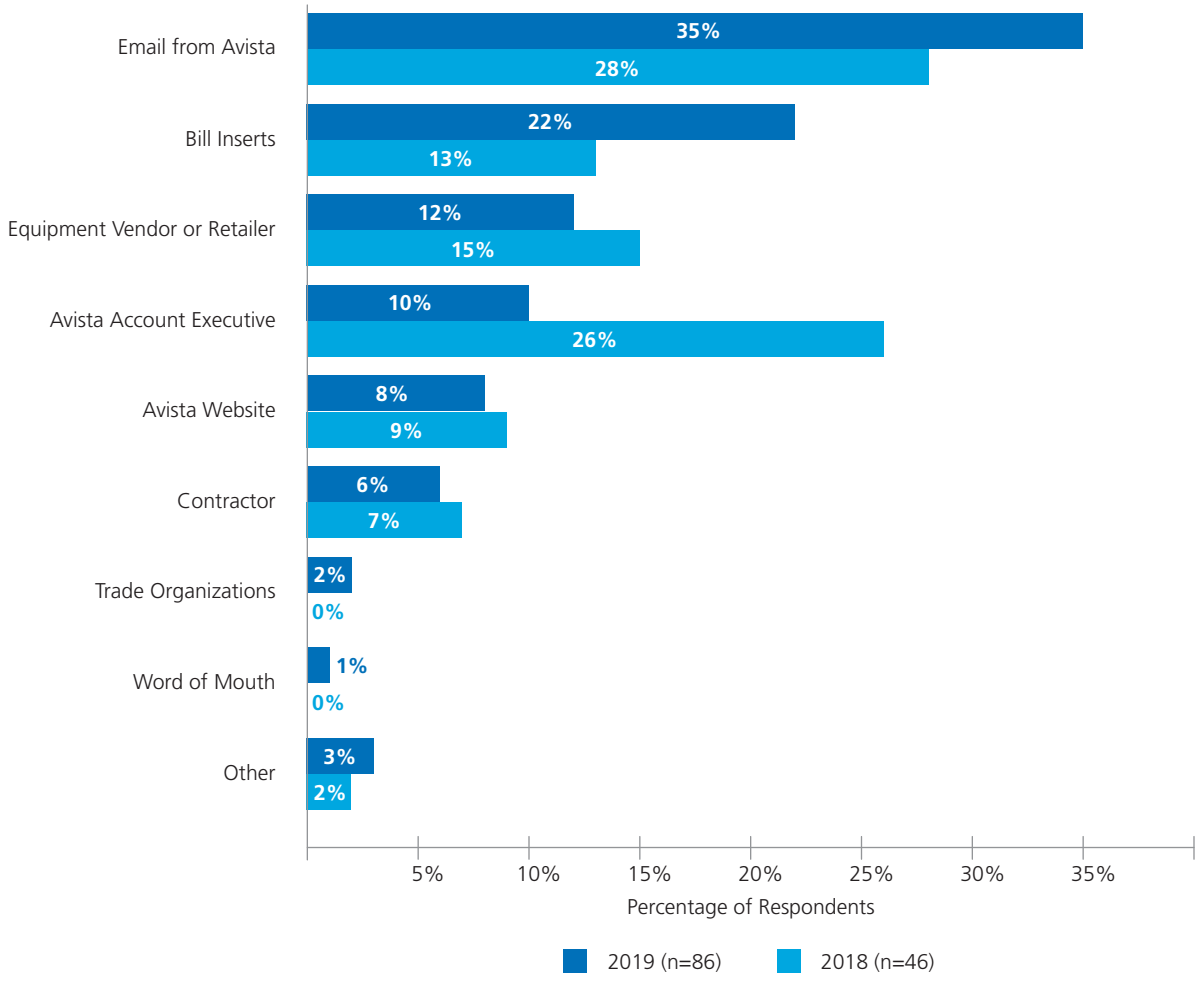
Change	2018	2019	Notes
Fluorescent Tubular Lamps			
T5HO 4-foot TLED	$ 15	$ 15	Design Lights Consortium (DLC) rated
T8 4-foot TLED	$ 6.50	$ 6.50	
U-Bend LED	Site-Specific	$ 8	New prescriptive measure; DLC rated
T8 8-foot TLED	Site-Specific	$ 13	
Fluorescent Fixtures			
2, 3, or 4-Lamp T12/T8 Fixture to LED Qualified 2x4 Fixture	$ 29-35	$ 40	Removed hourly requirement; DLC rated
2-Lamp T12/T8 Fixture to LED Qualified 2x2 Fixture	Site-Specific	$ 30	New prescriptive measure; DLC rated
HID Lighting			
250W HID Fixture to ≤140W LED Fixture or Lamp	$ 155	$ 155	Increased hourly requirements; lamps eligible only upon removing ballasts and other existing electric components; ≤ 70 hours per week; DLC rated
400W HID Fixture to ≤175W LED Fixture or Lamp	$ 185	$ 205	
1000W HID Fixture to ≤400W LED Fixture or Lamp	$ 460	$ 460	

Change	2018	2019	Notes
Incandescent Replacement Lamps, MR16, and Can Light Kits			
6W to 20W LED Lamp	$ 8	$ 8	Must be ENERGY STAR rated
50W to 60W LED Lamp	$ 55	$ 55	
2W to 9W MR16 Lamp	$ 10	$ 10	
12W to 20W LED Fixture Retrofit	$ 20	$ 20	
Occupancy Sensors			
Occupancy Sensors with Built-In Relays	$ 40	$ 40	Must control greater than 170w (not wall switch sensors)
Replacement HID Lighting (Pole, Wallpack, or Canopy)			
70W to 89W HID Fixture to ≤25w LED Fixture/Retrofit Kit/Lamp	$ 60	$ 60	Lamps become eligible upon removal of ballasts and all other existing electric components; must be used at least 4,288 hours per year; must be DLC rated
90W to 100W HID Fixture to ≤30w LED Fixture/Retrofit Kit/Lamp	$ 80	$ 80	
150W HID Fixture to ≤50W LED Fixture/Retrofit Kit/Lamp	$ 125	$ 125	
175W HID Fixture to ≤100W LED Fixture/Retrofit Kit/Lamp	$ 130	$ 130	
250W HID Fixture to ≤140W LED Fixture/Retrofit Kit/Lamp	$ 140	$ 140	
320W HID Fixture to ≤160W LED Fixture/Retrofit Kit/Lamp	$ 180	$ 180	
400W HID Fixture to ≤175W LED Fixture/Retrofit Kit/Lamp	$ 255	$ 255	
750W HID Fixture to ≤300W LED Fixture/Retrofit Kit/Lamp	Site-Specific	$ 450	
1000W HID Fixture to ≤400W LED Fixture/Retrofit Kit/Lamp	$ 610	$ 610	
New Construction Fixtures – HID Lighting			
175W Code HID Fixture to ≤100W LED Fixture	$ 130	$ 130	Must be used at least 4,288 hours per year; must be DLC rated
250W Code HID Fixture to ≤140W LED Fixture	$ 140	$ 140	
320W and 400W Code HID Fixture to ≤160W LED Fixture	$ 250	$ 250	
Sign Lighting Retrofit			
T12 to LED Sign Lighting	$ 17/sq ft	$ 17/sq ft	Must be used at least 4,288 hrs per year

Marketing

Key to the success of the prescriptive lighting program is clear communication to lighting supply houses, distributors, electricians, and customers on incentive requirements and forms. The Avista website is also a channel to communicate program requirements and highlight opportunities for customers. Additionally, the company's regionally-based account executives are an integral component of delivering the prescriptive lighting program to commercial and industrial customers. Any changes to the program typically include advance notice of 90 days to submit under the old requirements and/or incentive levels. This usually includes – at a minimum – direct email communication to trade allies as well as website updates.

FIGURE 15 – HEARING ABOUT COMMERCIAL/INDUSTRIAL PRESCRIPTIVE LIGHTING PROGRAM



Customer Satisfaction

According to the Cadmus process evaluation, prescriptive lighting participants were most satisfied with application processing times, rebate amounts, and equipment installed (99 percent *very* and *somewhat satisfied* with each component). Lighting survey respondents were highly satisfied with the pre- and post-project inspection and the equipment installed. Respondents also cited better lighting and energy cost savings as program elements that worked particularly well.

In 2019, Cadmus survey respondents cited saving money and energy as participation motivations. Respondents reported not only being more motivated than in 2018 by contractors or vendors, but also that they'd first learned about the program from a contractor or an equipment vendor. This increase is likely in response to Avista's launch of a more sophisticated trade ally network management system.

Prescriptive lighting survey respondents listed their top challenges as identifying eligible measures and learning about the program. Participants said using the Design Lights Consortium's (DLC) list or the ENERGY STAR-certified products list proved difficult. 30 percent of respondents reported challenges in program participation, which was down from 52 percent in 2018.

Cadmus included prescriptive program offerings in the 2019 process evaluation study. Key findings:

- **Prescriptive survey respondents identified saving money and receiving a rebate as the top benefits in 2019 (n=86; 76 percent and 66 percent, respectively).** In comparison, 2018 prescriptive survey respondents identified saving money and using less energy as the top benefits (n=46; 72 percent and 65 percent, respectively).
- **Prescriptive survey respondents identified energy or operating costs as the most important criteria (72 percent; n=43) in the decision to do the energy project.**
- **Prescriptive survey respondents indicated that the program succeeded because of the program application process and customer support (n=47; 28 percent).** Prescriptive survey respondents also cited better lighting (23 percent) and energy and cost savings (21 percent) as program elements that worked particularly well.
- **Prescriptive survey respondents were highly satisfied with the pre- and post-project inspection and the equipment installed.** Several survey respondents, however, provided reasons for dissatisfaction with the program and some of its components. One respondent stated that the overall process took too long and did not provide a high-enough incentive. Another said the account executive originally said the project would not qualify for incentives, while a third respondent said the program should cover the conversion of lower-wattage, high energy-usage lighting.
- **Prescriptive survey respondents listed their top challenges as identifying eligible measures and learning about the program.** Lighting participants said using the DLC's list or the ENERGY STAR-certified products list proved difficult.

Impact Evaluation

The program had strong realization rates for both interior and exterior lighting.

TABLE 26 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE ELECTRIC IMPACT FINDINGS

Program Type	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Interior Lighting	4,669,357	4,518,758	97%
Exterior Lighting	3,192,110	3,303,660	103%

The table below summarizes discrepancies found during the impact evaluation for this program:

TABLE 27 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE EVALUATION SUMMARY OF DISCREPANCIES

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Interior Lighting	5	↓	◆ Cadmus reduced the fixture counts for one project as the evaluated installed quantity on the site was lower than the quantity reported on the application. ◆ Cadmus reduced the hours of use (HOU) for one project that reported 24/7 operations after determining that occupancy controls and schedule controls were in place to reduce the lighting runtime prior to and after the project. ◆ The Avista database categorized two projects as interior lighting that only had exterior fixtures. These savings were subtracted from interior lighting and added to exterior lighting. ◆ Cadmus reduced fixture counts and increased HOU at one site where the building underwent a remodel shortly after completing the project and no longer matched the conditions reported at the time the application was submitted.
	4	↑	◆ Cadmus determined that the store hours at one site were higher than reported on the application. The team also determined that new occupancy controls were added that were not reported on the application, further decreasing installed HOU relative to baseline HOU. ◆ Cadmus found that the installed fixtures for one project had a lower wattage than reported on the application.
Exterior Lighting	3	↓	◆ Cadmus reduced fixture counts and increased HOU at one site where the building underwent a remodel shortly after completing the project and no longer matched the conditions reported at the time the application was submitted. ◆ Cadmus calculated savings for an outdoor display sign using the actual quantity and wattage of the lamps inside the sign. The Avista calculator used an estimated watts-per-square-foot method for exterior sign lighting based on assumed typical values. The team found the assumed baseline watts per square foot to be unreasonably high for the type of lighting typically installed in outdoor signs.
	4	↑	◆ Cadmus updated the savings calculations to use the actual verified fixture wattage instead of the assumed typical value for three projects. ◆ Cadmus determined that two exterior lighting measures were incorrectly categorized as interior lighting measures in the Avista database and transferred those savings to exterior lighting.

Recommendations

Cadmus made the following recommendations for the program:

- Review HOU estimates for interior and exterior lighting projects when reviewing submissions and conducting installation verification. Applications claiming 8,760 hours (365 days) should be particularly scrutinized. Before any new equipment installations, confirm the presence or absence of lighting controls and record how they were configured. Cadmus found several prescriptive and site-specific projects where lighting HOU and controls varied from submitted details.
- Ensure the correct categorization of lighting projects as interior or exterior. Cadmus evaluated two prescriptive lighting projects with fixtures listed under the wrong measure category.

Plans for 2020

Cadmus survey respondents said determining rebate eligibility proved challenging and that using the DLC list or the ENERGY STAR-certified product list posed difficulties. In January of 2020, Avista conducted an internal review of eligibility requirements and messaging to create and share, on our website and to our trade ally network, an FAQ document to answer common questions regarding eligibility.

To address the hours of use recommendation in 2020, Avista will set default hours for exterior lighting incentives in iEnergy to 4,288 annually. For projects that override this and claim 8,760 hours, Avista will randomly sample projects with time-of-use (TOU) light meters.

The Energy Independence and Security Act will ultimately lead to the discontinuation of incandescent to LED screw-in lamp replacement incentives in 2020. With more sophisticated price, run time, and savings data that Avista now has access to in the iEnergy system, the company anticipates several of the interior and exterior lighting measure incentives to be modified in 2020. Avista also plans to dive deeper into networked lighting controls and offer a prescriptive incentive for Luminaire Level Lighting Controls (LLLC).

Commercial/Industrial Non-Lighting Prescriptive Programs

TABLE 28 – COMMERCIAL/INDUSTRIAL NON-LIGHTING PRESCRIPTIVE PROGRAM METRICS

Prescriptive Non-Lighting Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	22	22
Overall kWh Savings	194,978	168,899
Idaho Energy Efficiency Rider Spend	$ 46,913	$ 26,484
Prescriptive Non-Lighting Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Conservation Projects	43	35
Overall Therm Savings	26,120	13,976
Idaho Energy Efficiency Rider Spend	$ 156,684	$ 51,782

Description

Commercial Food Service Equipment Program – The commercial food service equipment program helps encourage customers to purchase energy-efficient equipment, and is available for replacing existing or purchasing new equipment. If Avista provides the fuel type of the equipment installed, customers are eligible when equipment meets the efficiency requirement. For equipment that requires hot water heat, Avista must provide that heat source for eligibility. This program offers a variety of electric and natural gas food service equipment. Customers who meet the requirements must submit rebate paperwork within 90 days of project completion. Incentives are disbursed after receipt of documentation and verification of equipment eligibility.

Commercial Insulation Program – This is a retrofit program to encourage customers to increase the insulation in an existing building. It addresses three building areas: wall, attic, and roof, and is available to Avista commercial customers who have an annual heating footprint of at least 340 therms or 8,000 kWh. Insulation must be installed by a licensed contractor and meet the eligibility guidelines for existing and new R-values. Customers who meet the requirements must submit rebate paperwork with accompanying insulation certificate and invoice within 90 days of project completion. Incentives are dispersed after receipt of documentation.

AirGuardian – This free program was developed to offer a prescriptive path for Avista electric customers with a 15 HP or greater rotary screw compressor. It offers a walk-through audit to identify energy-saving opportunities and the direct installation of a compressed air leak reduction device. Energy savings are generated by reducing the impact of compressed air leaks during off-hour periods. The program is currently delivered by 4Sight Energy Group, LLC. Savings are determined on an individual basis with pre- and post-logging. After logging is complete, a site report is presented with detailed project data and an invoice for kWh savings payment to 4Sight Energy Group, LLC.

Commercial Natural Gas HVAC Program – This program encourages Avista commercial natural gas customers to save energy by choosing to install energy-efficient natural gas furnaces and boilers. It offers six different equipment types that customers may select from to best fit their business needs and save energy dollars. Incentives are paid by the input kBtu and the efficiency of the equipment selected. Customers must submit rebate forms with proof of purchase invoices and AHRI Certificates within 90 days of project completion. Incentives are disbursed after receipt of documentation.

Green Motors Rewind – This program offers Avista commercial electric customers an instant rebate off their service center invoice for a green rewind of an existing motor. Qualifying motors must fall between 15 and 5,000 horsepower (HP) and be used in an industrial capacity. The program pays $1 per HP to the service center and another $1 per HP off the invoice for the customer. Green Motors Practices Group is the third party that manages this program for the region and is paid an administrative fee of $.05 per kWh savings per customer rewind. Program participation is presented monthly by Green Motors Practices Group in the form of an invoice accompanied by detailed service center information per project. The majority of program participants are in the forest product industry.

Multifamily Direct Install and Supplemental Lighting – This program is designed to help hard-to-reach customers save energy. Field installers coordinate with property managers of multifamily complexes of five units or more to directly install small energy savers in tenant units, such as LED lamps, faucet aerators, showerheads, smart power strips, and vending misers in common areas. During the first site visit, installers audit the complex for not only tenant needs, but also for any eligible common area lighting, which would include stairwell lighting used 24/7, exterior lamps and fixtures on a daylight sensor, and conversions from interior fluorescent T12s and T8s to LEDs used 24/7. Direct installations are completed at the complex and the supplemental lighting information is passed on to lighting contractors contracted to work in various areas. Lighting contractors communicate with the property managers to audit and put together project data that is sent to SBW and Avista to ensure the project is cost-effective. The project is completed after approvals.

Program Activities

- ***Electric:*** Savings of 194,978 kWh – an increase of 15 percent over 2018. The majority of electric savings came from the AirGuardian program, followed by Green Motors Rewind.
- ***Natural Gas:*** Savings of 26,120 therms in 2019, or 100 percent of commercial/industrial natural gas savings and 15 percent of the overall natural gas savings. This is an 87 percent increase in savings relative to the 13,976 therms achieved in 2018. A majority of the savings is from commercial HVAC incentives, followed by food service equipment.

FIGURE 16 – COMMERCIAL/INDUSTRIAL ELECTRIC PRESCRIPTIVE INCENTIVE DOLLARS BY MEASURE

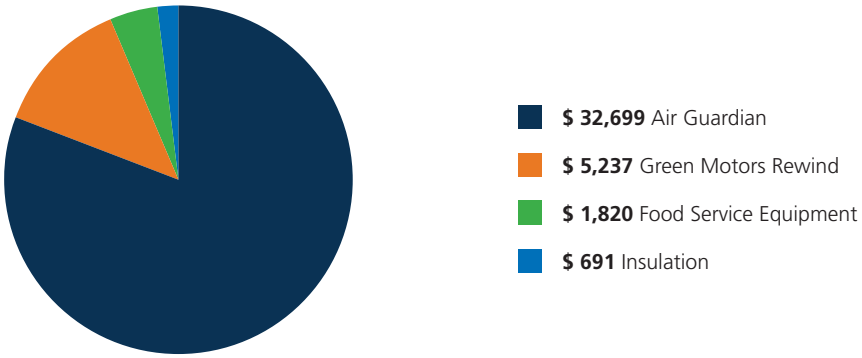
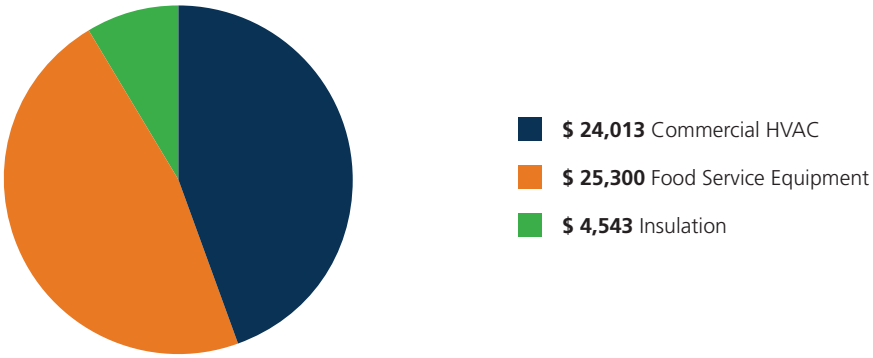


FIGURE 17 – COMMERCIAL/INDUSTRIAL NATURAL GAS PRESCRIPTIVE INCENTIVE DOLLARS BY MEASURE



Program Changes

Many incentive changes occurred in 2019 (see *Table 29*). One measure was added to the program – the commercial on-demand overwrapper. Overwrappers are used in grocery stores to wrap and seal fresh food, including meat, produce, deli items, and baked goods. Overwrappers are typically turned on in the morning and turned off all night and disseminate significant heat when not in use. On-demand overwrappers can be turned on when needed, heat quickly, and direct heat in a specific direction, saving energy.

The electric fryer measure was also modified from a standard fryer offering to a large vat-only measure. Hot food holding cart measures were changed from a flat incentive rate to a rate dependent on size. Other measures were increased or decreased based on cost-effectiveness of the measure.

TABLE 29 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE NON-LIGHTING PROGRAM REBATE CHANGES, COMMERCIAL KITCHENS

Equipment	2018 Incentive	2019 Incentives
Electric Fryer	300	175 Large Vat Only
Electric Steam 3 Pan	70	1300
Electric Steam 4 Pan	100	1700
Electric Steam 5 Pan	135	2200
Electric Steam 6 Pan	160	2600
Electric Steam 10 or more Pan	180	3200
Electric Dishwasher Low Temp	600	750
Electric Dishwasher High Temp	650	750
Natural Gas Dishwasher Low Temp	300	300
Natural Gas Dishwasher High Temp	350	300
Natural Gas Rack Oven	235	2000
Hot Food Holding Cart 1/2 Size		300
Hot Food Holding Cart Full Size		575
Hot Food Holding Cart Double Size		1000
Hot Food Holding Cart <15 cu. Ft.	165	
Pre Rinse Sprayer	25	50
Electric Griddle	88	250
Natural Gas Griddle	505	250
Electric Convection Oven	225	220
Ice Machine Under 200 lb/day	40	35
Ice Machine 200-399 lb/day	60	80
Ice Machine 400-599 lb/day	80	115
Ice Machine 600-799/day	100	160
Ice Machine 800-999/day	120	200
Ice Machine 100-1199/day	140	0
Ice Machine 1200-1399/day	160	0
Ice Machine 1400-1599/day	180	0
Ice Machine 1600 >/day	200	0
Commercial On-Demand Overwrapper		300

AirGuardian – This program was modified in 2019 to allow 4Sight Energy Group to also identify and manage site-specific projects for compressed air while at customer sites. The contractor was paid a portion for preliminary kWh savings identified and paid the remaining portion for final savings after project completion. After a six-month period of seeing projects come through that did not or would not come to completion, it was decided to grandfather in any site-specific projects already identified, but to terminate the site-specific portion of the program. Avista is operating this program solely as the walk-through audit and installation of leak reduction devices at this time, as it was originally designed.

Natural Gas HVAC – Avista increased the incentives for all but one of the existing measures offered on this program in 2019; see *Table 30* below for the measure changes. The company hoped that, by increasing the incentive, the throughput of the program would increase. All but one of the measures that came through in 2019 were either >95 percent single or multistage natural gas furnaces and >90 percent boilers.

TABLE 30 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE NON-LIGHTING PROGRAM REBATE CHANGES, HVAC

Heating System	Incentive per Input kBtu	
	2019	2018
90%–94.9% AFUE NG Single Stage Furnace <225 kBtu/hr	$ 5.00	$ 4.50
95% AFUE or greater NG Single Stage Furnace <225 kBtu/hr	$ 11.00	$ 6.00
90%–94.9% AFUE or greater NG Multi Stage Furnace <225 kBtu/hr	$ 11.00	$ 6.00
95% AFUE or greater NG Multi Stage Furnace <225 kBtu/hr	$ 13.00	$ 7.50
85%–89.9% AFUE NG Boiler <300 kBtu/hr	$ 5.00	$ 5.00
90% AFUE or greater NG Boiler <300 kBtu/hr	$ 9.00	$ 8.00

Marketing

Avista account executives marketed this program in 2019. It was also featured on the Avista efficiency website, and used by trade allies as a marketing tool.

Impact Evaluation

Electric: *Table 31* 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 2019. The overall commercial/industrial sector prescriptive program path electric realization rate was 100 percent.

TABLE 31 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE ELECTRIC IMPACT FINDINGS

Program Type	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Shell Measure	8,871	10,400	117%
Green Motors	38,828	38,828	100%
Food Service Equipment	9,506	9,506	100%
AirGuardian	136,244	136,244	100%

Cadmus identified two discrepancies based on the site visit and project documentation review. *Table 32* summarizes the reasons for discrepancies between reported and verified savings.

TABLE 32 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE EVALUATION SUMMARY OF DISCREPANCIES – ELECTRIC

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Attic Insulation	1	↓	◆ Avista reported incorrect savings values for one attic insulation project due to an error in its new database software. Cadmus reviewed all prescriptive shell measures to confirm that only one project was affected by the bug. Cadmus treated the affected project as a certainty project and evaluated savings using the typical savings calculator methodology.
Refrigerated Cases	1	↓	◆ Cadmus was only able to verify installation of 15 of the 17 refrigerator doors claimed on the application of one refrigerated cases measure and reduced the savings proportionally.

Natural Gas: *Table 33* shows reported and evaluated natural gas energy savings for Avista's commercial/industrial prescriptive program path and the realization rates between evaluated and reported savings for 2019. The overall commercial/industrial prescriptive program path natural gas realization rate was 88 percent.

TABLE 33 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE NATURAL GAS IMPACT FINDINGS

Program Type	Reported Savings (therms)	Evaluated Savings (therms)	Realization Rate
HVAC	11,257	11,483	102%
Shell	5,830	1,910	33%
Food Service Equipment	12,728	12,728	100%
Commercial/Industrial Prescriptive	**29,815**	**26,120**	**88%**

Note: totals may not sum due to rounding.

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 34* summarizes the reasons for discrepancies between reported and verified savings.

TABLE 34 – COMMERCIAL/INDUSTRIAL PRESCRIPTIVE EVALUATION SUMMARY OF DISCREPANCIES – NATURAL GAS

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Commercial HVAC	1	↑	◆ Cadmus determined from an on-site inspection that a furnace reported as 80 kBtu/hr on the application was actually a 100 kBtu/hr unit. The installation verification (IV) report only contained a distant photo of the unit and did not show the nameplate or confirm the capacity.
Shell Measure	2	↓	◆ Avista reported incorrect savings values for a shell insulation project due to an error in its new database software. Cadmus reviewed all prescriptive shell measures to confirm that only one project was affected by the bug. The team treated the affected project as a certainty project and evaluated savings using the typical savings calculator methodology.

Recommendations

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

- 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.
- 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 from site contacts for these calculator inputs differed significantly from the calculator default values. The team also recommends adjusting future rebate application forms to ask for site-specific hours of use and load estimates. Cadmus will review the Regional Technical Forum's (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.

Plans for 2020

For the commercial insulation program, Avista is considering increasing incentive levels for 2020 to encourage more participation. Avista has also made changes to the food service equipment calculators. Site-specific hours and days of operation are now collected and used as inputs to calculate a more accurate savings calculation in the iEnergy platform. Additional questions that are specific to the equipment have also been incorporated into the platform; for example, pounds of food cooked per day per unit, number of pans per unit, and racks washed per day.

Avista will also re-evaluate its processes for verifying equipment installed including sizes, quantities, and performance ratings. The company will look for ways to improve its internal verification process.

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, including: 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.

Nearly $3.4 million in rebates and direct customer benefits were provided to Idaho residential customers to offset the cost of implementing these energy-efficiency measures in 2019. All programs within the residential sector portfolio combined contributed 8,218 MWh and 179,759 therms to the annual energy savings.

TABLE 35 – RESIDENTIAL SAVINGS BY PROGRAM

Program By Sector	Energy Efficiency Savings	
Residential	**Electric Savings (kWh)**	**Natural Gas Savings (Therms)**
ENERGY STAR Homes	69,615	67
Multifamily Direct Install Program	1,591,615	4,296
Residential Fuel Conversions	1,181,596	0
Residential HVAC program	1,320,322	140,763
Residential Water Heat Program	14,763	17,131
Residential Shell Program	160,507	17,458
Simple Steps, Smart Savings	3,879,137	44
Total Residential	**8,217,556 kWh**	**179,759 Therms**
Interactive Effects (Therm Offsets)	0	(76,002)
Total Residential after Interactive Effects	**8,217,556 kWh**	**103,756 Therms**

Marketing

Avista's residential outreach included the popular "Efficiency Matters" promotion in the spring. To help increase awareness of energy efficiency, TV viewers could watch any KREM newscast for Avista's energy efficiency "word of the day" and enter to win a new Toyota Prius AWD Hybrid.

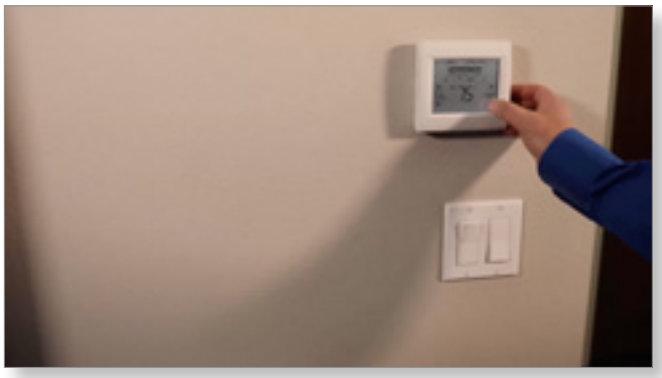
Energy efficiency tips, rebates, and DIY videos were promoted through television advertising, online and mobile display ads, pre-roll video, social media, email, and direct mail (Avista's Connections newsletter articles and bill insert). The contest ran April 22 through June 2, and, in addition to Avista's outreach, KREM's promotions included a home-page news story on their website as well as extended-reach online banner ads.

The finale was held in downtown Spokane at Riverfront Park, and included live interviews during the 5 p.m. and 6 p.m. news with Avista energy efficiency manager Chris Drake.

FIGURE 18 – RESIDENTIAL "EFFICIENCY MATTERS" BILL INSERT

FIGURE 19 – RESIDENTIAL "EFFICIENCY MATTERS" ONLINE AND MOBILE DISPLAY ADS

FIGURE 20 – RESIDENTIAL "EFFICIENCY MATTERS" TELEVISION ADVERTISING



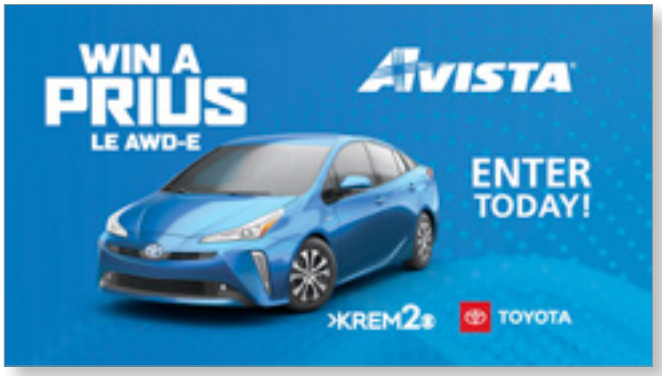


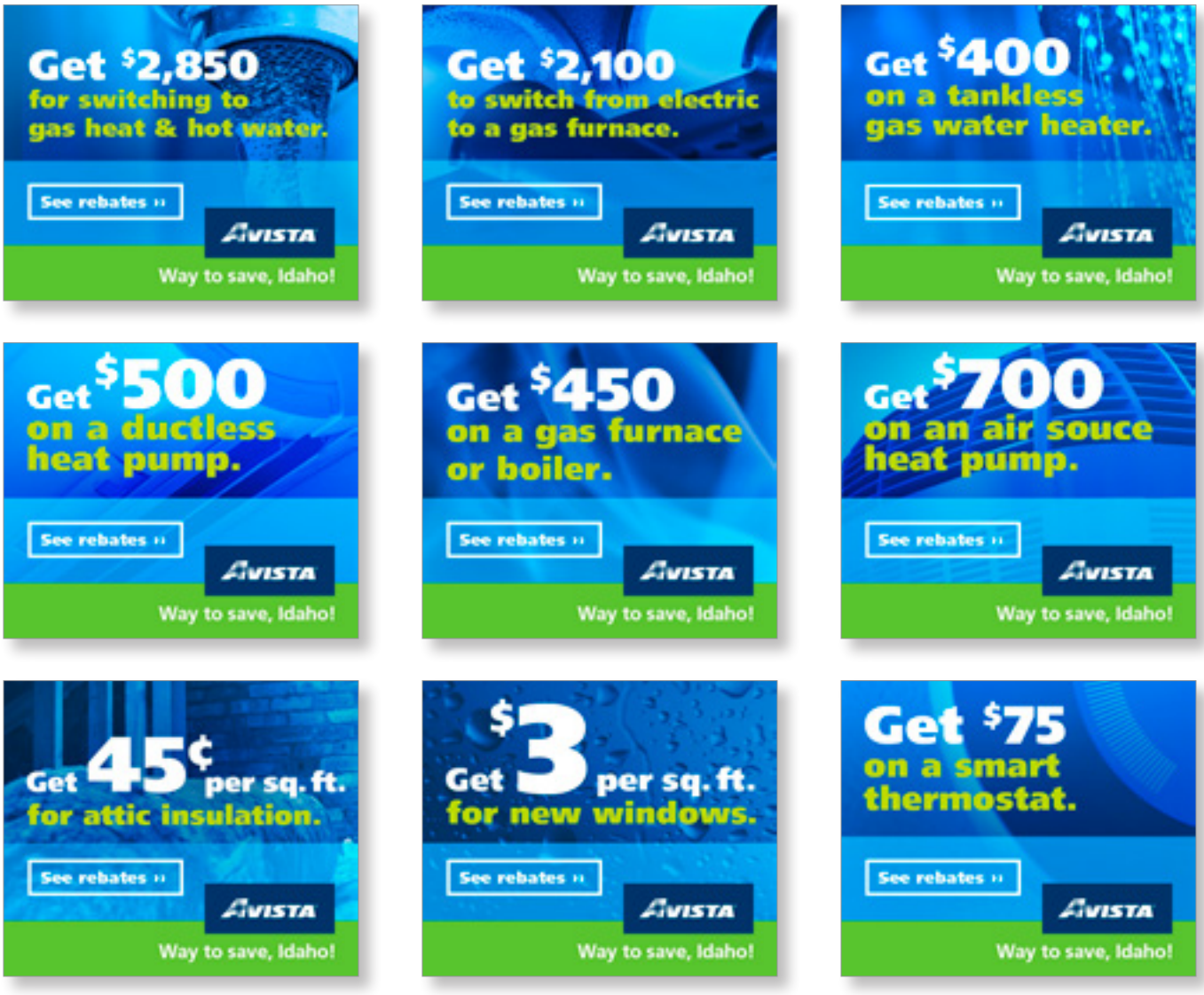
FIGURE 21 – RESIDENTIAL "EFFICIENCY MATTERS" SOCIAL MEDIA

In the fall of 2019, a second wave of energy-efficiency outreach ran with the "Way to Save" advertising campaign. Three new television commercials were developed, using humorous vintage footage to grab the viewer's attention. Along with new digital ads, the messaging worked to increase awareness of Avista's rebate programs and educate customers about energy-saving tips. Timing of the TV advertising took advantage of new season premieres and football to deliver high viewership. Search engine marketing and social media were also used to drive customer engagement.

With a call-to-action to visit myavista.com for more information, the advertising successfully drove visits to the company's website as evidenced by analytics. The campaign ran September 23 through November 17, during which time Avista website traffic increased substantially compared to the same time last year: visits to the Idaho rebates page were up by 1,139 percent.

FIGURE 22 – RESIDENTIAL ENERGY-SAVINGS "WAY TO SAVE" :30 TV ADVERTISING

FIGURE 23 – RESIDENTIAL "WAY TO SAVE" DIGITAL ADVERTISING



As cold weather moved in, a Winter Tips and Smart Winter Giveaway campaign was implemented to remind customers of energy-saving tips for the season.

FIGURE 24 – RESIDENTIAL ENERGY-SAVINGS WINTER TIPS SMART WINTER GIVEAWAY BILL INSERT

FIGURE 25 – RESIDENTIAL ENERGY-SAVINGS WINTER TIPS SMART WINTER GIVEAWAY PRESS KIT

FIGURE 26 – RESIDENTIAL ENERGY-SAVINGS WINTER TIPS PRINT AD

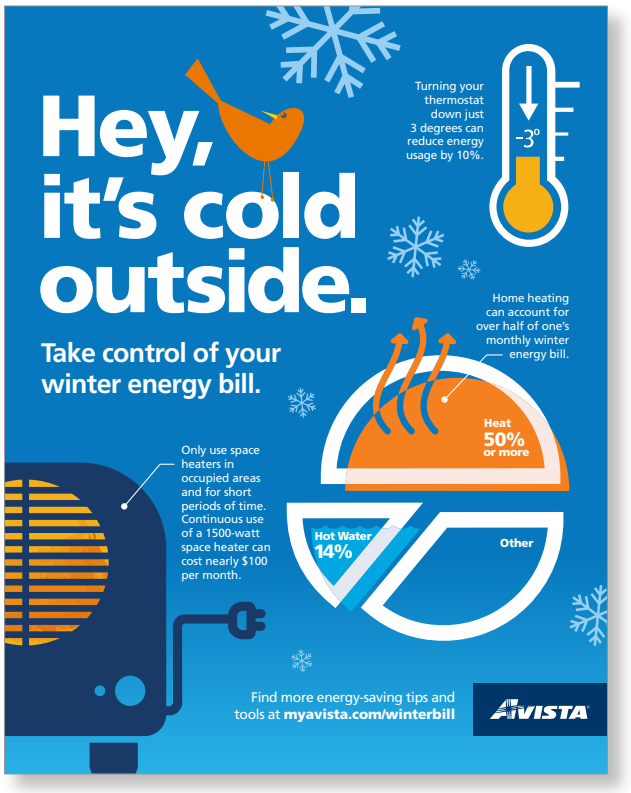
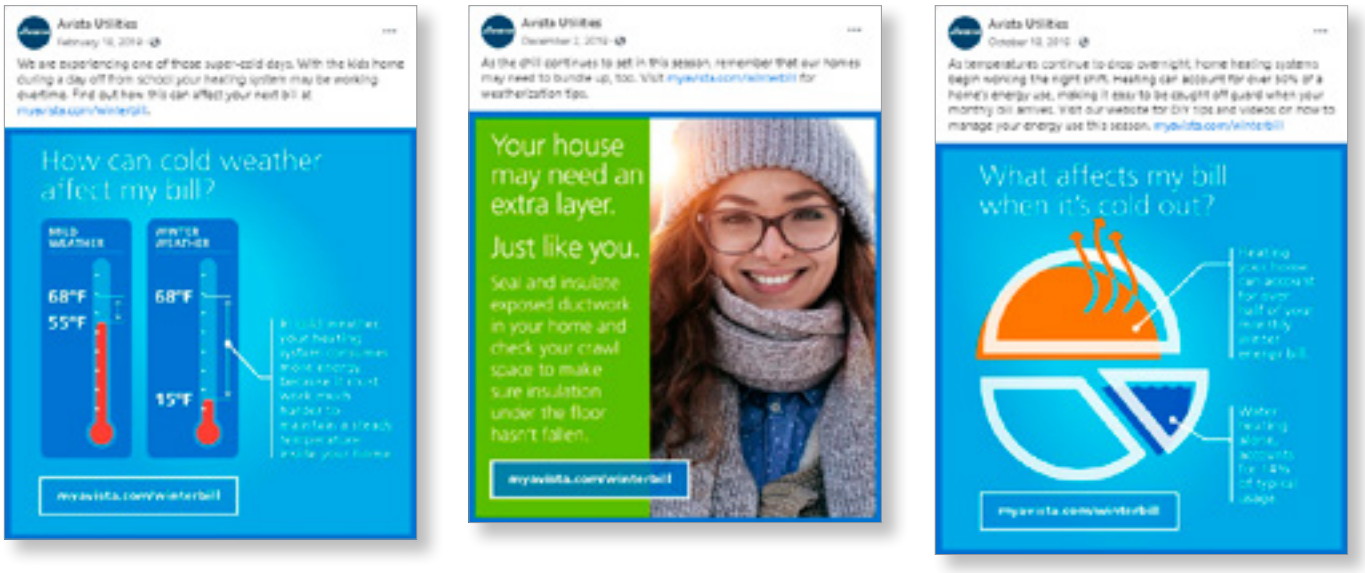


FIGURE 27 – RESIDENTIAL ENERGY-SAVINGS WINTER TIPS BILL INSERT

FIGURE 28 – RESIDENTIAL ENERGY SAVINGS WINTER TIPS SOCIAL MEDIA



In addition to appearing on Avista's website, energy-efficiency tips and/or rebates content were included in the company's monthly *Connections* newsletter, which is sent to customers as a bill insert. Search Engine Marketing (SEM) was also used to reach customers who were actively seeking information about energy efficiency rebates.

Customer Satisfaction

Cadmus's process evaluation activities for the 2018-19 biennium included all residential programs except for ENERGY STAR Homes. In addition to interviews with Avista and implementer staff and an online participant survey, Cadmus also conducted 152 phone surveys with HVAC, shell, and fuel-efficiency 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. Key findings:

- **Residential programs maintained high satisfaction levels throughout 2018 and 2019.** All respondents (n=152) were *very satisfied* or *somewhat satisfied* with programs in which they participated; 98 percent were *very satisfied* or *somewhat satisfied* with Avista's role in their experience.
- **Residential program participants learned about Avista programs differently in 2019 than they did in 2018.** While contractors remained the primary method through which customers learned about programs in 2019 (38 percent), this represented a decrease from the number in 2018 (53 percent). Word-of-mouth, however – a result of the company's marketing and advertising efforts – increased in 2019 (26 percent) over 2018 (14 percent).

The complete process evaluation of commercial/industrial and residential programs can be found in Appendix C, 2019 Process Evaluation Report.

Recommendations

Cadmus recommends that Avista consider increasing outreach and marketing efforts through bill inserts and Avista's website. While word-of-mouth referrals from contractors/trade allies and friends/family/coworkers proved beneficial, survey respondents in 2019 (n=76) most frequently preferred learning about energy-efficiency programs and opportunities through bill inserts (43 percent) and Avista's website (21 percent). Using bill inserts and Avista's website to promote midstream and third-party programs (such as Simple Steps, Smart Savings) could not only cultivate more interest in these offerings, but also raise awareness of Avista's role in administering the programs. It could also improve data collection efforts where access to customer information is lacking or difficult to compile.

Avista generally includes efficiency content as part of the *Connections* newsletters, which are included with customer bills. Simple Steps, Smart Savings will be ending in September 2020; however, Avista will consider using additional bill inserts to promote midstream and third-party implemented programs in future years.

Impact Evaluation: Residential Sector

While some individual programs varied, overall the residential sector performed strongly in 2019. Savings realization rates were as follows:

- ***Electric:*** Total verified savings of 8,217,556 kWh with a realization rate of 109 percent, approximately 1.3 times the verified savings in 2018.
- ***Natural Gas:*** Evaluated natural gas savings show a realization rate of 76 percent on savings of 179,759 therms; approximately 87 percent of 2018 verified savings.

Cadmus identified few discrepancies through document review, which found that the great majority of projects were well-documented and met program requirements.

Complete *Impact Evaluations for Electric* and *Natural Gas* are included in Appendices A and B.

Performance and Savings Goals

The electric program portfolio achieved 156 percent of the 2019 savings goal, the result of high program participation (134 percent) and a strong overall realization rate for the residential sector.

Lighting measures accounted for 73 percent of the total residential sector savings. The following shows the percentage of residential evaluated savings provided by each program:

- Simple Steps, Smart Savings provided 55 percent of residential evaluated savings, mostly through lighting measures.
- Multifamily Direct Install (MFDI) and MFDI supplemental lighting programs provided 23 percent of evaluated savings, again mostly through lighting measures.
- The residential HVAC program accounted for 19 percent of evaluated savings.
- The shell and ENERGY STAR Homes programs accounted for a combined 3 percent of residential evaluated savings.

Table 36 shows savings goals assigned to Avista's residential sector programs for 2019, as well as reported savings and the goal portion achieved in 2019. All programs except ENERGY STAR Homes and residential HVAC exceeded savings goals based on reported savings.

TABLE 36 – RESIDENTIAL PROGRAMS REPORTED ELECTRIC SAVINGS

Program	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Simple Steps, Smart Savings	2,495,393	3,879,137	155%
HVAC	674,367	659,957	98%
Shell	139,065	190,390	137%
ENERGY STAR Homes	86,190	66,262	77%
Multifamily Direct Install	957,450	1,289,539	135%
Multifamily Direct Install Supplemental Lighting	168,000	340,719	203%
Residential Total	**4,520,464**	**6,426,004**	**142%**

The natural gas segment of the portfolio achieved 109 percent of the goal for 2019.

Table 37 shows savings goals assigned to Avista's residential sector programs for 2019, as well as reported savings and the goal portion achieved in 2019. All programs except Simple Steps, Smart Savings exceeded savings goals, based on reported savings.

TABLE 37 – RESIDENTIAL PROGRAMS REPORTED NATURAL GAS SAVINGS

Program	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
Simple Steps, Smart Savings	6,273	44	1%
HVAC	199,183	208,904	105%
Shell	9,911	23,095	233%
ENERGY STAR Homes	67	471	703%
Multifamily Direct Install	3,480	5,615	161%
Multifamily Direct Install Supplemental Lighting	N/A	N/A	N/A
Residential Total	**218,914**	**238,129**	**109%**

Impact Evaluation Methodology

To determine the residential sector's evaluated savings for 2019, Cadmus employed a combination of three impact evaluation methods:[1]

- Database review
- Document review
- Billing analysis

First, Cadmus calculated adjusted savings for each program based on the results of a database review. For the HVAC, shell, and fuel-efficiency programs, Cadmus also applied realization rates for the document reviews. For these programs, the team calculated prescriptive evaluated savings by multiplying adjusted savings by the document review realization rate, as shown in *Figure 29*.

FIGURE 29 – RESIDENTIAL IMPACT PROCESS

To provide the most rigorous evaluation method where practical, Cadmus analyzed consumption data for all available participants of the HVAC, shell, fuel efficiency, and MFDI programs. As described in more detail in the *Billing Analysis* section, the team applied billing analysis results to determine evaluated savings only for measures where savings could be isolated (i.e., where a sufficient number of participants could be identified who installed only that measure) and where confidence and precision met specific targets. Program-level realization rates for the HVAC, shell, and fuel-efficiency programs incorporate billing analysis results for some measures.

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.

1) With approval from Avista, Cadmus ceased performing a fourth impact activity – verification surveys – in Q3 2018; this eliminated redundancy between verification surveys and document reviews.

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 a review of all projects, Cadmus calculated a realization rate for the document review by dividing savings calculated for the sample (using the revised information) by reported savings. The team then multiplied this realization rate by adjusted savings for the entire program to determine prescriptive evaluated savings for 2019.

Cadmus conducted document reviews for the programs shown in *Table 38*, drawing roughly equal samples from participants in each quarter.

TABLE 38 – RESIDENTIAL ELECTRIC IMPACT DOCUMENT REVIEW

Program	Completed through Q2 2019
HVAC	51
Shell	51

Billing Analysis

For the residential sector, Cadmus conducted billing analysis using available electricity and natural gas consumption data from Avista for the HVAC, shell, fuel-efficiency, and MFDI programs. Evaluating Simple Steps, Smart Savings program savings through billing analysis was not practical because participants of the midstream retail program were largely unknown. The ENERGY STAR Homes program had too few participants to produce meaningful billing analysis results.

HVAC, Shell, and Fuel-Efficiency Savings Estimates

With the HVAC, shell, and fuel-efficiency programs, Cadmus eliminated the effects of multiple energy efficiency measures by including only those participants in the analysis who installed one measure. With these programs, the goal was to provide average unit savings values at the measure level to ensure the most accurate values possible were used for evaluated savings and cost-effectiveness.

Cadmus used the unit savings value provided by the billing analysis for a given measure when its results met 2 requirements: the number of sites in the participant group was at least 5, and the relative precision achieved was no greater than ±40 percent at the 90 percent confidence level. If results calculated using only Idaho participants met these requirements, the team used those results. If not, Cadmus used combined results for Idaho and Washington if those results passed. If no billing analysis results passed for a given measure, Cadmus applied the results of database review and document review to determine evaluated savings.

Data Sources

To conduct the consumption analysis, Cadmus used program measure tracking data and monthly electric and natural gas consumption data provided by Avista, along with weather data (which included actual average daily temperatures for 13 weather stations in Idaho and Washington from the National Oceanic and Atmospheric Administration (NOAA)) for the billing analysis period. The team used ZIP codes to match daily heating and cooling degree days to respective monthly bill read dates. Cadmus also used typical meteorological year (TMY) 15 year normal weather values from 1991–2005, obtained from NOAA for the same weather stations, in assessing energy use under normal weather conditions.

Participant and Comparison Group Designation

Cadmus gathered data for a participant (treatment) group comprising all HVAC, shell, and fuel-efficiency program participants with measures installed in 2018. This allowed for enough pre- and post-consumption data to analyze the various measures' effects.

To isolate the impact of exogenous factors (such as energy rate changes, economic condition changes, and non-programmatic effects) on energy use, Cadmus used a quasi-experimental[2] design that involved selection of a comparison group composed of participants with installation dates in late 2019. Through this approach, the team compared the treatment group's pre- and post-change energy use (assumed to capture the program treatment) to the comparison group's change in energy use (reflecting what would have happened absent the program). To ensure similarity between treatment and control groups, the team chose to use future participants as the comparison group because they would have similar qualifications and could be assumed to have not participated in energy-efficiency programs prior to program treatment.

2) A quasi-experimental design is when treatment and control groups are not randomized prior to treatment. In this case, the comparison group was created after the treatment had occurred and participants self-selected the treatment.

Data Screening

Starting with all HVAC, shell, and fuel-efficiency participants and the comparison group, Cadmus cleaned the data and screened for several criteria to identify final analysis samples. Data cleaning included performing account-level reviews of the pre- and post-period monthly consumption of all individual participants to identify anomalies (such as periods of unoccupied units) that could bias the results. Cadmus conducted the consumption analysis using participants who had not moved since participating and who had at least 10 months of pre- and post-period billing data.

Cadmus applied several screens to remove anomalies, incomplete records, and outlier accounts, examples of which are as follows:

- Accounts missing records, prohibiting the team from merging participant program tracking data with consumption data.
- Accounts with low annual use in the pre- or post-period, such as less than 1,240 kWh annually.
- Customers with incorrect signs on Princeton Scorekeeping Method (PRISM) parameter estimates.
- Accounts with other extreme values, including vacancies in billing data (outliers), non-program-related heating or cooling system changes (such as added or removed heating or cooling loads), baseload equipment changes, or changes in occupancy. This included screening for accounts with large gaps in interval data, such as having zero consumption across multiple months.

Analysis

To estimate measure-level impacts, Cadmus employed a pre- and post-installation savings analysis using household-level PRISM models that accounted for differences in pre- and post-installation weather conditions. The team estimated the heating and cooling PRISM model using variable 45°F to 85°F heating and cooling bases in both the pre- and post-period for each customer.

Impact Evaluation Recommendations

Cadmus offered the following recommendation regarding Avista's residential electric programs:

- Ensure that reported savings for all measures are calculated using current TRM or RTF UES values, and that the TRM provides values for all measures. Cadmus noted no large-scale problems with the 2019 measure tracking data but did note numerous measure-tracking records that reported zero savings, despite appearing to have been completed and a rebate having been issued. In addition, some instances of 2019 measures used UES values from the 2018 TRM, and reported values for some measures (most notably, smart thermostats) did not match TRM values.

Avista has reviewed the UES values in the online rebate platform and determined that UES savings values were not automatically updating when other program updates were made. The problems noted by Cadmus have been fixed and any omitted electric savings numbers have been included in 2019 reporting.

Cost-Effectiveness

Tables 39 and *40* show the residential sector cost-effectiveness results by fuel type.

TABLE 39 – RESIDENTIAL ELECTRIC COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 7,300,206	$ 3,294,904	2.22
TRC	$ 8,030,226	$ 4,412,583	1.82
PCT	$ 12,822,604	$ 3,390,446	3.78
RIM	$ 7,300,206	$ 13,844,741	0.53

TABLE 40 – RESIDENTIAL NATURAL GAS COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 1,583,341	$ 671,310	2.36
TRC	$ 1,583,341	$ 2,557,879	0.62
PCT	$ 2,495,801	$ 2,447,366	1.02
RIM	$ 1,583,341	$ 2,606,314	0.61

Program by Program Summaries

Residential HVAC Program

TABLE 41 – RESIDENTIAL HVAC PROGRAM METRICS

HVAC Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	737	458
Overall kWh Savings	1,320,322	750,709
Idaho Energy Efficiency Rider Spend	$ 349,252	$ 213,605
HVAC Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Conservation Projects	2,467	1,900
Overall Therm Savings	140,763	150,936
Idaho Energy Efficiency Rider Spend	$ 415,742	$ 472,608

Description

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

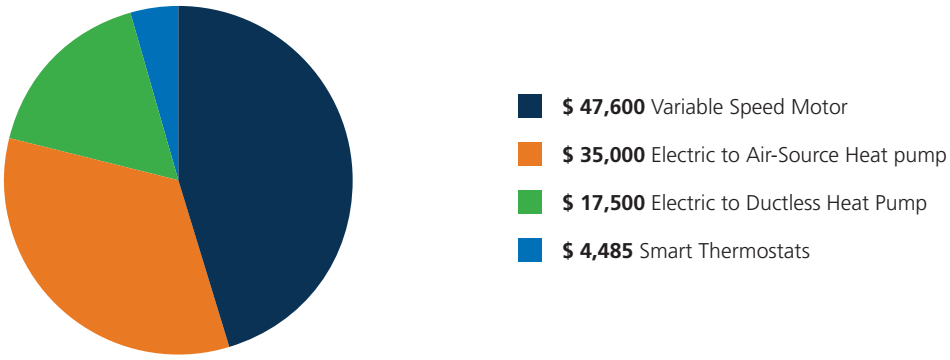
Idaho electric customers (Schedule 1) who heat their homes with Avista electricity may be eligible for a rebate for installing a variable speed motor on their forced-air heating equipment or for converting their electric straight-resistance space heating to an air-source heat pump. Any Idaho residential 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 pumps and ductless heat pumps. 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 UEF or higher, ductless heat pumps must be 9.0 HSPF or greater, and heat pump water heaters must have an efficiency of 1.8 UEF 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

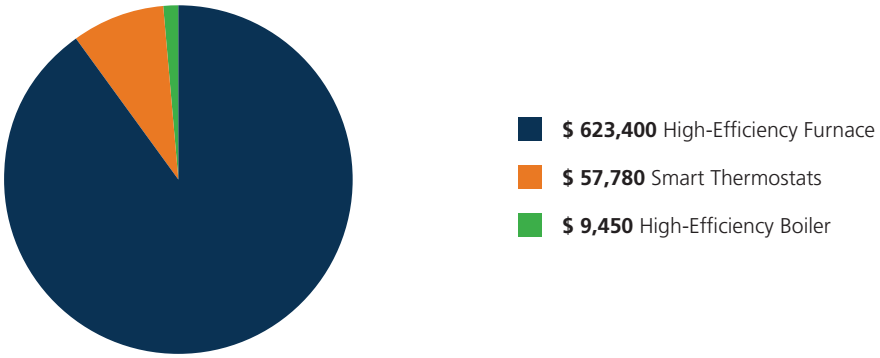
- ***Electric:*** Savings of 1,320,322 kWh in 2019, 16 percent of the overall savings achieved in Avista's residential portfolio. The program had a 76 percent increase over the 750,709 kWh achieved in 2018 and surpassed its program participation goal of 462 projects by 62 percent (750 projects in 2019).
- ***Natural Gas:*** Savings of 140,763 therms in 2019 – 78 percent of the overall residential savings – a 7 percent decrease relative to the 150,936 therms achieved in 2018. The program surpassed its program participation goal of 2,066 projects by 31 percent (2,700 projects in 2019).

FIGURE 30 – RESIDENTIAL HVAC INCENTIVE DOLLARS BY MEASURE – ELECTRIC



Overall, 2019 was an exceptional year for the residential HVAC program. For electric incentives, variable speed motors comprised approximately 45 percent of residential HVAC electric incentives. Air source heat pumps continued to be popular with customers as well.

FIGURE 31 – RESIDENTIAL HVAC INCENTIVE DOLLARS BY MEASURE – NATURAL GAS



High-efficiency natural gas furnaces continued to provide the largest portion of natural gas savings in the residential sector portfolio, comprising approximately 61 percent of Avista's 2019 residential HVAC incentives. Smart thermostats continued to be popular, with 865 installed in the Idaho service territory (801 for natural gas HVAC systems, 64 for electric HVAC systems).

Marketing

In 2019, 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.

The program also took advantage of the "Efficiency Matters" and "Way to Save" advertising campaigns to increase awareness and drive program participation, as well as ongoing SEM activities. See pages 46-53.

Impact Evaluation

The Cadmus impact evaluation team found a 202 percent realization rate for the electric HVAC program and a 76 percent realization rate for the natural gas HVAC program in 2019.

Billing analysis results for electric HVAC programs showed surprisingly high savings for the Variable Speed Motor measure, with a realization rate of 369 percent relative to the 2019 Avista TRM UES value of 414 kWh. These participants generally also replaced an existing natural gas furnace with a high-efficiency model (via the Natural Gas Furnace measure). The high electric energy savings appears to have resulted at least partly from a shift in some homes away from secondary electric heating, such as portable or wall heaters, after installing the new natural gas furnace.

Billing analysis results for natural gas furnace measures served as the biggest driver of the 76 percent realization rate for residential savings, providing a measure-level realization rate of 69 percent. The Avista TRM unit savings value of 102 therms is based on a 2011 billing analysis of natural gas upgrades, which showed higher natural gas savings largely because roughly 10 percent of participants in the treatment group installed heat pumps along with a more efficient natural gas furnace; participants who installed a heat pump along with a furnace upgrade showed a sharp reduction in natural gas usage, indicating that some heating load shifted to the heat pump. For 2019, Cadmus did not identify any participants who installed both a high-efficiency natural gas furnace and a heat pump.

Billing analysis results for natural gas furnace measures had a large impact on the realization rate for the HVAC program and the residential sector as a whole. The Avista TRM unit savings value of 102 therms appears to be based on a 2011 billing analysis of natural gas furnace upgrades across Avista programs in both states.

Recommendations

Cadmus offered the following recommendations for Avista's residential HVAC programs:

- For electric HVAC programs, consider adjusting the TRM to provide higher savings values for variable speed motors installed with the High Efficiency Natural Gas Furnace measure. The billing analysis showed savings for the variable-speed motor measure nearly 4 times the Avista TRM value on average, seemingly due to a shift away from secondary electric heating (such as portable or wall heaters) in some homes after replacing a natural gas furnace with a high-efficiency model.
- For natural gas programs, consider adjusting the Avista TRM to provide lower savings values for natural gas furnaces, replacement windows, and storm windows, based on the billing analysis conducted for this evaluation. The billing analysis estimated a unit energy savings of 71 therms for the High Efficiency Natural Gas Furnace measure, and 0.37 therms per square foot for the "Storm Windows with Natural Gas Heat" and "Window Replacement with Natural Gas Heat" measures. These values appear to provide more accurate estimates of savings than the current TRM values. Cadmus identified four reasons for the reduction to 71 therms. The difference with the largest impact was that roughly 10 percent of participants included in the 2011 study installed an air source heat pump along with a more efficient natural gas furnace. Installation of a heat pump appeared to result in greater natural gas savings by shifting some of the heating load to the heat pump, based on the observed sharp reduction in natural gas consumption for these participants.
- Continue to encourage installations of high-efficiency natural gas furnaces, which provided 65 percent of evaluated natural gas savings for residential programs. The *Northwest Energy Efficiency Alliance's Residential Building Stock Analysis II* estimated that roughly 50 percent of natural gas furnaces in Idaho single-family homes have an annual fuel utilization efficiency under 90 percent, indicating substantial savings opportunities remain.
- Continue to emphasize installation of smart thermostats, which accounted for 12 percent of 2019 residential natural gas savings. Billing analysis showed smart thermostats have a 104 percent realization rate with natural gas heating equipment.

Plans for 2020

Variable-speed motor (VSM) incentives will no longer be offered in 2020, due to VSMs becoming standard equipment on natural gas forced air furnaces.

Avista will lower savings adjustments in the TRM for the Natural Gas Furnace measure to 71 therms. Avista will continue to encourage installations of high-efficiency natural gas furnaces as well as smart thermostats.

Residential Shell Program

TABLE 42 – RESIDENTIAL SHELL PROGRAM METRICS

Shell Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	116	64
Overall kWh Savings	160,507	85,608
Idaho Energy Efficiency Rider Spend	$ 113,647	$ 25,238
Shell Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Conservation Projects	259	156
Overall Therm Savings	17,458	40,014
Idaho Energy Efficiency Rider Spend	$ 97,864	$ 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 communication methods that encourage program participation include 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; 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 160,507 kWh in 2019 (2 percent of the overall residential savings), an 87 percent increase over the 85,608 kWh achieved in 2018.
- ***Natural Gas:*** Savings of 17,458 therms in 2019, or 10 percent of the overall residential savings. The program had a 56 percent decrease in savings relative to the 40,014 therms achieved in 2018.

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.

Marketing

The program also took advantage of the "Efficiency Matters" and "Way to Save" advertising campaigns to increase awareness and drive program participation, as well as ongoing SEM activities. See pages 46-53.

Impact Evaluation

Cadmus arrived at an 84 percent realization rate of savings for prescriptive shell rebate measures in electric homes and a realization rate of 76 percent in rebate measures in homes with natural gas.

For electric programs, billing analysis provided relatively low electric energy savings for replacement windows relative to the 2019 TRM value of 15.25 kWh per square foot of window area, resulting in a realization rate of 72 percent. To provide participant counts high enough to support statistically significant estimates, Cadmus combined participants for the storm window and replacement window measures. Because billing analysis results for Idaho failed to meet the ±40 percent precision requirement, Cadmus based evaluated Idaho savings on the combined results for Idaho and Washington participants. Note that in 2019, only one Idaho project reported savings through the storm window measure; claiming savings for 150 square feet of installed storm window, the realization rate for that measure has little impact on program savings.

Billing analysis also provided relatively low natural gas savings for replacement windows relative to the 2019 TRM value of 0.6 therms per square foot of window area. For Idaho participants, the billing analysis estimated savings of 0.37 therms per square foot.

Cadmus's document review also illuminated some discrepancies with residential shell projects:

- For 4 window measures, documentation showed a square footage for installed windows that differed from the reported window area. In 3 cases, the documented window area was lower than the reported area and resulted in lower evaluated savings. In 1 case, the documented window area was more than that reported and resulted in higher evaluated savings based on the corrected area.
- For 4 window measures reported for sites with electric heating, project documents identified heating fuels other than electricity. Cadmus added natural gas savings and removed electricity savings at 2 sites identified as using natural gas heating. Documentation for the other 2 sites identified liquid propane as the heating fuel for 1 site and wood pellets as the fuel for the other; consequently, Cadmus removed electricity savings for these sites.
- There were some discrepancies between measure tracking data and TRM values, although these generally balanced each other out or had only a small effect on program-level adjusted savings.

Recommendations

Cadmus made the following recommendations for the residential shell program:

- Based on billing analysis conducted for this evaluation, adjust the Avista TRM to provide lower savings for replacement windows in electrically heated homes. The billing analysis estimated unit savings of 72 percent the 2019 TRM value.
- Ensure that reported savings for all measures are calculated using current TRM or RTF UES values, and that the TRM provides values for all measures. Cadmus noted no large-scale problems with the 2019 measure tracking data but did note numerous measure-tracking records that reported zero savings, despite appearing to have been completed and a rebate having been issued. In addition, some instances of 2019 measures used UES values from the 2018 TRM, and reported values for some measures did not match TRM values.

Plans for 2020

Avista plans to adjust the TRM in accordance with Cadmus's recommendations. Additionally, Avista plans to undertake a TRM process improvement project in 2020.

Residential Water Heating Program

TABLE 43 – RESIDENTIAL WATER HEATING PROGRAM METRICS

Water Heating Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	13	1,011
Overall kWh Savings	14,763	47,398
Idaho Energy Efficiency Rider Spend	$ 4,204	$ 8,147
Water Heating Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Conservation Projects	233	1,077
Overall Therm Savings	17,131	14622
Idaho Energy Efficiency Rider Spend	$ 28,750	$ 38,983

Description

Idaho electric customers (Schedule 1) 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 Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

Program Activities

- ***Electric:*** Residential water heating program savings were 14,763 kWh in 2019, a 69 percent decrease over the 47,398 kWh of savings achieved in 2018.
- ***Natural Gas:*** Overall therm savings were increased by 17,131, an increase of 17 percent over savings of 14,622 therms of savings in 2018. This increase took place in spite of the residential water heat project count decreasing.

Program Changes

Gas tankless water heater rebates increased mid-year from $215 to $400 per unit. Natural gas high-efficiency water heater rebates also increased, from $60 to $100 per unit.

Marketing

The program also took advantage of the "Efficiency Matters" and "Way to Save" advertising campaigns to increase awareness and drive program participation, as well as ongoing SEM activities. See pages 46-53.

Plans for 2020

Avista plans to continue offering water heater rebates in 2020.

Residential ENERGY STAR Homes Program

TABLE 44 – RESIDENTIAL ENERGY STAR HOMES PROGRAM METRICS

ENERGY STAR Homes Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	18	26
Overall kWh Savings	69,615	83,738
Idaho Energy Efficiency Rider Spend	$ 25,557	$ 37,958
ENERGY STAR Homes Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Conservation Projects	4	2
Overall Therm Savings	67	406
Idaho Energy Efficiency Rider Spend	$ 4,456	$ 2,083

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.

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

The ENERGY STAR Homes program accounted for less than 1 percent of program savings for both electric and natural gas programs.

The 2019 incentive for ENERGY STAR manufactured homes was reduced from $1000 to $650 per unit for electric only and natural gas with electric customers. The gas only customer rebate was reduced from $600 to $200 beginning of 2019. However, mid-year the incentive was bumped back up to $400.

Impact Evaluation

The 2019 Impact Evaluation for ENERGY STAR Homes (electric) had a realization rate of 105 percent. The larger adjusted savings for ENERGY STAR Homes resulted partly from some instances where the tracking data reported zero energy savings, despite the records showing the projects were complete and rebates were paid.

For natural gas ENERGY STAR Homes, the realization rate was 14 percent. Adjusted savings differed from reported savings with ENERGY STAR Homes because the Avista TRM provides a value of zero therm savings for dual-fuel ENERGY STAR manufactured homes and because the tracking data used the higher 2018 TRM savings value for natural gas homes instead of the 2019 TRM value.

Plans for 2020

Avista plans to continue to offer the ENERGY STAR Homes program in 2020 and will update the TRM value for the program.

Residential Fuel Efficiency Program

TABLE 45 – RESIDENTIAL FUEL CONVERSATION METRICS

Fuel Conversion Program Summary – Fuel Efficiency	2019	2018
Participation, Savings, and Costs		
Conservation Projects	143	170
Overall kWh Savings	1,181,596	1,442,640
Idaho Energy Efficiency Rider Spend	$ 511,069	$ 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. Avista does provide a combination conversion rebate for water heater and natural gas furnaces, however.

The company 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. Additional communication methods that encourage program participation and utility website promotion include vendor training, retail location visits, and presentations at various customer events throughout the year.

Residential electric customers (Schedule 1) in Idaho who heat their home 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 1,181,596 kWh of savings in 2019, which is a decrease of 18 percent from the 1,442,640 kWh achieved in 2018. In total, Avista served 143 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 2019, Avista served 170 customers, with a similar share pursuing the combo measure as in 2018.

Program Changes

In 2019, rebates for natural gas conversions were increased mid-year to promote and encourage gas conversion rebates in Idaho. The conversion for electric heat to natural gas forced air or boiler heat increased from $1,200 to $2,100. The conversion from electric heat to natural gas forced air heat and water heat combination went from $1,700 to $2,850.

Marketing

The program also took advantage of the "Efficiency Matters" and "Way to Save" advertising campaigns to increase awareness and drive program participation, as well as ongoing SEM activities. See pages 46-53.

Impact Evaluation

Cadmus found a realization rate of 102 percent for the residential fuel-efficiency program. Database review of residential fuel-efficiency measures resulted in roughly a 12 percent reduction in adjusted savings, primarily because reported savings in some instances used a higher UES value than the 2019 TRM value. Because billing analysis produced valid estimates for all residential fuel-efficiency measures, adjusted savings had no effect on evaluated savings.

Residential fuel-efficiency measures achieved evaluated savings of 1,181,596 kWh, yielding a 102 percent realization rate and achieving 118 percent of savings goal. Cadmus recommends that Avista update TRM values to match measure-level UES values calculated by the billing analysis. Cadmus also recommends that Avista ensure all measures are represented in the TRM.

Residential fuel-efficiency measures achieved evaluated natural gas penalties of 70,331 therms, yielding a 141 percent realization rate. Low-income fuel-efficiency measures contributed natural gas penalties of 1,535 therms, with a realization rate of 97 percent.

Cadmus recommends that Avista adjust reported natural gas penalties on all residential fuel-efficiency measures to match values determined through the billing analysis conducted for this evaluation, which appear to provide a more accurate estimate of savings than the 2019 TRM values. Based on billing analysis results for the low-income fuel-efficiency measures as a whole, Cadmus also recommends adjusting reported natural gas penalties for those measures.

Plans for 2020

Avista plans to update TRM values for this program in accordance with Cadmus recommendations.

Residential Simple Steps, Smart Savings Program

TABLE 46 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM METRICS

Simple Steps, Smart Savings Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Conservation Projects	317,124	239,430
Overall kWh Savings	3,879,137	3,411,299
Idaho Energy Efficiency Rider Spend	$ 720,303	$ 752,823
Simple Steps, Smart Savings Program Summary – Natural Gas	**2019**	**2018***
Participation, Savings, and Costs		
Conservation Projects	164	897
Overall Therm Savings	44	2,202
Idaho Energy Efficiency Rider Spend	$ 351	$ 449

Note: These savings were included in the 2018 Idaho Conservation report as water heating savings and were not specifically attributed to the Simple Steps, Smart Savings program.

Description

Avista collaborates with BPA on Simple Steps, Smart Savings, 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 LEDs, light fixtures, energy-saving showerheads, and ENERGY STAR appliances. Lighting and showerhead programs are offered only in Idaho.

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 burn-out of the existing less-efficient lighting. Energy savings claimed are based on RTF deemed savings.

Program Activities

The key to delivering on the objectives of this program are the incentives to encourage customers' interest and marketing efforts to drive them to using the program. The model used for lighting and showerheads uses manufacturer partnership to buy-down costs of products and allow for greater flexibility on how money is used (markdowns and/or marketing).

CLEAResult is contracted by Avista Utilities to provide the manufacturer and retail coordination. They are 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, in addition to select regional and national mass-market chains, are the primary recipient of the product and typically offer a variety of the Simple Steps, Smart Savings products at their locations. These products are clearly identified with point-of-purchase tags.

Lighting product savings increased in 2019 over 2018 as demand for LEDs reached its peak and retail prices continued to fall. The Simple Steps, Smart Savings program provided 55 percent of residential evaluated savings, mostly through lighting measures. The lowest lumen (250-1049) general purpose LED lamp continued to yield the largest savings for Avista. Savings for showerhead products fell drastically over the last two years as most retailers discontinued stocking the 1.75 and 1.5 GPM showerheads. The electric savings per unit on the 2.0 GPM showerheads, which was 98 percent of the 2019 sales, is considerably less than the other GPM options. Savings for clothes washers also fell as the major retailer dropped holiday promotions and shifted to offering year-round rewards. This move proved to be detrimental to overall participation in the Simple Steps, Smart Savings program.

FIGURE 32 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM – LIGHTING KWH SAVINGS

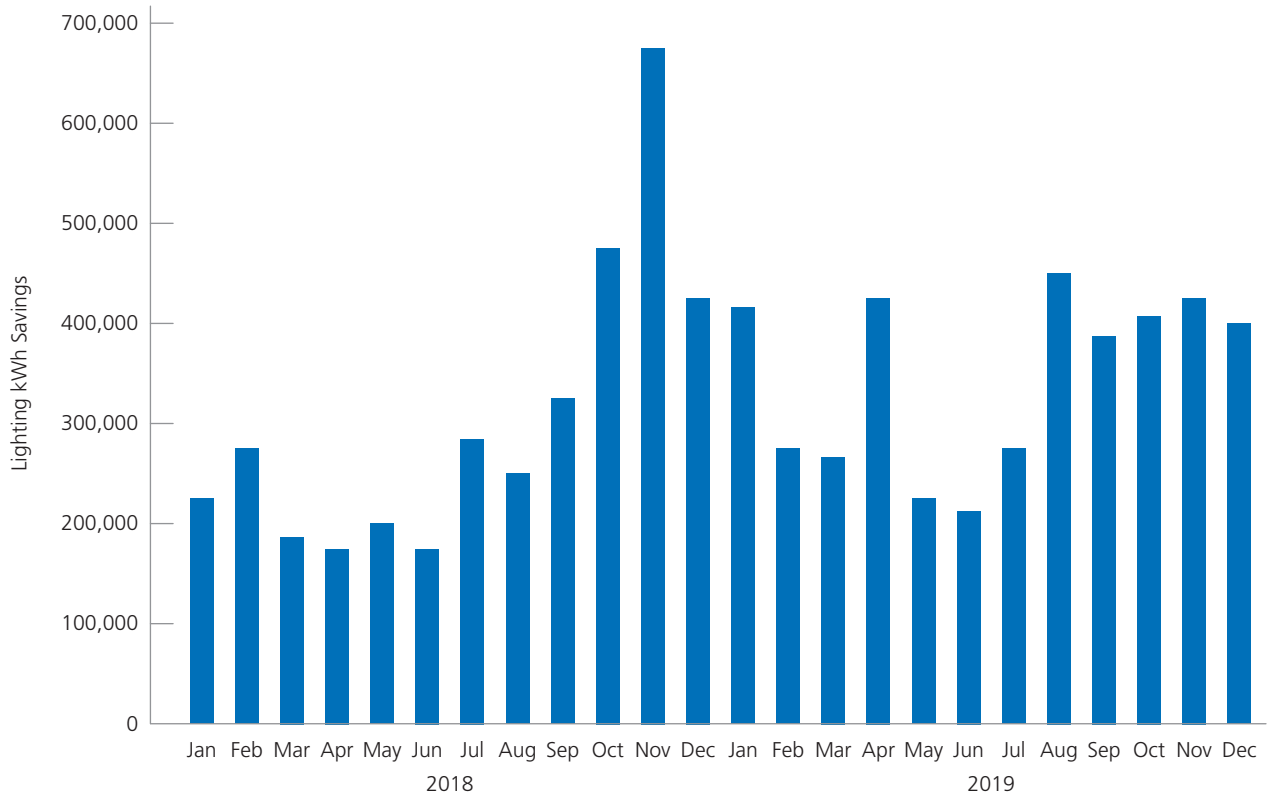


FIGURE 33 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM – SHOWERHEADS KWH SAVINGS

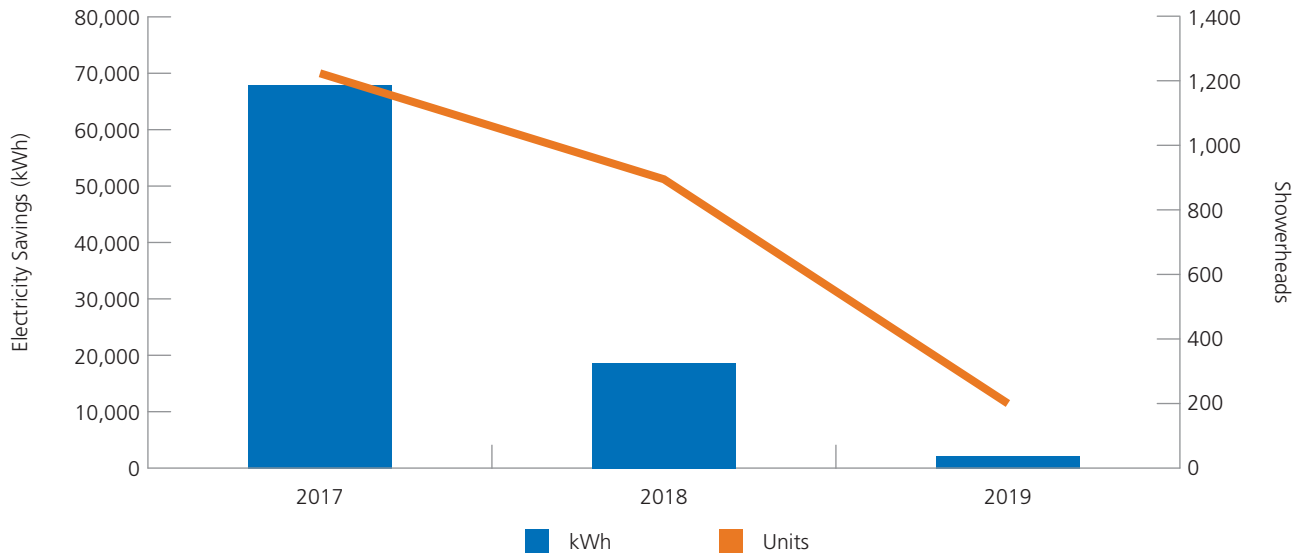
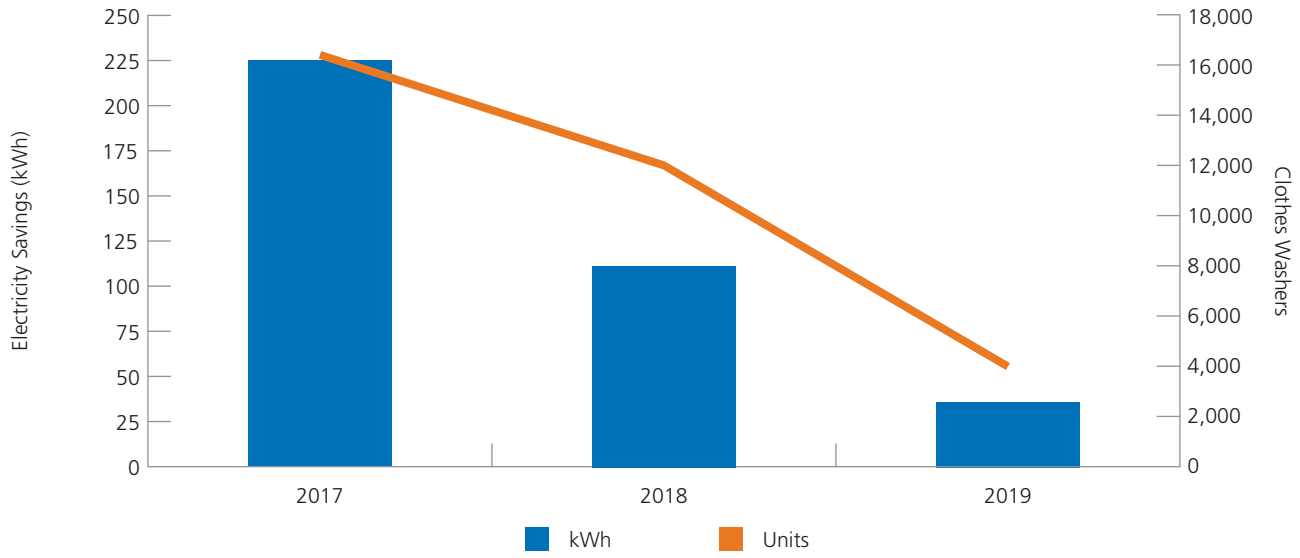


FIGURE 34 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM – CLOTHES WASHERS KWH SAVINGS



Program Changes

Incentives and savings per unit dropped in 2019 for lighting products. Incentives increased for showerhead products and remained stable for clothes washers.

TABLE 47 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM INCENTIVES CHANGES

	Incentive Per Unit	
Product Category	2018	2019
LED Bulb	$ 0.50 - 5.00	$ 0.50 - 3.00
LED Fixture	$ 0.50 - 9.00	$ 0.50 - 4.00
Showerhead	$ 1.00 - 5.00	$ 2.00 - 6.00
Clothes Washer	$ 25.00	$ 25.00

Marketing

Below is a monthly chart of Simple Steps, Smart Savings marketing activities indicating when the activity was deployed or took place.

TABLE 48 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM MARKETING ACTIVITIES

Deliverable	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Program-Driven Activities												
Retail Collateral		✔		✔			✔		✔	✔	✔	
Digital Assets		✔		✔			✔		✔	✔	✔	
Utility-Driven Activities												
Paid Online Search		✔		✔			✔		✔	✔	✔	
Direct E-mail Messages		✔		✔			✔		✔	✔	✔	
Direct Mail		✔		✔			✔		✔	✔	✔	

The appliance program worked to launch year-round promotions with participating retailers, as well as expand them to new retailers. The goal was to launch promotions that can continue uninterrupted for the entirety of the year. Only 1 of the retailers participated in year-round promotions while the remainder used the promotional window shown below:

TABLE 49 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM RETAILER ACTIVITIES

Deliverable	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Presidents' Day Promo		✔	✔									
Memorial Day Promo					✔	✔						
Fourth of July Promo						✔	✔					
Labor Day Promo								✔	✔			
Black Friday Promo											✔	✔

Additional appliance events also occurred in support of retailers launching year-round promotions as indicated below:

TABLE 50 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM RETAILER PROMOTIONS

Deliverable	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Lighting Events	✔	✔	✔	✔				✔	✔	✔	✔	
Appliance Events		✔			✔	✔		✔			✔	
Shelf Survey				✔						✔		

Customer Satisfaction

The process evaluation found that 2 participating retailers experienced a slight learning curve when submitting Simple Steps, Smart Savings program data to CLEAResult, but found the process somewhat easy after receiving assistance from program staff. It was also recommended that Avista could improve data collection efforts where access to customer information is lacking or difficult to compile.

There was also a recommendation to use bill inserts and Avista's website to promote this third-party program in order to cultivate more interest in the offerings and raise awareness of Avista's role in administering the program.

These recommendations were received in Q2 of 2020; because the Simple Steps, Smart Savings program is being terminated in Q3 of 2020, the timeline to implement these recommendations is too limited.

Impact Evaluation

The Simple Steps, Smart Savings program had a realization rate of 100 percent, achieving 3,879,137 kWh and accounting for 55 percent of residential evaluated savings.

Plans for 2020

In implementing the Simple Steps, Smart Savings program in 2020, the greatest challenge arose from uncertainty regarding the Energy Independence and Security Act, which made it difficult to plan the program in 2020 and beyond. For 10 years, Simple Steps has been a source of significant savings for Avista. During that time, the residential lighting market has transformed, and high-efficiency lamps are becoming the norm rather than the exception. As a result of this transformation, the Simple Steps, Smart Savings program will end on September 30, 2020 per the following activity schedule:

TABLE 51 – RESIDENTIAL SIMPLE STEPS, SMART SAVINGS PROGRAM PHASE-OUT

	August		September			October			
Program									
Partner Communication – Program Ending + Deadline to Submit Sales		✔	✔						
Monthly Invoices/Reports Delivered								✔	
Annual Report Delivered								✔	
Final Program Report (First Draft for Review)			✔						
Final Program Report (Second Draft for Review)						✔			
Final Program Report Delivered									✔
Utility Communication – Program Ending + Next Steps	✔	✔							
NPS Reports Delivered to BPA									✔
All Final Deliverables to BPA								✔	
Field									
Store Communication – Program Ending + Remove POP – Tier 3	✔	✔	✔						
Store Communication – Program Ending + Remove POP – Tier 2				✔	✔				
Store Communication – Program Ending + Remove POP – Tier 1						✔			
Marketing									
Websites Disabled						✔			
Temporary Website Messaging Displayed							✔	✔	✔	✔

Residential Multifamily Direct Install Program and Supplemental Lighting

TABLE 52 – RESIDENTIAL MULTIFAMILY DIRECT INSTALL PROGRAM AND SUPPLEMENTAL LIGHTING PROGRAM METRICS

Multifamily Direct Install Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Measures Installed [a)]	47,610	1,330
Overall kWh Savings	1,591,615	729,920
Idaho Energy Efficiency Rider Spend	$ 974,236	$ 524,290
Multifamily Direct Install Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Measures Installed	7,385	1,330
Overall Therm Savings	4,296	2,014
Idaho Energy Efficiency Rider Spend	$ 127,907	$ 16,491

a) The MFDI has been tracked by total measures installed which include LED lamps, faucet aerators, showerheads, smart strips, pipe wrap and other measures.

Description

The multifamily direct install program is designed to help hard-to-reach customers save energy. Field installers coordinate with property managers of multifamily complexes of 5 units or more to directly install small energy savers in tenant units – such as LED lamps, faucet aerators, showerheads, smart power strips, and vending misers in common areas. During the first site visit with properties, installers audit the complex for not only tenant needs, but also for any eligible common area lighting, which would include stairwell lighting used 24/7, exterior lamps and fixtures on a daylight sensor, and conversions from interior fluorescent T12s and T8s to LED used 24/7. Direct installations are completed at the complex and the supplemental lighting information is passed on to lighting contractors contracted to work in various areas. Lighting contractors communicate with the property managers to audit and put together project data that is sent to SBW and Avista to ensure the project is cost-effective, after which the project is completed.

Program Activities

The multifamily direct install program began in 2018 and slowly moved into Idaho starting in the Post Falls/ Coeur d'Alene area. 2019 had the program moving into all areas of Idaho. The most popular measures in the program are the LED lighting and faucet aerators; smart power strips and vending misers are the least installed.

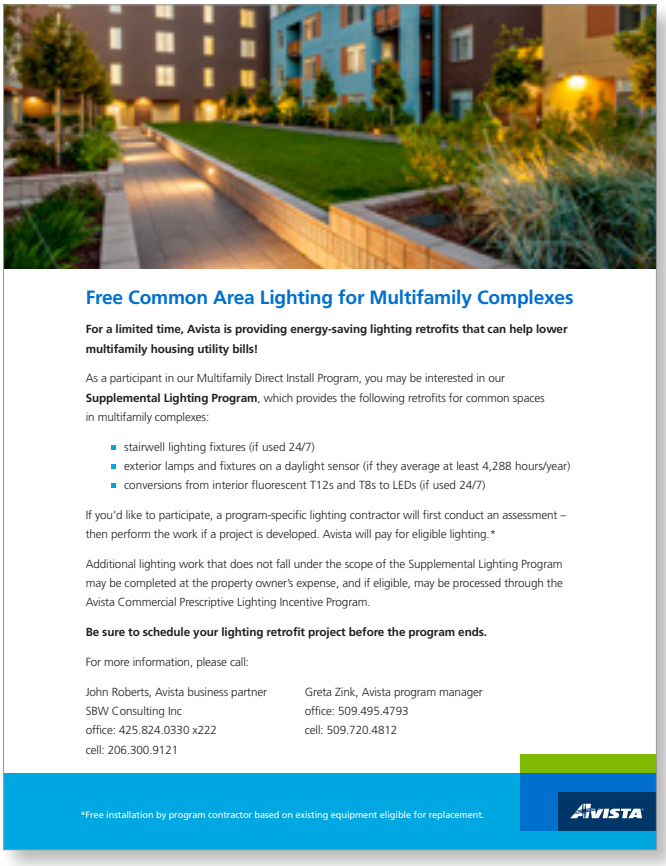
Program Changes

The multifamily direct install program began as a pilot in 2018. In 2019, a few new measures were introduced and tested in the market: water heater pipe wrap, blankets, and temperature assessments; domestic hot water pump smart plugs; and thermostatic restriction values. Ultimately, these measures were dropped due to low customer interest and a low cost-effectiveness ratio. The pilot rolled over into the current program in the fall of 2018. A supplemental lighting pilot was conducted later in 2018 with the full program beginning in early 2019.

Marketing

This program is marketed by Avista, SBW, and by property managers through word-of-mouth. Avista tries to have a controlled spread of the program to provide a timely scheduling process.

FIGURE 35 – RESIDENTIAL MULTIFAMILY DIRECT INSTALL PROGRAM FLIER



Free Common Area Lighting for Multifamily Complexes

For a limited time, Avista is providing energy-saving lighting retrofits that can help lower multifamily housing utility bills!

As a participant in our Multifamily Direct Install Program, you may be interested in our **Supplemental Lighting Program**, which provides the following retrofits for common spaces in multifamily complexes:

- stairwell lighting fixtures (if used 24/7)
- exterior lamps and fixtures on a daylight sensor (if they average at least 4,288 hours/year)
- conversions from interior fluorescent T12s and T8s to LEDs (if used 24/7)

If you'd like to participate, a program-specific lighting contractor will first conduct an assessment – then perform the work if a project is developed. Avista will pay for eligible lighting.*

Additional lighting work that does not fall under the scope of the Supplemental Lighting Program may be completed at the property owner's expense, and if eligible, may be processed through the Avista Commercial Prescriptive Lighting Incentive Program.

Be sure to schedule your lighting retrofit project before the program ends.

For more information, please call:

John Roberts, Avista business partner
SBW Consulting Inc
office: 425.824.0330 x222
cell: 206.300.9121

Greta Zink, Avista program manager
office: 509.495.4793
cell: 509.720.4812

*Free installation by program contractor based on existing equipment eligible for replacement.

AVISTA

Customer Satisfaction

The 2018-19 process evaluation report showed that multifamily property managers and tenants who participated were highly satisfied with the program and the measures installed. Tenants were also highly satisfied with the quality of outdoor LED lighting installed during the supplemental lighting phase. Moving from pilot to program for supplemental lighting had a few communication lapses with property managers due to the length of time between the direct installation and bringing on contractors to do the work in all areas.

Impact Evaluation

The 2019 electric impact evaluation stated that the MFDI program has proven to be an efficient, effective mechanism for installing high-efficiency lighting and aerators in multifamily units and suggested the continuation of the focus on replacing high-use, low-efficiency lamps where practical to maximize program cost-effectiveness while maintaining high savings.

Plans for 2020

This program is currently scheduled to run as-is through 2021.

Residential Home Energy Audit Pilot Program

Description

Taking advantage of previous home energy audit program experience and aligning with industry best practices, Avista launched a pilot home energy audit program in 2019. Eligible participants included residential customers who use Avista energy as their primary heating source and are located in Kootenai County, Idaho or in Spokane County, Washington. The program was implemented by third-party auditors, contracted by Avista.

Third-party evaluators conducted in-person energy audits in customer homes. Audit findings and energy-efficiency recommendations were discussed with the customer and documented in an audit report, which was left behind for customers. Customers were also given low-cost efficiency items if needed. Where applicable/feasible, items were directly installed by the auditor at the time of the audit. Energy savings were captured for LED lamps, power strips, low-flow showerheads, and low-flow faucet aerators. Other low-cost efficiency items were left behind for the customer to self-install if warranted. These items included rope caulk, plastic window film kits, foam outlet and switch-plate gaskets, door sweeps, and weather-stripping. Customers were then interviewed for feedback on the program.

Program Activities

61 audits were completed in 2019 in the combined Washington and Idaho service territories, 11 of which were in Idaho. After each audit, the program manager reached out to conduct informal feedback sessions with program participants. *Table 53* summarizes the feedback received by topic.

TABLE 53 – CUSTOMER FEEDBACK ON HOME ENERGY AUDIT PILOT PROGRAM – SUCCESSES

Topic	Summary Feedback
Customer Satisfaction	Feedback from pilot program participants was overwhelmingly positive. Service is a high customer value. Customers receiving the audit were engaged throughout the process. All appreciated the education and provided feedback that they learned a great deal about their home and energy efficiency.
Prescriptive Audit	Audit method using an infrared camera and set approach allowed for a high level of customer engagement and interaction.
Online Report Tool	Using an online tool allowed program and audit staff to enter and update information with ease. Program staff could create a specific template, and the tool's algorithms performed estimated calculations for energy efficiency measure costs and expected savings.

TABLE 54 – CUSTOMER FEEDBACK ON HOME ENERGY AUDIT PILOT PROGRAM – UNEXPECTED EVENTS

Description	Impact	Actions Taken
Delay of EUI calculation and subsequent GIS heat map layer	Impacted recruitment; schedule extended by three months	Original resource trained new position
Level of data analytics needed to process EUI results in both counties	Impacted recruitment; schedule extended two weeks	Once all data points from county were understood, applied business requirements to narrow down list
Low customer interest	Schedule extended	Expanded recruitment lists, added new recruiting venues
Low LED penetration	Ran out of materials	Purchased additional LEDs
Low interest in low-flow showerheads and faucet aerators	Overstocked inventory	Returned product to inventory to use for other outreach events

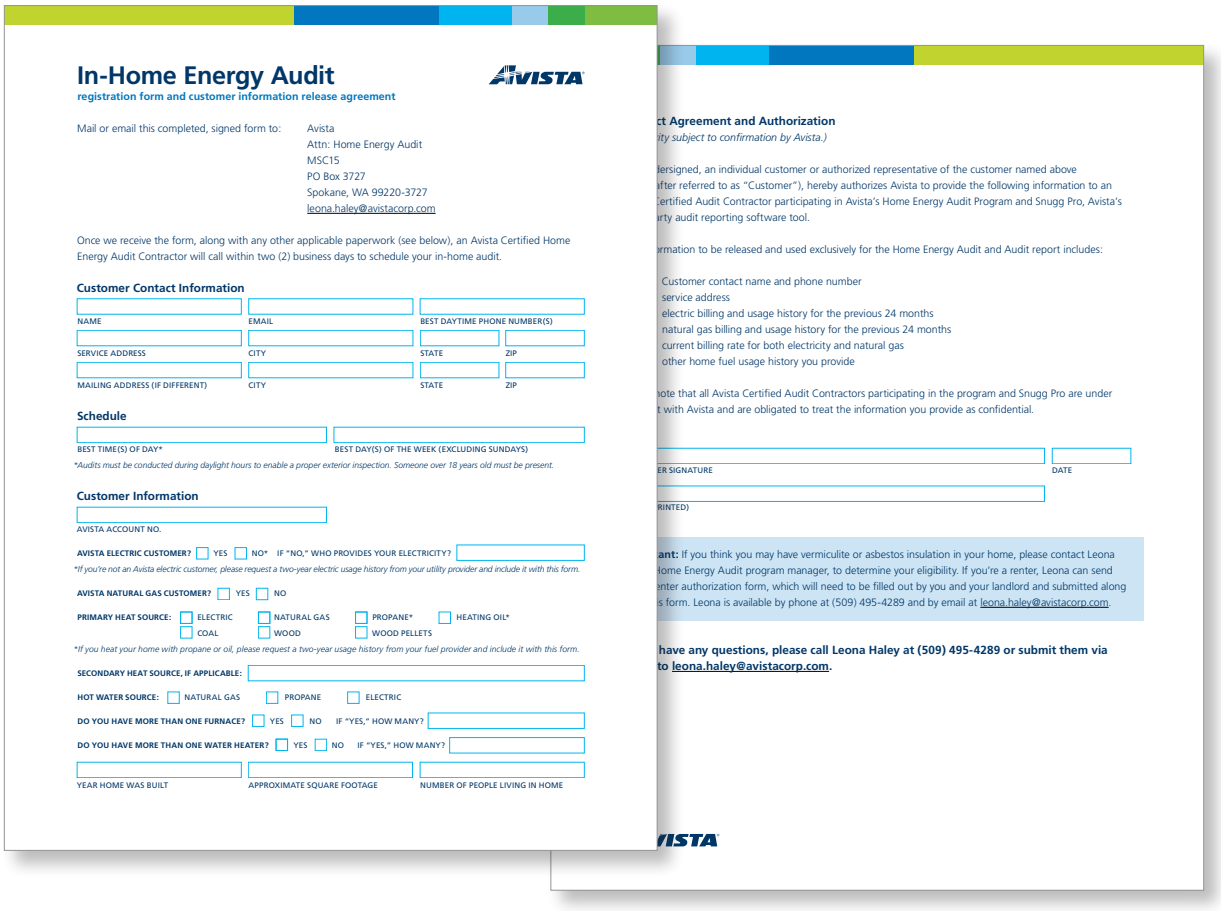
TABLE 55 – CUSTOMER FEEDBACK ON HOME ENERGY AUDIT PILOT PROGRAM – LESSONS LEARNED

Description	Recommendation
Customer drivers for an in-home audit are: ◆ Plan to stay in this home for years to come ◆ Higher than expected energy bills ◆ Uncomfortable areas in home ◆ Want to learn how to prioritize efficiency upgrades	Create program eligibility requirements to support these engaged customers' motivations
Not all interested customers want an in-home audit – either too much of a time commitment or privacy concerns	Review existing DIY options and consider new ones to increase self-serve capabilities Publish DIY guide
Home Inspectors with energy audit training possess the knowledge to be an auditor	Look for experienced home inspectors with energy efficiency certifications or credentials; BPI certification is not a requirement as it was in the previous audit program
High level of customer education	Because the customer is part of the audit walk-through and process, they see and hear trouble spots in their home and the recommendation options
Customers have difficulty finding home energy auditors and weatherization contractors	Research feasibility of adding insulation contractors and other weatherization contractors to the online Avista dealer network

Marketing

A direct marketing approach was used for the pilot to keep pace with contractor availability and to target customers in Kootenai County and Spokane County. The program was marketed as a limited-time offer. Recruitment efforts for pilot participation took place at Avista's energy fairs, as well.

FIGURE 36 – RESIDENTIAL IN-HOME ENERGY AUDIT FORM



In-Home Energy Audit

registration form and customer information release agreement

Mail or email this completed, signed form to:

Avista
Attn: Home Energy Audit
MSC15
PO Box 3727
Spokane, WA 99220-3727
leona.haley@avistacorp.com

Once we receive the form, along with any other applicable paperwork (see below), an Avista Certified Home Energy Audit Contractor will call within two (2) business days to schedule your in-home audit.

Customer Contact Information

NAME | EMAIL | BEST DAYTIME PHONE NUMBER(S)

SERVICE ADDRESS | CITY | STATE | ZIP

MAILING ADDRESS (IF DIFFERENT) | CITY | STATE | ZIP

Schedule

BEST TIME(S) OF DAY* | BEST DAY(S) OF THE WEEK (EXCLUDING SUNDAYS)

**Audits must be conducted during daylight hours to enable a proper exterior inspection. Someone over 18 years old must be present.*

Customer Information

AVISTA ACCOUNT NO.

AVISTA ELECTRIC CUSTOMER? ☐ YES ☐ NO* IF "NO," WHO PROVIDES YOUR ELECTRICITY?

**If you're not an Avista electric customer, please request a two-year electric usage history from your utility provider and include it with this form.*

AVISTA NATURAL GAS CUSTOMER? ☐ YES ☐ NO

PRIMARY HEAT SOURCE: ☐ ELECTRIC ☐ NATURAL GAS ☐ PROPANE* ☐ HEATING OIL* ☐ COAL ☐ WOOD ☐ WOOD PELLETS

**If you heat your home with propane or oil, please request a two-year usage history from your fuel provider and include it with this form.*

SECONDARY HEAT SOURCE, IF APPLICABLE:

HOT WATER SOURCE: ☐ NATURAL GAS ☐ PROPANE ☐ ELECTRIC

DO YOU HAVE MORE THAN ONE FURNACE? ☐ YES ☐ NO IF "YES," HOW MANY?

DO YOU HAVE MORE THAN ONE WATER HEATER? ☐ YES ☐ NO IF "YES," HOW MANY?

YEAR HOME WAS BUILT | APPROXIMATE SQUARE FOOTAGE | NUMBER OF PEOPLE LIVING IN HOME

ct Agreement and Authorization

ity subject to confirmation by Avista.)

dersigned, an individual customer or authorized representative of the customer named above after referred to as "Customer"), hereby authorizes Avista to provide the following information to an Certified Audit Contractor participating in Avista's Home Energy Audit Program and Snugg Pro, Avista's rty audit reporting software tool.

rmation to be released and used exclusively for the Home Energy Audit and Audit report includes:

- Customer contact name and phone number
- service address
- electric billing and usage history for the previous 24 months
- natural gas billing and usage history for the previous 24 months
- current billing rate for both electricity and natural gas
- other home fuel usage history you provide

ote that all Avista Certified Audit Contractors participating in the program and Snugg Pro are under t with Avista and are obligated to treat the information you provide as confidential.

ER SIGNATURE | DATE

RINTED)

ant: If you think you may have vermiculite or asbestos insulation in your home, please contact Leona Home Energy Audit program manager, to determine your eligibility. If you're a renter, Leona can send enter authorization form, which will need to be filled out by you and your landlord and submitted along s form. Leona is available by phone at (509) 495-4289 and by email at leona.haley@avistacorp.com.

have any questions, please call Leona Haley at (509) 495-4289 or submit them via to leona.haley@avistacorp.com.

Customer Satisfaction

Follow-up conversations were made with every pilot participant to understand their overall satisfaction, learn of potential recommendations from participants, and document energy-efficiency measures that were made or planned to be made. All customers made at least a minor efficiency upgrade such as allowing Avista to directly install LEDs to replace existing incandescent lamps or door weather stripping. Other customers made more significant improvements by adding attic insulation, sealing and insulating crawl spaces, or replacing an inefficient wood stove to a more efficient one that kept the electric strip heat from coming on in the middle of the night. Below are some customer quotes about the program:

- "Thank you. We definitely plan to make some changes. The auditor was very thorough. This service your company provided was very helpful."
- "Several of my neighbors are going to be calling you. I appreciated the opportunity to have the audit."
- "Thank you so much for providing this service. The auditor was fantastic, very informative, and professional. He gave us insight that was most helpful. We appreciated this opportunity.:
- "I would be hard-pressed to offer suggestions to improve the program, as I thought it was fantastic. The time, thorough evaluation, and depth of education was of great benefit to me. Education would be the greatest, as I have been able to share some of the information to benefit others. We did change light bulbs, used materials provided to create seals around some of the outlets (and have more to do), and are saving now to purchase new window dressings, and hopefully add insulation to upstairs walls that will help conserve energy."
- "Thank you for the audit. We did have all-new windows put in our house and added six more inches of spray insulation, thanks to your advice. We love our new smart power strips and we think they are saving us money. Our only suggestion would be to offer to a wider range of people."

Plans for 2020

The home energy audit pilot program will be scaled up and offered across the utility's entire Idaho and Washington service territory. Based on pilot program participation, Avista estimates that 200 audits will be conducted between the two states in 2020. Customer education about energy efficiency and cross-program awareness will be key focus areas. Avista will also continue to work closely with our community agency partners to serve vulnerable populations with this program offering.

In 2019, Avista put on nearly 50 low-income-specific events for its Idaho customers

LOW-INCOME SECTOR

Program by Program Summary

Low-Income Program

TABLE 56 – LOW-INCOME PROGRAM METRICS

Low-Income Program Summary – Electric	2019	2018
Participation, Savings, and Costs		
Measures Installed [a]	39,754	9,405
Overall kWh Savings	269,934	355,753
Idaho Energy Efficiency Rider Spend	$ 805,308	$ 629,674
Low-Income Program Summary – Natural Gas	**2019**	**2018**
Participation, Savings, and Costs		
Measures Installed [b]	3,286	111
Overall Therm Savings	3,932	4,772
Idaho Energy Efficiency Rider Spend	$ 344,431	$ 337,360

a) For 2019, the Low Income program served 111 electric and 100 natural gas customers.
b) Program participation for low income programs is quantified in number of installed units or square feet of installed insulation or windows.

Description

Avista partners with a Community Action Partnership (CAP) agency to deliver low-income energy-efficiency programs in 9 Idaho counties within the company's service territory. The CAP has the infrastructure in place to income-qualify customers and also provides access to a variety of funding sources to make energy-efficiency improvements to their homes. The agency serving Avista's Idaho territory receives an annual funding amount of $825,000.

The agency may spend its annual funds on either electric or natural gas efficiency measures at its discretion as long as the home demonstrates a minimum level of an Avista fuel for space heating use. Within the annual funding allocation is a 15 percent reimbursement for administrative costs. The agency may also choose to use up to 15 percent of its allocation for improvements to assist with health, safety, and home repair.

To guide the agency toward projects that are most beneficial to Avista's energy-efficiency efforts, the company provides an approved list of measures that are cost-effective and allow for full reimbursement of the installation. A qualified list of measures allows for partial reimbursement of those measures that may not be cost-effective but will serve the home well and are compensated with an amount that is equal to the utility's avoided cost of the energy savings associated with the measure. To allow an element of flexibility to their funds, the CAP may elect to use its health, safety, and repair dollars to fully fund the remaining cost of the qualified measure.

Program Activities

For 2019, the program achieved 234,102 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.

Table 57 shows Avista savings goals for the low-income sector for 2019, as well as reported savings and goal portions achieved in 2019.

TABLE 57 – LOW-INCOME REPORTED SAVINGS

Program	Savings Goals (kWh)	Reported Savings (kWh) a)	Percentage of Goal
Low-Income	148,972	234,102	157%
Low-Income – Fuel Conversions	101,640	37,808	37%
Low-Income – Total	**250,612**	**271,910**	**194%**

a) Reported savings do not include Low-Income Fuel Efficiency savings, shown in the Fuel Efficiency Impact Evaluation section.

Table 58 summarizes participation goals for the low-income programs, along with participation reported and achieved in 2019.

TABLE 58 – LOW-INCOME PARTICIPATION A)

Program	Participation Goals	Participation Reported	Percentage of Goal
Low-Income	24,834	39,754	160%

a) Participation numbers do not include Low-Income Fuel Efficiency participation, shown in the Fuel Efficiency Impact Evaluation section. Program participation for low income programs is quantified in number of installed units or square feet of installed insulation or windows.

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 *Table 59*). Avista deemed these measures as cost-effective during the *2019 Annual Conservation Plan* development.

TABLE 59 – LOW-INCOME PROGRAM APPROVED MEASURE LIST

Electric Measures	Natural Gas Measures
◆ Air Infiltration ◆ Air Source Heat Pump (9.0 HSPF) ◆ Attic Insulation ◆ Duct Insulation ◆ Duct Sealing ◆ ENERGY STAR Doors ◆ ENERGY STAR Refrigerator ◆ ENERGY STAR Windows ◆ Floor Insulation ◆ Heat Pump Water Heater (Tier 2-3) ◆ LED Lighting ◆ Wall Insulation	◆ Attic Insulation ◆ Duct Insulation ◆ ENERGY STAR Doors ◆ ENERGY STAR Windows ◆ High-Efficiency Furnace (90% AFUE) ◆ High-Efficiency Natural Gas Water Heater (0.67 for storage)
Fuel Conversion Measures	
◆ Electric to Natural Gas Furnace ◆ 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 was eligible to receive a partial reimbursement for their 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 60 – LOW-INCOME PROGRAM REBATE MEASURE LIST

Electric Measures	Natural Gas Measures
◆ Electric to Ductless Heat Pump (9.0 HSPF) ◆ Electric to Natural Gas Space and Water Heater ◆ Electric to Natural Gas Water Heater ◆ Floor Insulation	◆ Air Infiltration ◆ Boiler (95% AFUE) Duct sealing ◆ Floor Insulation ◆ Tankless Natural Gas Water Heater (.82 EF) ◆ Wall Insulation

Program Changes

The agency started the year with a funding allocation of $825,000 for energy-efficiency measures, an 18 percent increase in funding over previous years. This increase was a result of IPUC Order Number 34067, in Case Nos. AVU-E-18-02 and AVU-G-18-01. Other program changes include an update of measures eligible for either full or partial funding. This update is based on the company's business plan evaluation completed in 2018. Measures are summarized on *Tables 59* and *60* previously.

Customer Outreach

Customers who participate in the low-income weatherization program are often referred through the CAP's energy assistance program. Avista provides a handful of referrals each year from its customer service department and the Avista Customer Assistance Referral and Evaluation Services (CARES) program, which provides assistance for disabled, elderly, and low-income customers, or customers experiencing hardships related to employment, health, or finances.

Other referrals are a result of various outreach events Avista hosts or is invited to attend. In partnership with the company's energy-efficiency efforts, its consumer affairs department conducts conservation education and outreach for low-income customers, seniors, individuals living with disability, and veterans. Avista reaches this target population through workshops, energy fairs, and mobile and general outreach. 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 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.

Avista 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 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. Multiple communication channels were used in 2019 to increase awareness of Avista's energy fairs. Tactics included news releases, direct mail, email, fliers, community calendars, social media, signage, and print and radio advertising.
- 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 2019, Avista conducted and participated in 49 events that included workshops, energy fairs, mobile outreach, and general outreach (via partnerships and events) that reached 3,888 customers in Idaho. *Table 61* below shows an overview of the different activities in Idaho.

TABLE 61 – LOW-INCOME OUTREACH EVENT AND BULB GIVEAWAY SUMMARY

Description	Number of Events/ Activities	Contacts	LEDs
Energy Fairs	2	876	1,752
General Outreach	17	1,118	1,726
Mobile Outreach	22	1,422	2,459
Workshops	8	472	944
Total	**49**	**3,888**	**6,881**

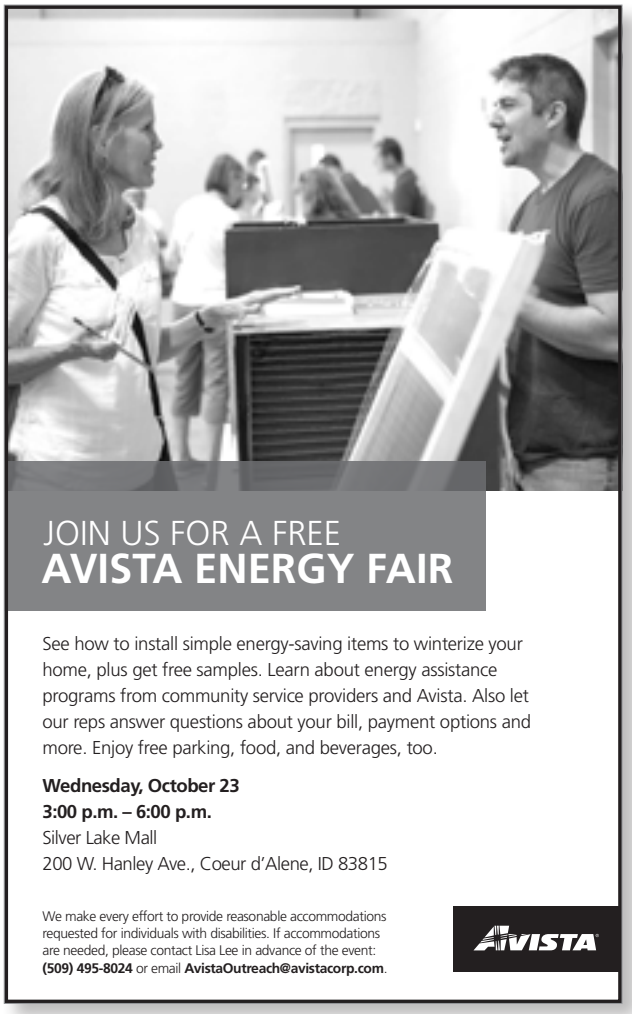
In addition to the company's outreach and education activities, Avista partners with CAP in the employment of a full-time conservation education specialist. CAP also uses the funds to enable energy assistance intake specialists in their ten offices to conduct conservation education activities with clients and in communities. The conservation 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 conservation specialist supports each CAP office's energy staff in their local conservation efforts.

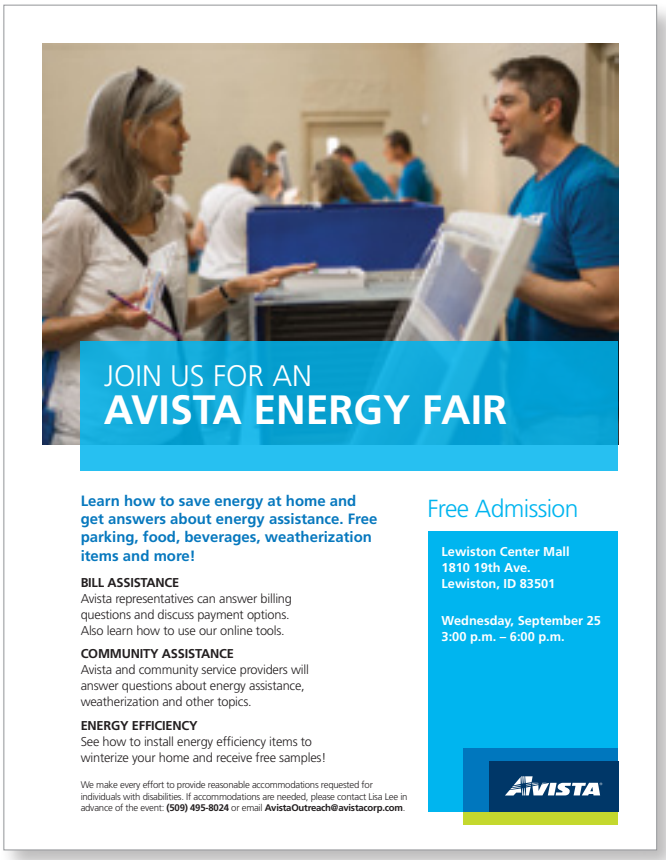
In some situations, the conservation specialist partners with Avista outreach. These collaborations provide an opportunity for the specialist to learn Avista outreach practices and messaging. During the events where both the company and agency staff are present, the specialist focuses on promoting CAP services and programs. At the 2019 Coeur d'Alene Energy Fair, Avista and CAP partnered to offer shower timers and magnets to event attendees. 200 attendees visited the Avista table, and approximately 30 low-income individuals had one-on-one conversations about energy assistance resources.

Marketing

Multiple communication channels were utilized to increase awareness of Avista's Energy Fairs. Tactics included news releases, direct mail, email, fliers, community calendars, social media, signage, and print advertising.

FIGURE 37 – LOW-INCOME ENERGY FAIR MARKETING





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: 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.

FIGURE 38 – LOW-INCOME HOME ENERGY SAVINGS KIT

AVISTA

Your 2019 Avista Home Energy Kit

Energy Guide
This guide provides an overview of the various ways that you use energy in your home and tips and instruction for managing your use and energy budget.

Reusable Tote
Please accept this handy tote as our gift to carry home all of your free energy-saving product samples. You can reuse it for other items too, so we hope it gets lots of good use.

LED Lightbulb
Your kits also includes two (2) energy-efficient LED lightbulbs. Compared to standard incandescent lightbulbs, LEDs last 15 times longer (providing up to 25,000 hours of light) and use up to 90% less energy. The LED bulbs in your kit are dimmable.

Nightlight
Nightlights can provide light and safe passage for nighttime trips in the dark in your home, and because of their low wattage they also save electricity. The one included in your kit has a light sensor so it only operates in the dark.

Blanket
We included a cozy blanket so you can lower your temperature and still stay warm and comfortable this winter. For energy saving benefits, set your thermostat at 68 degrees. Also lower it another 5 degrees at night or when you leave home for an hour or more.

Thermometer and Humidity Monitor
The humidity level in your home can affect how the temperature in your home feels. To ensure that you are maximizing your home heating systems, observe your room temperature and humidity and make adjustments where needed.

To Use:

1. Place close to your home thermostat.
2. Check the temperature on the thermostat against the monitor.
3. If it is below or above the range, consider how to increase or decrease the humidity in your home.

More energy-saving tips

- Open curtains on south-facing windows to let in warm sunlight during the winter. Keep window coverings closed in rooms that do not receive direct sunlight to insulate from cold window drafts. Close all curtains at night to retain heat.
- Clean or replace your furnace filters monthly throughout the heating season and every three months the rest of the year. Sign up for a free email reminder at: myavista.com/changemyfilter.
- Take quick showers and use low-flow showerheads. Short showers use less hot water than a bath.
- Practice zone heating when using baseboard or space heaters by turning down the heat and closing doors in unused rooms (a good temperature is 55). Keep both clear from obstructions such as furniture and drapes that block heat. Anything that touches these devices can be a fire hazard.
- See a complete list of energy-saving tips at **myavista.com/advice**.

If you have questions about your Home Energy Kit, please contact Avista Outreach by email at **AvistaOutreach@avistacorp.com** or by phone at **509-495-8500**.

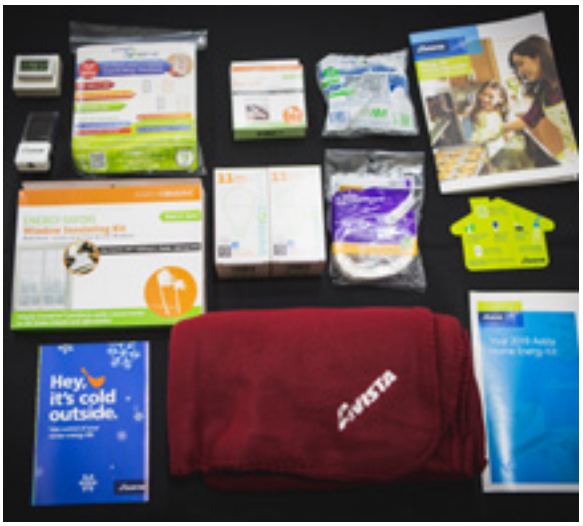
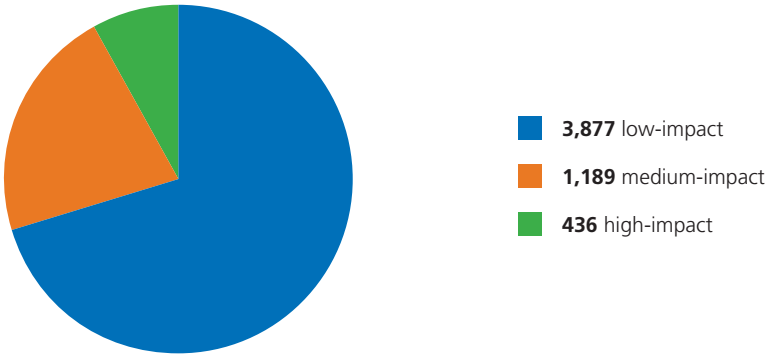


FIGURE 39 – LOW-INCOME HOME ENERGY COMMUNITY OUTREACH

In 2019, CAP's conservation activities reached 5,502 individuals. While the total number of individuals reached through outreach activities declined in comparison to 2018 outreach activities (6,449 individuals reached), the number of high-impact activities more than doubled (436 individuals reached in 2019 vs 198 individuals reached in 2018). Below is a breakdown of outreach activities by impact:

FIGURE 40 – LOW-INCOME CAP CONSERVATION OUTREACH ACTIVITIES BY LEVEL OF IMPACT



Impact Evaluation

With a realization rate of 99 percent for electricity savings, the low-income program achieved savings of 232,126 kWh in 2019, or 156 percent of goal. This number does not include savings for low-income programs' fuel-efficiency path measures (shown in the *Low-Income Fuel Efficiency Impact Evaluation* section on page 93).

Reported program participation reached 160 percent of the expected value. Roughly 26 percent of evaluated low-income program savings resulted from LED bulbs given out at events.

TABLE 62 – LOW-INCOME ELECTRIC IMPACT FINDINGS

Program	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Evaluated Electric Savings (kWh)	Realization Rate
Low-Income	234,102	232,126	232,126	99%

With a realization rate of 103 percent for natural gas savings, low-income programs achieved savings of 3,932 therms in 2019, or about 15 percent of the goal.

TABLE 63 – LOW-INCOME NATURAL GAS IMPACT FINDINGS

Program	Reported Savings (therms)	Adjusted Savings (therms)	Verified Savings (therms)	Realization Rate
Low-Income	3,825	3,932	3,932	103%

Impact Evaluation Methodology

Cadmus evaluated low-income program measures by conducting a database review (described in the *Database Review* section of the *Impact Evaluation Reports*) and billing analysis. The team 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.

For many measures reported in the tracking database, notes indicated that savings were capped at 20 percent of consumption. When duplicating savings calculations using TRM values, Cadmus used the newly calculated value if it was less than the capped value, but used the capped value where the TRM value indicated greater savings. Per Avista policy, the 20 percent cap rule is applied to a project that may have multiple measures; therefore individual savings values don't always match UES values in the Avista TRM. In fact, UES values in the Avista TRM often exceed 20 percent of low-income annual usage.

Cadmus conducted billing analysis for the low-income program using all consumption data available from Avista for 2018 and 2019 program participants. Because of the relatively small number of low-income program participants, Cadmus was unable to isolate measure-level savings for the program (which are necessary for cost-effectiveness calculations). For natural gas programs, realization rates for Idaho participants showed enough variation that billing analysis results did not meet the required confidence and precision threshold, either for Idaho participants or for Idaho and Washington participants combined. For electric programs, however, the billing analysis did provide savings estimates for the program as a whole that produced a point of comparison for evaluated savings, estimated using prescriptive methods.

Recommendations

As stated previously, notes indicated that savings were capped at 20 percent of consumption for many measures in the low-income tracking data. The low-income program measure-tracking data did not include adequate information to determine when savings values were appropriately capped. Cadmus recommends providing annual consumption for each measure in the tracking data, so that evaluation can include verifying that savings were capped at 20 percent of consumption for applicable measures.

Fuel-Efficiency Program Activities

For low-income fuel-efficiency measures, evaluated savings were 37,808, which was 37 percent of the savings target and 43 percent of the participation target.

Fuel-Efficiency Impact Evaluation

Table 64 shows reported and adjusted electric energy savings for low-income fuel-efficiency measures.

TABLE 64 – LOW-INCOME FUEL-EFFICIENCY PROGRAM ELECTRIC IMPACT FINDINGS

Fuel Efficiency Measure	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Evaluated Electric Savings (kWh)	Realization Rate
Low-Income Fuel Efficiency	37,808	37,808	37,808	100%

Cadmus found no discrepancies between reported and TRM UES values for electric energy savings with low-income fuel-efficiency measures, leading to a realization rate of 100 percent for electric energy savings.

The billing analysis estimated a realization rate of 144 percent for low-income fuel-efficiency electric savings, with a relative precision of ±27 percent at the 90 percent confidence level. Participation was not high enough to estimate savings at the measure level, which is necessary for calculating cost-effectiveness, but the results do indicate greater electric savings for low-income fuel-efficiency measures as a whole than indicated by 2019 Avista TRM values. This finding also supports the natural gas billing analysis finding that the natural gas penalties for low-income fuel-efficiency measures are much higher than estimated by the 2019 Avista TRM (see *2019 Idaho Natural Gas Impact Evaluation Report*). Together, the electric and natural gas billing analysis results suggest a much greater heating load than indicated by TRM values, which is evident as the heating load shifts from electricity to natural gas.

Fuel-Efficiency Recommendations

Billing analysis indicated that program electric savings are likely higher, based on the billing analysis realization rate of 144 percent for low-income fuel-efficiency measures as a whole. Based on this finding, Cadmus recommends increasing the Avista TRM UES values.

Cost-Effectiveness

Tables 65 and *66* show the low-income sector cost-effectiveness results by fuel type.

TABLE 65 – LOW-INCOME ELECTRIC COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 387,682	$ 813,132	0.48
TRC	$ 426,451	$ 602,697	0.71
PCT	$ 1,127,951	$ 444,596	2.54
RIM	$ 387,682	$ 1,286,052	0.30

TABLE 66 – LOW-INCOME NATURAL GAS COST-EFFECTIVENESS RESULTS

Cost-Effectiveness Test	Benefits	Costs	Benefit/Cost Ratio
UCT	$ 37,703	$ 344,431	0.11
TRC	$ 37,703	$ 225,023	0.17
PCT	$ 372,198	$ 206,768	1.80
RIM	$ 37,703	$ 390,452	0.10

Plans for 2020

An order from the 2019 Idaho General Rate Case included an increase to low-income weatherization program funding of $50,000 for the 2020 program year. This will result in a total allocation of $875,000.

The measures available for full reimbursement will differ from 2019. Homes that heat with natural gas will now receive partial funding for all insulation measures. Homes that heat with electricity will receive partial funding for attic and windows, replacing baseboard heat with ductless heat pump and the replacement of existing air source heat pumps with high-efficiency models.

As a dual-fuel utility, Avista does not impose requirements to serve a certain amount of electric or natural gas heated homes each year. The CAP is provided with the flexibility to serve the home of the qualified customer they identify during a program year. As mentioned previously, the measures that appear on the approved and qualified list may fluctuate annually based on utility cost-effectiveness tests. The flexibility given to the health, safety, and repair allocation does allow for non-cost effective measures identified on the qualified list to be fully funded. The agency has demonstrated the ability to fully spend its utility allocation each year.

Avista will revisit savings assumptions for UES measures as part of the company's annual business planning process. The company also plans to re-evaluate the units used to set program participation goals for the year. Finally, Avista will ensure that the TRM is updated to reflect any UES adjustments.

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GENERATION AND DISTRIBUTION EFFICIENCY

Generation

Avista did not complete any efficiency projects at its generation facilities in 2019.

Distribution

During 2019, Avista's grid modernization program led to a completed upgrade of one Idaho feeder with annual savings of 471.7 MWh. Avista created the grid modernization program, which officially started in 2013, to provide a thorough examination of its electric distribution circuits to programmatically address the facilities' upgrades and modernization. Avista is focused on selecting and improving the worst-performing feeders that have the most opportunity for improvement in the areas of reliability and energy efficiency. This includes the identification, prioritization, selection, and engineering analysis of the distribution circuits. For the grid modernization program, Avista performs a comprehensive inventory of each electric feeder on the system to appropriately prioritize and select the candidate feeders for the program. Avista then uses the feeder criteria information to rank the potential benefits for each circuit compared with all the distribution feeders on the system.

Avista initially optimized grid modernization at a cycle interval of 60 years, meaning that over 60 years the program would rebuild every feeder in the distribution system. The company selected this interval since it is related to the average life span of the company's distribution infrastructure as well as to the 20-year interval cycle time for the Wood Pole Management (WPM) program. These two programs are integrated in several important ways. Grid modernization relies on the inspection data from WPM for its asset condition assessment and targets the timing of feeder rebuilds to optimize the value of wood pole inspections and follow-up already performed. WPM relies on the poles inspected for grid modernization as contributing to the total number of poles that WPM inspectors must inspect annually to remain on the 20-year inspection cycle. Further, grid modernization integrates activities of other operational programs beyond WPM, including the transformer change-out program, vegetation management program, various budgeted maintenance programs, and segment reconductor and feeder tie program.

Through the grid modernization program, Avista aims to accomplish a comprehensive modernization approach from both an energy efficiency and 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 its system and a targeted 60-year life cycle, Avista should complete almost six grid modernization feeders each year when staffed and funded appropriately. So far, Avista has worked on 22 grid modernization feeders (which are in varying forms of design, construction, or completion). *Table 67* shows the grid modernization plan by feeder and identifies the program results and plans for the extend through 2023.

TABLE 67 – 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

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]
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	2021	2021	5/31/2019	Version 1	6.1	145.9	152.1
ROS 12F4	WA	TBD	TBD	TBD	Version 1	TBD	64.1	TBD
ORO 1282	ID	TBD	TBD	TBD	Version 1	TBD	TBD	TBD

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.

In 2019, Avista concluded its 5 year LED streetlight change-out program, which converted high pressure sodium streetlights to LED technology. The program operated across multiple local and state jurisdictions, including the company's entire Idaho service territory. These change-outs have saved significant energy and operating costs, while also improving lighting quality and safety.

In 2019, Avista's LED streetlight change-out program obtained 246 MW in energy savings in Idaho. Over the five-year program, Avista has changed out over 26,000 streetlights in total. *Table 68* shows total distribution efficiency savings activities in Idaho and Washington in 2019.

TABLE 68 – DISTRIBUTION EFFICIENCY SAVINGS BY PROGRAM

Program	Idaho Savings (MWh)	Washington Savings (MWh)	Total Savings (MWh)
Grid Modernization	472	481	952
LED Streetlight Change-Out	246	137	383
Total	**718**	**618**	**1,335**

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 cooperatively worked together through NEEA to address opportunities that are beyond the ability or reach of individual utilities. Avista has been participating in and funding NEEA since it was founded in 1997.

Table 69 shows the 2019 NEEA forecast savings versus actual savings and the associated costs for Idaho.

TABLE 69 – ACTUAL SAVINGS AND ASSOCIATED COSTS FOR AVISTA IDAHO

Fuel Type	2019 NEEA Final Reported Energy Savings as of March 2019	2019 Costs (Avista Financials)	Avista Current Funding Share (Idaho and Washington Combined)
Electric	3,789 MWh (0.43 aMW)	$ 670,330	5.77%
Natural Gas	N/A	$ 154,261	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, the funding share for Avista is split between 30 percent for Avista Idaho and 70 percent for Avista Washington (shown in *Table 69* above). The funding share for Avista 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.

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; and 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 Avista's local portfolio alone. Avista has historically communicated with NEEA the importance of NEEA delivering cost-effective resources to the company's service territory. Avista believes that NEEA will continue to offer cost-effective electric market transformation in the foreseeable future. Avista will continue to be active in the organizational oversight of NEEA, a critical step in ensuring that geographic equity, cost-effectiveness, and resource acquisition.

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 Adjusted 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, and 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 who 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 were enacted.

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 services and the cost of alternative energy-efficient equipment or services.

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 projects, 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 programs.

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 3rd 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

Post Falls Dam on the Spokane River, Post Falls, Idaho

APPENDIX A – 2019 IDAHO ELECTRIC IMPACT EVALUATION REPORT

CADMUS

PY 2019 Idaho Electric Impact Evaluation Report

May 29, 2020

Prepared for:

Avista Corporation
1411 East Mission Avenue
Spokane, WA 99202

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Portfolio Executive Summary

For several decades, Avista Corporation has administered demand-side management programs to reduce the electricity and natural gas energy use of its portfolio of customers. Avista contracted with Cadmus to complete process and impact evaluations of its program year (PY) 2018 and PY 2019 electric demand-side management programs in Idaho. This report presents Cadmus' electric impact evaluation findings for PY 2019. Cadmus did not apply net-to-gross adjustments to savings values, except in cases where deemed energy savings values already incorporated 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

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

Summary of Impact Evaluation Results

Overall, the Idaho electric portfolio achieved a 97% realization rate and acquired 25,230,990 kWh in annual evaluated savings (Table 2). Cadmus collected Avista's reported savings through database extracts from its Customer Care and Billing (residential) and InforCRM and iEnergy (nonresidential) databases and from data provided by third-party implementers to determine evaluated savings.

Although some individual project results varied, both the Residential and Nonresidential sector performed strongly in PY 2018 and PY 2019.

Table 2. Reported and Evaluated Electric Savings

Sector	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Nonresidential	17,826,108	16,443,270	92%
Residential	6,426,003	7,035,960	109%
Low-Income	234,102	232,126	99%
Fuel Efficiency	1,521,494	1,519,634	102%
Total	**26,007,707**	**25,230,990**	**97%**

Note: totals may not sum due to rounding.

Conclusions and Recommendations

During the PY 2019 evaluation, Cadmus identified several areas for improvement, outlined below by sector.

Nonresidential Conclusions and Recommendations

The Nonresidential sector achieved total evaluated electric energy savings of 16,443 MWh in PY 2019, with a realization rate of 92%. The Nonresidential sector achieved 78% of the combined Prescriptive and Site Specific program paths' electric savings goal of 21,215 MWh.

While some individual project results varied, the overall Nonresidential sector performed strongly in PY 2019. Most of the projects Cadmus sampled for evaluation were well documented and matched what the team found during site visit verification.

Cadmus encountered some challenges evaluating the PY 2019 Nonresidential program due to midyear changes Avista made to its application tracking database system. The new iEnergy database stores and reports data in different formats and different aggregation levels than the previous system.

As the transition occurred midyear and some applications were entered into both systems, Avista and Cadmus staff had to manually combine and recategorize data from the new database to match up with the format used for the old database. Cadmus identified several issues with exports from the new database as well as underlying errors with the way the new system calculated some savings. Avista has corrected the issues Cadmus identified, and the new iEnergy database has the potential to facilitate more accurate savings estimates, more detailed project tracking, and more thorough evaluations in the future.

Cadmus offers the following recommendations for improving the Nonresidential sector's 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 the installed equipment sizes, quantities, or performance ratings differed from those used in the reported savings calculations.
- Review hours of use (HOU) estimates for interior and exterior lighting projects when reviewing submissions and conducting installation verification (IV). Applications claiming 8,760 hours should be particularly scrutinized. Before any new equipment installations, confirm the presence or absence of lighting controls and record how they were configured. Cadmus found a small

percentage of Prescriptive and Site Specific projects where lighting HOU and controls varied from the submitted details.

- Ensure lighting projects are correctly categorized as interior or exterior. Cadmus evaluated two Prescriptive lighting projects with fixtures listed under the wrong measure category.
- Review measurement and verification plans for Site Specific projects carefully and early in the process to ensure an appropriate measurement basis. Also, work with site contacts to establish trend logs for relevant building management system or industrial control system data points during the baseline period.
- Continue to pursue improvements with Avista IV reports. Cadmus staff found that the level of detail in IV reports varied. Cadmus recommends that all IV reports include basic information and explicitly state the quantity and type of equipment found. For lighting projects, this would include confirmed fixture types, quantities, installation locations, controls, and estimated HOU. For most other equipment, this would include nameplates, model numbers, and quantities.

Residential Conclusions and Recommendations

Evaluated electricity savings show a realization rate of 109% on evaluated savings of 7,036 MWh for the Residential programs, which is 156% of the savings goal for the year. The high percentage of achieved savings relative to the goal results largely from high program participation (134% of goal) and the strong overall realization rate for the Residential sector (109%).

Lighting measures accounted for 73% of the total Residential sector savings. The following list shows the percentage of Residential evaluated savings provided by each program:

- The Simple Steps, Smart Savings program provided 55% of Residential evaluated savings, mostly through lighting measures.
- The Multifamily Direct Install and Multifamily Direct Install Supplemental Lighting programs provided 23% of evaluated savings, again mostly through lighting measures.
- The Residential HVAC program accounted for 19% of evaluated savings.
- The Shell and ENERGY STAR Homes programs accounted for a combined 3% of Residential evaluated savings.

Realization rates varied by program, from 84% for the Shell program to 202% for the HVAC program, which resulted in a strong overall realization rate of 109% for PY 2019. Cadmus identified few discrepancies through the document review, finding that the great majority of projects were well documented and met program requirements.

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

- Based on billing analysis conducted for this evaluation, adjust Avista's Technical Reference Manual (TRM) to provide higher savings values for variable-speed motors installed with the G Natural Gas Furnace measure and lower savings for replacement windows in electrically heated homes. The billing analysis showed savings for the variable-speed motor measure nearly four times the Avista TRM value on average. This was seemingly due to a shift away from

secondary electric heating (such as portable heaters or wall heaters) in some homes after replacing a gas furnace with a high-efficiency model. For replacement windows in electrically heated homes, the billing analysis estimated unit savings of 72% the 2019 TRM value.

- The MFDI program has proven to be an efficient, effective mechanism for installing high-efficiency lighting and aerators in multifamily units. Continue to focus on replacing high-use, low-efficiency lamps where practical, to maximize program cost-effectiveness while maintaining high savings.
- Ensure that reported savings for all measures are calculated using current TRM or Regional Technical Forum unit energy savings (UES) values, and that the TRM provides values for all measures. Cadmus did not find large-scale problems with the PY 2019 measure tracking data, but the team did note numerous measure-tracking records that reported zero savings, despite the record showing the measure was completed and that a rebate was issued. In addition, some instances of PY 2019 measures used UES values from the 2018 TRM, and reported values for some measures (most notably, smart thermostats) did not match TRM values.

Fuel Efficiency Recommendations

Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency measures achieved evaluated savings of 300,230 kWh, yielding a 100% realization rate. The Multifamily Market Transformation Fuel Efficiency measures exceeded the electric energy savings goal of 234,960 kWh by 28%. Cadmus does not recommend any changes to the Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency programs.

Residential Fuel Efficiency measures achieved evaluated savings of 1,181,596 kWh, yielding a 102% realization rate and achieving 118% of savings goal. Cadmus recommends that Avista update TRM values to match measure-level UES values calculated by the billing analysis. Cadmus also recommends that Avista ensure all measures are represented in the TRM.

For Low-Income Fuel Efficiency measures, evaluated savings were 37,808 kWh, with a realization rate of 100%, but fell short of Avista's savings goals, achieving 37% of the savings target and 43% of the participation target. Billing analysis indicated that program electric savings are likely higher, based on the billing analysis realization rate of 144% for Low-Income Fuel Efficiency measures as a whole. Based on this finding, Cadmus recommends increasing the Avista TRM's UES 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. Cadmus conducted Nonresidential impact evaluation activities to determine program year (PY) 2019 evaluated savings for most programs; the team conducted measurement and verification of Prescriptive and Site Specific projects across the full PY 2019 sample.

Program Summary

Avista completed and rebated 542 nonresidential electric measures in Idaho in PY 2019 and reported total electric energy savings of 17,826,108 kWh. Through the Nonresidential sector, Avista offers incentives for high-efficiency equipment and controls through three program paths: Prescriptive, Site Specific, and Multifamily Market Transformation.

The Prescriptive program path applies to 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 applies to 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).

Multifamily Market Transformation, a Site Specific program, prompts building owners and developers to consider natural gas as the fuel of choice when constructing new multifamily housing. These measures, represented by a combination of electric savings and natural gas penalties, typically involve replacing electric space-heating or water-heating systems with natural gas equipment. See the *Fuel Efficiency Impact Evaluation* section for the evaluation methodology and the results discussion for Nonresidential Fuel Efficiency measures.

Program Participation Summary

This section summarizes Nonresidential sector participation and progress toward PY 2019 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 2019, as well as reported savings and a comparison between reported savings and goals.

Table 3. Nonresidential Prescriptive Electric Savings

Program Name	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Interior Lighting	7,414,179	4,669,357	63%
Exterior Lighting	4,299,232	3,192,110	74%
Shell Measure	1,109	8,871	800%
Green Motors	49,098	38,828	79%
Motor Control (Variable Frequency Drives [VFD])	75,595	0	0%
Fleet Heat	8,000	0	0%
Food Service Equipment	32,429	9,506	29%
AirGuardian	18,000	136,244	757%
Energy Smart Grocer[a]	317,248	0	0%
Total	**12,214,890**	**8,054,916**	**66%**

[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 2019 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	121,200
Exterior Lighting	9,850
Shell Measure	435
Green Motors	17
Motor Control (VFD)	55
Fleet Heat	1
Food Service Equipment	6
AirGuardian	3
Energy Smart Grocer[a]	814

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

Table 5. Nonresidential Prescriptive Participation by Project

Program Type	Participation Reported[a]
Interior Lighting	249
Exterior Lighting	260
Shell Measure	6
Green Motors	12
Motor Control (VFD)	0
Fleet Heat	0
Food Service Equipment	3
AirGuardian	1
Energy Smart Grocer	0
Total[b]	**492**

[a] Participant is defined as a unique application number.

[b] Total unique applications. One application may contain measures from multiple programs.

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 2019, as well as reported savings. 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

Program Path	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Site Specific	9,000,000	9,771,192	109%

Nonresidential Impact Evaluation Methodology

As the first step in evaluating PY 2019 savings for the Nonresidential sector, Cadmus explored the following documents and data records to gain an understanding of the programs and measures slated for evaluation:

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

Based on the initial review, Cadmus checked the distribution of program contributions with the overall program portfolio. The review provided insight into the sources for unit energy savings (UES) claimed for each measure offered in the programs, along with sources for energy-savings algorithms, internal quality assurance, and quality control processes for large Nonresidential sector projects.

Following this review, Cadmus designed a sample strategy for impact evaluation activities. Cadmus performed the following evaluation activities in two waves:

- Selected evaluation sample and requested project documentation from Avista
- Reviewed project documentation
- Prepared on-site measurement and verification plans
- Performed site visits and collected on-site data (such as trend data, photos, and operating schedules)
- Used site visit findings to calculate evaluated savings by measure
- Applied realization rates to the total reported savings population to determine overall program year evaluated savings

Sample Design

Cadmus created two sample waves for PY 2019. Sample 1 included program data from January 2019 through June 2019, and sample 2 included program data from July 2019 through December 2019. As a guideline, Cadmus used the proposed, overall PY 2019 nonresidential sample sizes by subprogram in the measurement and verification plan, seeking to complete approximately half of the sample in each wave.

For each activity wave, Cadmus organized submitted program applications by path and measure (such as the Site Specific Shell Measure, Prescriptive Lighting, or Prescriptive Motor Controls), allowing the team to select the highest-savings applications in each category with certainty. For non-certainty applications, the team assigned random numbers and developed a random sample. In some cases, Cadmus sampled another application at the same location or a facility that was previously selected (and where the team could assess both applications with one site visit). This was a cost-effective verification strategy even if the second application represented minimal claimed savings.

As Avista implements its programs similarly in both states, Cadmus sampled randomly selected sites across Washington and Idaho. The team pooled results from the randomly selected sites to calculate a realization rate by stratum and applied that realization rate to projects in both states. Cadmus applied evaluated savings for sites selected with certainty only to the state in which they had been implemented.

Table 7 summarizes the Idaho Nonresidential Prescriptive program evaluation sample. In Idaho, Cadmus sampled 18 Prescriptive applications at 14 unique sites. Of the sampled applications, the team selected three for certainty review based on the scale of savings, measure type, or location. Cadmus then selected the remaining 15 applications randomly. No customers participated in the Fleet Heat, Motor Control, and Energy Smart Grocer programs in Idaho in PY 2019.

Table 7. Idaho Nonresidential Prescriptive Electric Evaluation Sample

Program Type	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Interior Lighting	7	576,688	12%
Exterior Lighting	5	26,001	1%
Shell Measure	1	3,920	44%
Green Motors	4	19,706	51%
Food Service Equipment	2	4,393	46%
AirGuardian	1	136,244	100%
Nonresidential Prescriptive	**18**	**766,951**	**10%**

Note: Totals may not sum due to rounding. Two applications contained both interior and exterior lighting measures.

Table 8 summarizes the Idaho Nonresidential Site Specific program path evaluation sample. In Idaho, Cadmus sampled five Site Specific applications at two unique sites. Of the sampled applications, the team selected four for certainty review based on the scale of savings, measure type, or location. Cadmus selected the remaining application randomly.

Table 8. Idaho Nonresidential Site Specific Electric Evaluation Sample

Program Path	Applications Sampled	Sampled Savings (kWh)	Percentage of Reported Savings
Site Specific	5	7,737,047	79%

Document Review

Cadmus requested and reviewed project documentation for each sampled application and prepared measurement and verification plans to guide its site visits. Typically, project documentation included incentive applications, calculation tools (usually based on the 2017 Regional Technical Forum [RTF]),[1] invoices, equipment specification sheets, and installation verification (IV) reports.

On-Site Verification

Cadmus performed site visits at 16 unique nonresidential locations to assess electric savings for 25 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 reported savings calculations where necessary. The team did not consider it necessary to conduct power metering or light logging for PY 2019 site visits and used trend data provided by the participant to evaluate Site Specific industrial process measures.

Nonresidential Impact Evaluation Results

This section summarizes the Nonresidential Prescriptive and Site Specific program paths' electric impact evaluation results for PY 2019.

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

Nonresidential Prescriptive Programs

Table 9 shows reported and evaluated electric energy savings for Avista's Nonresidential Prescriptive program and the realization rates between evaluated and reported savings for PY 2019. The overall Nonresidential Prescriptive program path electric realization rate was 100%.

Table 9. Nonresidential Prescriptive Electric Impact Findings

Program Type	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Interior Lighting	4,669,357	4,518,758	97%
Exterior Lighting	3,192,110	3,303,660	103%
Shell Measure	8,871	10,400	117%
Green Motors	38,828	38,828	100%
Food Service Equipment	9,506	9,506	100%
AirGuardian	136,244	136,244	100%
Nonresidential Prescriptive	**8,054,916**	**8,017,396**	**100%**

Of the evaluated applications, Cadmus identified discrepancies for 18 based on the site visit and project documentation review. Table 10 summarizes the reasons for discrepancies between reported and evaluated savings.

Table 10. Nonresidential Prescriptive Evaluation Summary of Discrepancies

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Attic Insulation	1	↓	• Avista reported incorrect savings values for one attic insulation project due to an error in its new database software. Cadmus reviewed all Prescriptive Shell measures to confirm that only one project was affected by the bug. Cadmus treated the affected project as a certainty project and evaluated savings using the typical savings calculator methodology.
Refrigerated Cases	1	↓	• Cadmus was only able to verify installation of 15 of the 17 refrigerator doors claimed on the application of one refrigerated cases measure and reduced the savings proportionally.

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Interior Lighting	5	↓	• Cadmus reduced the fixture counts for one project as the evaluated installed quantity on the site was lower than the quantity reported on the application. • Cadmus reduced the hours of use (HOU) for one project that reported 24/7 operations after determining that occupancy controls and schedule controls were in place to reduce the lighting runtime prior to and after the project. • The Avista database categorized two projects as interior lighting that only had exterior fixtures. These savings were subtracted from interior lighting and added to exterior lighting. • Cadmus reduced fixture counts and increased HOU at one site where the building underwent a remodel shortly after completing the project and no longer matched the conditions reported at the time the application was submitted.
	4	↑	• Cadmus determined that the store hours at one site were higher than reported on the application. The team also determined that new occupancy controls were added that were not reported on the application, further decreasing installed HOU relative to baseline HOU. • Cadmus found that the installed fixtures for one project had a lower wattage than reported on the application.
Exterior Lighting	3	↓	• Cadmus reduced fixture counts and increased HOU at one site where the building underwent a remodel shortly after completing the project and no longer matched the conditions reported at the time the application was submitted. • Cadmus calculated savings for an outdoor display sign using the actual quantity and wattage of the lamps inside the sign. The Avista calculator used an estimated watts-per-square-foot method for exterior sign lighting based on assumed typical values. The team found the assumed baseline watts per square foot to be unreasonably high for the type of lighting typically installed in outdoor signs.
	4	↑	• Cadmus updated the savings calculations to use the actual verified fixture wattage instead of the assumed typical value for three projects. • Cadmus determined that two exterior lighting measures were incorrectly categorized as interior lighting measures in the Avista database and transferred those savings to exterior lighting.

Throughout the evaluation, Cadmus found that the level of detail in IV reports varied. Most IV reports the team reviewed only stated that the reviewer "found the installation to match the application submitted," including for a portion of projects where the inspections found discrepancies between the installation and the application. Some IV reports did not contain any text at all and only provided unlabeled photos. Cadmus evaluated a lighting project where the IV report only contained one photograph of each fixture type and no information about quantities.

Nonresidential Site Specific Program

Table 11 shows reported and evaluated electric energy savings for Avista's PY 2019 Nonresidential Site Specific program path, as well as a comparison between evaluated and reported savings for PY 2019.

The overall Site Specific program path electric realization rate was 86%. The table does not include reported and evaluated electric savings for measures in the Fuel Efficiency path.

Table 11. Nonresidential Site Specific Electric Impact Findings

Program Path	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Site Specific	9,771,192	8,425,874	86%

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

Table 12. Nonresidential Site Specific Evaluation Summary of Discrepancies

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Green Motor Rewind	1	↑	• The reported savings reference for 2017 RTF. Cadmus applied deemed motor savings from the 2018 Technical Reference Manual (TRM) workbook.
Refrigerator Door Gaskets	1	↓	• The reported savings for one refrigerator door gasket project corresponded to 17 doors. Cadmus only received documentation for and verified installation of 15 doors at this site.
Interior Lighting	14	↓	• Cadmus reduced the fixture counts for three projects as the verified installed quantity on the site was lower than the quantity reported on the application. • Cadmus reduced the HOU for four projects that reported 24/7 operations after determining that occupancy controls and schedule controls were in place to reduce the lighting runtime prior to and after the project. • The Avista database categorized two projects as interior lighting that only had exterior fixtures. These savings were subtracted from interior lighting and added to exterior lighting. • Cadmus reduced the lighting hours from 100% on to 75% on one project, based on interviews with on-site staff. Cadmus also found a lower installed fixture quantity than that reported in the application. • Cadmus could not replicate the reported savings on one project based on reported fixture types and quantities. However, the team retained the reported quantities as they could not visit all spaces at the site for verification. • Cadmus determined that 13 W fixtures were installed in place of the 9 W fixtures reported on the application.
	2	↑	• Cadmus determined that the store hours at one site were higher than reported on the application. The team also determined that new occupancy controls were added which were not reported on the application, further decreasing installed HOU relative to baseline HOU. • Cadmus found that the installed fixtures for one project had a lower wattage than reported on the application.
Exterior Lighting	3	↓	• Cadmus reduced exterior lighting HOU from 8,760 to 4,288 for one project after determining that all exterior fixtures at the site were controlled by photocells.

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
			• Cadmus reduced fixture counts and increased HOU at one site where the building underwent a remodel shortly after completing the project and no longer matched the conditions reported at the time the application was submitted. • Cadmus calculated savings for an outdoor display sign using the actual quantity and wattage of the lamps inside the sign. The Avista calculator used an estimated watts-per-square-foot method for exterior sign lighting based on assumed typical values.
	4	↑	• Cadmus updated the savings calculations to use the actual verified fixture wattage instead of the assumed typical value for two projects. • Cadmus determined that two exterior lighting measures were incorrectly categorized as interior lighting measures in the Avista database and transferred those savings to exterior lighting.
Motor Control (VFD)	2	↓	• Cadmus determined that two return air fans with VFDs and reported as 3.0 horsepower were actually 2.5 horsepower.
Shell Measure	1	↓	• Cadmus determined there was no space cooling and space was heated with natural gas. As a result, the team removed electric savings from ceiling/wall insulation.
	2	↓	• Avista reported incorrect savings values for two Shell insulation projects due to an error in their new database software. Cadmus reviewed all Prescriptive Shell measures to confirm that only two projects were affected by the bug. Cadmus treated the two affected projects as certainty projects and evaluated savings using the typical savings calculator methodology.
Industrial Process	2	↑	• Cadmus recalculated savings for two motor replacement and VFD installation projects in a paper mill based on trend data from the post-installation period. The team found that the average kilowatt consumption of some installed motors was lower than predicted.
Industrial Motor Controls	1	↓	• Cadmus determined that the baseline power consumption estimation for a motor replacement project included unrelated equipment from the same power distribution bus. Cadmus revised the analysis using additional trend data and updated assumptions to ensure the baseline and post-installation calculations were consistent. The team found the estimated power consumption in both periods to be lower than reported in the original analysis, but significantly lower in the baseline, resulting in reduced savings.

Nonresidential Conclusions and Recommendations

The Nonresidential sector achieved total evaluated electric energy savings of 16,443 MWh in PY 2019, with a combined realization rate of 92%. The Nonresidential sector achieved 78% of the combined Prescriptive and Site Specific program paths' electric goal of 21,215 MWh.

While some individual project results varied, the overall Nonresidential sector performed strongly in PY 2019. Most of the projects Cadmus sampled for evaluation were well documented and matched what the team found during site visit verification.

Cadmus encountered some challenges evaluating the PY 2019 Nonresidential program due to midyear changes Avista made to their application tracking database system. The new iEnergy database stores and reports data in different formats and different aggregation levels than the previous system.

As the transition occurred midyear and some applications were entered into both systems, Avista and Cadmus staff had to manually combine and recategorize data from the new database to match up with the format used for the old database. Cadmus identified several issues with exports from the new database as well as underlying errors with the way some savings were calculated by the new system. Avista has corrected the issues Cadmus identified, and the new iEnergy database has the potential to facilitate more accurate savings estimates, more detailed project tracking, and more thorough evaluations in the future.

Cadmus offers the following recommendations for improving the Nonresidential sector's 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.
- Review HOU estimates for interior and exterior lighting projects when reviewing submissions and conducting IV. Applications claiming 8,760 hours should be particularly scrutinized. Before any new equipment installations, confirm the presence or absence of lighting controls and record how they were configured. Cadmus found several Prescriptive and Site Specific projects where lighting HOU and controls varied from submitted details.
- Ensure the correct categorization of lighting projects as interior or exterior. Cadmus evaluated two Prescriptive lighting projects with fixtures listed under the wrong measure category.
- Review measurement and verification plans for Site Specific projects carefully early in the process to ensure an appropriate measurement basis, and work with site contacts to establish trend logs for relevant building management system or industrial control system data points during the baseline period.
- Provide more thorough documentation with Avista IV reports. Cadmus staff found that the level of detail in IV reports varied. Cadmus recommends that all IV reports include basic information, explicitly stating the quantity and type of equipment found. For lighting projects this would include confirmed fixture types, quantities, installation locations, controls, and estimated HOU. For most other equipment, this would include nameplates, model numbers, and quantities.

Residential Impact Evaluation

Cadmus designed the Residential sector impact evaluation to verify reported program participation and energy savings. The team used data collected and reported in the tracking database, online application forms, Avista TRM and RTF savings review, and analysis of participant electricity consumption data to evaluate savings. This approach provided the strongest estimate of achieved savings practical for each program, given its delivery method, magnitude of savings, number of participants, and availability of billing data.

Program Summary

Avista completed and rebated 349,056 residential electric measures or units in Idaho in PY 2019 and reported total electric energy savings of 6,426,003 kWh, not including participation and savings from Fuel Efficiency measures, which are included in the *Fuel Efficiency Impact Evaluation* section. Participation is defined as installed pieces of equipment (such as a furnace or showerhead) for some measures and square feet of surface for others (such as wall insulation and windows replacement).

The Residential path includes several programs:

- Simple Steps, Smart Savings, which encourages consumers to purchase and install high-quality LEDs, light fixtures, and energy-efficient showerheads
- Residential HVAC, which offers incentives for high-efficiency heating and cooling equipment
- Residential Shell, which provides rebates to encourage customers to install high-efficiency windows and storm windows
- ENERGY STAR Homes, which offers 15% to 25% of energy savings relative to state energy codes
- Multifamily Direct Install (MFDI), which provides free direct-install measures to multifamily residences (five units or more) and common areas
- MFDI Supplemental Lighting, which revisited multifamily properties served by the MFDI program to install additional common area lighting.

Program Participation Summary

This section summarizes Residential sector participation and progress toward PY 2019 goals.

Residential Programs

Table 13 shows savings goals assigned to Avista's Residential sector programs for PY 2019, as well as reported savings and the goal portion achieved in PY 2019. All programs except ENERGY STAR Homes and Residential HVAC exceeded savings goals based on reported savings, leading to an overall achievement of 142% of the savings goal for Residential programs.

Table 13. Residential Reported Electric Savings

Program	Savings Goals (kWh)	Savings Reported (kWh)	Percentage of Goal
Simple Steps, Smart Savings	2,495,393	3,879,137	155%
HVAC	674,367	659,957	98%
Shell	139,065	190,390	137%
ENERGY STAR Homes	86,190	66,262	77%
Multifamily Direct Install	957,450	1,289,539	135%
Multifamily Direct Install Supplemental Lighting	168,000	340,719	203%
Residential Total	**4,520,465**	**6,426,003**	**142%**

Note: totals may not sum due to rounding.

Table 14 summarizes participation goals and reported participation in Avista's Residential sector programs for PY 2019, along with the percentage of goal achieved.

Table 14. Residential Participation

Program	Participation Goals	Participation Reported	Percentage of Goal
Simple Steps, Smart Savings[a]	190,126	317,124	167%
HVAC[b]	462	750	162%
Shell[c]	67,184	27,404	41%
ENERGY STAR Homes[b]	26	18	69%
Multifamily Direct Install[d]	1,473	3,057	208%
Multifamily Direct Install Supplemental Lighting[e]	750	703	94%
Residential Total	**260,021**	**349,056**	**134%**

[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.

[d] Participation is defined as the number of living units and common areas served.

[e] Participation is defined as the number of installed units.

Residential Impact Evaluation Methodology

To determine the Residential sector's evaluated savings for PY 2019, Cadmus employed a combination of three impact evaluation methods:[2]

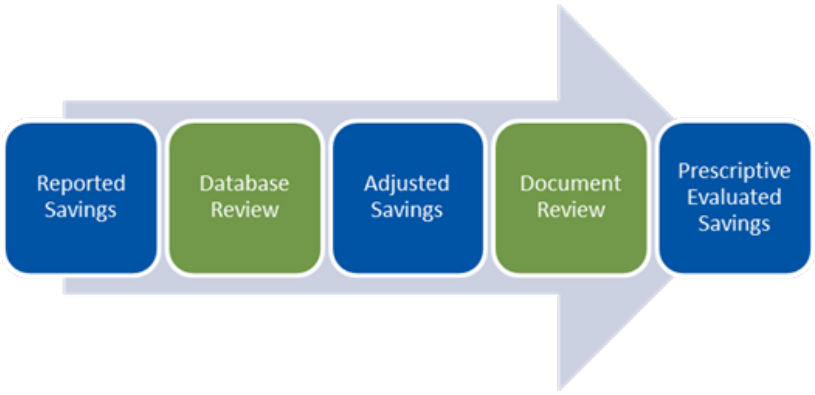
- Database review
- Document review
- Billing analysis

First, Cadmus calculated adjusted savings for each program based on results of a database review. For the HVAC, Shell, and Fuel Efficiency programs, Cadmus also applied realization rates for the document

[2] With approval from Avista, Cadmus ceased performing a fourth impact activity—verification surveys—in Q3 PY 2018; this eliminated redundancy between verification surveys and document reviews.

reviews. For these programs, the team calculated prescriptive evaluated savings by multiplying adjusted savings by the document review realization rate, as shown in Figure 1.

Figure 1. Residential Impact Process



To provide the most rigorous evaluation method where practical, Cadmus analyzed consumption data for all available participants of the HVAC, Shell, Fuel Efficiency, and MFDI programs. As described in more detail in the *Billing Analysis* section, the team applied billing analysis results to determine evaluated savings only for measures where savings could be isolated (that is, where a sufficient number of participants could be identified who installed only that measure) and where confidence and precision met specific targets. Program-level realization rates for the HVAC, Shell, and Fuel Efficiency programs incorporate billing analysis results for some measures.

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 a review of all projects, Cadmus 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. The team then multiplied this realization rate by adjusted savings for the entire program to determine prescriptive evaluated savings for PY 2019.

Cadmus conducted document reviews for the programs shown in Table 15, drawing roughly equal samples from participants in each quarter.

Table 15. Residential Electric Impact Document Review

Program	Completed through Q2 PY 2019
HVAC	51
Shell	51

Billing Analysis

For the Residential sector, Cadmus conducted billing analysis using available electricity and natural gas consumption data from Avista for the HVAC, Shell, Fuel Efficiency, and MFDI programs. Evaluating Simple Steps, Smart Savings program savings through billing analysis was not practical because participants of the midstream retail program were largely unknown. The ENERGY STAR Homes program had too few participants to produce meaningful billing analysis results.

HVAC, Shell, and Fuel Efficiency Savings Estimates

With the HVAC, Shell, and Fuel Efficiency programs, Cadmus eliminated the effects of multiple energy efficiency measures by only including participants in the analysis who installed one measure. With these programs, the goal was to provide average unit savings values at the measure level to ensure the most accurate values possible were used for evaluated savings and cost-effectiveness.

Cadmus used the unit savings value provided by the billing analysis for a given measure when results for that measure met two requirements: the number of sites in the participant group was at least five, and the relative precision achieved was no greater than ±40% at the 90% confidence level. If results calculated using only Idaho participants met these requirements, the team used those results. If results based only on Idaho participants failed to meet the requirements, Cadmus used combined results for Idaho and Washington if those results passed. If no billing analysis results passed for a given measure, Cadmus applied the results of database review and document review to determine evaluated savings.

Data Sources

To conduct the consumption analysis, Cadmus used program measure tracking data provided by Avista, monthly electric and gas consumption data provided by Avista, and weather data (which included actual average daily temperatures for 13 weather stations in Idaho and Washington from the National Oceanic and Atmospheric Administration) for the billing analysis period. The team used zip codes to match daily heating and cooling degree days to respective monthly bill read dates. Additionally, Cadmus used typical meteorological year (TMY3) 15-year normal weather values from 1991–2005, obtained from National Oceanic and Atmospheric Administration for the same weather stations, in assessing energy use under normal weather conditions.

Participant and Comparison Group Designation

Cadmus gathered data for a participant (treatment) group comprising all HVAC, Shell, and Fuel Efficiency program participants with measures installed in 2018. This allowed for enough pre- and post-consumption data to analyze the various measures' effects.

To isolate the impact of exogenous factors (such as energy rate changes, economic condition changes, and non-programmatic effects) on energy use, Cadmus utilized a quasi-experimental[3] design that involved selection of a comparison group, composed of participants with installation dates in late PY 2019. Through this approach, the team compared the treatment group's pre- and post-change energy use (assumed to capture the program treatment) to the comparison group's change in energy use (reflecting what would have happened absent the program). To ensure similarity between treatment and control groups, the team chose to use future participants as the comparison group because they would have similar qualifications and could be assumed to have not participated in energy efficiency programs prior to program treatment.

Data Screening

Starting with all HVAC, Shell, and Fuel Efficiency participants and the comparison group, Cadmus cleaned the data and screened for several criteria to identify final analysis samples. Data cleaning included performing account-level reviews of the pre- and post-period monthly consumption of all individual participants to identify anomalies (such as periods of unoccupied units) that could bias the results. Cadmus conducted the consumption analysis using participants who had not moved since participating and who had at least 10 months of pre- and post-period billing data.

Cadmus applied several screens to remove anomalies, incomplete records, and outlier accounts. The following are examples of accounts excluded from the analyses:

- Accounts missing records, prohibiting the team from merging participant program tracking data with consumption data.
- Accounts with low annual use in the pre- or post-period, such as less than 1,240 kWh annually.
- Customers with incorrect signs on Princeton Scorekeeping Method (PRISM) parameter estimates.
- Accounts with other extreme values, including vacancies in billing data (outliers), non-program-related heating or cooling system changes (such as added or removed heating or cooling loads), baseload equipment changes, or changes in occupancy. This included screening for accounts with large gaps in interval data, such as having zero consumption across multiple months.

Analysis

To estimate measure-level impacts, Cadmus employed a pre- and post-installation savings analysis using household-level PRISM models that accounted for differences in pre- and post-installation weather conditions. The team estimated the heating and cooling PRISM model using variable 45°F to 85°F heating and cooling bases in both the pre- and post-period for each customer.

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[3] A quasi-experimental design is when treatment and control groups are not randomized prior to treatment. In this case, the comparison group was created after the treatment had occurred and participants self-selected the treatment.

Multifamily Direct Install

With the MFDI program, isolating individual measures was not possible, because most living units received a range of LED light bulbs as well as water saving measures such as aerators and showerheads. To provide an accurate estimate of the energy savings for the program a whole, Cadmus performed a complex and rigorous evaluation involving matching tracking data with billing data at the account level.

Cadmus estimated weather-normalized facility level usage. There were two main components of usage that were combined to develop the pre- and post-facility level usage estimates: unit-level usages and common area usages.

Cadmus referenced the same data sources for MFDI consumption analysis as those identified for HVAC, Shell, and Fuel Efficiency analyses (see *Data Sources* section above) as well as the participant and comparison group approach to isolate the impact of exogenous factors (see *Participant and Comparison Group Designation*). Additionally, Cadmus cleaned the data to remove anomalies, incomplete records, and outlier accounts (see *Data Screening*).

Analysis

To estimate program impacts, Cadmus employed a pre- and post-installation savings analysis using household-level PRISM models that account for differences in pre- and post- installation weather conditions.

Cadmus estimated the heating and cooling PRISM model using variable 45°F to 85°F heating and cooling bases in both the pre- and post-period for each MFDI unit and common area account. Because some units in a facility could not be matched to billing data or did not pass the screening process, the team found it necessary to extrapolate the available weather normalized pre- and post-period unit level PRISM usages to the facility level for all units. For each facility, the number of units in the facility was known. To obtain the final unit level component, Cadmus calculated the average pre-period usage, post-period usage, and savings per unit. Cadmus then multiplied those per-unit values by the number of units in the facility to obtain the total unit component facility usages, savings, and *ex ante* estimates. If the facility also had a common area component, Cadmus added usage for that area to the facility level unit usage component to develop the final total facility usage.

Cadmus then applied weighting to calculate the final program savings estimate. A facility with 100 units has more weight than a facility with 10 units. The final savings estimates and *ex ante* estimates were weighted by the number of units.

The MFDI Idaho participant group showed a reliable relative precision estimate of ±17% at the 90% confidence level for the 34 facilities included in the analysis and savings of 5.8%. The comparison group had only four facilities and showed a reduction in usage of 1.2%; however, with very high relative precision estimate of ±303%. This large confidence band around the comparison group shows that the change in usage was not significantly different than zero (that is, a savings increase was within the error bound), so a comparison group adjustment was not applied.

Residential Impact Evaluation Results

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

Database Review

Table 16 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. The larger adjusted savings for the HVAC, ENERGY STAR Homes, and Shell programs resulted partly from some instances where the tracking data reported zero energy savings, despite the records showing the projects were complete and rebates were paid. For the MFDI program, adjustments included applying RTF UES values for multifamily direct-install aerators that were lower than the older values used by the implementer. The discrepancy with MFDI Supplemental Lighting resulted mostly from the omission of heating interactive effects for measures in common areas indicated as heated.

Table 16. Residential Database Review Electric Impact Findings

Program	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Percentage Change
Simple Steps, Smart Savings	3,879,137	3,879,137	0%
HVAC	659,957	684,425	4%
Shell	190,390	216,838	14%
ENERGY STAR Homes	66,262	69,615	5%
Multifamily Direct Install	1,289,539	1,258,897	-2%
Multifamily Direct Install Supplemental Lighting	340,719	332,718	-2%
Residential Total	**6,426,003**	**6,441,629**	**0%**

Note: totals may not sum due to rounding.

Document Review

Table 17 summarizes document review findings. The HVAC program had a 100% electric realization rate, and the Shell program had an 90% electric realization rate.

Table 17. Residential Electric Impact Document Review Realization Rates

Program	Document Audit Count	Sample Reported Savings (kWh)	Sample Evaluated Savings (kWh)	Document Review Realization Rate
HVAC	51	50,106	48,800	97%
Shell	51	73,925	64,268	87%

Cadmus' document review (through Q2 PY 2019) identified the following discrepancies:

- For four window measures, documentation showed a square footage for installed windows that differed from the reported window area. In three cases, the documented window area was lower than the reported area and resulted in lower evaluated savings. In one case, the

documented window area was more than that reported and resulted in higher evaluated savings based on the corrected area.

- For four window measures reported for 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 liquid propane as the heating fuel for one site and wood pellets as the fuel for the other; consequently, Cadmus removed electricity savings for these sites.
- One PY 2018 heat pump water-heater measure had a tank capacity of 80 gallons, per the documentation. However, conditions for the rebate required a tank size below 55 gallons in PY 2018; consequently, Cadmus removed savings for this measure.

Billing Analysis

Table 18 shows measure-level billing analysis results, used when calculating evaluated electric energy savings. The participant count and relative precision for each measure easily met requirements established to ensure meaningful results, which required a participant count of at least five and a relative precision no greater than ±40% at the 90% confidence level.

Table 18. Residential Programs Billing Analysis Results

Measure	2019 Avista TRM UES (kWh)	n[a]	Pre-Installation Weather Normalized Usage (kWh)	Annual UES (kWh)	Realization Rate	Relative Precision at 90% Confidence	Participant State
E Variable Speed Motor[b]	414.00	195	12,251	1,528.63	369%	30%	Idaho
E Storm Window with Electric Heat	10.30	15,876	17,543	11.00	107%	26%	Idaho and Washington
E Window Replc from Single Pane W Electric Heat[b]	15.25	15,876	17,543	11.00	72%	26%	Idaho and Washington

[a] To provide unit savings values that align with TRM units, this table presents participant count in sq. ft. of window surface for storm widow and replacement window measures.

[b] Results shown represent combined analysis of storm window and window-replacement measures, to maximize relative precision. Separate results for each measure appeared similar.

Billing analysis results showed surprisingly high savings for the E Variable Speed Motor measure, with a realization rate of 369% relative to the 2019 Avista TRM UES value of 414 kWh. These participants generally also replaced an existing gas furnace with a high-efficiency model (via the G Natural Gas Furnace measure). The high electric energy savings appears to have resulted at least partly from a shift in some homes away from secondary electric heating, such as portable electric heaters or electric wall heaters, after installing the new gas furnace. Specifically, 66 of 159 participants in Idaho increased natural gas usage after installing the high-efficiency furnace with variable speed fan motor, and they sharply reduced electricity consumption. This pattern was not strong enough to suggest that the primary

heating system had changed from some other fuel to natural gas, but it did suggest that the high-efficiency furnace prompted participants to move away from secondary heating with electricity.

Billing analysis provided relatively low electric energy savings for replacement windows relative to the 2019 TRM value of 15.25 kWh per square foot of window area, resulting in a realization rate of 72%. To provide participant counts high enough to support statistically significant estimates, Cadmus combined participants for the storm window and replacement window measures. Because billing analysis results for only Idaho failed to meet the ±40% precision requirement, Cadmus based evaluated Idaho savings on the combined results for Idaho and Washington participants. Note that in PY 2019, only one Idaho project reported savings through the storm window measure, claiming savings for 150 square feet of installed storm window, the realization rate for that measure has little impact on program savings.

Billing analysis for the MFDI program showed strong electric energy savings for the program as a whole. As noted previously in

Residential Impact Evaluation Methodology, isolating the impact of individual measures was not possible for MFDI because most living units received a range of LED light bulbs as well as water saving measures such as aerators and showerheads. To provide an accurate estimate of the energy savings for the program as a whole, Cadmus performed a complex and rigorous evaluation involving 1,549 living units in 34 apartment buildings and complexes. The analysis yielded a realization rate of 96% for electric energy savings in Idaho, with a relative precision of ±17% at a 90% confidence level. The billing analysis did not evaluate savings from the MFDI Supplemental Lighting program.

Evaluated Savings

To calculate evaluated savings, Cadmus used unit savings values determined through billing analysis for the measures shown in Table 18. For the remaining measures, Cadmus applied the results of database review and, where applicable, document review to evaluate savings for each measure. The analysis then rolled up measure-level evaluated savings to calculate evaluated savings and a realization rate for each program. Table 19 shows the resulting evaluated savings and realization rates.

Table 19. Residential Electric Impact Findings

Program	Reported Electric Savings (kWh)	Evaluated Electric Savings (kWh)[a]	Realization Rates
Simple Steps, Smart Savings	3,879,137	3,879,137	100%
HVAC	659,957	1,335,085	202%
Shell	190,390	160,507	84%
ENERGY STAR Homes	66,262	69,615	105%
Multifamily Direct Install	1,289,539	1,258,897	98%
Multifamily Direct Install Supplemental Lighting	340,719	332,718	98%
Residential Total	**6,426,003**	**7,035,960**	109%

Note: totals may not sum due to rounding.

Residential Conclusions and Recommendations

Evaluated electricity savings show a realization rate of 109% on evaluated savings of 7,036 MWh for the Residential programs, which is 156% of the savings goal for the year. The high percentage of achieved savings relative to the goal results from program participation that was 134% of goal and the strong overall realization rate for the Residential sector.

Lighting measures accounted for 73% of the total Residential sector savings. The following shows the percentage of residential evaluated savings provided by each program:

- The Simple Steps, Smart Savings program provided 55% of Residential evaluated savings, mostly through lighting measures.
- The MFDI and MFDI Supplemental Lighting programs provided 23% of evaluated savings, again mostly through lighting measures.
- The Residential HVAC program accounted for 19% of evaluated savings.
- The Shell and ENERGY STAR Homes programs accounted for a combined 3% of residential evaluated savings.

Realization rates varied by program from 84% for the Shell program to 202% for the HVAC program, resulting in a strong overall realization rate of 109% for PY 2019. Cadmus identified few discrepancies through document review, which found that the great majority of projects were well documented and met program requirements.

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

- Based on billing analysis conducted for this evaluation, adjust the Avista TRM to provide higher savings values for variable-speed motors installed with the G Natural Gas Furnace measure and lower savings for replacement windows in electrically heated homes. The billing analysis showed savings for the variable-speed motor measure nearly four times the Avista TRM value on average, seemingly due to a shift away from secondary electric heating (such as portable heaters or wall heaters) in some homes after replacing a gas furnace with a high-efficiency model. For replacement windows in electrically heated homes, the billing analysis estimated unit savings of 72% the 2019 TRM value.
- The MFDI program has proven to be an efficient, effective mechanism for installing high-efficiency lighting and aerators in multifamily units. Continue to focus on replacing high-use, low-efficiency lamps where practical, to maximize program cost-effectiveness while maintaining high savings.
- Ensure that reported savings for all measures are calculated using current TRM or RTF UES values, and that the TRM provides values for all measures. Cadmus noted no large-scale problems with the PY 2019 measure tracking data but did note numerous measure-tracking records that reported zero savings, despite appearing to have been completed and a rebate having been issued. In addition, some instances of PY 2019 measures used UES values from the 2018 TRM, and reported values for some measures (most notably, smart thermostats) did not match TRM values.

Low-Income Impact Evaluation

Cadmus designed the Low-Income program impact evaluation to verify reported program participation and energy savings. Evaluation methods included database review and billing analysis.

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's residential customers in Idaho whose income falls between 175% and 250% of federal poverty level. For PY 2019, the program achieved 234,102 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 2019, as well as reported savings and goal portions achieved in PY 2019.

Table 20. Low-Income Reported Savings

Program	Savings Goals (kWh)	Reported Savings (kWh)[a]	Percentage of Goal
Low-Income	148,972	234,102	157%

[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 2019.

Table 21. Low-Income Participation[a]

Program	Participation Goals	Participation Reported	Percentage of Goal
Low-Income	24,834	39,758	160%

[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.

Low-Income Impact Evaluation Methodology

Cadmus evaluated Low-Income program measures by conducting a database review (described in the *Database Review* section) and billing analysis. The team 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*.

For many measures reported in the tracking database, notes indicated that savings were capped at 20% of consumption. When duplicating savings calculations using TRM values, Cadmus used the newly calculated value if it was less than the capped value, but used the capped value where the TRM value indicated greater savings.

Cadmus conducted billing analysis for the Low-Income program using all electricity consumption data available from Avista for PY 2018 and PY 2019 program participants. Because of the relatively small number of Low-Income program participants, Cadmus was unable to isolate measure-level savings for the program (which are necessary for cost effectiveness calculations). In addition, realization rates for Idaho participants showed enough variation that billing analysis results did not meet the required confidence and precision threshold, either for Idaho participants or for Idaho and Washington participants combined.

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)	Evaluated Electric Savings (kWh)	Realization Rate
Low-Income	234,102	232,126	232,126	99%

During the database and TRM review, Cadmus noted a number of errors or challenges with the measure tracking data. For example, although the 2019 Avista TRM moved to providing a savings value per square foot of living space for air sealing, many instances of air sealing in the tracking data used the previous TRM value and did not include the area of the home. Some instances of some measures reported low or high electric savings values. The errors largely offset one another at the program level, as shown by the program's 99% realization rate.

Low-Income Conclusions and Recommendations

With a realization rate of 99% for electricity savings, the Low-Income program achieved savings of 232,126 kWh in PY 2019, or 156% of goal. Reported program participation reached 160% of the expected value. Roughly 26% of evaluated Low-Income program savings resulted from LED bulbs given out at events.

For many instances of measures in the Low-Income tracking data, notes indicated that savings were capped at 20% of consumption. The tracking data did not include adequate information to determine when savings values are appropriately capped. Cadmus recommends providing annual consumption for each measure in the tracking data, if practical, so that the evaluation can verify savings were capped at 20% of consumption for applicable measures.

Fuel Efficiency Impact Evaluation

Cadmus designed the Fuel Efficiency sector impact evaluation to verify reported program participation and energy savings. Evaluation methods included a database review, document review, and billing analysis.

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 (which includes HVAC Combined, refrigerator case doors, industrial process, and Multifamily Market Transformation measures), Residential programs, and Low-Income programs. Across these programs, Avista reported electric energy savings of 1,494,614 kWh for 161 Fuel Efficiency measures.

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 and reported the negative natural gas consumption impacts in the *PY 2019 Idaho Natural Gas Impact Evaluation Report*.

Program Participation Summary

This section summarizes Fuel Efficiency sector participation and progress toward PY 2019 goals for the Nonresidential Site Specific path, Residential programs, and Low-Income programs.

Table 23 shows savings goals, reported savings, and percentage of goal for Nonresidential Site Specific, Multifamily Market Transformation, Residential, and Low-Income Fuel Efficiency measures. Avista did not set savings goals for the Site Specific Fuel Efficiency measures outside of the Multifamily Market Transformation program.

Table 23. Avista Portfolio Fuel Efficiency Reported Electric Savings

Program	Savings Goals (kWh)	Reported Savings (kWh)	Percentage of Goal
Multifamily Market Transformation	234,960	300,230	128%
Residential Fuel Efficiency	1,002,795	1,156,576	115%
Low-Income Fuel Efficiency	101,640	37,808	37%

Table 24 shows Avista's PY 2019 participation goals and reported participation for Multifamily Market Transformation, Residential, and Low-Income Fuel Efficiency measures. Avista did not set participation goals for Site Specific Fuel Efficiency measures outside of the Multifamily Market Transformation program. There were four Multifamily Market Transformation program participants and no Nonresidential Site Specific participants in PY 2019.

Table 24. Avista Portfolio Fuel Efficiency Reported Participation

Fuel Efficiency Measure	Participation Goals[a]	Participation Reported[a]	Percentage of Goal
Multifamily Market Transformation	40	4	10%
Residential Fuel Efficiency	141	143	101%
Low-Income Fuel Efficiency	30	13	43%

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

Fuel Efficiency Impact Evaluation Methodology

The impact methodology for Fuel Efficiency measures is outlined below for the Nonresidential Site Specific path, Residential 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. The team randomly sampled one Multifamily Market Transformation program project in Washington for the evaluation of the Nonresidential Fuel Efficiency measures. Cadmus did not evaluate the single Nonresidential Site Specific Combined HVAC application in the Idaho Fuel Efficiency program; however, the team evaluated two applications with the same measure category in the electric and gas Site Specific programs and found realization rates of 100% on those two projects. Verification site visits involved verifying installed equipment type, make and model numbers, operating schedules, and set points.

Residential Fuel Efficiency Impact Methodology

Cadmus applied billing analysis results to evaluate electric consumption impacts for all Residential Fuel Efficiency measures using the methodology described previously in *Billing Analysis*. Cadmus also completed database review of all PY 2019 reported Residential Fuel Efficiency savings as well as document reviews for 50 Fuel Efficiency participants from Q1 PY 2018 through Q2 PY 2019.

Low-Income Fuel Efficiency Impact Methodology

To evaluate electric consumption impacts for the Low-Income Fuel Efficiency measures, Cadmus conducted a database review (described above in the *Database Review* section) and billing analysis. The relatively low number of participants for the Low-Income program made it impractical for the billing analysis to isolate consumption impacts for specific measures. Using unit savings values provided in the TRM, Cadmus calculated electric consumption impacts for measures reported in the measure-tracking database. For Low-Income program measures in general (including Low-Income Fuel Efficiency measures), the evaluation relied on results from the database review to determine evaluated electric energy consumption impacts.

Fuel Efficiency Impact Evaluation Results

The following sections summarize findings for the Nonresidential Site Specific path, Residential 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. The team also report these negative savings in the *PY 2019 Idaho Natural Gas Impact Evaluation Report*.

Nonresidential Fuel Efficiency Impact Findings

Table 25 shows reported and evaluated electric energy savings for Avista's Nonresidential Fuel Efficiency measures, along with realization rates, through PY 2019.

Table 25. Nonresidential Fuel Efficiency Electric Impact Findings

Fuel Efficiency Measure	Reported Savings (kWh)	Evaluated Savings (kWh)	Realization Rate
Multifamily Market Transformation	300,230	300,230	100%
Total	**300,230**	**300,230**	**100%**

Cadmus did not identify any discrepancies affecting electric savings in the randomly sampled Multifamily Market Transformation program application based on the evaluation site visit and project documentation review.

Residential Fuel Efficiency Impact Findings

Table 26 shows measure-level billing analysis results used when calculating PY 2019 electric consumption impacts. The participant count and relative precision for each measure easily met requirements established to ensure meaningful results, which required a participant count of at least five and relative precision no greater than ±40% at the 90% confidence level. The billing analysis found the electric energy savings to be higher than predicted by the 2019 Avista TRM values for all but the wall heater measure. Realization rates relative to 2019 TRM values ranged from 63% for the wall heater measure to a high of 178%.

Table 26. Residential Fuel Efficiency Analysis Results

Measure	2019 Avista TRM Unit Energy Savings (kWh)	n[a]	Pre-Installation Weather Normalized Usage (kWh)	Annual Unit Energy Savings (kWh)	Realization Rate	Relative Precision at 90% Confidence	Participant State
E Electric To Natural Gas Furnace	6,104	39	19,054	7,384	121%	16%	Idaho
E Electric To Natural Gas Furnace & Water Heat	8,513	35	19,284	9,789	115%	12%	Idaho
E Electric To Natural Gas Wall Heater[a]	10,624	9	17,597	6,745	63%	30%	Idaho
E Multifamily Electric to Natural Gas Furnace and Water Heat	4,566	21	12,259	8,133	178%	13%	Idaho and Washington

[a] The 2019 Avista TRM does not include the E Electric to Natural Gas Wall Heater measure. The TRM value shown is taken from the 2018 Avista TRM.

Table 27 shows reported, adjusted, and evaluated electric energy savings for the Residential Fuel Efficiency measures. Based on the measure-level billing analysis results listed in Table 26, Cadmus calculated a 102% realization rate for evaluated electric energy savings for the Residential Fuel Efficiency path.

Table 27. Residential Fuel Efficiency Electric Impact Findings

Fuel Efficiency Measure	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Evaluated Electric Savings (kWh)	Realization Rate
Residential Fuel Efficiency	1,156,576	1,010,460	1,181,596	102%

Database review of Residential Fuel Efficiency measures resulted in roughly a 12% reduction in adjusted savings, primarily because reported savings in some instances used a higher UES value than the 2019 TRM value. Because billing analysis produced valid estimates for all Residential Fuel Efficiency measures, adjusted savings had no effect on evaluated savings.

In reviewing documentation for 50 Residential Fuel Efficiency measures, Cadmus found issues with two conversions to gas furnaces: documentation for each site indicated that the furnace replaced an oil-fired heating system. The team eliminated electricity savings for the natural gas furnaces, given that the replaced system did not use electric heating. These adjustments led to a document review realization rate of 97%, but Cadmus did not apply document review results to estimate evaluated savings because billing analysis produced valid estimates for all Residential Fuel Efficiency measures.

Low-Income Fuel Efficiency Impact Findings

Table 28 shows reported and adjusted electric energy savings for Low-Income Fuel Efficiency measures.

Table 28. Low-Income Fuel Efficiency Program Electric Impact Findings

Fuel Efficiency Measure	Reported Electric Savings (kWh)	Adjusted Electric Savings (kWh)	Evaluated Electric Savings (kWh)	Realization Rate
Low-Income Fuel Efficiency	37,808	37,808	37,808	100%

Cadmus found no discrepancies between reported and TRM UES values for electric energy savings with Low-Income Fuel Efficiency measures, leading to a realization rate of 100% for electric energy savings.

The billing analysis estimated a realization rate of 144% for Low-Income Fuel Efficiency electric savings, with a relative precision of ±27% at the 90% confidence level. Participation was not high enough to estimate savings at the measure level, which is necessary for calculating cost-effectiveness, but the results do indicate greater electric savings for Low-Income Fuel Efficiency measures as a whole than indicated by 2019 Avista TRM values. This finding also supports the natural gas billing analysis finding that the natural gas penalties for Low-Income Fuel Efficiency measures are much higher than estimated by the 2019 Avista TRM (see *PY 2019 Idaho Natural Gas Impact Evaluation Report*). Together, the electric and natural gas billing analysis results suggest a much greater heating load than indicated by TRM values, which is evident as the heating load shifts from electricity to natural gas.

Fuel Efficiency Conclusions and Recommendations

Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency measures achieved evaluated savings of 300,230 kWh, yielding a 100% realization rate. The Multifamily Market Transformation Fuel Efficiency measures achieved 128% of the electric energy savings goal of 234,960 kWh.

Residential Fuel Efficiency measures achieved evaluated savings of 1,181,596 kWh, yielding a 102% realization rate and achieving 118% of savings goal. Cadmus recommends that Avista update TRM values to match measure-level UES values calculated by the billing analysis. Cadmus also recommends that Avista ensure all measures are represented in the TRM.

For Low-Income Fuel Efficiency measures, evaluated savings were 37,808, with a realization rate of 100%, but fell short of Avista's savings goals, achieving 37% of the savings target and 43% of the participation target. Billing analysis indicated that program electric savings are likely higher, based on the billing analysis realization rate of 144% for Low-Income Fuel Efficiency measures as a whole. Based on this finding, Cadmus recommends increasing the Avista TRM UES values.

APPENDIX B – 2019 IDAHO NATURAL GAS IMPACT EVALUATION REPORT

CADMUS

PY 2019 Idaho Natural Gas Impact Evaluation Report

May 29, 2020

Prepared for:

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1411 East Mission Avenue
Spokane, WA 99202

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Portfolio Executive Summary

For several decades, Avista Corporation has administered demand-side management programs to reduce the electricity and natural gas energy use of its portfolio of customers. Avista contracted with Cadmus to complete process and impact evaluations of its program year (PY) 2018 and PY 2019 natural gas demand-side management programs in Idaho. This report presents Cadmus' natural gas impact evaluation findings for PY 2019. Cadmus did not apply net-to-gross adjustments to savings values, except in cases where deemed energy savings values already incorporated 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 2019 Natural Gas Program Evaluation Activities

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

Summary of Impact Evaluation Results

The Idaho portfolio achieved a 78% realization rate and acquired 216,962 therms in annual gross savings (Table 2). Cadmus calculated Avista's reported savings through database extracts from its Customer Care and Billing (Residential) and InforCRM (Nonresidential) databases and from data provided by third-party implementers.

Table 2. PY 2019 Reported and Gross Evaluated Natural Gas Savings

Sector	Reported Savings (therms)	Gross Evaluated Savings (therms)	Realization Rate
Nonresidential	36,965	33,271	90%
Residential	238,129	179,759	75%
Low-Income	3,828	3,932	103%
Total	**278,922**	**216,962**	**78%**

Conclusions and Recommendations

During the course of the PY 2019 evaluation, Cadmus identified several areas for improvement, outlined below by sector.

Nonresidential Conclusions and Recommendations

The Nonresidential sector achieved total evaluated natural gas energy savings of 33,271 therms in PY 2019, with a realization rate of 90%. The Nonresidential sector fell short of the combined Prescriptive and Site Specific program paths' natural gas savings goal of 76,944 therms by 43%.

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 from site contacts for these calculator inputs differed significantly from the calculator default values. The team also recommend adjusting future rebate application forms to ask for site-specific hours of use and load estimates. Cadmus will review the Regional Technical Forum's (RTF's) 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

Evaluated natural gas savings show a realization rate of 75% on savings of 179,759 therms for Residential programs, which is 82% of the savings goal for the year.

The HVAC program accounts for most evaluated Residential natural gas savings, 88%, followed by the Shell program with 10% of natural gas savings. The Simple Steps, Smart Savings; Multifamily Direct Install; and ENERGY STAR Homes programs account for a combined 2% of savings, primarily through water-saving measures.

Billing analysis results for natural gas furnace measures served as the biggest driver of the 75% realization rate for Residential savings, providing a measure-level realization rate of 69%. The Avista Technical Resource Manual (TRM) unit savings value of 102 therms appears to be based on a 2011 billing analysis of natural gas upgrades, which showed higher natural gas savings largely because roughly 10% of participants in the treatment group installed heat pumps along with a more efficient natural gas furnace; participants who installed a heat pump along with a furnace upgrade showed a sharp reduction natural gas usage, indicating that some heating load shifted to the heat pump. For PY 2019, Cadmus did not identify any participants who installed both a high-efficiency natural gas furnace and a heat pump. Billing analysis also found lower natural gas savings for storm windows and replacement windows than estimated by 2019 TRM values.

Cadmus offers three recommendations for Avista's Residential natural gas programs:

- Adjust the Avista TRM to provide lower savings values for natural gas furnaces, replacement windows, and storm windows, based on the billing analysis conducted for this evaluation. The

billing analysis unit energy savings of 71 therms for the G Natural Gas Furnace measure and 0.37 therms per square foot for G Storm Windows with Natural Gas Heat and G Window Replc with Natural Gas Heat appear to provide more accurate estimates of savings than the current TRM values.

- Continue to encourage installations of high-efficiency natural gas furnaces, which provided 65% of evaluated natural gas savings for Residential programs. The Northwest Energy Efficiency Alliance's Residential Building Stock Analysis II estimated that roughly 50% of natural gas furnaces in Idaho single-family homes have an annual fuel utilization efficiency under 90%, indicating substantial savings opportunities remain.
- Continue to emphasize installation of smart thermostats, which accounted for 12% of PY 2019 Residential natural gas savings. Billing analysis showed smart thermostats have a 104% realization rate with natural gas heating equipment.

Fuel Efficiency Conclusions and Recommendations

Nonresidential Site Specific Multifamily Market Transformation Fuel Efficiency measures achieved evaluated natural gas penalties of 16,813 therms, yielding an 99% realization rate.

Residential Fuel Efficiency measures achieved evaluated natural gas penalties of 70,331 therms, yielding a 141% realization rate. Low-Income Fuel Efficiency measures contributed natural gas penalties of 1,535 therms, with a realization rate of 97%.

Residential natural gas measures more than offset the natural gas penalty of Residential Fuel Efficiency measures, with evaluated natural gas savings of 179,759 therms. Similarly, Low-Income natural gas measures also more than offset the Low-Income Fuel Efficiency natural gas penalties, with evaluated savings of 3,932 therms.

Cadmus recommends that Avista adjust reported natural gas penalties on all Residential Fuel Efficiency measures to match values determined through the billing analysis conducted for this evaluation, which appear to provide a more accurate estimate of savings than the 2019 TRM values. Based on billing analysis results for the Low-Income Fuel Efficiency measures as a whole, Cadmus also recommends adjusting reported natural gas penalties for those measures.

Nonresidential Impact Evaluation

Through its Nonresidential program portfolio, Avista promotes purchases of high-efficiency equipment for commercial and industrial utility customers. By providing rebates, Avista partially offsets cost differences between high-efficiency and standard equipment. Cadmus conducted Nonresidential impact evaluation activities to determine program year (PY) 2019 evaluated savings for most programs; the team also conducted measurement and verification of Prescriptive and Site Specific projects across the full PY 2019 sample.

Program Summary

Avista completed and rebated 45 nonresidential natural gas projects in Idaho in PY 2019 and reported total natural gas energy savings of 36,965 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 serves smaller, straightforward equipment installations that generally include similar operating characteristics (such as simple HVAC systems, food service equipment, and envelope upgrades). The Site Specific program path serves more unique projects, requiring custom savings calculations and technical assistance from Avista's account executives (such as compressed air, process equipment and controls, and comprehensive HVAC retrofits).

Multifamily Market Transformation measures involve a combination of electric savings and natural gas penalties. Typically, these measures include replacing electric space-heating or water-heating systems with natural gas equipment. The *Fuel Efficiency Impact Evaluation* section provides a discussion of the evaluation methodology and the results for Multifamily Market Transformation measures.

Program Participation Summary

This section summarizes Nonresidential sector participation and progress toward PY 2019 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 2019, as well as reported savings and a comparison between reported savings and goals.

Table 3. Nonresidential Prescriptive Natural Gas Savings

Program Type	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
HVAC	26,221	11,257	43%
Shell	1,826	5,830	319%
Food Service Equipment	24,119	12,728	53%
Energy Smart Grocer[a]	8,134	0	0%
Total	**60,300**	**29,815**	**49%**

[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 2019 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	8,250
Shell	8,880
Food Service Equipment	45
Energy Smart Grocer	N/A

Table 5. Nonresidential Prescriptive Participation by Project

Program Type	Participation Reported[a]
HVAC	21
Shell	5
Food Service Equipment	17
Energy Smart Grocer	0
Total	**43**

[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 2019, as well as reported savings. 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

Program	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
Site Specific	16,644	7,150	43%

Evaluation Goals and Objectives

For the PY 2019 quarterly, semiannual, and annual reports, Cadmus conducted Nonresidential impact activities to determine evaluated savings for most programs.

Nonresidential Impact Evaluation Methodology

As the first step in evaluating PY 2019 savings for the Nonresidential sector, Cadmus explored the following documents and data records to gain an understanding of programs and measures slated for evaluation:

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

Based on the initial review, Cadmus checked the distribution of program contributions with the overall program portfolio. The review provided insight into the sources for unit energy savings (UES) claimed for each measure offered in the programs, along with sources for energy-savings algorithms, internal quality assurance, and quality control processes for large Nonresidential sector projects.

Following this review, Cadmus designed a sample strategy for impact evaluation activities, with Cadmus performing the following evaluation activities in two waves:

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

Sample Design

Cadmus created two sample waves for PY 2019. Sample 1 included program data from January 2019 through June 2019, and sample 2 included program data from July 2019 through December 2019. As a guideline, Cadmus used the proposed, overall PY 2019 Nonresidential sample sizes by subprogram in the measurement and verification plan, seeking to complete approximately half of the sample in each wave.

For each activity wave, Cadmus broke down submitted program applications by path and measure (such as Site Specific shell measure, Prescriptive HVAC), allowing the team to select the highest-savings applications in each category with certainty. For non-certainty applications, Cadmus assigned random numbers and developed a random sample. In some cases, the team sampled another application at the same location or facility previously selected (and where Cadmus could assess both applications with one

site visit). This was a cost-effective verification strategy even if the second application represented minimal claimed savings.

As Avista similarly implements its programs in both states, Cadmus sampled randomly selected sites across both Washington and Idaho. The team pooled results from the randomly selected sites to calculate a realization rate by stratum and applied that realization rate to projects in both states. The team applied evaluated savings for sites selected with certainty only to the state in which they had been implemented. Cadmus applied evaluated 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. Cadmus sampled seven Prescriptive applications at seven unique sites in Idaho. Of the sampled applications, the team selected two for certainty review based on the scale of savings, measure type, or location, and selected the remaining five applications randomly.

Table 7. Idaho Nonresidential Prescriptive Natural Gas Evaluation Sample

Program Type	Applications Sampled	Sampled Savings (therms)	Percentage of Reported Savings
HVAC	3	2,528	22%
Shell	1	3,920	67%
Food Service Equipment	3	3,030	24%
Nonresidential Prescriptive	**7**	**9,478**	**32%**

Note: totals may not sum due to rounding.

Table 8 summarizes the Idaho Nonresidential Site Specific program path natural gas evaluation sample. Cadmus sampled one Site Specific application at one unique site in Idaho. The sampled application was selected randomly.

Table 8. Idaho Nonresidential Site Specific Natural Gas Evaluation Sample

Program	Applications Sampled	Sampled Savings (therms)	Percentage of Reported Savings
Site Specific	1	6,724	94%

Document Review

Cadmus requested and reviewed project documentation for each sampled application and prepared measurement and verification 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 eight unique nonresidential locations in Idaho and Washington to assess natural gas energy savings for eight unique Prescriptive and Site Specific measures (not including Fuel

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

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 Prescriptive and Site Specific program paths' natural gas impact evaluation results for PY 2019.

Nonresidential Prescriptive Programs

Table 9 shows reported and evaluated natural gas energy savings for Avista's Nonresidential Prescriptive program path and the realization rates between evaluated and reported savings for PY 2019. The overall Nonresidential Prescriptive program path natural gas realization rate was 88%.

Table 9. Nonresidential Prescriptive Natural Gas Impact Findings

Program Type	Reported Savings (therms)	Evaluated Savings (therms)	Realization Rate
HVAC	11,257	11,483	102%
Shell	5,830	1,910	33%
Food Service Equipment	12,728	12,728	100%
Nonresidential Prescriptive	**29,815**	**26,120**	**88%**

Note: totals may not sum due to rounding.

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

Table 10. Nonresidential Prescriptive Evaluation Summary of Discrepancies

Project Type	Number of Occurrences	Savings Impact	Reason(s) for Discrepancy
Commercial HVAC	1	↑	• Cadmus determined from on-site inspection that a furnace reported as 80 kBtu/hr on the application was actually a 100 kBtu/hr unit. The installation verification (IV) report only contained a distant photo of the unit and did not show the nameplate or confirm the capacity.
Shell Measure	2	↓	• Avista reported incorrect savings values for a shell insulation project due to an error in its new database software. Cadmus reviewed all prescriptive shell measures to confirm that only one project was affected by the bug. The team treated the affected project as a certainty project and evaluated savings using the typical savings calculator methodology.

Nonresidential Site Specific Program

Table 11 shows reported and evaluated natural gas energy savings for Avista's PY 2019 Nonresidential Site Specific program path, as well as a comparison between evaluated and reported savings for PY 2019. The overall Site Specific program path natural gas realization rate was 100%. The table does not include reported and evaluated natural gas penalties for measures in the Fuel Efficiency path. Cadmus did not identify discrepancies in the evaluated application.

Table 11. Nonresidential Site Specific Natural Gas Impact Findings

Program	Reported Savings (therms)	Evaluated Savings (therms)	Realization Rate
Site Specific	7,150	7,150	100%

Nonresidential Conclusions and Recommendations

The Nonresidential sector achieved total evaluated natural gas energy savings of 33,271 therms in PY 2019 with a combined realization rate of 90%. The Nonresidential sector fell short of the combined Prescriptive and Site Specific program paths' natural gas savings goal of 76,944 therms by 43%.

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

- Provide more thorough documentation with Avista IV reports. Cadmus recommends that all IV reports include basic information explicitly stating the quantity and type of equipment found and include clear photos of equipment nameplates.

Residential Impact Evaluation

Cadmus designed the Residential sector impact evaluation to verify reported program participation and energy savings. The team used data collected and reported in the tracking database, online application forms, the Avista Technical Reference Manual (TRM) and RTF savings review, and applicable updated deemed savings values.

Program Summary

In PY 2019, Avista reported participation of 85,858 for the Residential natural gas program in Idaho, which resulted in reported natural gas savings of 238,129 therms. This did not include participation and savings from Fuel Efficiency measures. Participation was defined as installed pieces of equipment (such as a furnace or showerhead) for some measures and square feet of surface for others (such as wall insulation and replacement windows).

The Residential program path includes several programs:

- Simple Steps, Smart Savings, which encourages consumers to purchase and install high-efficiency lighting and showerheads.
- Residential HVAC, which offers incentives for high-efficiency heating and cooling equipment.
- Residential Shell, which provides rebates to encourage customers to install insulation and high-efficiency windows and storm windows.
- ENERGY STAR Homes, which offers 15% to 25% in energy savings relative to the state energy code.
- The Multifamily Direct Install (MFDI) program, which provides free direct-install measures to multifamily residences (five units or more) and common areas.
- MFDI Supplemental Lighting, which revisited multifamily properties served by the MFDI program to install additional common area lighting.

Program Participation Summary

This section summarizes Residential sector participation and progress toward PY 2019 goals for the Residential programs.

Residential Programs

Table 12 shows savings goals assigned to Avista's Residential sector programs for PY 2019, as well as reported savings and the goal portion achieved in PY 2019. All programs except Simple Steps, Smart Savings exceeded savings goals, based on reported savings, leading to an overall achievement of 109% for Residential programs.

Table 12. Residential Programs Reported Natural Gas Savings

Program	Savings Goals (therms)	Savings Reported (therms)	Percentage of Goal
Simple Steps, Smart Savings	6,273	44	1%
HVAC	199,183	208,904	105%
Shell	9,911	23,095	233%
ENERGY STAR Homes	67	471	703%
Multifamily Direct Install	3,480	5,615	161%
Multifamily Direct Install Supplemental Lighting	N/A	N/A	N/A
Residential Total	**218,914**	**238,129**	**109%**

Table 13 summarizes participation goals and reported participation in Avista's Residential programs for PY 2019, along with the percentage of goal achieved.

Table 13. Residential Programs Participation

Program	Participation Goals	Participation Reported	Percentage of Goal
Simple Steps, Smart Savings[a]	907	164	18%
HVAC[b]	2,066	2,700	131%
Shell[c]	66,934	81,850	122%
ENERGY STAR Homes[b]	1	4	400%
Multifamily Direct Install[d]	57	1,140	2000%
Multifamily Direct Install Supplemental Lighting	N/A	N/A	N/A
Residential Total	**69,965**	**85,858**	**123%**

[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.
[d] Participation is defined as number of living units that received measures.

Residential Impact Evaluation Methodology

To determine the Residential sector evaluated savings for PY 2019, Cadmus employed a combination of three impact evaluation methods:[2]

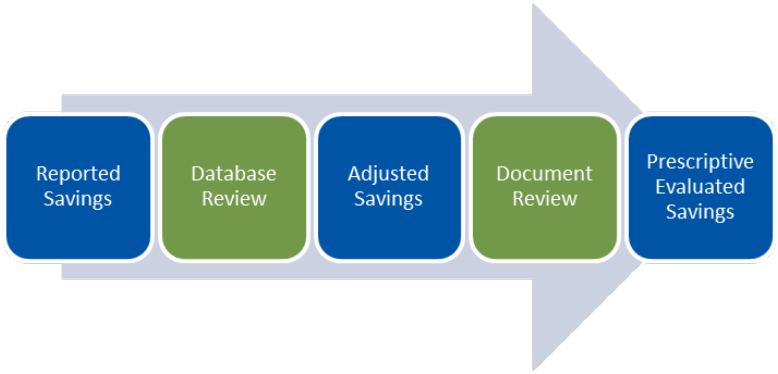
- Database review
- Document review
- Billing analysis

First, Cadmus calculated adjusted savings for each program, based on results of a database review. For the HVAC, Shell, and Fuel Efficiency programs, Cadmus also applied realization rates for the document

[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.

reviews. For these programs, Cadmus calculated prescriptive evaluated savings by multiplying adjusted savings by the document review realization rate, as shown in Figure 1.

Figure 1. Residential Impact Process



To provide, where practical, the most rigorous evaluation method, Cadmus analyzed consumption data for all available participants of the HVAC, Shell, and Fuel Efficiency programs. As described in more detail in the *Billing Analysis* section, the team applied billing analysis results to determine evaluated savings only for measures where savings could be isolated (that is, where a sufficient number of participants could be identified who installed only that measure) and where confidence and precision met specific targets. Program-level realization rates for the HVAC, Shell, and Fuel Efficiency programs incorporate billing analysis results for some measures.

Database Review

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

Document Review

To conduct 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 not matching the measure tracking database, and other discrepancies. Following the review of all projects, Cadmus 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. The team multiplied this realization rate by adjusted savings for the entire program to determine prescriptive evaluated savings for PY 2019.

Cadmus conducted 51 document reviews for the HVAC and Shell programs, drawing roughly equal samples from participants in each quarter. Based on the low variation in document review results, these sample sizes easily met the target of ±10% relative precision at 90% confidence established for this evaluation activity.

Billing Analysis

For the Residential sector, Cadmus conducted billing analysis using available natural gas and electricity consumption data from Avista for the HVAC, Shell, and Fuel Efficiency programs. Evaluating Simple Steps, Smart Savings program savings through billing analysis was not practical because participants of the midstream retail program were largely unknown. The ENERGY STAR homes program had too few participants to produce meaningful billing analysis results. With MFDI, Cadmus did not analyze natural gas consumption because it would have been impossible to separate lighting interactive effects from savings that resulted from installations of aerators and efficient showerheads.

HVAC, Shell, and Fuel Efficiency Savings Estimates

With the HVAC, Shell, and Fuel Efficiency programs, Cadmus eliminated the effects of multiple energy efficiency measures by including in the analysis only participants who installed one measure. With these programs, the goal was to provide average unit savings values at the measure level to ensure the most accurate values possible were used for evaluated savings and cost-effectiveness.

Cadmus used the unit savings value provided by the billing analysis for a given measure when results for that measure met two requirements: the number of sites in the participant group was at least five, and the relative precision achieved was no greater than ±40% at the 90% confidence level. If results calculated using only Idaho participants met these requirements, the team used those results. If results based only on Idaho participants failed to meet the requirements, Cadmus used combined results for Idaho and Washington if those results passed. If no billing analysis results passed for a given measure, Cadmus applied the results of database review and document review to determine evaluated savings.

Data Sources

To conduct the consumption analysis, Cadmus used program measure tracking data provided by Avista, monthly electric and gas consumption data provided by Avista, and weather data (which included actual average daily temperatures for 13 weather stations in Idaho and Washington from the National Oceanic and Atmospheric Administration) for the billing analysis period). The team used zip codes to match daily heating and cooling degree days to respective monthly bill read dates. Additionally, Cadmus used typical meteorological year (TMY3) 15-year normal weather values from 1991–2005, obtained from the National Oceanic and Atmospheric Administration for the same weather stations, in assessing energy use under normal weather conditions.

Participant and Comparison Group Designation

Cadmus gathered data for a participant (treatment) group, composed of all HVAC, Shell, and Fuel Efficiency program participants with measures installed in 2018. This allowed enough pre- and post-consumption data to analyze the various measures' effects.

To isolate the impact of exogenous factors (such as energy rate changes, economic condition changes, and non-programmatic effects) on energy use, Cadmus used a quasi-experimental design that involved selection of a comparison group, composed of participants with installation dates in late PY 2019. Through this approach, the team compared the treatment group's pre- and post-change energy use (assumed to capture the program treatment) to the comparison group's change in energy use (reflecting

what would have happened absent the program). To ensure similarity between treatment and control groups, the team chose to use future participants as the comparison group because they would have similar qualifications and could be assumed to have not participated in energy efficiency prior to program treatment.

Data Screening

Starting with all HVAC, Shell, and Fuel Efficiency participants and the comparison group, Cadmus cleaned the data and screened for several criteria to identify final analysis samples. Data cleaning included performing account-level reviews of the pre- and post-period monthly consumption of all individual participants to identify anomalies (such as periods of unoccupied units) that could bias the results. Cadmus conducted the consumption analysis using participants who had not moved since participating and who had at least 10 months of pre- and post-period billing data.

Cadmus applied several screens to remove anomalies, incomplete records, and outlier accounts. The following are examples of accounts excluded from the analyses:

- Accounts missing records, prohibiting the team from merging participant program tracking data with consumption data
- Accounts with low annual use in the pre- or post-period, such as less than 1,240 kWh annually
- Customers with incorrect signs on Princeton Scorekeeping Method (PRISM) parameter estimates
- Accounts with other extreme values, including vacancies in billing data (outliers), non-program-related heating or cooling system changes (such as added or removed heating or cooling loads), baseload equipment changes, or changes in occupancy. This included screening for accounts with large gaps in interval data, such as having zero consumption across multiple months.

Analysis

To estimate measure-level impacts, Cadmus employed a pre- and post-installation savings analysis using household-level PRISM models that accounted for differences in pre- and post-installation weather conditions. The team estimated the heating PRISM model using variable 45°F to 65°F heating bases in both the pre- and post-period for each customer.

Residential Impact Evaluation Results

The following sections summarize findings for each impact evaluation methodology and provide PY 2019 evaluated savings.

Database Review

Table 14 shows database review findings. Adjusted savings are slightly higher than reported savings for some programs and considerably lower for others. Adjusted savings differed from reported savings with ENERGY STAR Homes because the Avista TRM provides a value of zero therm savings for dual-fuel ENERGY STAR manufactured homes and because the tracking data used the higher 2018 TRM savings value for natural gas homes instead of the 2019 TRM value. For the MFDI program, Cadmus applied RTF

UES values for multifamily direct-install aerators that were much lower than the older values used by the implementer.

Table 14. Residential Programs Database Review Natural Gas Impact Findings

Program	Reported Savings (therms)	Adjusted Savings (therms)	Percentage Change
Simple Steps, Smart Savings	44	44	0%
HVAC	208,904	207,889	0%
Shell	23,095	23,103	0%
ENERGY STAR Homes	471	67	-86%
Multifamily Direct Install	5,615	4,296	-23%
Multifamily Direct Install Supplemental Lighting	0	0	N/A
Residential Total	**238,129**	**235,398**	**-1%**

Note: totals may not sum due to rounding.

Cadmus noted additional discrepancies between the measure-tracking data and TRM values, although these generally balanced each other out or had only a small effect on program-level adjusted savings. The following list shows a few examples of these discrepancies:

- Measure-tracking data reported various unit savings values for smart thermostats other than the 2019 TRM value of 26 therms.
- Some window replacement measures reported much lower savings values than provided in the 2018 and 2019 TRMs.
- All PY 2019 high-efficiency natural gas water heater measures reported savings of 25 therms per unit rather than the 20.9 therms value provided in the 2019 TRM.
- For several instances of installed Shell measures, apparent typos for square feet of windows or insulation or incorrect UES values caused discrepancies between reported and adjusted savings.

Document Review

Table 15 summarizes document review findings for measures installed from Q1 PY 2018 through Q2 PY 2019, which Cadmus applied to estimate PY 2019 savings. The HVAC program had a 100% natural gas document review realization rate, and the Shell program had a 105% natural gas document review realization rate.

Table 15. Residential Natural Gas Impact Document Review Realization Rates

Program	Document Audit Count	Sample Reported Savings (therms)	Sample Evaluated Savings (therms)	Document Audit Realization Rate
HVAC	51	7,306	7,306	100%
Shell	51	3,195	3,360	105%

Cadmus' document review (through Q2 PY 2019) identified several discrepancies:

- For two window measures, documentation showed square footage for installed windows that differed from the reported window area. In one case, the documented area was higher than

reported; in the other case, it was lower. Cadmus adjusted savings based on the corrected window area for both measures.

- For three window measures reported for sites with electric heating, project documents identified natural gas as the heating fuel. Cadmus added natural gas savings and removed electricity savings at these sites.

Billing Analysis

Table 16 shows measure-level billing analysis results, used when calculating natural gas savings. The participant count and relative precision for each measure easily met requirements established to ensure meaningful results, which required a participant count of at least five and a relative precision no greater than ±40% at the 90% confidence level.

Table 16. Residential Programs Billing Analysis Results

Measure	2019 Avista TRM UES (therms)	n[a]	Pre-Installation Weather Normalized Usage (therms)	Annual UES (therms)	Realization Rate	Relative Precision at 90% Confidence	Participant State
G Natural Gas Furnace	102.0	348	824	70.542	69%	±16%	Idaho
G Storm Windows with Natural Gas Heat[b]	0.6	11,901	732.323	0.367	61%	±34%	Idaho
G Window Replc With Natural Gas Heat[b]	0.6	11,901	732.323	0.367	61%	±34%	Idaho
G Smart thermostat Do-It-Yourself with Natural Gas Heat[c]	26.0	607	848	27.024	104%	±26%	Idaho and Washington
G Smart thermostat Paid Install with Natural Gas Heat[c]	26.0	607	848	27.024	104%	±26%	Idaho and Washington

[a] To provide unit savings values that align with TRM units (sq. ft.), this table presents participant count in sq. ft. of window surface for storm widow and replacement window measures.

[b] Results shown represent combined analysis of storm window and window-replacement measures, to maximize relative precision. Separate results for each measure appeared similar

[c] Results shown represent combined analysis of smart thermostats for do-it-yourself and contractor installation to maximize relative precision. Separate results for each delivery method appeared similar.

Billing analysis results for natural gas furnace measures had a large impact on the realization rate for the HVAC program, and the Residential sector as a whole. The Avista TRM unit savings value of 102 therms appears to be based on a 2011 billing analysis of natural gas furnace upgrades across Avista programs in both states. Cadmus identified four reasons for the reduction in billing analysis results from 102 therms to 71 therms. The difference with the largest impact was that roughly 10% of participants included in the 2011 study installed an air source heat pump along with a more efficient natural gas furnace. Installation of a heat pump appeared to result in greater natural gas savings by shifting some of the heating load to the heat pump, based on the observed sharp reduction in natural gas consumption for these participants.

Other factors included a shift from normalizing temperature based on TMY2 weather data in 2011 to TMY3 weather data for the current study and using a floating degree day base temperature for the current study rather than the fixed base temperature of 65°F in 2011. In addition, in contrast to the 2011 value of 102 therms, which represented combined results for Idaho and Washington, the 71 therm unit savings value from the current billing analysis is specific to Idaho participants. The 2011 value for Idaho participants only was 100 therms.

Billing analysis also provided relatively low natural gas savings for replacement windows relative to the 2019 TRM value of 0.6 therms per square foot of window area. For Idaho participants, the billing analysis estimated savings of 0.37 therms per square foot.

Smart thermostats achieved strong savings, as estimated by the billing analysis. The billing analysis UES value of 27 therms provided a realization of rate of 104% relative to the TRM UES value of 26 therms. To provide participant counts high enough to support statistically significant estimates, Cadmus combined participants for the two measures, which distinguished between do-it-yourself installation and contractor installation. Because billing analysis results for only Idaho failed to meet the ±40% precision requirement, Cadmus based evaluated Idaho savings on the combined results for Idaho and Washington participants.

Evaluated Savings

To calculate evaluated savings, Cadmus used unit savings values determined through the billing analysis for the measures shown in Table 16. For the remaining measures, Cadmus applied the results of database review and, where applicable, the document review to evaluate savings for each measure. The analysis then rolled up measure-level evaluated savings to calculate evaluated savings and a realization

Table 17. Residential Programs Natural Gas Impact Findings

Program	Reported Savings (therms)	Evaluated Savings (therms)	Realization Rates
Simple Steps, Smart Savings	44	44	100%
HVAC	208,904	157,894	76%
Shell	23,095	17,458	76%
ENERGY STAR Homes	471	67	14%
Multifamily Direct Install	5,615	4,296	77%
Multifamily Direct Install Supplemental Lighting	0	0	N/A
Residential Total	**238,129**	**179,759**	**75%**

Residential Conclusions and Recommendations

Evaluated natural gas savings show a realization rate of 75% on savings of 179,759 therms for Residential programs, which is 82% of the savings goal for the year.

The HVAC program accounts for most evaluated Residential natural gas savings, 88%, followed by the Shell program with 10% 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.

Billing analysis results for natural gas furnace measures served as the biggest driver of the 75% realization rate for Residential savings, providing a measure-level realization rate of 69%. The Avista TRM unit savings value of 102 therms is based on a 2011 billing analysis of natural gas upgrades, which showed higher natural gas savings largely because roughly 10% of participants in the treatment group installed heat pumps along with a more efficient natural gas furnace; participants who installed a heat pump along with a furnace upgrade showed a sharp reduction natural gas usage, indicating that some heating load shifted to the heat pump. For PY 2019, Cadmus did not identify any participants who installed both a high-efficiency natural gas furnace and a heat pump. Billing analysis also found lower natural gas savings for storm windows and replacement windows than estimated by 2019 TRM values.

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

- Adjust the Avista TRM to provide lower savings values for natural gas furnaces, replacement windows, and storm windows, based on the billing analysis conducted for this evaluation. The billing analysis unit energy savings of 71 therms for the G Natural Gas Furnace measure and 0.37 therms per square foot for G Storm Windows with Natural Gas Heat and G Window Replc with Natural Gas Heat appear to provide more accurate estimates of savings than the current TRM values.
- Continue to encourage installations of high-efficiency natural gas furnaces, which provided 65% of evaluated natural gas savings for Residential programs. The Northwest Energy Efficiency Alliance's Residential Building Stock Analysis II estimated that roughly 50% of natural gas furnaces in Idaho single-family homes have an annual fuel utilization efficiency under 90%, indicating substantial savings opportunities remain.
- Continue to emphasize installation of smart thermostats, which accounted for 12% of PY 2019 Residential natural gas savings. Billing analysis showed smart thermostats have a 104% realization rate with natural gas heating equipment.

Low-Income Impact Evaluation

Cadmus designed the Low-Income program impact evaluation to verify reported program participation and energy savings. Evaluation methods included a database review and billing analysis.

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% and 250% of federal poverty level. For PY 2019, the program achieved 3,828 therms reported natural gas savings in Idaho.

Program Participation Summary

Table 18 shows Avista savings goals for the Low-Income sector for PY 2019 as well as reported savings and goal portions achieved in PY 2019.

Table 18. Low-Income Reported Savings

Program	Savings Goals (therms)	Reported Savings (therms)[a]	Percentage of Goal
Low-Income	25,262	3,828	15%

[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 2019.

Table 19. Low-Income Participation[a]

Program	Participation Goals[a]	Participation Reported	Percentage of Goal
Low-Income	154,647	3,303	2%

[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.

Low-Income Impact Evaluation Methodology

Cadmus' impact evaluation of the Low-Income programs' measures included a database review (described above in the *Database Review* section). The team used UES values provided in the TRM to calculate savings for measures reported in the measure-tracking database and labeled savings calculated during the database review as *adjusted savings*.

For many measures reported in the tracking database, notes indicated that savings were capped at 20% of consumption. When duplicating savings calculations using TRM values, Cadmus used the newly calculated value if it was less than the capped value, but used the capped value if the TRM value indicated greater savings.

Cadmus also conducted billing analysis for the Low-Income program, using all available natural gas consumption data for PY 2018 and PY 2019 program participants. Because of the relatively small number of Low-Income program participants, Cadmus was unable to isolate measure-level savings for the program (which are necessary for cost-effectiveness calculations). However, the billing analysis did provide savings estimates for the program as a whole that produced a point of comparison for evaluated savings, estimated using prescriptive methods.

Low-Income Impact Evaluation Results

Table 20 shows reported, adjusted, and evaluated natural gas savings for Low-Income measures. The table does not include savings for Low-Income Fuel Efficiency 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)	Evaluated Savings (therms)	Realization Rate
Low-Income	3,828	3,932	3,932	103%

During the database and TRM review, Cadmus noted errors in the measure-tracking data, such as measures with little or no reported savings and some unit savings values that did not match TRM values. Overall, however, the errors largely canceled one another out, leading to the overall realization rate of 103%.

The billing analysis estimated a realization rate of 112% for Low-Income natural gas savings, excluding homes that installed Fuel Efficiency measures, but participation was not high enough to allow for isolation from effects of other installed measures. Such isolation is necessary to provide valid measure-level savings, which are necessary to support cost-effectiveness calculations for each measure.

Additionally, with relative precision of ±39% at the 90% confidence level, the billing analysis estimate has relatively large error bounds. Accordingly, while the 112% realization rate suggests that natural gas savings may be understated for the Low-Income program, Cadmus recommends adopting the more conservative interpretation that the result provides strong support for the 103% realization rate calculated for the Low-Income program.

Low-Income Conclusions and Recommendations

With a realization rate of 103% for natural gas savings, the Low-Income programs achieved savings of 3,932 therms in PY 2019, or about 15% of the goal. The 85% gap between evaluated savings and the goal results largely from relatively low program participation: reported program participation reached 2% of the participation goal, though some of the shortfall likely results from Avista using square feet to set participation goals for some measures that the TRM addresses on a per-project basis, such as air infiltration and duct sealing in gas-heated homes.

The Low-Income program measure-tracking data did not include adequate information to determine when savings values were appropriately capped. Cadmus recommends providing annual consumption for each measure in the tracking data, so that evaluation can include verifying that savings were capped at 20% of consumption for applicable measures.

Fuel Efficiency Impact Evaluation

Cadmus designed the Fuel Efficiency sector impact evaluation to verify reported program participation and natural gas consumption impacts. Evaluation methods included a database review, document review, and billing analysis.

Program Summary

Fuel Efficiency measures replace electric space heating or water heating systems with equipment that uses natural gas. These measures are offered within the Nonresidential Site Specific path, Residential programs, and Low-Income programs. Across these programs, the Fuel Efficiency measures achieved reported participation of 160 projects in PY 2019 and a natural gas energy penalty of 88,679 therms.

Fuel Efficiency measures provide positive electricity savings and negative natural gas consumption impacts, reflecting negative avoided costs. Cadmus reported the electric energy savings in the *PY 2019 Idaho Electric Impact Evaluation Report*.

Program Participation Summary

This section summarizes Fuel Efficiency sector impact in PY 2019 for the Nonresidential Site Specific path, Residential programs, and Low-Income programs.

Table 21 shows Avista's PY 2019 participation estimate and reported participation for Multifamily Market Transformation, Residential, and Low-Income Fuel Efficiency measures as well as achieved percentages of the estimate. Avista did not estimate Nonresidential sector participation outside of the Multifamily Market Transformation program. There were four Multifamily Market Transformation program participants and no Nonresidential Site Specific participants in PY 2019.

Table 21. Avista Portfolio Fuel Efficiency Participation[a]

Program	Participation Estimate	Participation Reported	Percentage of Estimate
Multifamily Market Transformation	N/A	4	N/A
Residential Fuel Efficiency	141	143	101%
Low-Income Fuel Efficiency	30	13	43%

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

Fuel Efficiency Impact Evaluation Methodology

This section presents the impact methodology for Fuel Efficiency measures included in the Nonresidential Site Specific path, Residential 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. The team randomly sampled one Multifamily Market Transformation program project in Washington for the evaluation of the Nonresidential sector Fuel Efficiency measures. Cadmus did not evaluate the single Nonresidential Site

Specific Combined HVAC application in the Idaho Fuel Efficiency program, but did evaluate several applications with the same measure category in the electric and gas Site Specific programs, and found realization rates of 100% on those projects. Verification site visits involved verifying installed equipment type, make and model numbers, operating schedules, and set points.

Residential Fuel Efficiency Impact Methodology

Cadmus applied billing analysis results to evaluate natural gas consumption impacts for all Residential Fuel Efficiency measures, using the methodology described previously in *Billing Analysis*. Cadmus also completed database review of all PY 2019 reported Residential Fuel Efficiency impacts as well as document reviews for 50 Fuel Efficiency participants from Q1 PY 2018 through Q2 PY 2019.

Low-Income Fuel Efficiency Impact Methodology

To evaluate natural gas consumption impacts for the Low-Income Fuel Efficiency measures, Cadmus conducted a database review (described above in the *Database Review* section) and billing analysis. The relatively low number of participants for the Low-Income program made it impractical for the billing analysis to isolate consumption impacts for specific measures. Using unit savings values provided in the TRM, Cadmus calculated natural gas consumption impacts for measures reported in the measure-tracking database. For Low-Income program measures in general (including Low-Income Fuel Efficiency measures), the evaluation relied on results from the database review to determine evaluated natural gas consumption impacts.

Fuel Efficiency Impact Evaluation Results

This section summarizes findings for Fuel Efficiency measures in the Nonresidential Site Specific path, Residential program, and Low-Income program. All Fuel Efficiency measures provide positive electricity savings and negative natural gas consumption impacts because the measures replace electric space-heating or water-heating systems with equipment that uses natural gas. Negative natural gas consumption impacts reflect negative avoided costs and are incorporated in the electric cost-effectiveness calculations. Cadmus reported positive electric savings in the *PY 2019 Idaho Electric Impact Evaluation Report*.

Nonresidential Site Specific Fuel Efficiency Impact Findings

Table 22 shows reported and evaluated natural gas penalties for Avista's Nonresidential Fuel Efficiency measures, along with realization rates, through PY 2019.

Table 22. Nonresidential Fuel Efficiency Natural Gas Impact Findings

Fuel Efficiency Measure	Reported Consumption Impacts (therms)	Evaluated Consumption Impacts (therms)	Realization Rate
Multifamily Market Transformation	(16,944)	(16,813)	99%
Total	**(16,944)**	**(16,813)**	**99%**

Cadmus identified a minor discrepancy for the one 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 Fuel Efficiency Impact Findings

Table 23 shows measure-level billing analysis results used when calculating PY 2019 natural gas consumption impacts. The participant count and relative precision for each measure easily met requirements established to ensure meaningful results, which required a participant count of at least five and relative precision no greater than ±40% at the 90% confidence level. The billing analysis found the additional natural gas usage to be notably higher than predicted by the 2019 Avista TRM values. Realization rates relative to 2019 TRM values ranged from a low of 112% to a high of 194%, indicating that 112% to 194% more natural gas was consumed than predicted by the TRM values.

Table 23. Residential Fuel Efficiency Analysis Results

Measure	2019 Avista TRM UES (therms)	n[a]	Pre-Installation Weather Normalized Usage (therms)	Annual UES (therms)	Realization Rate	Relative Precision at 90% Confidence	Participant State
E Electric To Natural Gas Furnace	(275)	43	78	(449)	163%	13%	Idaho
E Electric To Natural Gas Furnace & Water Heat	(420)	21	110	(565)	135%	20%	Idaho
E Electric To Natural Gas Wall Heater[a]	(466)	10	-	(520)	112%	21%	Idaho
E Multifamily Electric to Natural Gas Furnace and Water Heat	(199)	20	-	(386)	194%	10%	Idaho and Washington

[a] The 2019 Avista TRM does not include the E Electric to Natural Gas Wall Heater measure. The TRM value shown is taken from the 2018 Avista TRM.

Table 24 shows reported, adjusted, and evaluated natural gas impact results for the Residential Fuel Efficiency measures. Based on the measure-level billing analysis results listed in Table 23, the evaluation calculated a 141% realization rate for evaluated natural gas consumption impacts for the Residential Fuel Efficiency path, meaning that the measures resulted in 141% of the natural gas usage reported in the measure tracking data.

Table 24. Residential Fuel Efficiency Natural Gas Impact Findings

Fuel Efficiency Measure	Reported Consumption Impacts (therms)	Adjusted Consumption Impacts (therms)	Evaluated Consumption Impacts (therms)	Realization Rate
Residential Fuel Efficiency	(50,028)	(47,482)	(70,331)	141%

Adjusted consumption impacts, which reflects findings of database review, were different than reported impacts because of discrepancies between reported unit savings values and those in the 2019 TRM.

These adjustments largely offset one another. Because billing analysis produced valid estimates for all Residential Fuel Efficiency measures, adjusted impacts had no effect on evaluated consumption impacts.

In reviewing documentation for 50 Residential Fuel Efficiency measures, Cadmus found no discrepancies affecting natural gas consumption impacts, resulting in a document review realization rate of 100%. Cadmus did not apply document review results to estimate evaluated impacts because billing analysis produced valid estimates for all Residential Fuel Efficiency measures; the 100% realization rate appears to indicate strong compliance with program requirements among contractors and participants.

Low-Income Fuel Efficiency Impact Findings

Table 25 shows reported and adjusted natural gas energy consumption impacts for Low-Income Fuel Efficiency measures.

Table 25. Low-Income Fuel Efficiency Program Natural Gas Impact Findings

Fuel Efficiency Measure	Reported Consumption Impacts (therms)	Adjusted Consumption Impacts (therms)	Evaluated Consumption Impacts (therms)	Realization Rate
Low-Income Fuel Efficiency	(1,585)	(1,535)	(1,535)	97%

Adjusted and evaluated consumption impacts differed slight from reported impacts because of discrepancies between reported UES values and 2019 TRM UES values for some projects.

The billing analysis estimated a realization rate of 200% for Low-Income Fuel Efficiency natural gas consumption impacts, with a relative precision of ±22% at the 90% confidence level. Participation was not high enough to support isolating consumption impacts at the measure level, which are necessary for calculating cost-effectiveness, but the results do indicate much greater natural gas fuel penalties for Low-Income Fuel Efficiency measures as a whole than indicated by 2019 Avista TRM values. This finding also supports the electric billing analysis finding that electric savings for Low-Income Fuel Efficiency measures are much higher than estimated by the 2019 Avista TRM (see *PY 2019 Idaho Electric Impact Evaluation Report*). Together, the electric and natural gas billing analysis results suggest a much greater heating load than indicated by TRM values, which is evident as the heating load shifts from electricity to natural gas.

Fuel Efficiency Conclusions and Recommendations

Nonresidential Site Specific and Multifamily Market Transformation Fuel Efficiency measures achieved evaluated natural gas penalties of 16,813 therms, yielding a 99% realization rate.

Residential Fuel Efficiency measures achieved evaluated natural gas penalties of 70,331 therms, yielding a 141% realization rate. Low-Income Fuel Efficiency measures contributed natural gas penalties of 1,535 therms, with a realization rate of 97%.

Residential natural gas measures more than offset the natural gas penalty of Residential Fuel Efficiency measures, with evaluated natural gas consumption impacts of 179,759 therms. Similarly, Low-Income

natural gas measures also more than offset the Low-Income Fuel Efficiency natural gas penalties, with evaluated consumption impacts of 3,932 therms.

Cadmus recommends that Avista adjust reported natural gas penalties on all Residential Fuel Efficiency measures to match values determined through the billing analysis conducted for this evaluation, which appear to provide a more accurate estimate of consumption impacts than the 2019 TRM values. Based on billing analysis results for the Low-Income Fuel Efficiency measures as a whole, Cadmus also recommends adjusting reported natural gas penalties for those measures.

APPENDIX C – 2019 PROCESS EVALUATION REPORT

CADMUS

Appendix to the 2019 Idaho Annual Conservation Report

PROCESS EVALUATION REPORT

April 15, 2020

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Figures

Tables

Executive Summary

As part of the Avista 2018–2019 demand-side management (DSM) portfolio evaluation, Cadmus conducted process evaluation activities for PY 2018 and PY 2019. The process evaluation focused on four fundamental objectives:

- Assess program delivery channel and marketing methods
- Assess participant and market actor program journeys, including participation barriers, satisfaction levels, and rebate levels' effectiveness
- Assess Avista's and implementer's staff experiences, including organizational structures, communication levels, and program processes
- Document program successes, challenges, and changes

This report describes Cadmus' data collection and process methods, presents analysis results, summarizes findings, draws conclusions, and recommends possible improvements for all Avista programs, except the Nonresidential Grocer program, the Residential ENERGY STAR® Homes program, and the third-party Community Energy Efficiency program.

Summary of Milestones and Deliverables

Cadmus conducted the evaluation by reviewing documents, surveying participants, and interviewing program and implementation staff and contractors. Table 1 lists these process evaluation activities.

Table 1. PY 2018 and PY 2019 Completed Milestones and Deliverables

Milestones and Deliverables	PY 2018	PY 2019
Document and Database Review	✓	✓
Avista and Implementer Interviews	✓	✓
Participant Surveys	✓	✓
Trade Ally Interviews		
HVAC Contractors	✓	
Multifamily Property Managers	✓	✓
Builders		✓
Retailers		✓
Community Action Program Agencies		✓

Key Findings

Nonresidential

- **Almost two-thirds of Nonresidential survey respondents participated in past business energy efficiency programs.** Most Site Specific (17 of 21) survey respondents previously participated in an Avista business energy efficiency program, compared with 56% of prescriptive respondents (42 of 75).
- **Contractors and equipment vendors were more engaged with participation drivers in PY 2019.**

  - In contrast with PY 2018 respondents, more PY 2019 respondents reported first learning about the Prescriptive program from a contractor (for an 8% increase) or an equipment vendor (a 4% increase).
  - PY 2019 respondents were more likely to designate their contractor or vendor as a motivating factor in PY 2019, increasing to 34% from 20% the previous year.
- **Participant motivations differed by program.**
  - Site Specific program participants identified saving money and using less energy as the top benefits from program participation, consistent with PY 2018 results.
  - PY 2019 Prescriptive survey respondents identified saving money and receiving a rebate as the top benefits (n=86; 76% and 66%, respectively), while, in PY 2018, Prescriptive survey respondents identified saving money and using less energy as the top benefits (n=46; 72% and 65%, respectively).
- **Though participants were highly satisfied with the program, a small number indicated some dissatisfaction.**
  - All Site Specific survey respondents (n=19) and 98% (n=83) of Prescriptive survey respondents expressed satisfaction with the program overall. In PY 2019, this satisfaction increased for Prescriptive survey respondents over PY 2018 respondents (98% and 91%, respectively).
  - Site Specific respondents expressed satisfaction with all program components, except for the equipment installed; one of 19 was *not too satisfied* with this component as the company "chose a weak vendor." Except for communication with contractors and vendors, PY 2019 respondents provided a higher number of *very satisfied* responses than in PY 2018.
  - Prescriptive survey respondents were highly satisfied with the pre- and post-project inspection and the equipment installed. Several survey respondents, however, provided reasons for dissatisfaction with the program and some of its components. One respondent stated that the overall process took too long and did not provide them with a high-enough incentive. Another said their account executive originally told them their project would not qualify for incentives, and a third respondent said the program should cover the conversion of lower-wattage, high energy-usage lighting.
- **Site Specific survey respondents said the program succeeded due to Avista staff (6 of 11) while Prescriptive survey respondents cited the program application process and customer support (n=47; 28%).**
  - Site Specific program participants also cited energy and cost savings (3 of 11); and reported effective projects, easy processes, and multiple benefits (one response each) worked well.
  - Prescriptive survey respondents also cited better lighting (23%) and energy and cost savings (21%) as program elements that worked particularly well.
- **Participation challenges differed by program.**
  - For the Site Specific program, the top participation challenge was lack of program awareness. This differed from PY 2018's top challenge of determining rebate eligibility.

  - Prescriptive survey respondents listed their top challenges as identifying eligible measures and learning about the program. Lighting participants said using the DLC list or the ENERGY STAR-certified products list proved difficult.

- **Avista's rebate played an important role in the decision to complete the energy efficiency project.** All Site Specific and all but two Prescriptive survey respondents said Avista's rebate proved important in their decision to complete the project.
  - Site Specific respondents identified availability of rebates and/or other co-funding as the most important criteria for making energy efficiency improvements (14 of 18), followed by energy or operating costs (12 of 18), and the return on investment (12 of 18).
  - Prescriptive survey respondents identified energy or operating costs as the most important criteria (72%; n=43).

Multifamily

- **Multifamily property managers and tenants participating in the MFDI program generally were *highly satisfied* with the program and the measures installed.**
  - Property managers expressed satisfaction with contractors' professionalism, item quality, time required to complete installations, and the scheduling process.
  - Tenants proved *highly satisfied* with the quality of outdoor LED lighting installed during the program's supplemental lighting phase.
- **Communication during the MFDI program's supplemental lighting phase could improve.**
  - Two of five multifamily property managers that Cadmus interviewed in PY 2019 had yet to hear from the implementer's subcontractor regarding the program's supplemental lighting phase.
  - Similar delays and communications lapses remained an issue from the PY 2018 pilot, when two of 10 interviewed managers noted these problems.
- **Home builders participating in the MFMT program highlighted positive benefits from the program helping their business.**
  - Four home builders that participated in the PY 2019 MFMT program cited specific participation benefits (such as incentives helping with project financing and increased tenant interest in natural gas appliances).

Residential

- **Residential program participants learned about Avista programs differently in PY 2019 than in PY 2018.**
  - While contractors remained the primary method through which customers learned about their program in PY 2019 (38%), this represented a decrease from the number in PY 2018 (53%). Word-of-mouth, however, increased in PY 2019 (26%) over PY 2018 (14%).
- **Residential programs maintained high satisfaction levels throughout PY 2018 and PY 2019.**

- All respondents (n=152) were *very satisfied* or *somewhat satisfied* with programs in which they participated; 98% were *very satisfied* or *somewhat satisfied* with Avista's role in their experience.

Third-Party Implementer

- **Some retailers experienced a slight learning curve when submitting Simple Steps, Smart Savings program data.**
  - Two participating retailers interviewed about the Simple Steps, Smart Savings program reported facing a small learning curve when first submitting data to the implementer. They found the process *somewhat easy* and were assisted by program staff.

Low-Income

- **CAP agencies and participating customers were highly satisfied with the Low-Income program.**
  - Avista and all five CAP agencies interviewed by Cadmus for PY 2019 emphasized positive, well-established relationships that were communicative and collaborative. Consequently, potential issues or changes that arose were easy to address.
  - All five CAP agencies reported that customers generally expressed positive feedback. Two CAP agencies said customers specifically had been satisfied with energy savings and with the program's effect on their energy bills.
- **The Low-Income program experienced high turnover among participating contractors.**
  - Three CAP agencies interviewed by Cadmus reported high turnover among contractors completing weatherization projects through the program—a problematic finding, given the contractors' low availability and highly competitive field.

Recommendations

Nonresidential

Nonresidential Recommendation 1: Per some survey respondents, determining rebate eligibility proved challenging. Lighting survey participants specifically said using the DLC list or the ENERGY STAR-certified product list posed difficulties. Consider conducting an internal review of eligibility requirements and messaging to determine additional educational materials that could be created for and provided to customers. For example, a frequently asked questions pamphlet could be developed to answer common questions regarding eligibility, or a customer newsletter could provide information about determining eligibility.

Multifamily

Multifamily Recommendation 1: Improve the timeline and communication among parties between MDFI program's direct-install phase and supplemental lighting phase. Provide property managers with a point of contact to whom they can direct inquiries about the status of their outdoor lighting applications.

Multifamily Recommendation 2: Conduct an internal review of steps for qualifying new buildings for the MFMT program to determine whether the program can remove or streamline qualification steps and simplify the process for home builders. Consider developing a process flow map to outline the program steps, making it easier for builders to follow.

Multifamily Recommendation 3: Include language in MFMT program marketing and outreach to target participation benefits noted by builders (such as incentives that help with project financing and increased tenant interest in natural gas appliances).

Residential

Residential Recommendation 1: Consider increasing outreach and marketing efforts through bill inserts and Avista's website. While word-of-mouth referrals from contractors/trade allies and friends/family/coworkers proved beneficial, survey respondents in PY 2019 (n=76) most frequently preferred learning about energy efficiency programs and opportunities through bill inserts (43%) and Avista's website (21%). Using bill inserts and Avista's website to promote midstream and third-party programs (such as Simple Steps, Smart Savings) not only could cultivate more interest in these offerings; it could raise awareness of Avista's role in administering the programs, and it could improve data collection efforts where access to customer information is lacking or difficult to compile.

Third-Party Implementer

Recommendation 1: Develop supplemental documentation or provide direct assistance to retailers who participate in the Simple Steps, Smart Savings program to help troubleshoot issues with the data submission process. Cadmus interviewed two retailers who experienced a small learning curve while submitting their program data to the implementer.

Low-Income

Low-Income Recommendation 1: Dedicate a small percentage of CAP agency funding to incentives (beyond each project's cost) for contractors that work on Low-Income program projects. Retaining contractors will prevent coverage losses and the need for CAP agencies to train new contractors, which, given training's time- and resource-intensive nature, can prove more costly than providing a small incentive to ensure contractors' loyalty to the CAPs and the program.

Introduction

In 2018 and 2019, Avista provided rebates and services to its Nonresidential and Residential electric and natural gas customers throughout its Washington and Idaho service territories. The 2018–2019 portfolio process evaluation sought to identify and document the program's successes and challenges by reviewing program materials; conducting interviews with program and implementation staff and trade allies; and conducting surveys with Nonresidential and Residential program participants.

Though the evaluation results concentrate on PY 2019, they refer to PY 2018 results where differences occur. The evaluation included all Avista programs, except the Nonresidential Grocer program, the Residential ENERGY STAR® Homes program, and the third-party Community Energy Efficiency program.

Program Descriptions

Table 2 provides a summary of programs included in Avista's 2018–2019 demand-side management (DSM) portfolio's evaluation.

Table 2. PY 2018 and PY 2019 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 receive a smart block heating system to install on vehicles. The device controls the water temperature in the block and the air temperature outside the block. HOTSTART can provide Installation help.
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 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	Following a compressed air audit, electric customers receive direct installation of a compressed air leak reduction device.
Multifamily			
Multifamily Direct Install (MFDI)	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.
Multifamily Market Transformation (MFMT)	Natural gas space and water heat	Avista	New multifamily development receives incentives to install natural gas space and water heating.

Program	Measure(s)	Implementer	Program Summary
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 (Weatherization)	Standard and storm windows		
Fuel Efficiency	Natural gas space and water heat		
Residential Low-Income			
Low-Income	Weatherization products and services	N/A	Weatherization managers from Community Action Agencies (CAP) deliver energy efficiency programs to low-income communities. Qualified homes can be in Washington or Idaho and receive 100% reimbursement for the work's cost.
Residential Third-Party Implementer Programs			
Simple Steps, Smart Savings	LEDs, LED fixtures, showerheads, clothes washers	CLEAResult	Midstream program markdowns are offered for certain products in retail stores; CLEAResult receives monthly sales data and provides program support through retailer visits.

Methodology

This section describes the interview and survey methodology.

Program Administrator and Implementer Interviews

Cadmus conducted telephone interviews with the program staff and third-party implementers listed in Table 3. Interviews 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 impacts on the market
- Future program changes, including redesigns

Table 3. PY 2018 and PY 2019 Stakeholder Interviews

Program	Avista Staff	Implementer Staff	Avista Staff	Implementer Staff
	PY 2018		PY 2019	
Nonresidential				
Lighting	✓	N/A	–	N/A
HVAC, Shell, VFD, Food Service Equipment	✓	N/A	–	N/A
Green Motors		*	–	–
AirGuardian		✓	–	–
Fleet Heat		N/A	–	N/A
Site Specific	✓	N/A	–	N/A
Grocer	–	–	✓	N/A
Multifamily				
Multifamily Direct Install	✓	✓	✓	✓
Multifamily Market Transformation	-	-	✓	-
Residential				
Heating and Ventilation (HVAC)	✓	N/A	–	N/A
Weatherization (Shell)			–	
Fuel Efficiency			–	
Residential Low-Income				
Low-Income	–	–	✓	N/A
Residential Third-Party Implementer				
Simple Steps, Smart Savings	–	–	✓	✓

* Cadmus could not reach the PY 2018 Green Motors implementer, despite support from Avista.

Trade Ally Interviews

In PY 2019, Cadmus conducted telephone interviews with various trade allies to assess program awareness levels, experiences, successes, and challenges. Avista provided contact lists for each audience. Table 4 lists the program, audience, number of records provided by Avista, interview target, and number of interviews.

Table 4. PY 2019 Trade Ally Interviews

Program	Audience	Number of Records	Target	Number of Interviews
Multifamily Direct Install (MFDI)	Participating Property managers	112	5	5
Multifamily Market Transformation (MFMT)	Participating multifamily home builders	27	5	5
Simple Steps, Smart Savings	Participating retailers	99	5	5
Low-Income	Participating CAP agencies	6	5	5

Participant Surveys

Cadmus completed 76 phone surveys with Residential program participants in PY 2018 and 76 phone surveys in PY 2019. Additionally, Cadmus completed 65 online surveys in PY 2018 and 107 online surveys in PY 2019 with Nonresidential program participants. Cadmus relied on 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

Residential Sampling

For each program, Cadmus completed the targeted number of surveys—16 for HVAC, 14 for Shell, and eight for Fuel Efficiency—for each of the four survey waves conducted for PY 2018 and PY 2019 (with two waves per year). Overall, Cadmus collected 152 responses for process evaluation purposes, as shown in Table 5.

Table 5. Residential Participant Survey Sample Frame, Target, and Completes by Program

Program	PY 2018 Total			PY 2019 Total			Total		
	Sample	Target	Complete	Sample	Target	Complete	Sample	Target	Complete
HVAC	4,191	32	32	5,759	32	32	9,950	64	64
Shell	612	28	28	1,349	28	28	1,961	56	56
Fuel Efficiency	782	16	16	435	16	16	1,217	32	32
Total	**5,585**	**76**	**76**	**7,543**	**76**	**76**	**13,128**	**152**	**152**

Nonresidential Sampling

To prepare the contact lists for each Nonresidential survey, Cadmus removed duplicate records along with records having incorrect or missing email addresses. Cadmus sent an email invitation to a census of all participants in each program, except for Nonresidential Prescriptive Lighting participants. Due to the large number of participants in this program, Cadmus randomly selected a sample of 20 participants, sending email invitations in batches of 20 records until meeting the target. Following the initial email invitation, Cadmus sent a reminder email. To increase the number of survey responses, the field engineers urged participants to complete the survey during on-site visits, if they had not yet done so.

As shown in Table 6, 65 surveys were completed in PY 2018 and 107 were completed in PY 2019.

Table 6. Nonresidential Participant Survey Sample Frame, Target, and Completes by Program

Program	PY 2018 Total			PY 2019 Total			PY 2018 and PY 2019 Total		
	Population[a]	Target	Completes	Population[b]	Target	Completes	Population	Target	Completes
Nonresidential Site Specific									
Electric	127	27	**17**	138	20	**18**	265	47	**35**
Gas	5	5	**2**	9	7	**3**	14	12	**5**
Nonresidential Prescriptive									
Lighting	701	32	**29**	1153	58	**70**	1854	90	**99**
HVAC Motor Controls	10	8	**2**	6	5	**1**	16	13	**3**
Food Service Equipment (Electric)	12	9	**1**	7	6	**0**	19	15	**1**
Food Service Equipment (Gas)	59	22	**4**	48	16	**4**	107	38	**8**
Commercial HVAC	35	18	**6**	34	14	**7**	69	32	**13**
Green Motors Rewind	10	8	**1**	7	6	**1**	17	14	**2**
Fleet Heat	1	1	**0**	0	0	**0**	1	1	**0**
AirGuardian Compressed Air	0	0	**0**	4	4	**2**	4	4	**2**
Insulation	10	8	**3**	12	9	**1**	22	17	**4**
Total	**970**	**138**	**65**	**1418**	**145**	**107**	**2388**	**283**	**172**

[a]The sample population included only 2018 Nonresidential participants.

[b]The sample population included only 2019 Nonresidential participants.

Nonresidential Programs

This section focuses on two Nonresidential programs: Site Specific and Prescriptive. The Site Specific program provides incentives to customers who install custom energy efficiency projects, while the Prescriptive program offers incentives for specific measures and services.

Nonresidential Site Specific Findings

This section describes the findings from 21 surveys completed with PY 2019 Site Specific participants. Where meaningful, Cadmus compares PY 2018 results to PY 2019.

Program Changes

In PY 19, Avista made one change to the Site Specific program, realigning the 15-year simple payback criteria. Avista now offers an incentive for any qualifying electric or natural gas energy-saving improvement with a simple payback less than the life of the equipment installed.

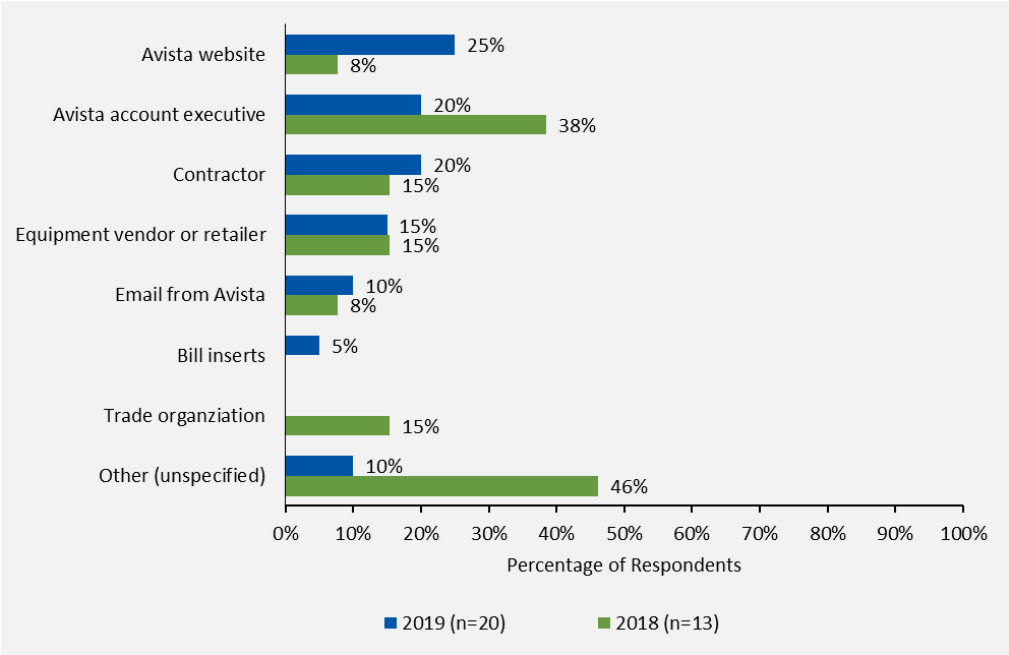
In addition to this program change, Avista launched the Business Partner pilot program in July 2019, specifically to reach a larger percentage of small- and medium-sized customers, reminding them about the availability of basic scoping energy audits, budget billing plans, and energy efficiency rebate programs. Avista created a new support team to assist commercial customers with their energy needs.

The program manager did not report problems or issues in implementing the Site Specific program, noting that the program continues to work well for customers as they become more aware of energy efficiency.

Customer Awareness

The majority of PY 2019 survey respondents (17 of 21) were repeat participants from an Avista business energy efficiency program, a finding consistent with PY 2018 survey results. As shown in Figure 1, survey respondents first learned about the Site Specific program through a variety of sources. While respondents most commonly cited Avista's website as an information source, respondents cited Avista account executives and contractors almost as often. This pattern of multiple information channels reaching customers differs from PY 2018, when respondents most likely learned of the program through an account executive or an unspecified source.

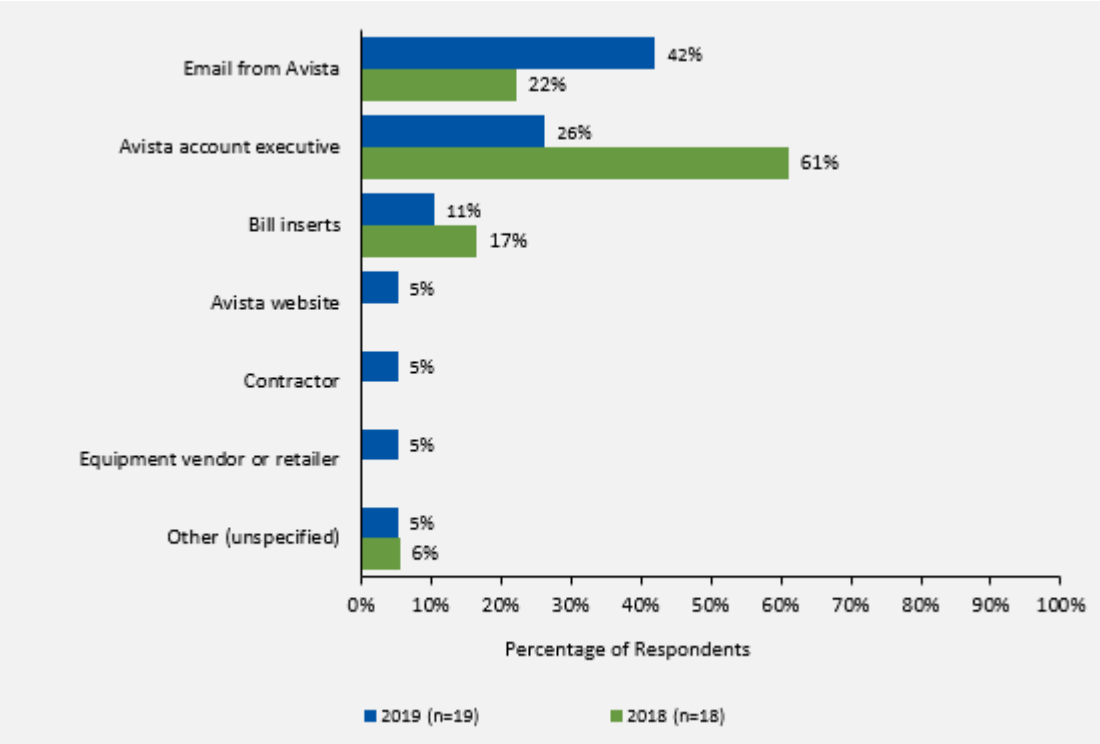
Figure 1. How Participants First Learned of Program



Source: Site specific survey questions C2: "How did you first hear about the Site Specific program?"

When asked how they preferred to learn of rebates and incentives, PY 2019 respondents most likely indicated email, followed by their account executive. As shown in Figure 2, this also represents a change from PY 2018, when over one-half of respondents preferred to learn about energy efficiency programs through their account executive. This change most likely reflected a different mix of organization types in the PY 2019 survey sample, rather than particular market changes. In PY 2018, six of 19 respondents were from manufacturing facilities. In PY 2019, the survey sample proved more diverse. Figure 9 shows more detail on organizations represented in the sample.

Figure 2. How Participants Prefer to Learn of Programs and Offers

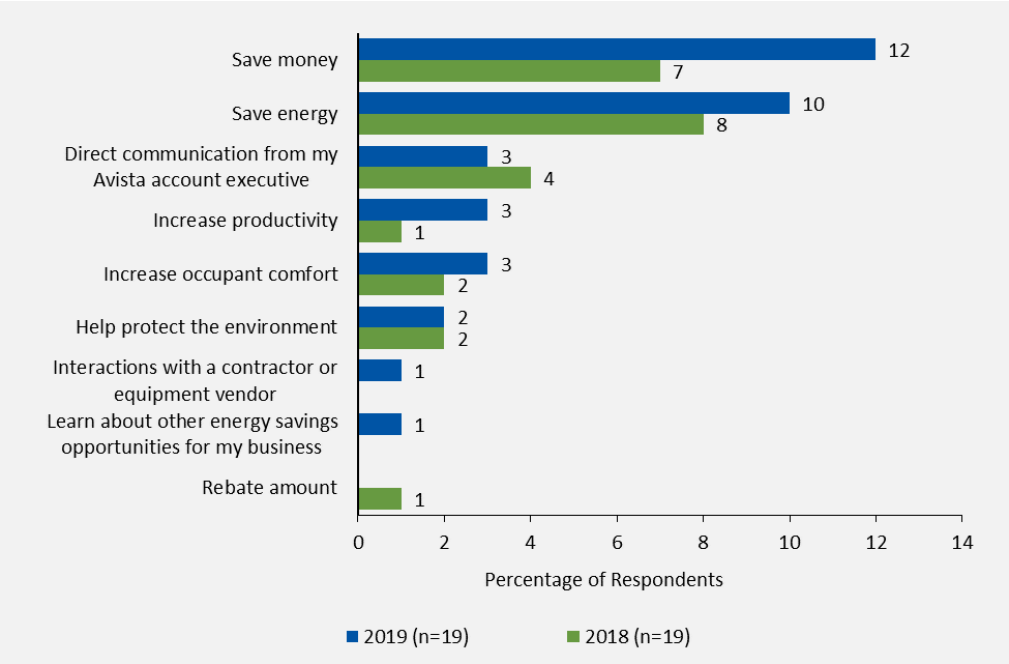


Source: Site specific survey questions C3: "What is the best way for Avista to inform commercial customers like you about their rebates and incentives for energy efficiency improvements?"

Participation Motivations and Benefits

As shown in Figure 3, PY 2019 survey respondents' participation motivations followed a pattern similar to that of PY 2018. Respondents cited saving money and saving energy as their most common motivators, though more participants mentioned each of these in PY 2019 than in the prior year.

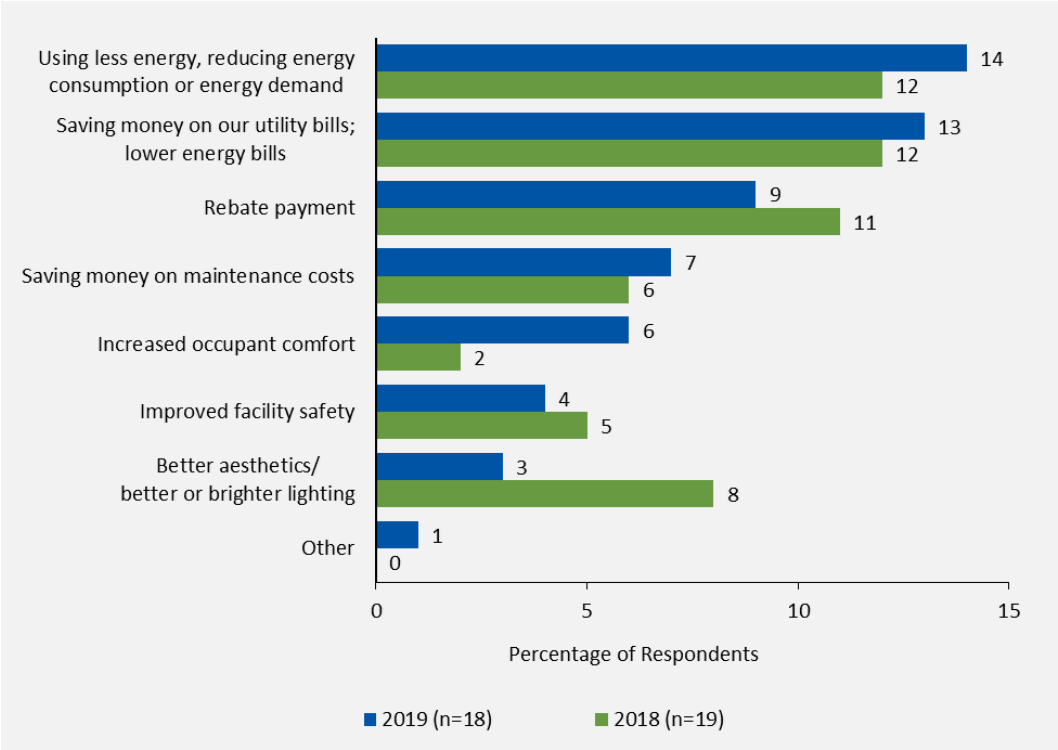
Figure 3. Site Specific Participation Motivation



Source: Site specific survey question C4: "What motivated you to participate in the Site Specific program?" Multiple responses allowed.

Respondents' perceived benefits aligned closely with their motivations, as shown in Figure 4. The majority of respondents cited using less energy and saving money on utility bills as benefits, and one-half of respondents noted the rebate payment. PY 2019 respondents reported perceived benefits similar to those from PY 2018 respondents, except PY 2019 respondents .

Figure 4. 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

All PY 2019 survey respondents (except one) cited their Avista account representative (7 of 19); their contractor, vendor, or retailer (4 of 19); or both (7 of 19) as involved in the design or implementation of the project they completed through the program—responses similar to PY 2018. Nevertheless, the majority of respondents took the lead in completing the application, though five reported that contractors, vendors, or retailers took the lead, and four indicated that the Avista account representative took the lead.

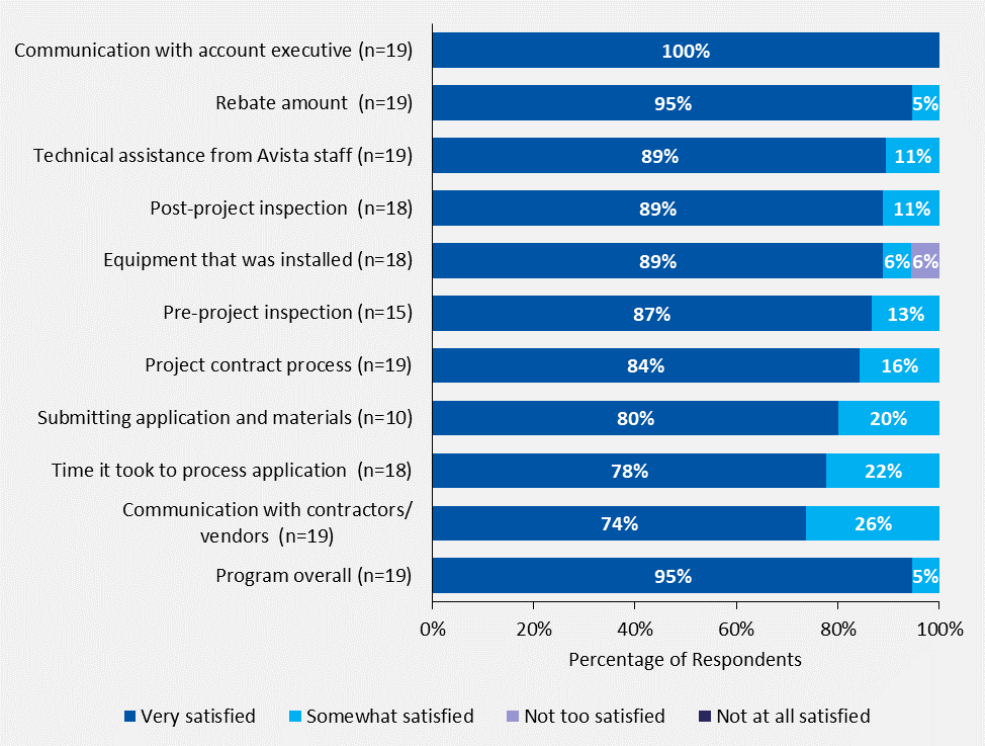
Three of 12 respondents said they received an instant discount toward the project's cost (seven did not respond). One respondent said the company preferred to handle "these types of transactions" through the instant discount; one said they wanted lower out-of-pocket costs, and a third said they wanted paperwork completion to burden their staff less.

Program Satisfaction

Figure 5 shows very high respondent satisfaction levels with different aspects of Avista's Site Specific program. Satisfaction ran very high, with almost all respondents either *very* or *somewhat satisfied* with all program aspects. This excepted one respondent who reported they were *not too satisfied* with equipment installed, commenting that the company "chose a weak vendor." Respondents were most

satisfied with communications from Avista account executives and were least satisfied with communications from program contractors and vendors.

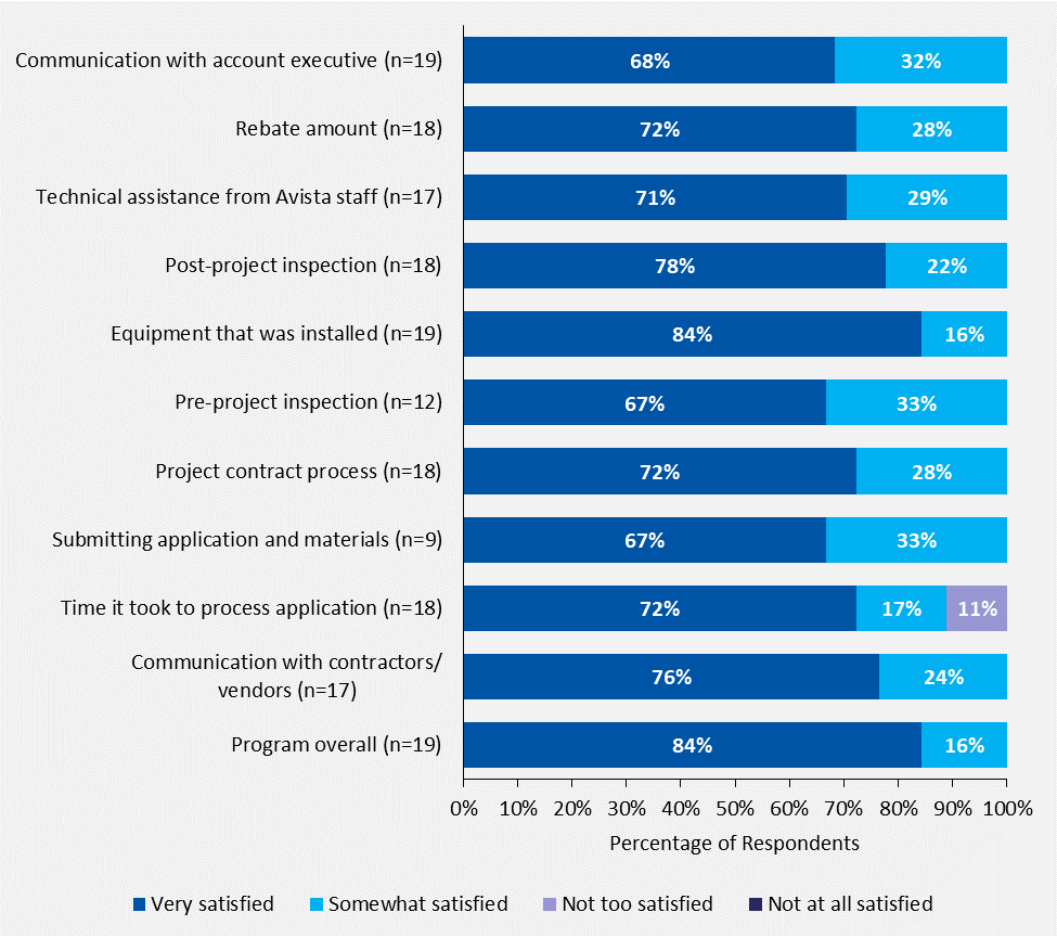
Figure 5. Satisfaction with Site Specific Program Components (PY 2019)



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."

In addition, PY 2019's satisfaction ratings ran higher than PY 2018's satisfaction ratings in terms of the number of *very satisfied* respondents in all categories, except communication with contractors and vendors. In this category, 74% (n=19) were *very satisfied* in PY 2019 compared to 76% (n=19) in PY 2018. For comparison, Figure 6 shows the PY 2018 satisfaction ratings. Two PY 2018 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 6. Satisfaction with Site Specific Program Components (PY 2018)



Source: PY 2018 Participant Survey, 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."

Program Challenges and Successes

As shown in Table 7, nine PY 2019 respondents reported an array of program participation challenges, another four reported no problems or challenges with the program, while six did not answer the question. In PY 2019, respondents reported lack of awareness about the program as its primary challenge (noted by four), followed by the time required to complete the program (noted by two). Such issues differed from PY 2018, when respondents most commonly reported issues related to understanding program requirements.

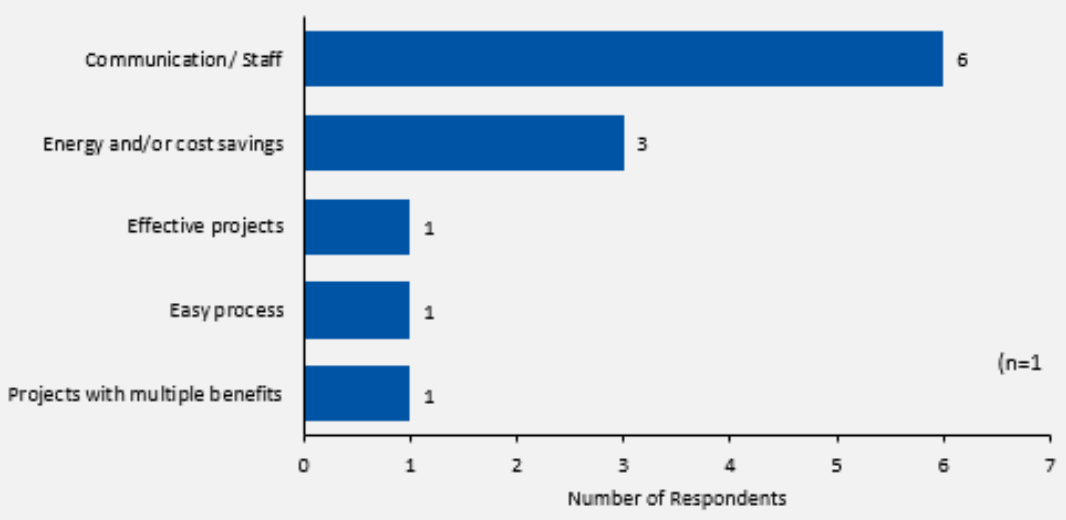
Table 7. Participation Challenges

Challenge	Number of Responses	
	PY 2019 (n=9)	PY 2018 (n=12)
Lack of awareness of the program	4	0
Time needed to complete the project	2	1
Understanding the program requirements and measure eligibility	1	6
Desired measures not eligible	1	0
Getting internal buy-in	1	2
Determining the correct rebate amount	0	1
Vendor availability	0	1
Working with multiple internal and external staff to complete the project	0	1

Source: Site specific survey question E3: "What do so see as the biggest challenges to participating in Avista's Site Specific program?"

Despite these issues, 11 PY 2019 respondents called out several program areas that they viewed as working well, as shown in Figure 7. These categories are similar to those reported for PY 2018.

Figure 7. 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.

While nine PY 2019 respondents indicated they could not think of ways to improve the program, four survey respondents provided recommendations:

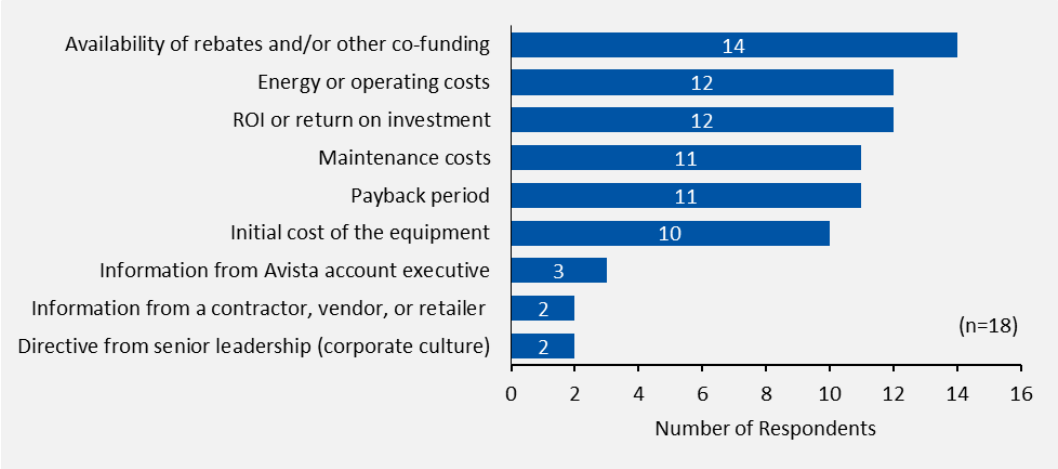
- Increase awareness
- Increase efficiency requirements
- More communication (in particular with engineers when working with fixture types and loads)
- Simplify the approval process

Energy Efficiency Attitudes and Behaviors

All PY 2019 respondents (n=18) said the rebate provided by Avista was *very* or *somewhat important* in their decision to complete their project, but all respondents said energy efficiency was *very* or *somewhat important* when making capital upgrades or improvements. (One respondent did not answer.)

As shown in Figure 8, respondents most commonly selected rebate or outside funding availability as the most important criteria, followed closely by energy or operating costs and the project's return on investment. These respondents produced results similar to those from PY 2018.

Figure 8. Important Criteria for Making Energy Efficiency Improvements



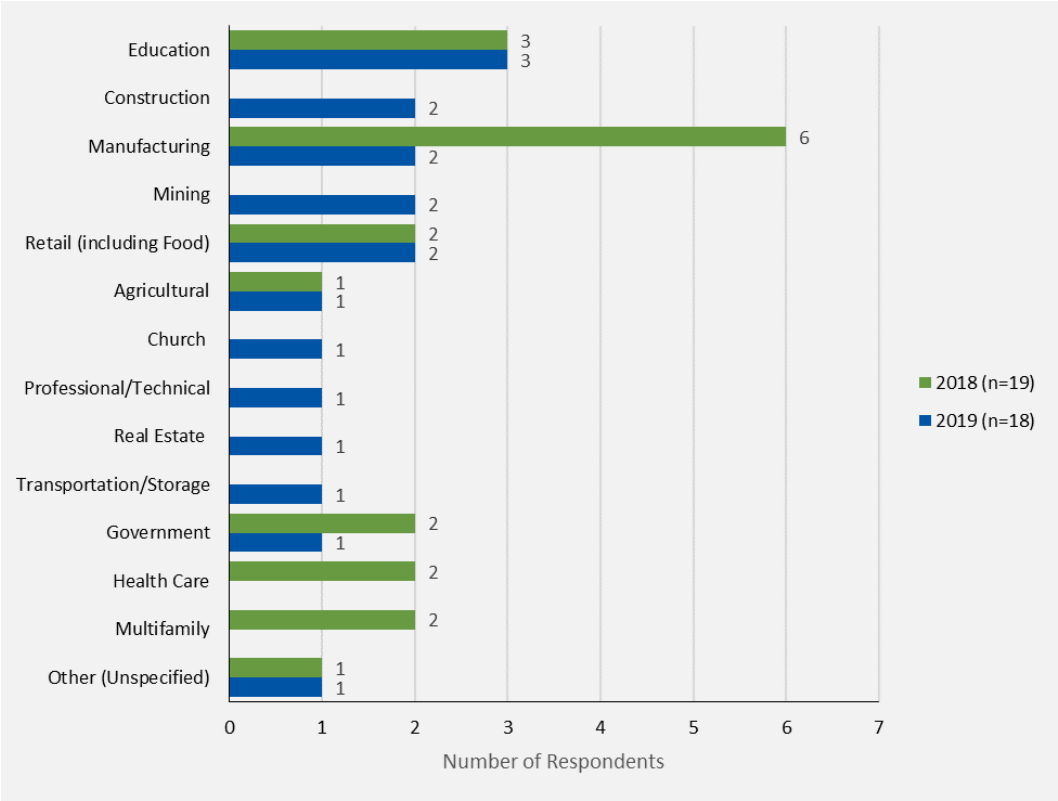
Source: Site specific survey question F3: "Which of the following criteria are important in deciding whether your company makes energy efficiency improvements?" Multiple responses allowed.

Since participating in the Site Specific program, eight PY 2019 respondents purchased energy-efficient equipment, and one adopted new energy-efficient protocols. New equipment included boilers (two respondents), LEDs (two respondents), compressed air upgrade (one respondent), and controls (two respondents). Two respondents did not name equipment types or protocols they adopted.

Survey Respondent Profile

The majority of PY 2019 respondents (14 of 17) owned their facilities; three leased, and two did not respond. Employee numbers at each facility ranged from three to 5,000: seven companies had 20 employees or fewer, six had 100 to 700 employees, and one facility had 5,000 employees (n=14). Twelve of 17 facilities used gas for heating, three used electricity, one used different fuels across different facilities, and one used a different fuel. As shown in Figure 9, the PY 2019 sample included a range of sectors, including industrial, commercial, public sector, and nonprofits. Unlike in PY 2018, when six of 19 respondents came from the manufacturing sector, no more than three respondents represented a group in the PY 2019 sample.

Figure 9. Site Specific Project Respondent Type



Source: PY 2019 and PY 2018 program participant data.

Nonresidential Prescriptive Findings

This section describes findings from 86 online surveys completed with Prescriptive participants for PY 2019. Where meaningful, Cadmus compared PY 2018 results to those from PY 2019.

Program Changes

As shown in Table 8, Avista made several changes to the Lighting Rebates program in PY19; the *PY19 Avista DSM Standard Operating Procedures Manual*, pages 36 and 37, compares the PY18 and PY19 Prescriptive Lighting Rebates.

Table 8. Prescriptive Lighting Rebate Changes

Change	PY18	PY19	Notes
Fluorescent Tubular Lamps			
T5HO four-foot TLED	$15	$15	Must be Design Lights Consortium (DLC) rated
T8 four-foot TLED	$6.50	$6.50	
U-bend LED	Site Specific	$8	New prescriptive measure; must be DLC rated
T8 eight-foot TLED	Site Specific	$13	
Fluorescent Fixtures			
2, 3, or 4-lamp T12/T8 fixture to LED qualified 2x4 fixture	$26-$35	$40	Removed hourly requirement; must be DLC rated

Change	PY18	PY19	Notes
2-lamp T12/T8 fixture to LED qualified 2x2 fixture	Site Specific	$30	New prescriptive measure; must be DLC rated
HID Lighting			
250-watt HID fixture to ≤140-watt LED fixture or lamp	$155	$155	Increased hourly requirements; lamps eligible only upon removing ballasts and other existing electric components; must be used more than 70 hours per week; must be DLC rated
1,000-watt HID fixture to ≤400-watt LED fixture or lamp	$18	$205	
1,000-watt HID fixture to ≤400-watt LED fixture or lamp	$460	$460	
Incandescent Replacement Lamps, MR16, and Can Light Kits			
6-watt to 20-watt LED lamp	$8	$8	Must be ENERGY STAR rated
50-watt to 60-watt LED lamp	$55	$55	
2-watt to 9-watt MR16 lamp	$10	$10	
12-watt to 20-watt LED fixture retrofit	$20	$20	
Occupancy Sensors			
Occupancy sensors with built-in relays	$40	$40	Must control greater than 170 watts (not wall switch sensors)
Replacement HID Lighting (Pole, Wallpack, or Canopy)			
70-watt to 89-watt HID fixture to ≤25-watt LED fixture, retrofit kit, or lamp	$60	$60	Lamps become eligible upon removal of ballasts and all other existing electric components; must be used at least 4,288 hours per year; must be DLC rated
90-watt to 100-watt HID fixture to ≤30-watt LED fixture, retrofit kit, or lamp	$80	$80	
150-watt HID fixture to ≤50-watt LED fixture, retrofit kit, or lamp	$125	$125	
175-watt HID fixture to ≤100-watt LED fixture, retrofit kit, or lamp	$130	$130	
250-watt HID fixture to ≤140-watt LED fixture, retrofit kit, or lamp	$140	$140	
320-watt HID fixture to ≤160-watt LED fixture, retrofit kit, or lamp	$180	$180	
400-watt HID fixture to ≤175-watt LED fixture, retrofit kit, or lamp	$255	$255	
750-watt HID fixture to ≤300-watt LED fixture, retrofit kit, or lamp	Site Specific	$450	
1,000-watt HID fixture to ≤400-watt LED fixture, retrofit kit, or lamp	$610	$610	
New Construction Fixtures – HID Lighting			
175-watt code HID fixture to ≤100-watt LED fixture	$130	$130	Must be used at least 4,288 hours each year; must be DLC rated
250-watt code HID fixture to ≤140-watt LED fixture	$140	$140	
320-watt and 400-watt code HID fixture to ≤160-watt LED fixture	$250	$250	
Sign Lighting Retrofit			
T12 to LED sign lighting	$17/sq ft	$17/sq ft	Must be used at least 4,288 hours each year

In PY19, Avista began implementing the Grocer program directly; currently, it allows only prescriptive measures. The program's manager said additional program changes may occur in PY20, but the planning phase has just started; so those changes have yet to be determined.

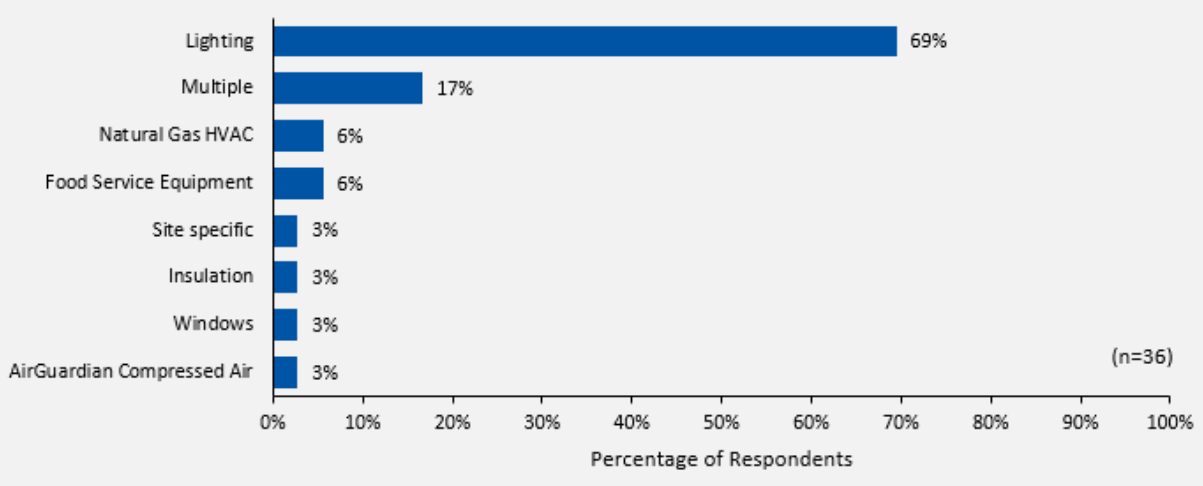
In addition to the Grocer program change, Avista made a process change to the Fleet Heat program: after a customer submits the rebate form (necessary to order the heater cord), Avista places the order, and the customer is billed for the equipment. The customer then receives reimbursement for the heater cord once verification has been completed.

Customer Awareness

Over one-half of PY 2019 survey respondents (56%, n=75) previously participated in an Avista business energy efficiency program, for a previous participation rate about equal to the PY 2018 program year (58%, n=40); this held consistently across lighting and non-lighting participants.

Of 42 respondents who participated previously, 36 provided details about programs in which they participated. As shown in Figure 10., most reported installing lighting, with five respondents reporting they participated multiple times in previous years.

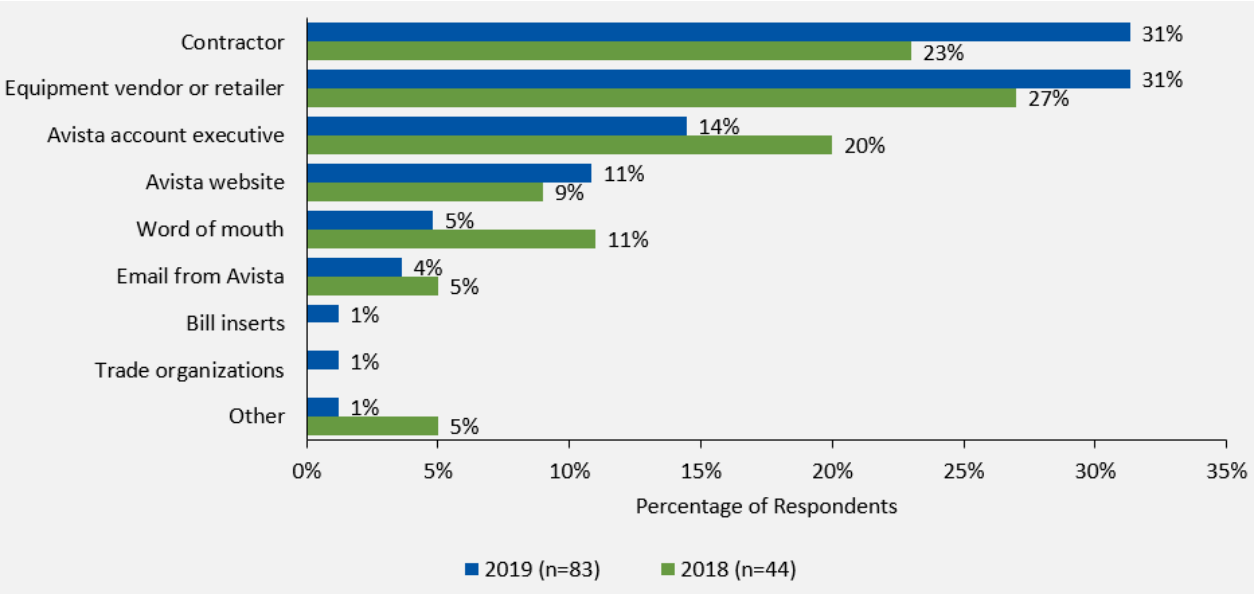
Figure 10. Equipment Installed by Previous Avista Program Participants



Source: Prescriptive survey question C1.2: "What other Avista Nonresidential energy efficiency programs has your business participated in?" Multiple responses accepted.

In PY 2019, Lighting respondents most likely said they first learned about the program from a contractor (36%, n=67), followed by a vendor or retailer (28%). Non-lighting participants most likely reported first learning about the program through an equipment vendor (44%, n=16), with only 13% reporting they learned about the program through a contractor. As shown in Figure 11, PY 2019 respondents, overall, proved equally likely to learn about the program through a contractor or an equipment vendor, with about 31% of respondents citing each one of the two most common channels in PY 2018.

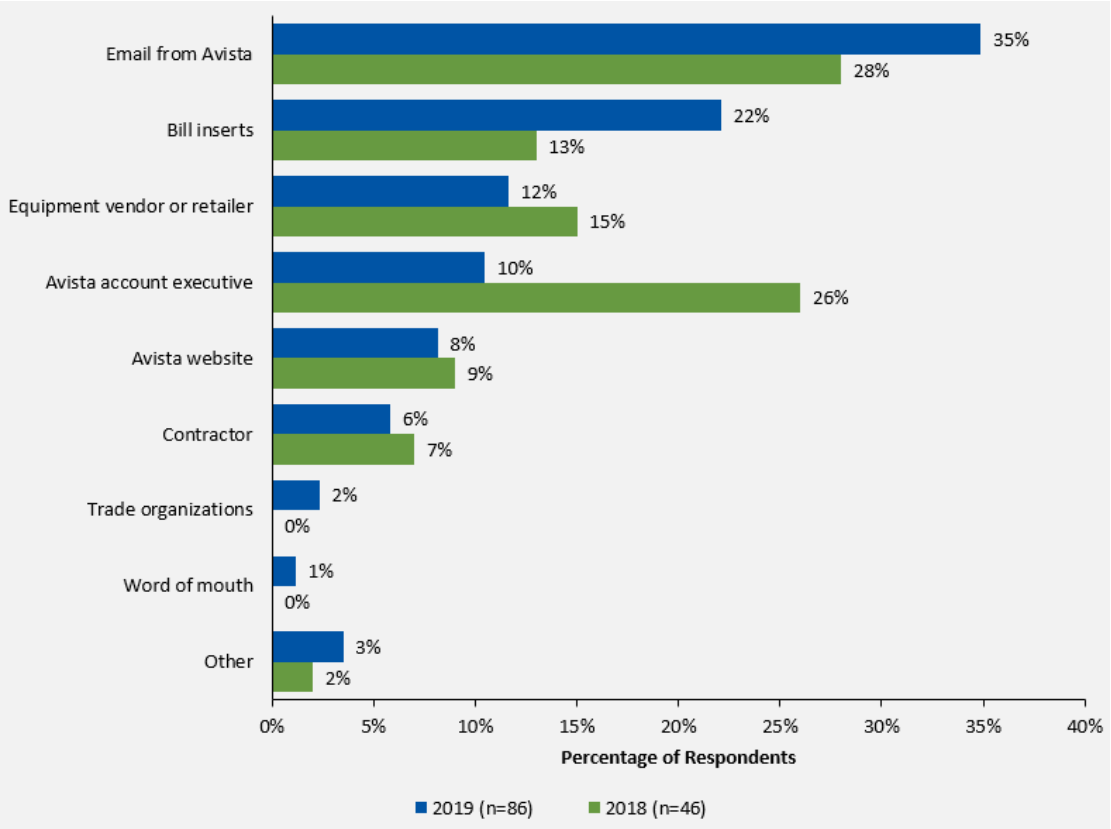
Figure 11. How Participants First Learned of Program



Source: Prescriptive survey questions C2 and C3: "How did you first hear about the program?"
Percentages may not total 100% due to rounding.

Respondents most likely reported that Avista's best way to inform them of rebate programs was by an email from Avista (35%) or through a bill insert (22%). While lighting and non-lighting participants reported an email from Avista as the top channel, the next most-preferred channels differed by program. Lighting participants chose bill inserts as their second most-preferred channel (24%; n=70), though non-lighting participants chose equipment vendors or retailers (25%; n=16) and Avista account managers (25%; n=16). Figure 12 shows the distribution of preferred methods across all respondents in PY 2019 and PY 2018.

Figure 12. How Participants Preferred to Learn of Programs and Offers

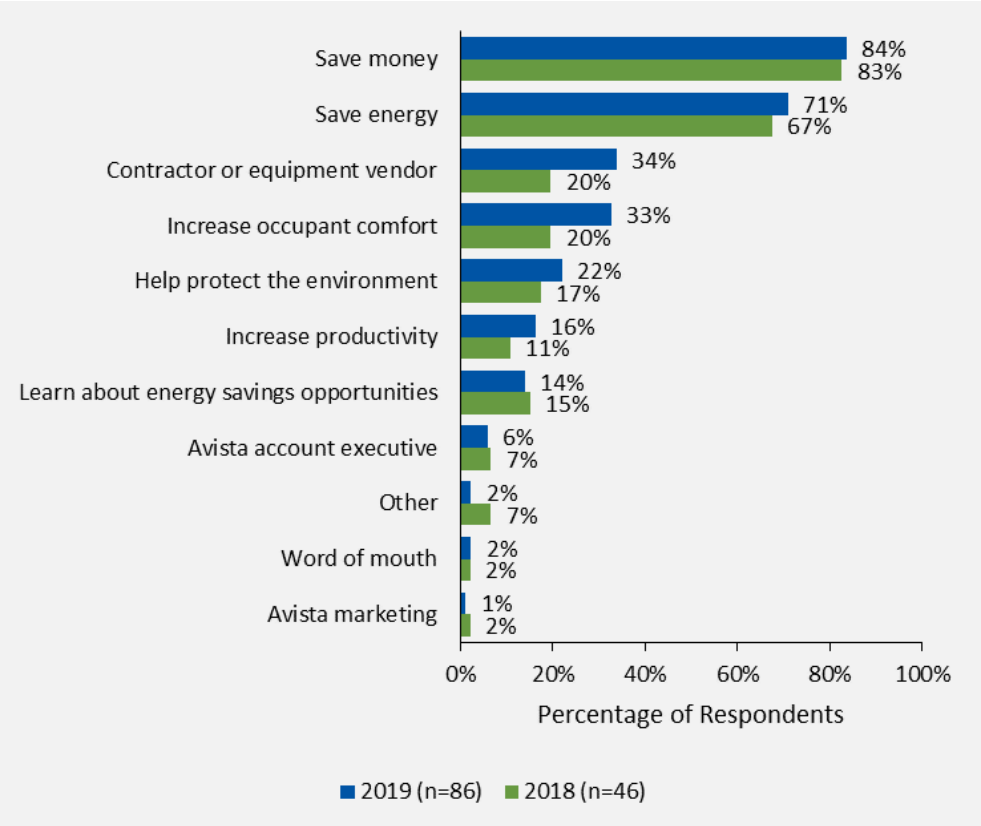


Source: Prescriptive survey question C3: "What is the best way for Avista to inform commercial customers like you about their rebates and incentives for energy efficiency improvements?"

Participation Motivations and Benefits

In PY 2019, respondents most commonly cited saving money and saving energy as participation motivations—the same as in PY 2018. As shown in Figure 13, however, more PY 2019 respondents than PY 2018 respondents reported being motivated by contractors or vendors, or they sought increased occupant comfort.

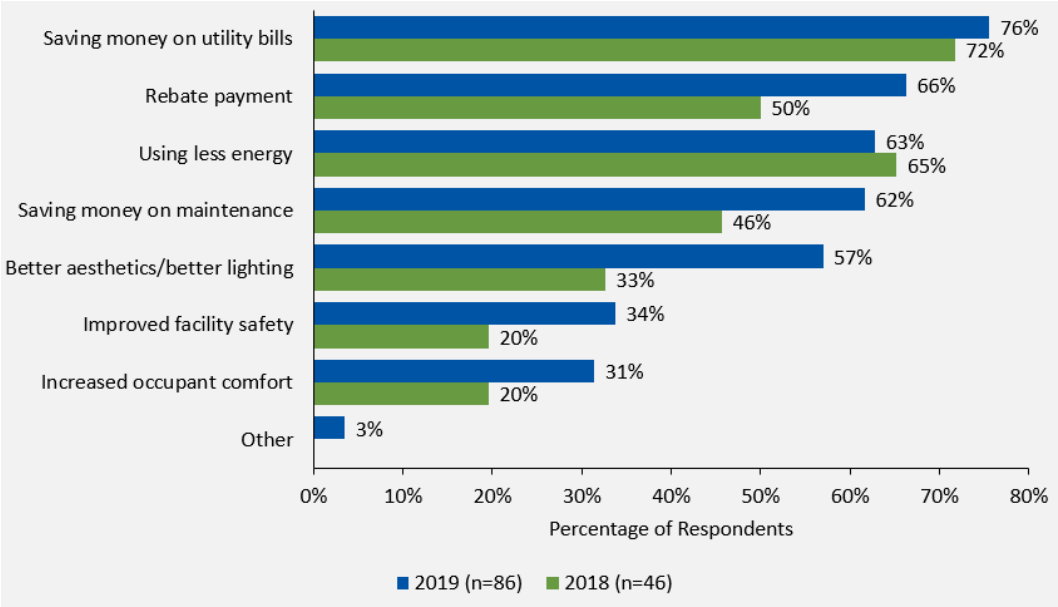
Figure 13. Prescriptive Participant Motivation



Source: Prescriptive survey question C4: "What motivated you to participate in the program?" Multiple responses accepted.

As shown in Figure 14., PY 2019 participants' main reported benefits closely reflected their motivations, with saving money on utility bills, receiving a rebate, using less energy, and saving money on maintenance as the top benefits reported. Although only about 33% reported improving occupant comfort as a motivation, and only 31% reported it as a benefit, 57% reported improved lighting as a benefit (including 69% of commercial lighting participants), and 34% reported improved facility safety as a benefit (including 36% of commercial lighting participants). Overall, PY 2019 respondents were about equally likely to report saving money on utility bills and using less energy as participation benefits, but they were more likely to cite all other benefits than PY 2018 respondents.

Figure 14. 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

Although over one-half of PY 2019 respondents reported a contractor or vendor (65%, n=55) or an Avista account executive (19%) as involved in a project's design or implementation, a majority of respondents (56%) took the lead on their own applications (a decrease from PY 2018, when 68% [n=38] of respondents took the lead in preparing their own applications.)

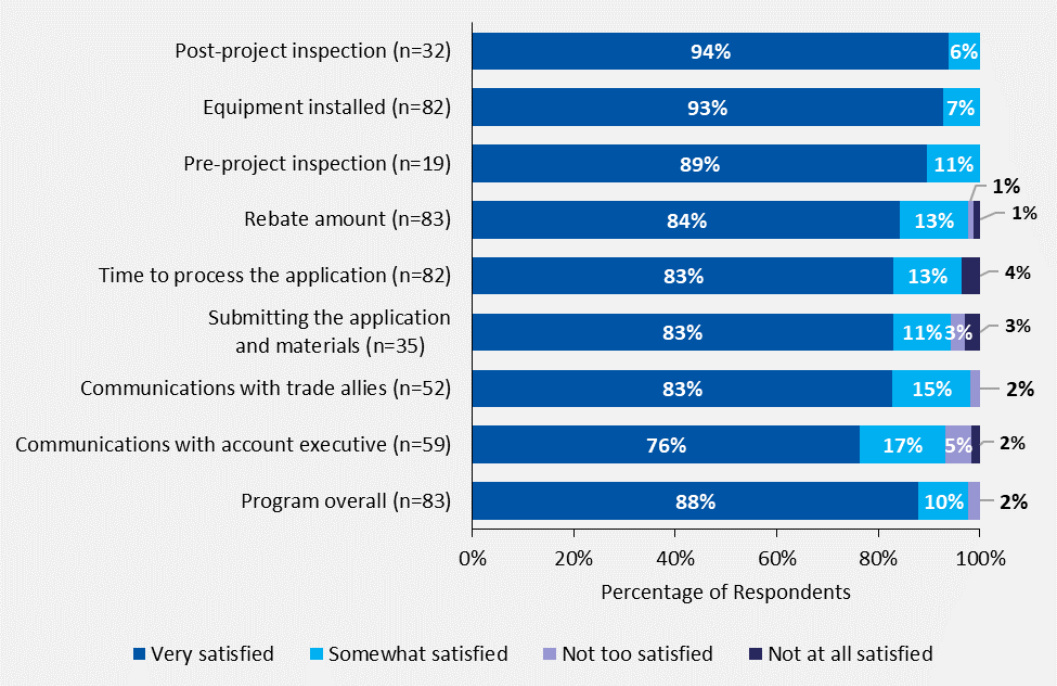
Most PY 2019 respondents (78%; n=48) also received their rebate checks directly, rather than as instant discounts from a contractor or vendor. This also represents, however, a decrease from PY 2018, when 89% received their checks directly. This change likely occurred due to an increased number of lighting survey respondents in PY 2019 than in PY 2018, rather than from a change in the rebate delivery method. Of the 22% of PY 2019 respondents not receiving an instant discount, two said they chose the instant discount as it was easier for them, allowing them to complete projects with less cash outlay. One respondent said the contractor wrote the contract, including an instant discount. Others did not respond.

Program Satisfaction

The great majority of PY 2019 respondents were *somewhat satisfied* or *very satisfied* with all aspects of the Avista program, as shown in Figure 15. Lighting participants were most satisfied with application processing times, rebate amounts, and equipment installed (99% *very* and *somewhat satisfied* with each component), while non-lighting participants were most satisfied with equipment installed (100% *very* and *somewhat satisfied*; n=13) and with trade ally communications (100% *very satisfied*; n=7). The two

AirGuardian participants and the one Green Motors Rewind participant were *very satisfied* with all program aspects. Overall, PY 2019 respondents' likelihood to be at least *somewhat satisfied* with each program aspect proved consistent with PY 2018 results, within seven percentage points of the earlier responses. All PY 2018 respondents were *very satisfied* (82%) or *somewhat satisfied* (18%) with their Avista experience.

Figure 15. Satisfaction with Prescriptive Program Components



Source: Prescriptive survey questions H1: "In terms of the [PROGRAM], how satisfied were you with the following aspects? Please think about each item individually as you select your answer."

Two of the four respondents less than *somewhat satisfied* with account executive communications provided comments in that regard:

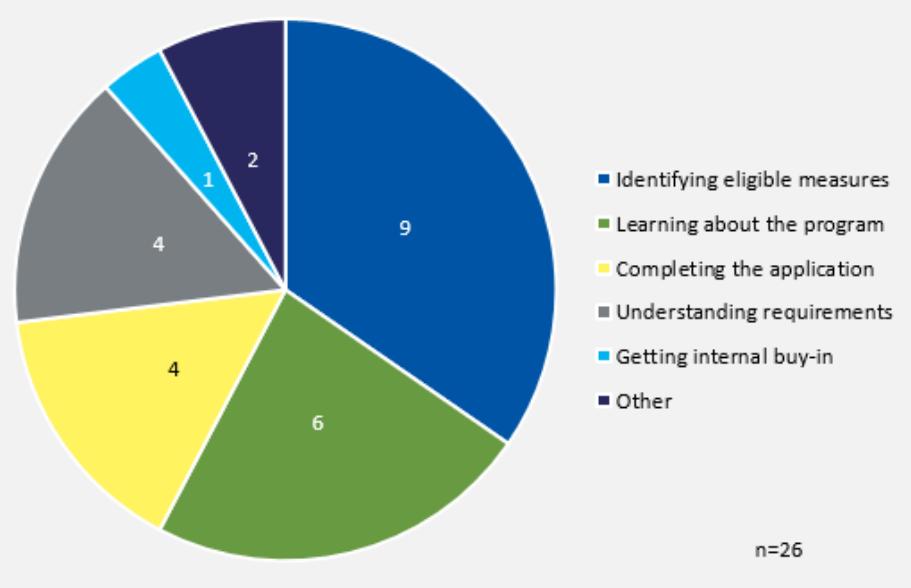
- One commercial HVAC respondent (also dissatisfied with submitting the application, the time required to process the application, the rebate, and the program overall) explained that the process took too long, involved a great deal of indecision in terms of what equipment qualified and what incentives were available, and, in the end, provided an incentive equivalent to 1.5% of the project's total cost. This respondent did not engage with a contractor or vendor.
- A second respondent (commercial lighting) expressed dissatisfaction with their account executive as the account executive initially said the project would not qualify for incentives.

A third respondent (commercial lighting) was *very satisfied* with individual program aspects, but was *not too satisfied* with the program overall. This respondent commented, "The program should cover conversion of lower-wattage, high energy-usage lighting. This rebate was for external lighting, yet at the same location, there are 58 metal halide fixtures that are 150 watts, available for conversion to 45-watt LEDs. The current rebate plan does not cover conversion of fixtures having this lower wattage."

Program Challenges and Successes

Only 26 of 86 respondents (30%) reported challenges in program participation, down from 52% (n=46) in PY 2018. As shown in Figure 16, respondents most commonly cited challenges in understanding what measures were eligible. Lighting participants typically reported this, further commenting that using the DesignLights Consortium's (DLC) list or ENERGY STAR©-certified product lists proved difficult. Six respondents felt the program should be marketed more, with some adding that they only learned of the program from their contractor or vendor, rather than directly from Avista.

Figure 16. 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 aspects that they viewed as working well. As shown in Table 9, respondents cited aspects related to the program process, including the ease of completing the application and fast and informative communication.

Table 9. Aspects of Avista Prescriptive Programs Working Well

Program Aspects	Number of Respondents
Application process and customer support	13
Better lighting for participants	11
Energy and cost savings for participants	10
Avista account executive communication	7
Rebate amount	7
Fast rebate	5
Reduced maintenance	2
Working with local trade allies	1
Other	1

Source: Prescriptive survey question H11: "What would you say is working particularly well with Avista's program?" (Multiple responses allowed; n=47)

As shown in Table 10, 19 participants provided recommendations for program improvements.

Table 10. Suggestions to Improve Avista Prescriptive Programs

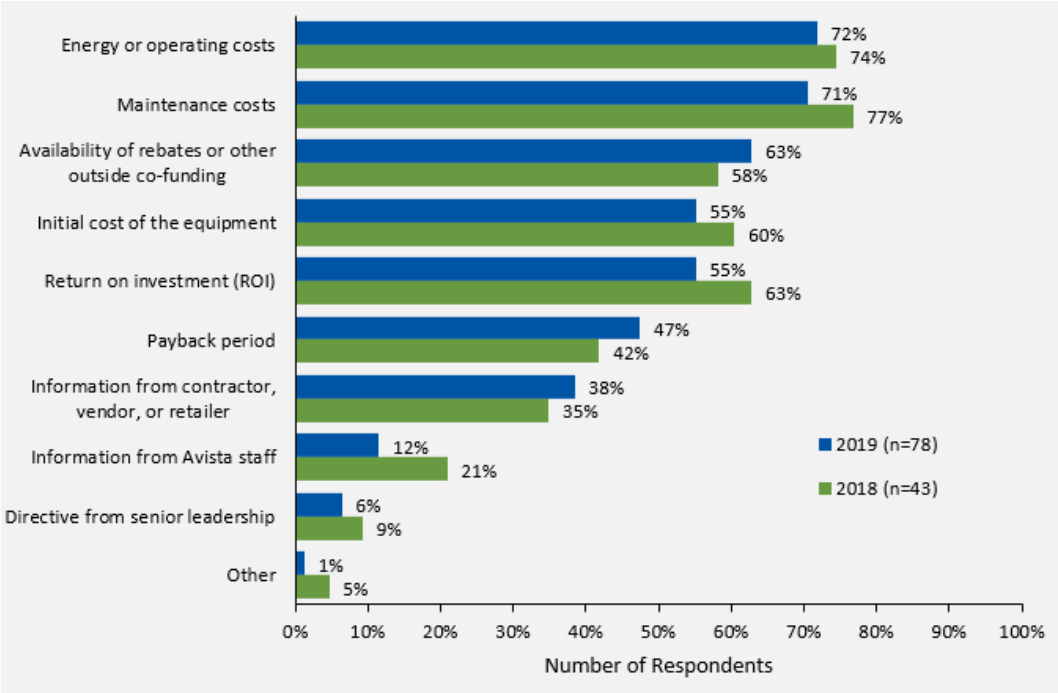
Suggestion	Number of Respondents
Expand eligible measures	6
Improve marketing	6
Make it easier to identify qualifying measures	3
Clarify requirements for eligibility, and/or outcome if post-inspection savings are low	2
Allow for more direct communication with Avista	1
Have not received rebate	1

Source: Prescriptive survey question H10: "What recommendations, if any, would you make to improve the program?" (Multiple responses allowed; n=19)

Energy Efficiency Attitudes and Behaviors

Nearly all (98%; n=80) PY 2019 respondents considered energy efficiency either *somewhat* or *very important* to their organization when making capital upgrades or improvements. As shown in Figure 17., respondents cited energy or operating costs (72%) and maintenance costs (71%) as the most important criteria in their decisions to undertake energy efficiency improvements. PY 2019 participants reported priorities similar to those of PY 2018 respondents when deciding to make energy efficiency improvements, and priorities remained similar across programs.

Figure 17. 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.

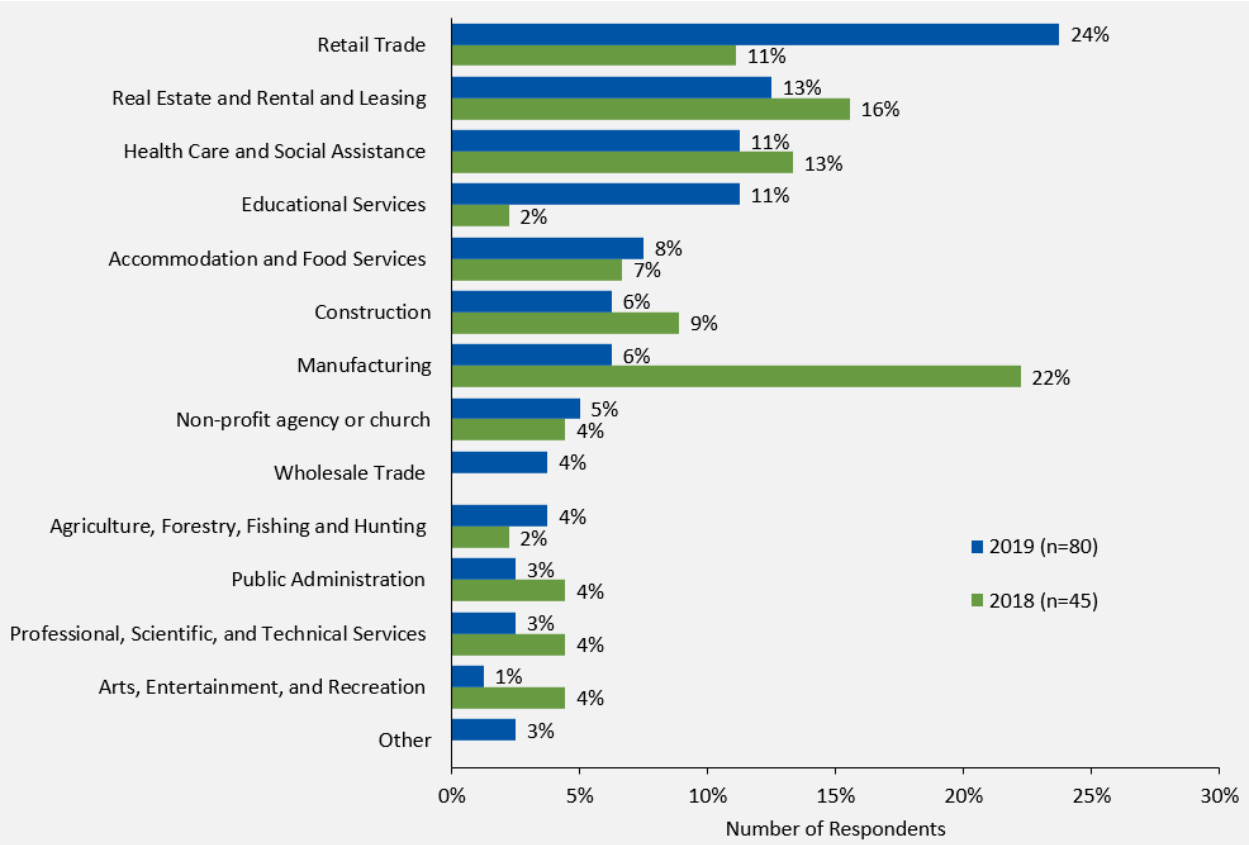
Nine respondents suggested other energy-savings programs that Avista could offer (though Avista already offers some of these items):

- Incentives for air conditioners (two responses)
- Energy management systems (two responses)
- HVAC upgrades (two responses)
- Special technologies, such as parking lot heating and Nano windows (two responses)
- Lighting and HVAC controls (one response)
- Energy audit (one response)
- Streetlights (one response)

Survey Respondent Profiles

Most PY 2019 survey respondents' reported natural gas as their primary heating fuel (70%; n=76); 83% owned their facilities. Facility sizes ranged from 1,000 square feet to one million square feet, with an average of 93,215 square feet (n=60). Employee numbers ranged from one to 3,000, with an average of 120 employees (n=34). Figure 18 shows respondents' organization types, compared to the PY 2018 Prescriptive survey sample. Respondents were similarly distributed, except PY 2019 had almost twice as many retail establishments than PY 2018, while PY 2018 had three times as many manufacturing facilities than PY 2019.

Figure 18. PY 2019 and PY 2018 Prescriptive Survey Sample Organization Types



Source: Prescriptive survey question L1: "What is the primary industry of your organization?"

Nonresidential Conclusions and Recommendations

Conclusions and recommendations for the Nonresidential programs are presented in this section.

Nonresidential Conclusions

- **Almost two-thirds of Nonresidential survey respondents participated in past business energy efficiency programs.** Most Site Specific (17 of 21) survey respondents previously participated in an Avista business energy efficiency program, compared with 56% of prescriptive respondents (42 of 75).
- **Contractors and equipment vendors were more engaged with participation drivers in PY 2019.**
  - In contrast with PY 2018 respondents, more PY 2019 respondents reported first learning about the Prescriptive program from a contractor (for an 8% increase) or an equipment vendor (a 4% increase).
  - PY 2019 respondents were more likely to designate their contractor or vendor as a motivating factor in PY 2019, increasing to 34% from 20% the previous year.
- **Participant motivations differed by program.**

  - Site Specific program participants identified saving money and using less energy as the top benefits from program participation, consistent with PY 2018 results.
  - PY 2019 Prescriptive survey respondents identified saving money and receiving a rebate as the top benefits (n=86; 76% and 66%, respectively), while, in PY 2018, Prescriptive survey respondents identified saving money and using less energy as the top benefits (n=46; 72% and 65%, respectively).

- **Though participants were highly satisfied with the program, a small number indicated some dissatisfaction.**
  - All Site Specific survey respondents (n=19) and 98% (n=83) of Prescriptive survey respondents expressed satisfaction with the program overall. In PY 2019, this satisfaction increased for Prescriptive survey respondents over PY 2018 respondents (98% and 91%, respectively).
  - Site Specific respondents expressed satisfaction with all program components, except for the equipment installed; one of 19 was *not too satisfied* with this component as the company "chose a weak vendor." Except for communication with contractors and vendors, PY 2019 respondents provided a higher number of *very satisfied* responses than in PY 2018.
  - Prescriptive survey respondents were highly satisfied with the pre- and post-project inspection and the equipment installed. Several survey respondents, however, provided reasons for dissatisfaction with the program and some of its components. One respondent stated that the overall process took too long and did not provide them with a high-enough incentive. Another said their account executive originally told them their project would not qualify for incentives, and a third respondent said the program should cover the conversion of lower-wattage, high energy-usage lighting.
- **Site Specific survey respondents said the program succeeded due to Avista staff (6 of 11) while Prescriptive survey respondents cited the program application process and customer support (28%; n=47).**
  - Site Specific program participants also cited energy and cost savings (3 of 11); and reported effective projects, easy processes, and multiple benefits (one response each) worked well.
  - Prescriptive survey respondents also cited better lighting (23%) and energy and cost savings (21%) as program elements that worked particularly well.
- **Participation challenges differed by program.**
  - For the Site Specific program, the top participation challenge was lack of program awareness. This differed from PY 2018's top challenge of determining rebate eligibility.
  - Prescriptive survey respondents listed their top challenges as identifying eligible measures and learning about the program. Lighting participants said using the DLC list or the ENERGY STAR-certified products list proved difficult.
- **Avista's rebate played an important role in the decision to complete the energy efficiency project.** All Site Specific and all but two Prescriptive survey respondents said Avista's rebate proved important in their decision to complete the project.

- Site Specific respondents identified availability of rebates and/or other co-funding as the most important criteria for making energy efficiency improvements (14 of 18), followed by energy or operating costs (12 of 18), and the return on investment (12 of 18).
- Prescriptive survey respondents identified energy or operating costs as the most important criteria (72%; n=43).

Nonresidential Recommendations

Nonresidential Recommendation 1: Per some survey respondents, determining rebate eligibility proved challenging. Lighting survey participants specifically said using the DLC list or the ENERGY STAR-certified product list posed difficulties. Consider conducting an internal review of eligibility requirements and messaging to determine additional educational materials that could be created for and provided to customers. For example, a frequently asked questions pamphlet could be developed to answer common questions regarding eligibility, or a customer newsletter could provide information about determining eligibility.

Multifamily Programs

This section focuses on two Multifamily programs: Multifamily Direct Install (MFDI) and Multifamily Market Transformation (MFMT). The MFDI program provides energy efficiency measures through a direct-install phase and an optional supplemental phase, while the MFMT program provides incentives for natural gas space and water heating equipment in new multifamily developments.

Multifamily Direct Install Program Findings

The MFDI program consists of a direct-install phase that includes energy efficiency measures (such as faucet aerators, kitchen aerators, LEDs, Tier I smart power strips, and VendingMisers).[1] An optional supplemental lighting phase follows, in which SBW Consulting offers lighting upgrades in facilities' common areas. Various lighting contractors perform an audit and provide SBW with the best lighting retrofit options.

For a process evaluation of the MFDI program, Cadmus conducted stakeholder interviews with Avista program and implementer staff, in addition to two sets of phone interviews with multifamily property managers who participated in the pilot in PY 2018 and in the program in PY 2019.

Stakeholder Interviews

In January 2019, Cadmus interviewed Avista and program implementer staff about the MFDI program, as Cadmus did in April 2018, when the program was still a pilot. The 2018 DSM Business Plan specified that the program implementer would recruit MFDI pilot participants through door-to-door visits, drawing upon a list of complexes and property owners provided by Avista. Since the pilot, however, maintaining and developing the candidate list primarily has become the implementer's responsibility. The implementer noted that, due to the pilot's success, word-of-mouth and referrals effectively generated participation in PY 2019, and Avista has been helpful in confirming whether properties fall within Avista's service territory.

The program implementer and Avista reported high satisfaction levels for direct-install measures among tenants and building mangers. Though the implementer reported that participants occasionally requested measure removal (due to water pressure differences with aerators and faucets),[2] this did not occur frequently.

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[1] Devices that can be installed on beverage vending machines that use a motion sensor to determine when the machine should be powered on and off. The device measures ambient room temperatures every few hours to determine how much power to utilize.

[2] In other similar direct-install programs, water-saving measures experience lower installation rates than other measures for these same reasons.

Following the pilot's initial, direct-install phase, Avista and the implementer initiated a supplemental lighting phase, during which installers, subcontracted by the implementer, revisited multifamily properties to install additional common area lighting for property managers expressing interest. While completing direct-install measure installations, the implementer identified and reviewed opportunities for common area lighting with Avista and the pilot participant, all subject to Avista's approval. If approved by Avista, a subcontractor later returned to the property to install the lighting.

The PY 2019 program followed this same structure as the PY 2018 pilot, but, in PY 2019, the implementer attempted to integrate the supplemental lighting phase more effectively with the program's direct-install portion. Previously, confusion occurred, with extended delays between the primary direct-install and the supplemental lighting phases. Currently, lighting audits and installations are scheduled closer to the initial, direct-install phase to help mitigate these issues, though one PY 2019 participant reported an extended delay between these phases.

In PY 2018, the implementer faced challenges in managing large data amounts required to refine *ex ante* energy-savings and demand-reduction estimates for the direct-install measures. Although the pilot achieved its initial participation and natural gas savings targets, it did not meet its electricity savings targets.[3] In PY 2019, however, the program surpassed its goals midway through the year, encouraging the implementer to increase its electricity and natural gas targets for 2020.

Throughout the MFDI Pilot, Avista and the implementer met weekly to discuss the pilot's progress and its delivery issues. During PY 2019, the frequency decreased to monthly meetings, given the program ran so smoothly, and both were highly satisfied with their working relationship. The implementer noted strong communication and a sense of partnership, allowing for improvements while ensuring the program's cost-effectiveness. Avista considered the partnership exceptionally collaborative.

Participant Interviews

In March 2019, Cadmus interviewed five multifamily property managers who participated in the MFDI program, seeking to ascertain their awareness of, motivation to participate in, and satisfaction with the program, in addition to identifying participation barriers and the program's influence on other energy-saving behaviors. The five property managers had not participated in the original PY 2018 pilot. Participating multifamily residences could have the following measures installed:

- Faucet aerators
- Kitchen aerators
- LEDs (indoor)
- Tier I smart power strips

[3] Because of its status as a pilot, the MFDI pilot did not set formal energy-saving goals.

- Showerheads
- VendingMisers

Though the PY 2018 pilot also offered these measures, the implementer no longer offered the following in 2019: water heater temperature assessments; water heater blanket installs; water heater pipe wrap installs; shower valves with automatic temperature shut-offs; or smart plugs.

All five PY 2019 property managers installed faucet aerators, kitchen aerators, LEDs, and showerheads, but not VendingMisers or smart power strips.[4] The implementer reported VendingMisers had the lowest uptake of all measures in PY 2019. Avista and the implementer agreed that smart power strips also had very low uptake in PY 2019; the implementer reported that it often did not recommend this measure to participants as it generates little interest.

In PY 2018, similar interviews were conducted with 10 multifamily property managers who participated in the pilot.

Awareness and Motivation

All five property managers learned about the program from Avista (three) or the implementer (two). Three property managers said Avista or the implementer usually informed them of methods to save energy in their buildings, though one property manager learned about energy-saving opportunities through the residence's sister property, and one property manager reported hearing or learning little about energy-saving methods or opportunities. These results were similar to findings from PY 2018.

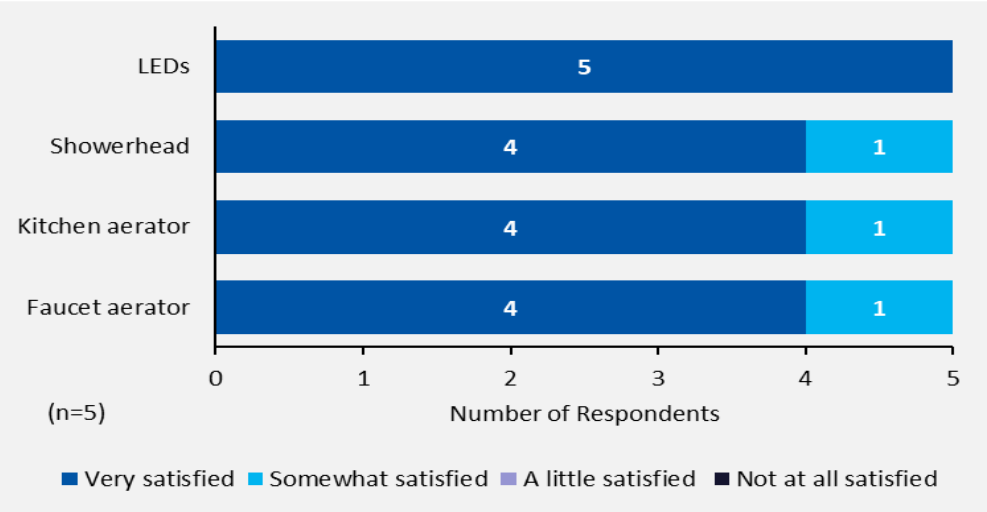
Measure Satisfaction

All five property managers were *very satisfied* with the quality of energy-saving measures installed at their multifamily properties. Results were similar to those from PY 2018, in which eight of 10 interviewed participants were *very satisfied* with energy-saving measures. One PY 2019 participant did not have post-installation problems, aside from two faulty light bulbs that the implementer replaced the day after installation. Another property manager realized significant savings in his/her water bills, reporting that tenants also noticed savings in their electricity bills.

In terms of tenant satisfaction, all property managers reported that their tenants were *very satisfied* with the LEDs, as shown in Figure 19. One property manager reported a significant decrease in work orders after the LED installations. For showerheads, faucet aerators, and kitchen aerators, four property managers thought their tenants were *very satisfied,* and one thought they were *somewhat satisfied* with these measures.

[4] Cadmus interviewed 10 multifamily property managers in 2018 who participated in the initial pilot. Measure installations for 2018 were similar to 2019 for measures that were offered both years.

Figure 19. Satisfaction with Program Measures, PY 2019



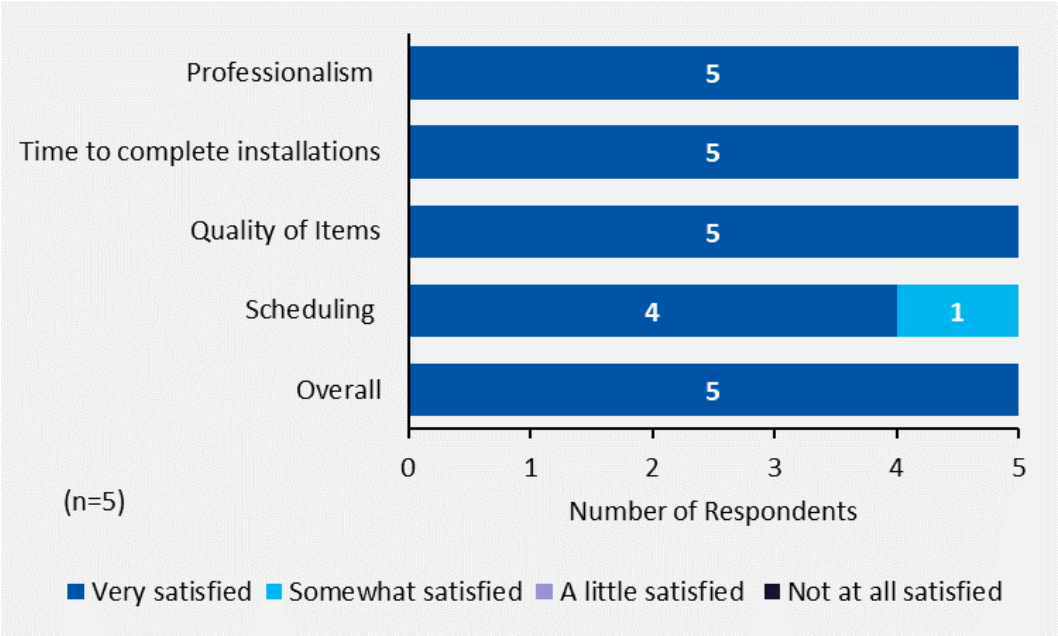
Source: MFDI Program Participant Interview, Question B1:
"In your perspective (given your interactions with them), are your tenants very satisfied, somewhat satisfied, a little satisfied, or not at all satisfied with their new…?"

Of the five PY 2019 property managers, two participated in the supplemental lighting phase, both of whom were *very satisfied* with the new outdoor lighting. When asked about tenant feedback, one did not report tenant issues or complaints; the other reported that tenants provided positive feedback, such as feeling much safer around the complex at night.

Program Satisfaction

All five property managers were *very satisfied* with their MFDI program experiences overall, consistent with PY 2018 results. In addition, all but one property manager were *very satisfied* with every program element in PY 2019, as shown in Figure 20. The one property manager was *somewhat satisfied* with scheduling the installer.

Figure 20. Satisfaction Ratings with Program Elements and Overall, PY 2019



Source: MFDI Program Participant Interview, Question B3 and B9:
"Using the same scale as before, how satisfied were you with…"

The two property managers who received supplemental lighting also addressed questions about their satisfaction with the same program elements and with their overall experience around this program phase. Both property managers reported being *very satisfied* with the contractors' professionalism, the time required to complete the installations, and the quality of outdoor lighting. In terms of satisfaction with the scheduling process, one property manager was *very satisfied* while one was *not at all satisfied*. The latter property manager reported that, after initial program installations, months passed before the installer returned to install the outdoor lighting, and that the installer had shown up without warning. This property manager recommended increased communication from the installer.

Participation Barriers

No property managers interviewed in PY 2018 or PY 2019 reported barriers to pilot/program participation. For the program's supplemental lighting portion, one property manager in PY 2019 reported difficulties in scheduling the assessment and installation appointment, though eventually the installer completed the outdoor lighting. Two other PY 2019 property managers were eager to participate, but they either had not heard back from the implementer's subcontractor regarding the audit, or they had the audit completed, but never receive further communication from the installer. Both reported reaching out to the implementer, but not hearing back; both recommended enhanced communication.

Avista and the implementer did not observe significant barriers for multifamily property managers or tenants to participate in the MFDI program. For the PY 2018 pilot, Avista directly targeted potential property managers to prescreen them. Avista and the implementer noted that property managers encountered challenges in finding the time and resources to accompany the installer to the complex.

The implementer reported mitigating this by managing the properties' scheduling pipeline and by remaining flexible with property managers' availability to accompany the installer.

Program Influence

Cadmus asked property managers if they took energy-saving actions after participating in the MFDI program, and, if so, how important the program was in influencing that behavior. In PY 2019, two of the five property managers installed additional energy-saving items. One reported that the program was *somewhat important* in influencing this decision;[5] the other property manager would have installed the measures anyway and considered the program's influence as *not at all important*. Two respondents were *somewhat likely* to seek out energy efficiency measures, while another two said they were *a little likely* to do so. The fifth was *not too likely* as he/she could not afford to install additional energy-saving measures.

In PY 2018, three of 10 property managers installed additional energy-saving items and said the pilot was *very important* in influencing their actions, with all stating they were only *a little likely* to pursue energy-saving actions in the pilot's absence.[6] The other seven property managers had not taken additional energy-saving actions, but said they were *very likely* to seek out energy-saving items.

Successes

In PY 2018 and PY 2019, the program ran smoothly. Cadmus identified four success areas for the MFDI program through interviews with Avista, the implementer, and participating property managers:

- **Surpassing savings goals** midway through PY 2019 allowed the development of increased goals for 2020.
- **High customer interest**, generated through positive word-of-mouth and referrals, generated sufficient support for the program overall.
- **High property manager satisfaction** levels with direct-install measures and the supplemental lighting phase led to high program satisfaction levels and some spillover effects, in which property managers pursued other energy-saving opportunities.
- **Collaborative relationships** between Avista and the program implementer allowed the program to run smoothly in PY 2018 and PY 2019.

Challenges

Cadmus identified two minor challenges for the MFDI program:

- **Unclear supplemental lighting phase communication** may have affected participation and progress toward savings goals. Two property managers never heard back from the

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[5] Using the following scale: *not at all important*, *a little important*, *somewhat important*, *very important*.

[6] Using the following scale: *not at all likely*, *a little likely*, *somewhat likely*, *very likely*.

implementer's subcontractor regarding the supplemental lighting phase in PY 2019; this also occurred for two of 10 property managers in PY 2018. Although not necessarily dissatisfied with the delay, the property managers grew impatient, having received no further correspondence about a follow-up appointment at the time of Cadmus' interviews.

- **Low installation rates for VendingMisers and smart power strip measures.** Though the smart power strips remained eligible, they generated very low interest among property managers, leading the implementer not actively pursuing installation of this measure. Though the implementer still pursues VendingMisers, it does few installations. Per Avista and the implementer, both measures had the lowest uptake among the program's direct-install measures.

Multifamily Market Transformation Program Findings

The MFMT program provides incentives for natural gas space and water heating equipment in new multifamily developments. Cadmus conducted interviews with Avista staff and home builders as part of the MFMT program evaluation in PY 2019.

Avista Staff Interview

The program is marketed primarily through multifamily developers—a strategy that has succeeded. Avista also markets the program with Alaska Airlines, through magazines such as *Eco-Structure* and *The Architect*, and through pamphlets, direct mail, and email. The Idaho program remains on track to meet its year-end goals, while the Washington program will likely fall short of its goals. Avista staff does not expect significant changes for the remainder of the program year.

Avista staff emphasized that HVAC program trade allies, which help deliver the MFMT program, serve as a crucial group that Avista seeks to further involve in the program. Two main trade ally highlights appeared:

- ***Contractor Support:*** While Avista does not require contractor training on installing natural gas heat or various natural gas appliances (such as ranges, dryers, or fireplaces), staff reported regularly attending HVAC association meetings alongside contractors. Avista staff also reported seeing significant installation practice improvements due to increased communication and support between trade allies.
- ***Outreach methods:*** Avista staff said that working hand-in-hand with contractors has provided an effective means of estimating costs in project areas. As such, Avista provides contractors with resources similar to those building developers receive to help inform contractors about the program. Avista staff also noted the importance of the Trade Ally Network and the Trade Ally Module (now called the Trade Ally Connect) in reaching contractors. Through Avista uses this online portal, trade allies can log into the Trade Ally Network, create a profile, and become part of the network. Avista program managers believe that the Trade Ally Module, an online database of trade allies that Avista implemented in spring PY 2018, has been a very successful communication tool for engaging with contractors. Staff said this tool has been used to send mass emails about webinars and upcoming trainings. Following a recent upgrade, the Trade Ally

Module has become Trade Ally Connect, offering further avenues for improving communication with trade allies (such as project tracking the number of savings, projects, and incentives).

Avista staff identified two challenges with the new program:

- ***Developer and design firm involvement:*** Difficulties sometimes arose in convincing developers to pay redesign fees or to take the time necessary to redesign an entire project with their hired design firms (for example, design/build groups, architects, or mechanical engineers). Converting an electric multifamily project to natural gas increased expenses and required more technical expertise, and Avista reported losing a few projects due to this. Avista recognized, however, that presenting developers with this opportunity early in the design phase can break down this barrier and increase participation.
- ***Conflicting incentives:*** The U.S. Department of Housing and Urban Development (HUD) provides developers with more funding for HUD low-income properties if those properties are all electric (rather than natural gas). Though Avista continues its efforts to work with HUD developers, it has encountered issues in addressing the conflict between MFMT program and HUD incentives at the local level.

Home Builder Interviews

In 2019, Cadmus conducted interviews with five participating home builders, assessing their reasons for and obstacles to participation as well as measuring their overall satisfaction and experience with the program. Of those interviewed, four home builders participated in the program in Washington and one participated in Idaho. All five were *very satisfied* with their overall program experience.[7]

Four builders said the program incentives served as their primary motivation for program participation, while one builder installed natural gas appliances due to their increased benefit for the environment and to provide a good product offering for prospective tenants. All five builders described their relationship with Avista as positive, with one builder citing the helpfulness of their program representative.

Cadmus asked builders how they would rate the ease of qualifying a new building for the program's incentive: three home builders found it *very easy* and one found it *somewhat easy*.[8] The latter builder considered it *not too easy* because, while the program itself was not too complicated, it had many moving parts that could make qualifying for incentives somewhat complex.

Additionally, Cadmus asked the builders about the program's impact on the way home builders design and construct buildings. One builder reported his/her firm primarily used electric heating in its developments before participating in the program, but it switched to natural gas to take advantage of

[7] Using the following scale: *not at all satisfied*, *a little satisfied*, *somewhat satisfied*, *very satisfied*.

[8] Using the following scale: *not at all easy*, *not too easy*, *somewhat easy*, *very easy*.

the incentive. The other four home builders already used natural gas as the primary heating fuel in most of their developments.

When asked how program participation affected business for their companies, four home builders indicated positive impacts due to incentives that helped finance the projects. Again, the last builder said he/she did not notice measurable impacts, but did note that tenants liked natural gas appliances and that installing these appliances set them apart from competitors that only installed electric heating appliances.

Multifamily Conclusions and Recommendations

Conclusions and recommendations for the Multifamily programs are presented in this section.

Multifamily Conclusions

- **Multifamily property managers and tenants participating in the MFDI program generally were *highly satisfied* with the program and the measures installed.**
  - Property managers expressed satisfaction with contractors' professionalism, item quality, time required to complete installations, and the scheduling process.
  - Tenants proved *highly satisfied* with the quality of outdoor LED lighting installed during the program's supplemental lighting phase.
- **Communication during the MFDI program's supplemental lighting phase could improve.**
  - Two of five multifamily property managers that Cadmus interviewed in PY 2019 had yet to hear from the implementer's subcontractor regarding the program's supplemental lighting phase.
  - Similar delays and communications lapses remained an issue from the PY 2018 pilot, when two of 10 interviewed managers noted these problems.
- **Home builders participating in the MFMT program highlighted positive benefits from the program helping their business.**
  - Four home builders that participated in the PY 2019 MFMT program cited specific participation benefits (such as incentives helping with project financing and increased tenant interest in natural gas appliances).

Multifamily Recommendations

Multifamily Recommendation 1: Improve the timeline and communication among parties between MDFI program's direct-install phase and supplemental lighting phase. Provide property managers with a point of contact to whom they can direct inquiries about the status of their outdoor lighting applications.

Multifamily Recommendation 2: Conduct an internal review of steps for qualifying new buildings for the MFMT program to determine whether the program can remove or streamline qualification steps and

simplify the process for home builders. Consider developing a process flow map to outline the program steps, making it easier for builders to follow.

Multifamily Recommendation 3: Include language in MFMT program marketing and outreach to target participation benefits noted by builders (such as incentives that help with project financing and increased tenant interest in natural gas appliances).

Residential Programs

The HVAC, Shell, and Fuel Efficiency programs provide Residential households with prescriptive rebates for installing space heat, water heat, smart thermostats, storm and standard windows, and natural gas space and water heat.

Residential Program Findings

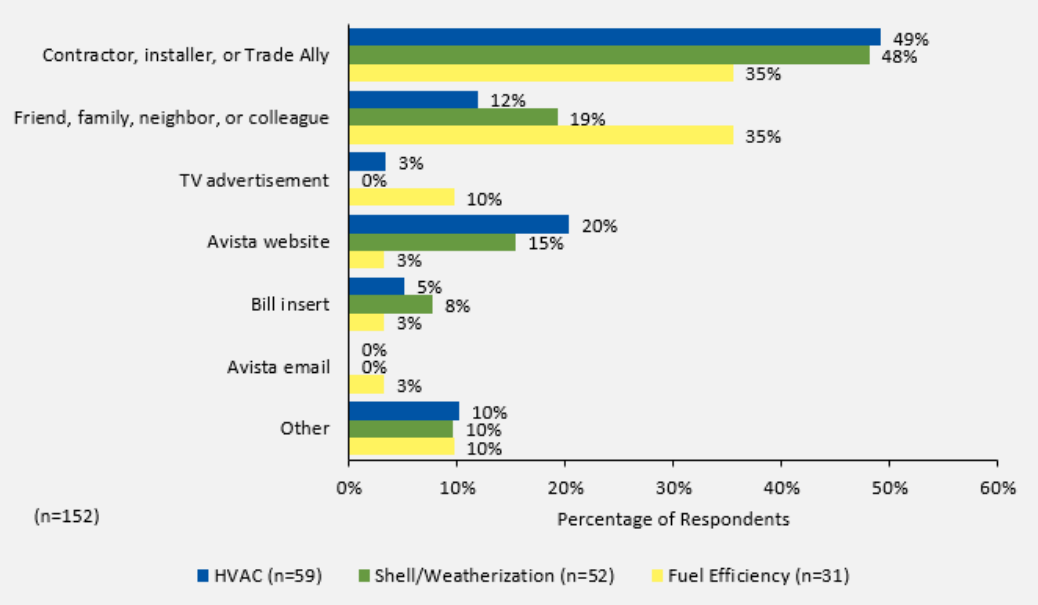
For the PY 2019 process evaluation, Cadmus conducted phone surveys with HVAC, Shell, and Fuel Efficiency program participants.

Cadmus completed 152 phone surveys with HVAC, Shell, and Fuel Efficiency program participants, in four waves of 38 completes. The following sections synthesize the results from all four survey waves (two waves per program year) and detail the findings (all program-specific findings have been synthesized from the four waves). All other findings are specific to results gathered in PY 2019 for waves three and four.

Customer Awareness

Cadmus asked survey respondents where they learned about the program in which they ultimately participated. In PY 2019, respondents most commonly learned about Avista programs through contractors (38%), followed by word-of-mouth (26%) and Avista's website (19%). Figure 21 shows program-specific results. While customers continued to learn about programs primarily through contractors, they did so less frequently than in PY 2018 (53%). Otherwise, respondents learned more frequently about the program through word-of-mouth (26% in PY 2019 compared to 14% in PY 2018) and Avista's website (19% in PY 2019 compared to 11% in PY 2018).

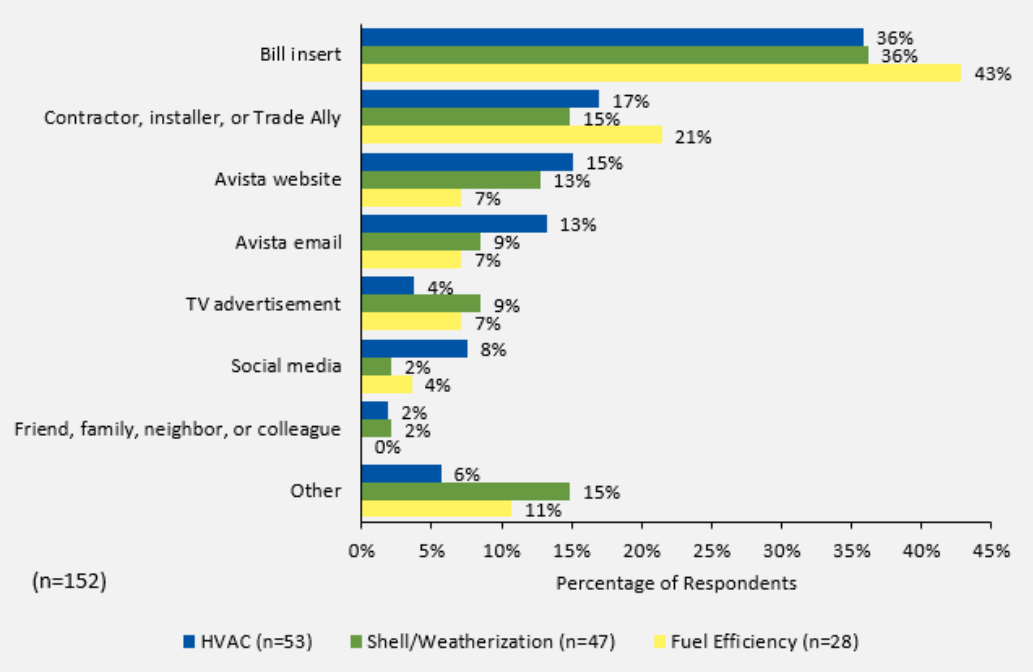
Figure 21. Awareness of Avista Energy Efficiency Programming, PY 2018 and PY 2019



Source: Residential Programs Participant Survey, Question B1: "How did you first hear about the [PROGRAM NAME] program?"

Cadmus also asked respondents how they preferred to learn about Avista's energy efficiency programs. Though most PY 2019 respondents preferred bill inserts (43%), they also cited Avista's website (21%) as an effective method for spreading information. A small portion of PY 2019 respondents preferred Avista's emails (10%) or contractors (9%). From PY 2018 to PY 2019, the Avista website saw the greatest increase as an information source (from 3% to 21%), while contractors experienced the biggest decrease (from 27% to 9%). Figure 22 shows program-specific results.

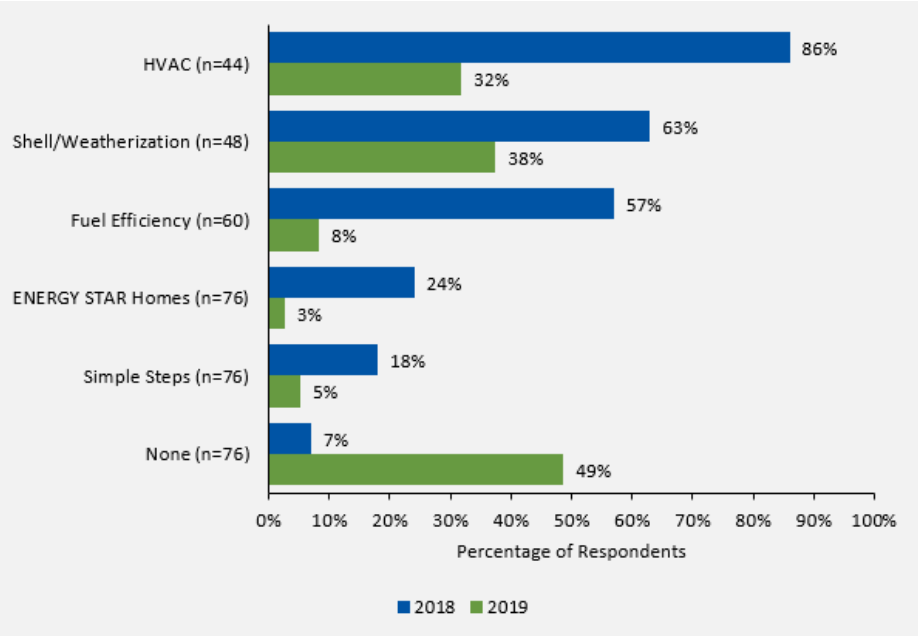
Figure 22. Preferred Method to Learn About Programming, PY 2018 and PY 2019



Source: Residential Programs Participant Survey, Question B2: "What is the best way for Avista to inform Residential customers like you about their energy efficiency improvement rebates?"

In PY 2019, 49% of respondents heard about at least one Avista energy efficiency program, other than the program in which they participated. Respondents most frequently reported hearing about the Shell program (38%), followed by the HVAC program (32%). As shown in Figure 23, survey respondents reported that New Homes and Simple Steps, Smart Savings—two programs administered by third-party implementers—achieved much lower awareness levels. As the surveys allowed multiple responses, they collected more responses in PY 2018 (139) than in PY 2019 (86), possibly exerting downward pressure on awareness results for PY 2019. Otherwise, it remains unclear why awareness of other programs might have fallen in PY 2019.

Figure 23. Awareness of Other Programs, by Program Year

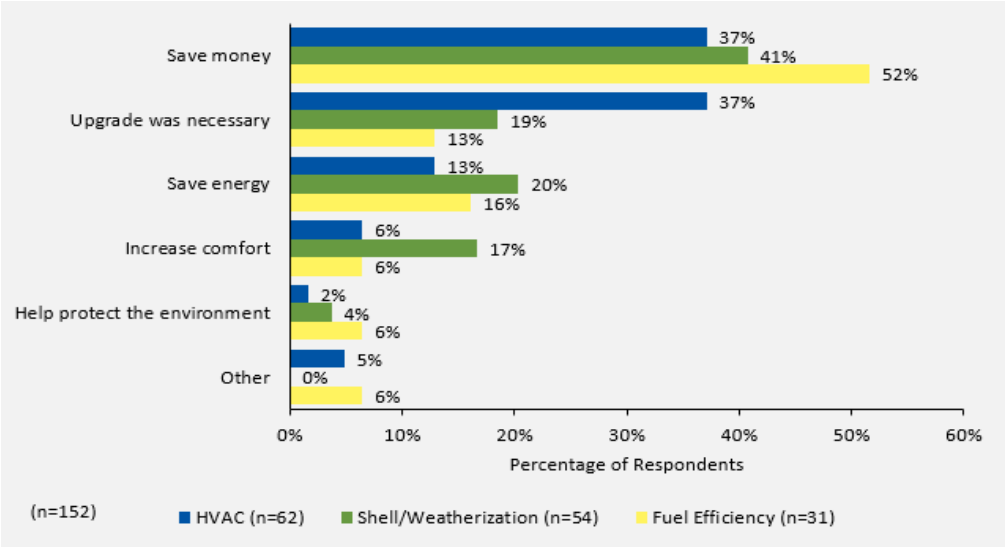


Source: Residential Programs Participant Survey, Question D1: "What other Avista energy efficiency programs have you heard of?" Multiple responses allowed.

Motivation and Program Benefits

In PY 2019, respondents participated in Avista's programs primarily to save money (25%), save energy (22%), and/or increase their homes' comfort (11%). Figure 24 shows program-specific results, with 37% of HVAC program respondents participating only because it was necessary (for example, existing furnaces or windows were broken); 19% of Shell and 13% of Fuel Efficiency respondents gave similar answers. From PY 2018 to PY 2019, necessary upgrades provided the largest motivation increase (from 20% to 31%), followed by saving energy (from 11% to 22%). Saving money realized the largest decrease in motivation (from 57% to 25%).

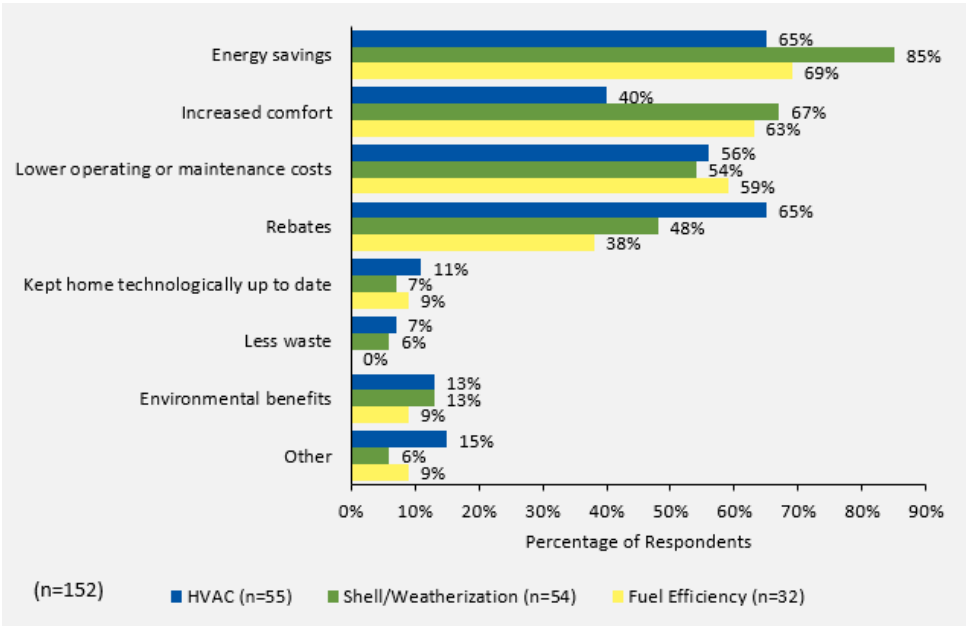
Figure 24. Motivation to Participate in Residential Programs, PY 2018 and PY 2019



Source: Residential Programs Participant Survey, Question B3: "What motivated you to participate in the [PROGRAM NAME] program?" Multiple responses allowed.

Cadmus asked respondents a multiple-response question about benefits they associated with Avista's Residential programs. In PY 2019, most cited lower operation/maintenance costs (38%), energy savings (34%), increased comfort (32%), and rebates (32%). Figure 25 shows program-specific results.

Figure 25. Benefits of Participation in Residential Programs, PY 2018 and PY 2019



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.

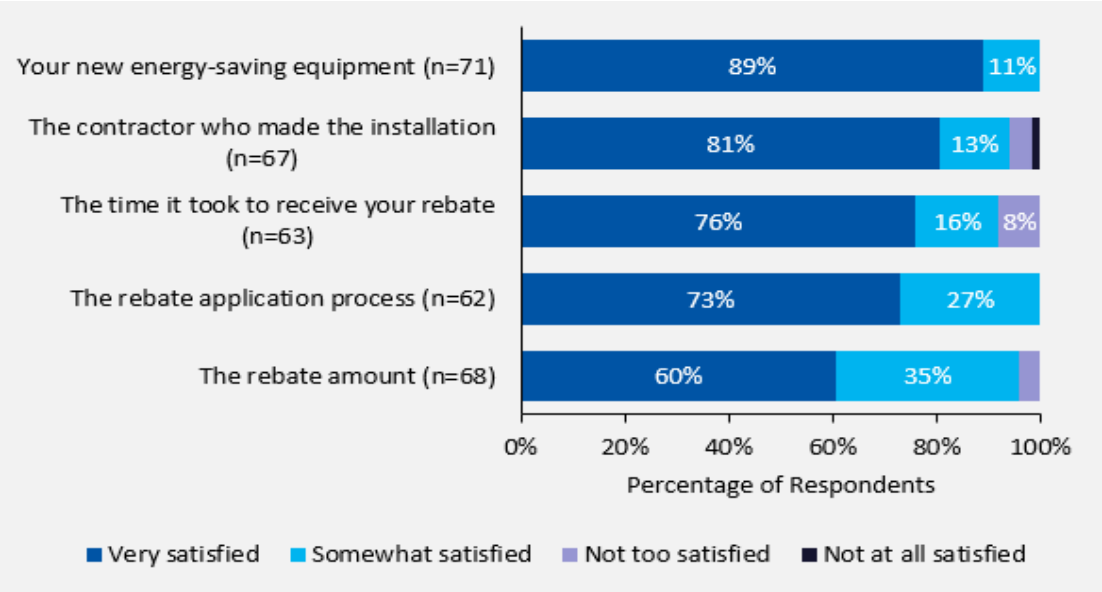
Though a small portion of respondents preferred to keep up with technological trends and to produce less waste and better environmental outcomes, the largest increase in perceived application benefits

from PY 2018 to PY 2019 occurred for environmental benefits (from 7% to 17%). The biggest decrease in perceived benefits occurred in energy savings (from 83% to 34%). Due to multiple responses, the PY 2018 survey collected more responses (248) than the PY 2019 survey (138), possibly exerting downward pressure on PY 2019 results. It remains unclear why awareness of other programs might have fallen in PY 2019.

Program Satisfaction

Cadmus asked survey respondents to indicate their satisfaction levels with various program elements associated with their rebate, new equipment, and installing contractor. Respondents' satisfaction levels ranged from 92% to 100%[9] with the five elements shown in Figure 26. Respondents were least often *very satisfied* with the rebate amount. Lower satisfaction with rebates—as customers self-reported via the survey—occurs commonly among prescriptive rebate programs; hence, Cadmus does not find this result unusual. From PY 2018 to PY 2019, however, the rebate amount received the largest increase in *very satisfied* responses (from 42% to 60%). The rebate application process experienced the largest decrease in *very satisfied* responses (from 85% to 73%).

Figure 26. Satisfaction with Residential Program Elements, PY 2019



Source: Residential Programs Participant Survey, Question C1: "How would you rate your overall experience with..."

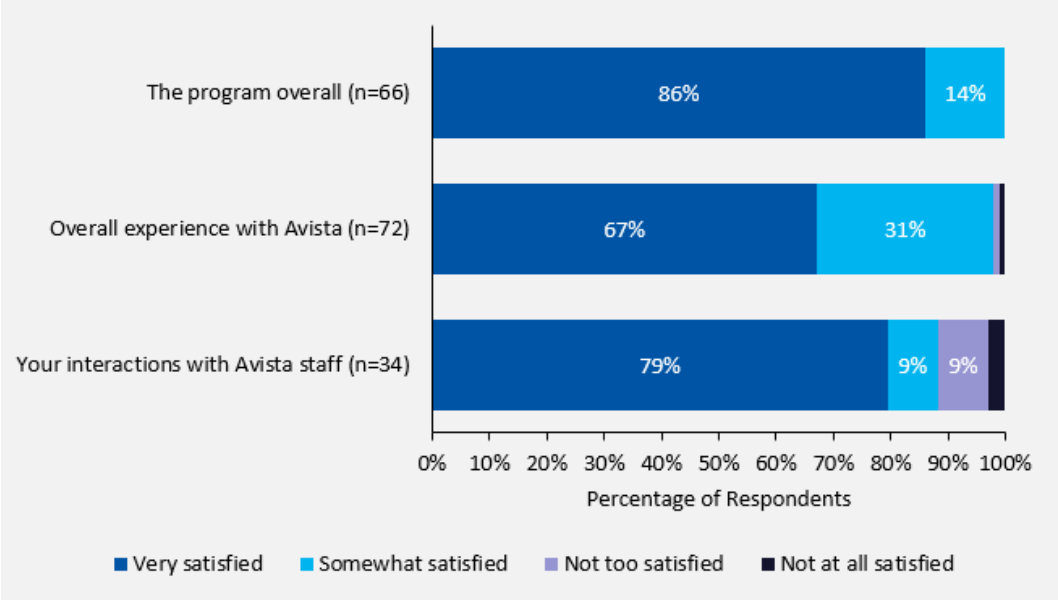
By year, Cadmus found detectable differences in rebate satisfaction: 29 of 69 participants from PY 2018 were *very satisfied* with the rebate amount (42%), in comparison to 41 of 68 participants from PY 2019 (60%). Additionally, 51 of 60 participants from PY 2018 were *very satisfied* with the rebate application

[9] The combination of *very satisfied* and *somewhat satisfied* responses.

process (85%), in comparison to 45 of 62 participants from PY 2019 (73%). Cadmus found each of these differences statistically significant at 90% confidence. It remains unclear (beyond feedback that rebates were "too low") why the percentage of *very satisfied* respondents was higher for PY 2019 participants than for PY 2018 participants.

Respondents satisfaction levels ranged from 88% to 100%[10] with the three elements shown in Figure 27. From PY 2018 to PY 2019, the program overall showed the largest increase in *very satisfied* responses (from 74% to 86%), and interactions with Avista staff showed the largest decrease in *very satisfied* responses (from 87% to 79%).

Figure 27. Satisfaction with Avista and Residential Programs Overall, PY 2019



Source: Residential Programs Participant Survey, Question C1: "How would you rate your overall experience with..."

After asking respondents about their satisfaction with the programs and their elements, Cadmus solicited respondents' recommendations and feedback regarding possible program improvements. Across all survey waves, 43% of respondents (66 of 152) provided feedback, consisting mostly of the following recommendations:

- Increase rebates (29 of 66)
- Increase advertising (20 of 66)
- Simplify rebate applications (9 of 66)

[10] The combination of *very satisfied* and *somewhat satisfied* responses.

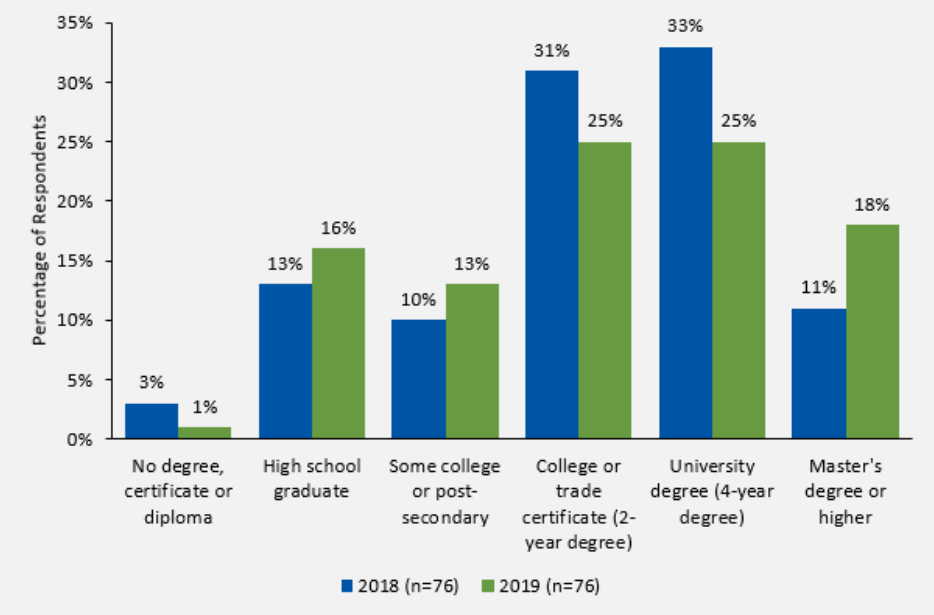
Energy Efficiency Behaviors

In PY 2018 or PY 2019, 25 of 147 survey respondents (17%) purchased and installed other high-efficiency equipment after participating in an Avista Residential program. Ten of those 25 respondents considered their program participation a *very important* influence on their purchasing decisions.

Survey Respondent Profile

As shown in Figure 28, most survey respondents in PY 2019 had a two-year, four-year, or master's degree (68%), similar to the 75% reporting in PY 2018.

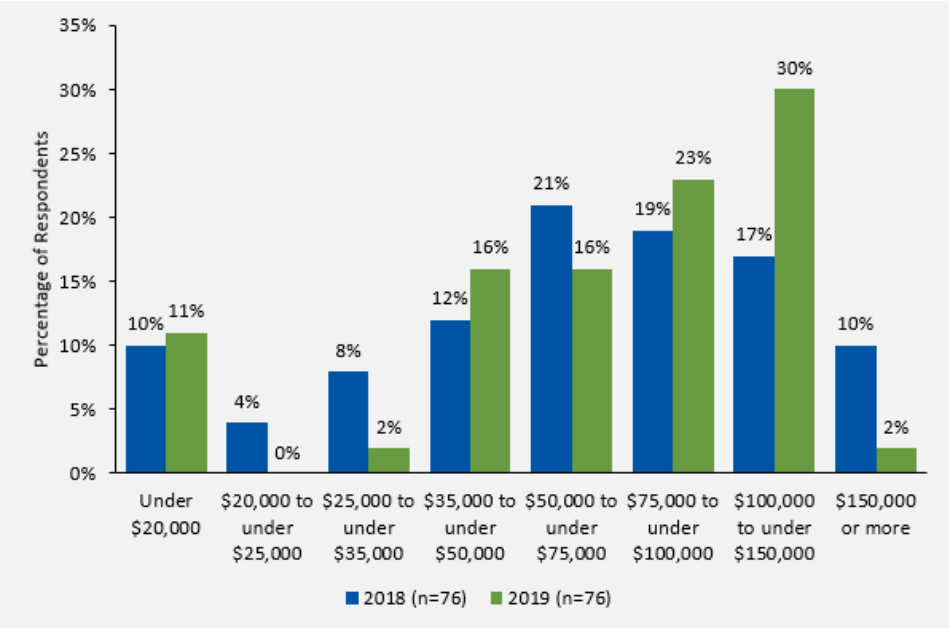
Figure 28. Residential Program Participant Education, by Program Year



Source: Residential Programs Participant Survey, Question F1: "What is the highest level of education that you have completed?"

In PY 2019, 71% of respondents earned at least $50,000 annually, as shown in Figure 29.

Figure 29. Residential Program Participant Income Ranges, by Program Year



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."

In PY 2019, survey respondents reported an average household size of roughly 2.5 residents (n=73). Over 93% of respondents owned their homes (n=74), and over 89% had wireless Internet access (n=74).

Residential Conclusions and Recommendations

Conclusions and recommendations for the Residential programs are presented in this section.

Residential Recommendations

- **Residential program participants learned about Avista programs differently in PY 2019 than in PY 2018.**
  - While contractors remained the primary method through which customers learned about their program in PY 2019 (38%), this represented a decrease from the number in PY 2018 (53%). Word-of-mouth, however, increased in PY 2019 (26%) over PY 2018 (14%).
- **Residential programs maintained high satisfaction levels throughout PY 2018 and PY 2019.**
  - All respondents (n=152) were *very satisfied* or *somewhat satisfied* with programs in which they participated; 98% were *very satisfied* or *somewhat satisfied* with Avista's role in their experience.

Residential Conclusions

Residential Recommendation 1: Consider increasing outreach and marketing efforts through bill inserts and Avista's website. While word-of-mouth referrals from contractors/trade allies and friends/family/coworkers proved beneficial, survey respondents in PY 2019 (n=76) most frequently preferred learning about energy efficiency programs and opportunities through bill inserts (43%) and

Avista's website (21%). Using bill inserts and Avista's website to promote midstream and third-party programs (such as Simple Steps, Smart Savings) not only could cultivate more interest in these offerings; it could raise awareness of Avista's role in administering the programs, and it could improve data collection efforts where access to customer information is lacking or difficult to compile.

Third-Party Implementer Program

Simple Steps, Smart Savings is a midstream program that provides markdowns on specific items (such as LEDs, LED fixtures, showerheads, and clothes washers) through participating retailers. Avista administers the program, and CLEAResult implements it. As part of the implementation process, CLEAResult gathers all sales data from participating retailers, occasionally sends program staff to visit each retailer, and provides marketing materials as well as any other relevant program information.

Third-Party Program Findings

For the process evaluation of Simple Steps, Smart Savings, Cadmus conducted stakeholder interviews with Avista, implementer staff, and participating retailers.

Stakeholder Interviews

Avista staff reported delivering the Simple Steps, Smart Savings program, as described in the *PY19 Avista DSM Standard Operating Procedures Manual*. Avista staff said the program runs smoothly and CLEAResult (the program implementer) has been easy to work and communicate with.

Avista noted two program changes since PY18:

- ***Cost per kilowatt-hour:*** As of PY19, Avista pays the implementer $0.12 per kilowatt-hour to administer the program, up from $0.11 per kilowatt-hour in PY18.
- ***Rebate amounts:*** Avista staff said incentive levels have dropped since PY17 as prices for products have generally decreased. From PY18 to PY19, the only change to incentive levels consisted of maximum showerhead incentives increasing from $5 to $6, as shown in Table 11. At the beginning of Q3 PY19, however, maximum incentives for LED bulbs and LED fixtures decreased, while minimum incentives for showerheads increased. Overall, changes to the incentives per-unit have been slight, and Avista staff does not expect the changing incentive levels to decrease program participation.

Table 11. Simple Steps, Smart Savings Incentives Per Unit

Measure	Q1 PY17	Q1 PY18	Q1 PY19	Q3 PY19[a]
LED Bulb	$0.75 to $5	$0.50 to $5	$0.50 to $5	$0.50 to $3
LED Fixture	$1.50 to $20	$0.50 to $9	$0.50 to $9	$0.50 to $4
Showerhead	$5 to $15	$1 to $5	$1 to $6	$2 to $6
Clothes Washer	N/A	$10 to $25	$10 to $25	N/A

[a] This is the anticipated incentive range as of October 1, 2019.

Avista indicated two primary challenges for the Simple Steps, Smart Savings program:

- ***Program marketing:*** In PY19, Avista reported that implementers will design and display all program marketing materials in retail stores. Consequently, Avista staff cannot easily inform customers that discounted products are part of an Avista-sponsored program, which limits customer awareness.

- ***Insufficient measure-level data:*** While program data tracking systems satisfy all reporting requirements, the program's midstream nature prevents Avista from gathering sufficient customer information to evaluate customer feedback. Avista staff indicated that, in the future, they want to know more about customers to better tailor the program to meet their associated needs.

Cadmus also interviewed the implementer regarding program performance in PY 2019, with the interview providing several insights about the program:

- ***Program goals:*** Through July, the program remained on track to reach its electricity savings goal.
- ***Marketing and outreach:*** The implementer's field team handles placement of marketing materials in retail stores. Marketing's primary challenge is that it must be relatively generic; so the implementer can use it for multiple participating utilities. Although Avista noted challenges in informing customers that discounted products were part of an Avista program, marketing materials placed on qualifying products indicated discount amounts and identified Avista as a program sponsor.
- ***Customer experience:*** Due to generic branding, implementers find it difficult to collect customer feedback. The implementer maintains a customer-facing website, but that website does not generate much traffic. Utilities can promote the website to accrue more feedback, but they often choose not to, given it is a third-party website and does not look like an Avista-sponsored landing page.
- ***Participation:*** The implementer anticipated sales would decline as LED incentives reduced, but they actually encountered higher participation levels than expected.

In implementing the Simple Steps, Smart Savings program in PY19, the implementer's greatest challenge arose from uncertainty regarding the Energy Independence and Security Act, which made it difficult to plan the program in PY20 and beyond. Conversely, the implementer said the program's greatest success has been how streamlined the implementation process has become. The implementer continues to maintain good relationships with utility partners, manufacturers, and retailers, and the utilities find the program easy to sponsor, with current reporting systems making the program easy to maintain.

Retailer Interviews

For its 2019 process evaluation, Cadmus conducted interviews with five participating retailers (a mixture of home improvement stores and hardware stores) to assess their reasons for and obstacles to participation and to gather information about the support they received from program staff. Cadmus also explored respondents' overall experience and satisfaction with the program. All five interviewed retailers offered markdowns on general purpose and fixture LEDs, three offered markdowns on showerheads, and one offered markdowns on clothes washers.

Cadmus asked retailers to rate the ease of the sales data submission process. All five considered the process either *very easy* (three) or *somewhat easy* (two). The two saying *somewhat easy* reported

experiencing a small learning curve when first submitting data for the program, but program staff assisted them. Otherwise, none of the retailers encountered program participation barriers and, overall, were *very satisfied* with the program.

Further, Cadmus asked retailers about support they received from the implementer's field staff, which visited participating stores periodically to distribute marketing materials and to assist as needed. All five retailers were *very satisfied* with these visits and attested to a positive relationship with field staff.

Retailers received program-specific marketing materials (such as stickers and tags, which contained the program's name and communicated Avista's role in it, to place near LEDs, fixtures, and showerheads). The retailer providing markdowns on clothes washers also received specific marketing materials that identified a discount on the appliance as well as its increased efficiency. All five retailers were pleased with the marketing materials and did not provide suggestions for improvements.

Third-Party Program Conclusions and Recommendations

Conclusions and recommendations for the Simple Steps, Smart Savings program are presented in this section.

Conclusions

- **Some retailers experienced a slight learning curve when submitting Simple Steps, Smart Savings program data.**
  - Two participating retailers interviewed about the Simple Steps, Smart Savings program reported facing a small learning curve when first submitting data to the implementer. They found the process *somewhat easy* and were assisted by program staff.

Recommendations

Recommendation 1: Develop supplemental documentation or provide direct assistance to retailers who participate in the Simple Steps, Smart Savings program to help troubleshoot issues with the data submission process. Cadmus interviewed two retailers who experienced a small learning curve while submitting their program data to the implementer.

Low-Income Program

The Low-Income program consists of Community Action Program (CAP) agencies providing qualified customers with energy efficiency measures, drawn from an "Approved Measures List," at no cost. Avista receives a set funding portion for each state and reimburses CAPs for the measures' cost.

Low-Income Program Findings

For its process evaluation of the Low-Income program, Cadmus conducted stakeholder interviews with Avista staff and with CAP agencies participating in PY 2019.

Stakeholder Interviews

In September 2019, Cadmus interviewed Avista about its Low-Income program, and Avista confirmed that, in Washington and Idaho, it provided funding to CAP agencies, which ultimately became responsible for qualifying potential customers based on their income.

Avista made a few changes to its list of approved measures that received full reimbursement in PY 2019:

- ***Washington and Idaho:*** Added ENERGY STAR refrigerators and removed electric-to-natural gas conversion water heaters
- ***Washington only:*** Removed air source heat pumps
- ***Idaho only:*** Added ENERGY STAR-rated windows, attic and duct insulation, air source heat pump replacements, and heat pump water heaters

The qualified rebate lists include the remaining measures (shown in Table 12 for Washington and Table 13 for Idaho) receiving partial reimbursement equal to the value of their avoided cost of energy saved.

Table 12. Low-Income Program Qualified Rebate List for Washington

Measure Category	Measure Name	PY18 (Per Installation)	PY19 (Per Installation)
Electric Measures	Electric to Natural Gas Furnace and Water Heater Conversion	$586.78	$4,723.34
	Electric to Natural Gas Water Heater	N/A	$562.04
Natural Gas Measures	Tankless Natural Gas Water Heater (0.82 EF)	N/A	$573.00
	Natural Gas Boiler	N/A	$894.11

Table 13. Low-Income Program Qualified Rebate List for Idaho

Measure Category	Measure Name	PY18 (Per Installation)	PY19 (Per Installation)
Electric Measures	Duct Insulation	$0.81 per sq ft	N/A
	ENERGY STAR Refrigerators	$49.14	N/A
	Attic Insulation	$546.30	N/A
	Floor Insulation	$1.313.54	$2.36 per sq ft
	Electric Ductless Heat Pump	$3,822.37	$2,155.54
	Electric to Natural Gas Space and Water Heater	N/A	$4,582.35

Measure Category	Measure Name	PY18 (Per Installation)	PY19 (Per Installation)
	Electric to Natural Gas Water Heater	$1,331.07	$590.56
	Heat Pump Water Heater	$697.39	N/A
	Air-Source Heat Pump	$4,172.89	N/A
Natural Gas Measures	Air Infiltration	$146.33	$105.71
	ENERGY STAR Windows	$13.40 per sq ft	N/A
	Attic Insulation	$0.34 per sq ft	N/A
	Floor Insulation	$1.21 per sq ft	$1.19 per sq ft
	Duct Insulation	$6.70 per sq ft	N/A
	Wall Insulation	$1.04 per sq ft	$1.01 per sq ft
	Duct Sealing	$429.85	$173.67
	Tankless Natural Gas Water Heater	N/A	$573.00
	Natural Gas Boiler	N/A	$894.11

Successes

Avista staff reported four successes for the PY 2019 Low-Income program:

- ***CAP agency relationships:*** Avista staff emphasized an overall positive relationship with CAP agencies. Avista staff believed that, as the CAP agencies have such a well-established infrastructure to verify incomes, install measures, and market the program, this easily allowed discussions about potential changes or program improvements, as needed.
- ***Program flexibility:*** Avista staff reported that the CAP agencies appreciated their discretion to spend funds on either electric or natural gas efficiency measures. In addition, Avista said the CAP agencies appreciated the freedom to help residents best with the money available, rather than receiving a specific number of homes that they would be required to serve—a factor that Avista staff considered crucial to program success.
- ***Data tracking:*** Program data are tracked through the Customer Care and Billing system, which Avista respondents said meets the needs of its staff.
- ***Marketing:*** Even though most Low-Income program customers learned of the program through the CAP agencies, Avista staff conducts outreach, informing customers and developers about the program. For example, Avista may generate interest by informing customers of the program when they call the contact center about bill payments. Additionally, Avista cross-promotes the Low-Income program with other offerings, such as the Weatherization program.

Challenges

Avista staff reported a few minor challenges with the program in PY 2019:

- ***Source funding awareness:*** As program funding occurs after some measures have been installed, end-use customers often do not know that Avista funded their home improvements. Avista staff may place signs in customers' yards or send postcards that inform them that they received home improvements from Avista. Additionally, Avista said homeowners provided positive reactions when attending post-installation inspections and were able to tell customers about Avista's funding role.

- ***Funding year:*** As Avista administers the Low-Income program by calendar year, but obtains other funding sources by fiscal year, CAP agencies often concentrate on spending Avista funds at the year's close, making the program's pace appear slow during the year. Avista staff, however, thinks CAP agencies are forthright about this, and, if required to spend funds according to fixed or predetermined timelines, may not use the funding.
- ***Turnover:*** Avista staff expects turnover within CAP agencies and said new CAP staff require significant training.

Participant Interviews

In November 2019, Cadmus conducted interviews with five CAP agencies participating in the Low-Income program, all of which had participated in the program for at least three years.

To qualify their clients by income, CAP agencies use various strategies. Three reported that the Energy Assistance program referred most people to them, already identifying them as income-eligible. Often, if these clients faced weatherization issues, Avista referred them to the CAP agencies. The remaining two CAP agencies utilized the Department of Commerce low-income standard to income-qualify new clients.

In term of prioritizing people that qualify, three CAP agencies specifically prioritize more vulnerable populations (such as the elderly, families with children, those with disabilities, those with emergency status, Native Americans, and those with the lowest-income rates). Beyond that, all CAP agencies employ several of the following criteria (in no particular order) to prioritize the rest of their clients:

- High energy use
- Household size
- Geographic location
- Application date

The CAP agencies primarily secure contractors through normal bidding processes or, in one CAP agency's case, contractors utilized within the CAP agency itself. CAP agencies reported that determining and agreeing upon measures or improvements needed for a home often required a collaborative effort between contractors and CAP agencies, though responsibility fell upon the contractor to complete the installations. The CAP agencies did not provide contractors with additional incentives beyond project funding, but all reported positive relationships with the contractors.

In terms of addressing measures neither approved nor on the state's priority rebate list, all CAP agencies treat the whole home as much as possible, then use other available funding to create a blend of sources that covers as much remaining treatment as possible. All five CAP agencies said funding was almost always allocated to homes on an individual basis, depending on improvements needed and which sources covered what improvements. One CAP agency said that, with more funding, it could hire additional crews to treat more homes. In addition, one CAP agency noted difficulties in covering administrative costs with Avista supplying only 15% of the budget. All five CAP agencies ultimately considered Avista's funding sufficient and did not feel underbudgeted.

CAP agencies said the most-commonly installed measures included air/duct sealing, attic/floor/wall insulation, furnaces, and water heaters, while the least-commonly installed measures included appliances (such as refrigerators, heat pumps, windows, and doors).

Two of the five CAP agencies did not consider marketing and outreach as a priority. Typically, one had a robust waitlist of potential clients; another serviced as many homes as it could accommodate with the funding. Two respondents cited the Energy Assistance program as the program's primary marketing tool, while the final CAP agency relied on word-of-mouth, a website, and a monthly newsletter.

Successes

CAP agencies reported three major successes for the Low-Income program:

- ***Relationship with Avista:*** All five CAP agencies emphasized a positive relationship with Avista. Three CAP agencies cited collaboration and communication as a highlight of working with Avista staff. Two CAP agencies also reported that Avista staff were very helpful when issues arose and processed reimbursements very quickly.
- ***Positive customer feedback:*** All five CAP agencies reported that customer feedback was generally positive. Two CAP agencies specified that customers had been most satisfied with energy savings and the effects this had on their energy bills.
- ***Reliable data tracking systems:*** The CAP agencies did not report issues with their data tracking systems or with making their data available to Avista upon request.

Challenges

CAP agencies mentioned two challenges with the Low-Income program:

- ***Untreatable homes:*** Four of the five CAP agencies said the most common reason that customers did not qualify for the Low-Income program's home treatment arose when a house proved beyond repair due to plumbing or electrical system issues, a faulty roof, or hoarding. In such cases, treatment was deferred until the issues were resolved.
- ***Contractor availability:*** Three CAP agencies struggled to secure and retain contractors due to high competition rates and low volumes of trained professionals. High contractor turnover was problematic, given extended timelines for training new contractors. Three CAP agencies emphasized that, even though they were currently doing well, they would have difficulty in finding new contractors if their current contractors chose not to participate any longer. One CAP agency recommended Avista's assistance in incentivizing contractor participation, especially in rural areas. Another suggested developing and assisting with outreach at area high schools to promote trade schools.

Low-Income Conclusions and Recommendations

Low-Income Conclusions

- **CAP agencies and participating customers were highly satisfied with the Low-Income program.**

  - Avista and all five CAP agencies interviewed by Cadmus for PY 2019 emphasized positive, well-established relationships that were communicative and collaborative. Consequently, potential issues or changes that arose were easy to address.
  - All five CAP agencies reported that customers generally expressed positive feedback. Two CAP agencies said customers specifically had been satisfied with energy savings and with the program's effect on their energy bills.
- **The Low-Income program experienced high turnover among participating contractors.**
  - Three CAP agencies interviewed by Cadmus reported high turnover among contractors completing weatherization projects through the program—a problematic finding, given the contractors' low availability and highly competitive field.

Low-Income Recommendations

Low-Income Recommendation 1: Dedicate a small percentage of CAP agency funding to incentives (beyond each project's cost) for contractors that work on Low-Income program projects. Retaining contractors will prevent coverage losses and the need for CAP agencies to train new contractors, which, given training's time- and resource-intensive nature, can prove more costly than providing a small incentive to ensure contractors' loyalty to the CAPs and the program.

APPENDIX D – 2019 TARIFF RIDER ACTIVITY

	Electric	Natural Gas	Total
Beginning Balance (Underfunded)/Overfunded	**$ (7,134,247)**	**$ 234,187**	**$ (6,900,060)**
Energy-Efficiency Funding	$ 10,332,033	$ 1,461,206	$ 11,793,239
Net Funding of Operations	$ 3,197,786	$ 1,695,394	$ 4,893,180
Energy-Efficiency Expenditures	$ 7,573,073	$ 1,617,320	$ 9,190,394
Ending Balances (Underfunded)/Overfunded	**$ (4,375,287)**	**$ 78,073**	**$ (4,297,214)**

APPENDIX E – 2019 EXPENDITURES BY PROGRAM

	Electric	Natural Gas	Total
Energy Efficiency			
Low-Income			
Low-Income	$ 388,487	$ 269,620	$ 658,107
Low-Income Fuel Conversions	$ 75,493	$ 0	$ 75,493
Health and Safety	$ 42,919	$ 48,481	$ 91,399
Residential			
ENERGY STAR Homes	$ 11,700	$ 2,600	$ 14,300
Fuel Efficiency	$ 287,150	$ 0	$ 287,150
HVAC	$ 106,535	$ 690,680	$ 797,215
Multifamily Direct Install	$ 975,664	$ 50,600	$ 1,026,264
Shell	$ 43,200	$ 101,346	$ 144,546
Simple Steps, Smart Savings	$ 258,374	$ 185	$ 258,559
Water Heater	$ 2,795	$ 74,050	$ 76,845
Commercial/Industrial			
Site Specific	$ 1,468,744	$ 20,444	$ 1,489,188
AirGuardian	$ 32,699	$ 0	$ 32,699
EnergySmart Grocer	$ 0	$ 0	$ 0
Food Services	$ 1,820	$ 25,300	$ 27,120
Green Motors	$ 5,237	$ 0	$ 5,237
HVAC	$ 0	$ 34,013	$ 34,013
Shell	$ 691	$ 4,543	$ 5,234
Exterior Lighting	$ 497,353	$ 0	$ 497,353
Interior Lighting	$ 489,618	$ 0	$ 489,618
Motor Control HVAC	$ 0	$ 0	$ 0
Fuel Conversion (MFMT)	$ 455,000	$ 0	$ 455,000
Energy Efficiency Total	**$ 5,143,479**	**$ 1,321,862**	**$ 6,465,341**
Market Transformation			
NEEA	$ 670,330	$ 154,261	$ 824,591
Market Transformation Total	**$ 670,330**	**$ 154,261**	**$ 824,591**
Other Programs and Activities			
General Implementation	$ 1,372,447	$ 122,109	$ 1,494,555
Pilot Programs	$ 19,364	$ 1,838	$ 21,203
EM&V/CPA	$ 98,020	$ 17,250	$ 115,270
Idaho Research	$ 269,434	$ 0	$ 269,434
Other Programs and Activities Total	**$ 1,759,265**	**$ 141,197**	**$ 1,900,462**
Grand Total	**$ 7,573,074**	**$ 1,617,320**	**$ 9,190,394**

APPENDIX F – 2019 PROGRAM ACTIVITY

Energy Efficiency Program	Electric				Natural Gas			
	Participants		Evaluated Savings (kWh)	Utility Cost	Participants		Evaluated Savings (Therms)	Utility Cost
Low-Income								
Weatherization	32,834	Sq Ft	67,910	$ 242,848	3,242	Sq Ft	981	$ 24,878
HVAC	25	Units	102,097	$ 267,944	35	Units	2,888	$ 143,847
Water Heat	0	Units	0	$ 0	9	Units	63	$ 29,722
Outreach/Giveaways	6,874	LEDs	61,807	$ 18,166	0	NA	0	$ 0
Health and Safety	17	HHS	0	$ 174,367	17	HHS	0	$ 145,985
ENERGY STAR Refirgerator	8	Units	312	$ 6,966	0	Units	0	$ 0
Low-Income Fuel Conversions	13	Units	37,808	$ 95,016	0	NA	0	$ 0
Low-Income Total			**269,934**	**$ 805,308**			**3,932**	**$ 344,431**
Residential								
ENERGY STAR Homes	18	Homes	69,615	$ 25,557	4	Homes	67	$ 4,456
Fuel Efficiency	143	Units	1,181,596	$ 511,069	0	NA	0	$ 0
HVAC	737	Furnace, Tstat	1,320,322	$ 349,252	2,467	Furnace, Tstat	140,763	$ 415,742
Water Heat	13	Units	14,763	$ 4,204	233	Units	17,131	$ 28,750
Multifamily Direct Install	47,610	Units	1,591,615	$ 974,236	7,385	Units	4,296	$ 127,907
Shell	116	Windows	160,507	$ 113,647	259	Windows	17,458	$ 97,864
Simple Steps, Smart Savings	317,124	LEDs, Washers, SH	3,879,137	$ 720,303	164	SH	44	$ 351
Residential Total			**8,217,556**	**$ 2,698,269**			**179,759**	**$ 675,070**
Commercial/Industrial								
Site-Specific	50	Projects	8,425,874	$ 1,933,928	2	Projects	7,150	$ 47,418
AirGuardian	1	Units	136,244	$ 36,709	0	NA	0	$ 0
EnergySmart Grocer (PSC)	0	Projects	0	$ 0	0	Projects	0	$ 0
Food Services	3	Projects	9,506	$ 2,175	17	Projects	12,728	$ 63,545
Green Motors	12	Motor Rewinds	38,828	$ 6,337	0	NA	0	$ 0
HVAC	0	Units	0	$ 0	21	Units	11,483	$ 78,844
Shell	6	Projects	10,400	$ 1,693	5	Projects	1,910	$ 14,295
Exterior Lighting	260	Projects	3,303,660	$ 658,230	0	NA	0	$ 0
Interior Lighting	249	Projects	4,518,758	$ 660,556	0	NA	0	$ 0
Motor Control HVAC	0	Projects	0	$ 0	0	Projects	0	$ 0
Fuel Conversion (MFMT)	4	Projects	300,230	$ 473,778	0	NA	0	$ 0
Comm/Industrial Total			**16,743,500**	**$ 3,773,404**			**33,271**	**$ 204,102**
Energy Efficiency Total			**25,230,990**	**$ 7,276,980**			**216,962**	**$ 1,223,603**

APPENDIX G – 2019 UES MEASURE LIST

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Residential Prescriptive – Electric						
Web Tstat Elec DIY	$ 240.35	748.50	-	15	$ 0.00	$ 0.00
Web Tstat Elec Cont	$ 294.25	748.50	-	15	$ 0.00	$ 0.00
ELEC RESISTANCE TO ASHP	$ 4,359.21	5,865.33	-	18	$ 0.00	$ 14.00
VARIABLE SPEED MOTOR ASHP	$ 275.00	420.35	-	20	$ 0.00	$ 0.00
ELEC WINDOWS SP/MDP --> <0.30 U	$ 22.32	15.25	-	45	$ 0.00	$ 0.19
VARIABLE SPEED MOTOR FURNACE	$ 275.00	414.00	-	20	$ 0.00	$ 0.00
E ESTAR HOME - MANUF, ELEC/DF	$ 2,400.94	3,315.00	-	25	$ 0.00	$ 50.83
ElEC Storm Windows	$ 9.90	10.30	-	20	$ 0.00	$ 0.14
Ductless Heat Pump (displace zonal)	$ 3,553.36	2,348.00	-	15	$ 0.00	$ 39.00
Heat Pump Water Heater (Anysize Ave Tier 2/3)	$ 629.17	1,166.00	-	13	$ 0.00	$ 0.00
Wall Insulation	$ 1.54	2.00	-	45	$ 0.00	$ 0.02
Floor Insulation	$ 1.41	1.00	-	45	$ 0.00	$ 0.01
Attic Insulation	$ 1.10	1.80	-	45	$ 0.00	$ 0.02
Residential – Simple Steps, Smart Savings – Electric						
LED Decorative and Mini-Base 1490-2600 lumens	$ 0.01	0.00	-	13	$ 0.00	$ 0.00
LED Decorative and Mini-Base 250-1049 lumens	$ 1.89	14.63	-	13	$ 0.00	$ 0.00
LED Decorative and Mini-Base 1050-1489 lumens	$ 0.01	0.00	-	13	$ 0.00	$ 0.00
LED General Purpose and Dimmable 1490-2600 lumens	$ 1.64	9.66	-	13	$ 0.00	$ 0.00
LED General Purpose and Dimmable 250-1049 lumens	$ 0.73	12.51	-	13	$ 0.00	$ 0.00
LED General Purpose and Dimmable 1050-1489 lumens	$ 4.17	28.85	-	13	$ 0.00	$ 0.00
LED Globe 1490-2600 lumens	$ 4.20	13.42	-	13	$ 0.00	$ 0.00
LED Globe 250-1049 lumens	$ 1.93	15.05	-	13	$ 0.00	$ 0.00
LED Globe 1050-1489 lumens	$ 2.66	33.92	-	13	$ 0.00	$ 0.00
LED Reflectors and Outdoor 1490-2600 lumens	$ 4.16	59.70	-	13	$ 0.00	$ 0.00
LED Reflectors and Outdoor 250-1049 lumens	$ 0.25	8.60	-	13	$ 0.00	$ 0.00
LED Reflectors and Outdoor 1050-1489 lumens	$ 0.62	10.36	-	13	$ 0.00	$ 0.00
Showerhead 1.75 GPM	$ 7.11	51.00	-	10	$ 0.00	$ 0.00
Showerhead 1.5 GPM	$ 0.37	78.00	-	10	$ 0.00	$ 0.00
LED Decorative Ceiling Flush Mount Fixture 500-1999 lumens	$ 2.66	14.36	-	20	$ 0.00	$ 0.00
LED Decorative Ceiling Flush Mount Fixture 2000-7999 lumens	$ 16.47	51.22	-	20	$ 0.00	$ 0.00
LED Decorative Ceiling Flush Mount Fixture 0-499 lumens	$ 4.62	4.13	-	20	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
LED Track Light Fixture 0-499 Lumens	$ 0.76	6.28	-	20	$ 0.00	$ 0.00
LED Track Light Fixture 2000-7999 Lumens	$ 9.33	77.99	-	20	$ 0.00	$ 0.00
LED Track Light Fixture 500-1999 lumens	$ 2.60	21.86	-	20	$ 0.00	$ 0.00
LED Linear Flush Mount Fixture 0-499 lumens	$ 0.60	0.01	-	20	$ 0.00	$ 0.00
LED Linear Flush Mount Fixture 2000-7999 lumens	$ 7.47	0.01	-	20	$ 0.00	$ 0.00
LED Linear Flush Mount Fixture 500-1999 lumens	$ 2.10	0.01	-	20	$ 0.00	$ 0.00
LED Exterior Porch Light Fixture 0-499 Lumens	$ 0.81	10.69	-	20	$ 0.00	$ 0.00
LED Exterior Porch Light Fixture 2000-7999 Lumens	$ 10.05	132.74	-	20	$ 0.00	$ 0.00
LED Exterior Porch Light Fixture 500-1999 Lumens	$ 2.82	37.20	-	20	$ 0.00	$ 0.00
LED Exterior Security Fixture 0-499 Lumens	$ 2.82	6.92	-	20	$ 0.00	$ 0.00
LED Exterior Security Fixture 2000-7999 Lumens	$ 9.94	85.92	-	20	$ 0.00	$ 0.00
LED Exterior Security Fixture 500-1999 Lumens	$ 2.79	24.08	-	20	$ 0.00	$ 0.00
LED Retro-Fit Fixture 0-499 Lumens	$ 1.07	3.48	-	20	$ 0.00	$ 0.00
LED Retro-Fit Fixture 2000-7999 Lumens	$ 13.19	43.20	-	20	$ 0.00	$ 0.00
LED Retro-Fit Fixture 500-1999 Lumens	$ 3.70	12.11	-	20	$ 0.00	$ 0.00
LED Bathroom Vanity 0-499 Lumens	$ 3.78	4.79	-	13	$ 0.00	$ 0.00
LED Bathroom Vanity 2000-7999 Lumens	$ 6.40	59.42	-	13	$ 0.00	$ 0.00
LED Bathroom Vanity 500-1999 Lumens	$ 5.73	16.65	-	12	$ 0.00	$ 0.00
LED TLED 1000-1999 Lumens	$ 10.11	4.85	-	12	$ 0.00	$ 0.00
LED TLED 2000-3999 Lumens	$ 14.85	6.59	-	12	$ 0.00	$ 0.00
Clothing Washer	$ 55.00	108.58	-	11	$ 0.00	$ 0.00
Residential – Fuel Conversions						
ELEC RES --> CENTRAL NG	$ 4,398.67	6,104.00	(275.49)	20	$ 0.00	$ 0.00
E --> NG Space and DHW	$ 6,708.33	8,513.00	(419.61)	20	$ 0.00	$ 0.00
Low Income – Electric						
E AIR INFILTRATION	$ 1.54	2.00	-	20	$ 0.00	$ 0.01
E ENERGY STAR DOORS	$ 1,013.40	333.00	-	40	$ 628.00	$ 0.00
E ENERGY STAR REFRIGERATOR	$ 100.23	39.00	-	20	$ 55.00	$ 0.00
Windows	$ 8.55	15.25	-	45	$ 0.00	$ 0.19
E HE AIR HPUMP	$ 5,377.54	752.00	-	20	$ 0.00	$ 0.00
E INS - CEIL/ATTIC	$ 1.10	1.80	-	45	$ 0.00	$ 0.02
E INS - DUCT	$ 6.70	6.50	-	45	$ 0.00	$ 0.00
E INS - FLOOR	$ 1.41	1.00	-	45	$ 0.00	$ 0.01
E INS - WALL	$ 1.54	2.00	-	45	$ 0.00	$ 0.02
Duct sealing	$ 608.58	1,374.00	-	20	$ 0.00	$ 0.00
Ductless Heat Pump w FAF	$ 3,822.37	5,651.00	-	15	$ 0.00	$ 124.00
Ductless Heat Pump (displace Zonal)	$ 3,364.80	2,348.00	-	15	$ 0.00	$ 39.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Tier2-3 Anysize HPWH	$ 629.17	1,166.00	-	13	$ 0.00	$ 0.00
9 watt A19 bulbs - 60W replacement - (6 units)	$ 17.70	54.00	-	13	$ 0.00	$ 0.00
Elec Res --> Heat Pump	$ 4,359.21	5,865.33	-	15	$ 0.00	$ 23.00
E TO G FURNACE CONVERSION	$ 5,207.53	3,496.00	(133.00)	20	$ 1,500.00	$ 0.00
E TO G H2O CONVERSION	$ 3,008.50	1,586.00	(84.50)	13	$ 500.00	$ 0.00
E TO G Combo	$ 9,613.38	5,082.00	(217.50)	20	$ 2,000.00	$ 0.00
Commercial/Industrial – Interior Prescriptive Lighting – Electric						
6-9 watt LED lamp	$ 7.37	55.27	(0.69)	12	$ 0.00	$ 0.00
10-13 watt LED lamp	$ 9.61	82.23	(1.02)	12	$ 0.00	$ 0.00
14-20 watt LED lamp	$ 9.98	112.82	(1.40)	12	$ 0.00	$ 0.00
12-20 watt LED Fixture Retrofit	$ 37.03	159.45	(1.98)	12	$ 0.00	$ 0.00
50-60 watt LED fixture	$ 68.82	245.63	(3.05)	12	$ 0.00	$ 0.00
140 watt fixture/Lamp - Int	$ 292.64	595.38	(7.39)	12	$ 0.00	$ 0.00
175 watt fixture/Lamp - Int	$ 290.78	971.49	(12.06)	12	$ 0.00	$ 0.00
400 watt fixture/Lamp - Int	$ 450.56	2,772.59	(34.42)	12	$ 0.00	$ 0.00
5-6 watt MR16	$ 8.33	29.12	(0.36)	12	$ 0.00	$ 0.00
7-9 watt MR16 lamp	$ 7.42	54.67	(0.68)	12	$ 0.00	$ 0.00
Occ Sensors	$ 56.38	85.28	(1.06)	20	$ 0.00	$ 0.00
T5HO TLED	$ 15.73	69.51	(0.86)	12	$ 0.00	$ 0.00
T8 TLED	$ 12.80	38.17	(0.47)	12	$ 0.00	$ 0.00
U-Bend	$ 16.79	48.36	(0.60)	12	$ 0.00	$ 0.00
2x2 fixtures	$ 60.00	96.72	(1.20)	12	$ 0.00	$ 0.00
2x4 fixtures	$ 90.00	212.16	(2.63)	12	$ 0.00	$ 0.00
8' T8 TLED	$ 27.30	109.20	(1.36)	12	$ 0.00	$ 0.00
Commercial/Industrial – Exterior Prescriptive Lighting – Electric						
25 watt fixture	$ 125.23	331.54	-	12	$ 0.00	$ 22.68
30 watt fixture	$ 196.61	447.74	-	12	$ 0.00	$ 22.53
50 watt fixture	$ 215.55	662.31	-	12	$ 0.00	$ 19.83
100 watt fixture	$ 240.99	700.57	-	12	$ 0.00	$ 26.75
100 watt NC fixture	$ 165.76	784.31	-	12	$ 0.00	$ 24.18
140 watt fixture - Ext	$ 324.01	885.07	-	12	$ 0.00	$ 16.47
140 watt NC fixture	$ 475.00	873.60	-	12	$ 0.00	$ 27.49
160 watt fixture	$ 425.09	1,066.95	-	12	$ 0.00	$ 24.18
160 watt NC fixture	$ 418.71	959.24	-	12	$ 0.00	$ 26.75
175 watt fixture - Ext	$ 569.35	1,398.21	-	12	$ 0.00	$ 27.49
300 watt fixture - Ext	$ 650.00	2,315.52	-	12	$ 0.00	$ 11.76
400 watt fixture - Ext	$ 930.80	3,442.31	-	12	$ 0.00	$ 11.76
Sign Lighting	$ 46.62	109.20	-	10	$ 0.00	$ 27.90

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Commercial/Industrial – Shell – Electric						
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/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 R4 wall insulation (E/E) to R11-R18 Wall Insulation	$ 0.61	2.82	-	22	$ 0.00	$ 0.00
Less than R4 wall insulation (E/E) to R19+ Wall Insulation	$ 0.65	4.11	-	22	$ 0.00	$ 0.00
Commercial/Industrial – Green Motors – Electric						
15 HP Industrial	$ 125.07	525.00	-	7	$ 0.00	$ 0.00
20 HP Ind	$ 139.54	703.00	-	7	$ 0.00	$ 0.00
25 HP Ind	$ 159.43	893.00	-	8	$ 0.00	$ 0.00
30 HP Ind	$ 175.10	962.00	-	8	$ 0.00	$ 0.00
40 HP Ind	$ 213.98	1,121.00	-	8	$ 0.00	$ 0.00
50 HP Ind	$ 236.88	1,206.00	-	8	$ 0.00	$ 0.00
60 HP Ind	$ 279.38	1,269.00	-	8	$ 0.00	$ 0.00
75 HP Ind	$ 301.98	1,305.00	-	8	$ 0.00	$ 0.00
100 HP Ind	$ 374.61	1,723.00	-	8	$ 0.00	$ 0.00
125 HP Ind	$ 373.40	1,990.00	-	8	$ 0.00	$ 0.00
150 HP Ind	$ 415.93	2,366.00	-	8	$ 0.00	$ 0.00
200 HP Ind	$ 500.72	3,138.00	-	8	$ 0.00	$ 0.00
250 HP Ind	$ 643.55	3,799.00	-	8	$ 0.00	$ 0.00
300 HP Ind	$ 650.50	4,535.00	-	8	$ 0.00	$ 0.00
350 HP Ind	$ 681.80	5,287.00	-	8	$ 0.00	$ 0.00
400 HP Ind	$ 761.51	5,994.00	-	8	$ 0.00	$ 0.00
450 HP Ind	$ 832.39	6,732.00	-	8	$ 0.00	$ 0.00
500 HP Ind	$ 899.26	7,491.00	-	8	$ 0.00	$ 0.00
600 HP Ind	$ 1,353.31	10,137.00	-	8	$ 0.00	$ 0.00
700 HP Ind	$ 1,476.45	11,777.00	-	8	$ 0.00	$ 0.00
800 HP Ind	$ 1,638.17	13,431.00	-	8	$ 0.00	$ 0.00
900 HP Ind	$ 1,806.00	15,077.00	-	8	$ 0.00	$ 0.00
1000 HP Ind	$ 1,946.32	16,682.00	-	8	$ 0.00	$ 0.00
1250 HP Ind	$ 2,325.02	17,812.00	-	9	$ 0.00	$ 0.00
1500 HP Ind	$ 2,663.37	21,329.00	-	9	$ 0.00	$ 0.00
1750 HP Ind	$ 3,039.84	24,779.00	-	9	$ 0.00	$ 0.00
2000 HP Ind	$ 3,409.96	28,201.00	-	9	$ 0.00	$ 0.00
2250 HP Ind	$ 3,714.88	31,527.00	-	9	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
2500 HP Ind	$ 4,064.37	34,957.00	-	9	$ 0.00	$ 0.00
3000 HP Ind	$ 4,752.00	41,686.00	-	9	$ 0.00	$ 0.00
3500 HP Ind	$ 5,251.18	48,532.00	-	9	$ 0.00	$ 0.00
4000 HP Ind	$ 5,862.69	55,466.00	-	9	$ 0.00	$ 0.00
4500 HP Ind	$ 6,318.17	62,269.00	-	9	$ 0.00	$ 0.00
5000 HP Ind	$ 6,744.35	69,044.00	-	9	$ 0.00	$ 0.00
Commercial/Industrial – Fleet Heat – Electric						
Idaho Fleet Heat	$ 520.50	8,000.00	-	12	$ 0.00	$ 0.00
Commercial/Industrial – Variable Frequency Drives – Electric						
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
Prescriptive VFDS - HVAC Heating Pump or combo	$2 00.00	1,756.00	-	16	$ 0.00	$ 0.00
Commercial/Industrial – MFMT – Electric						
Multifamily NG Market Transformation (per unit)	$ 6,000.00	5,874.00	(258.00)	20	$ 0.00	$ 0.00
Commercial/Industrial – Grocer – Electric						
On-Demand Commercial Overwrapper	$ 306.77	1,588.00	-	10	$ 0.00	$ 0.00
LT Case: T12 to LP LED Inside Lamp	$ 15.02	104.00	-	7	$ 0.00	$ 0.00
MT Case: T12 to LP LED Inside Lamp	$ 15.02	85.00	-	7	$ 0.00	$ 0.00
MT Case: T8 to LED Inside Lamp	$ 15.02	61.00	-	7	$ 0.00	$ 0.00
LT Case: T8 to LP LED Inside Lamp	$ 15.02	61.00	-	7	$ 0.00	$ 0.00
T12 to LP LED Outside Lamp	$ 15.02	73.00	-	7	$ 0.00	$ 0.00
T8 to LP LED Outside Lamp	$ 15.02	43.00	-	7	$ 0.00	$ 0.00
MT Case: 2 T8 to 1 High Power LED Inside Lamp	$ 24.28	113.00	-	7	$ 0.00	$ 0.00
MT Case: 2 T12 to 1 High Power LED Inside Lamp	$ 24.28	183.00	-	7	$ 0.00	$ 0.00
LT Case: 2 T8 to 1 High Power LED Inside Lamp	$ 24.28	137.00	-	7	$ 0.00	$ 0.00
LT Case: 2 T12 to 1 High Power LED Inside Lamp	$ 24.28	223.00	-	7	$ 0.00	$ 0.00
MT Case: 2 T8 to 1 High Power LED Outside Lamp	$ 24.28	96.00	-	7	$ 0.00	$ 0.00
MT Case: 2 T12 to 1 High Power LED Outside Lamp	$ 24.28	156.00	-	7	$ 0.00	$ 0.00
Anti-Sweat Heater Controls - Low Temp	$ 47.90	305.00	-	12	$ 0.00	$ 0.00
Anti-Sweat Heater Controls - Med Temp	$ 47.90	217.00	-	12	$ 0.00	$ 0.00
Gaskets for Low Temp Reach-in Glass Doors	$ 111.12	243.00	-	4	$ 0.00	$ 0.00
Gaskets for Medium Temp Reach-in Glass Doors	$ 89.95	248.00	-	4	$ 0.00	$ 0.00
Gaskets for Walk-in Freezer - Main Door	$ 125.93	347.00	-	4	$ 0.00	$ 0.00
Gaskets for Walk-in Cooler - Main	$ 84.66	204.00	-	4	$ 0.00	$ 0.00
Evap motors: shaded pole to ECM in Walk-in - Greater than 23 watts	$ 275.73	1,355.00	-	15	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Evap motors: shaded pole to ECM in Walk-in - less than 23 watts	$ 275.73	583.00	-	15	$ 0.00	$ 0.00
Evap motors: shaded pole to ECM in Display Case	$ 94.38	685.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure for Single Compressor Systems, LT Condensing Unit	$ 306.99	855.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure for Single Compressor Systems, LT Remote Condenser	$ 163.25	685.00	-	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 for Single Compressor Systems, MT Remote Condenser	$ 214.50	473.00	-	15	$ 0.00	$ 0.00
Evaporated Fan - Walk-In ECM Controller - Low Temp - 1/10-1/20 HP	$ 179.69	186.00	-	15	$ 0.00	$ 0.00
Evaporated Fan - Walk-In ECM Controller - Medium Temp - 1/10-1/20 HP	$ 275.76	234.00	-	15	$ 0.00	$ 0.00
Strip Curtains for Convenience Store Walk-in Freezers	$ 10.14	31.00	-	2	$ 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
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	-	20	$ 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 Open to Reach-in	$ 282.84	1,674.00	-	15	$ 0.00	$ 0.00
Cases - Low Temp Reach-in to High Efficiency Reach-in	$ 282.84	963.00	-	15	$ 0.00	$ 0.00
Cases - Medium Temp Open Case to New High Efficiency Open Case	$ 88.45	222.00	-	15	$ 0.00	$ 0.00
Cases - Medium Temp Open Case to New Reach In	$ 88.45	585.00	-	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
Advanced Floating Controls: Floating Head and Suction Pressure with Balanced Port Valves	$ 404.29	238.40	-	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
Advanced Floating Controls: Increase Suction Temperature with Electronic Expansion Valves (EEXVs)	$ 404.29	203.60	-	15	$ 0.00	$ 0.00
Efficient Compressors - Low Temperature	$ 287.47	798.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure Control - Air Cooled	$ 51.87	332.00	-	15	$ 0.00	$ 0.00
Floating Head Pressure Control - Evap Cooled	$ 51.87	708.00	-	15	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Floating Head Pressure Control w/ VFD- Air Cooled	$ 200.00	915.00	-	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
Multiplex - Controls - Floating suction pressure - air cooled condenser	$ 106.83	227.00	-	15	$ 0.00	$ 0.00
Multiplex - Controls - Floating suction pressure - evaporative condenser	$ 106.83	231.00	-	15	$ 0.00	$ 0.00
Multiplex - Efficient/oversized Air-cooled Condenser for Multiplex	$ 106.83	2,061.00	-	15	$ 0.00	$ 0.00
Multiplex - Efficient/oversized Water-cooled Condenser for Multiplex	$ 106.83	1,550.00	-	15	$ 0.00	$ 0.00
VFD - Condenser Fan Motors - Air Cooled	$ 191.18	930.00	-	15	$ 0.00	$ 0.00
VFD - Condenser Fan Motors - Evap Cooled	$ 191.18	930.00	-	15	$ 0.00	$ 0.00
Add doors to Open Medium Temp Cases	$ 385.00	-	49.00	20	$ 0.00	$ 0.00
Commercial/Industrial – Food Services – Electric						
0.81 to 1.00 GPM electric pre-rinse sprayer	$ 86.65	570.00	-	4	$ 0.00	$ 82.00
3 pan electric steamer	$ 103.69	9,066.00	-	8	$ 0.00	$ 399.00
4 pan electric steamer	$ 2,489.00	12,123.00	-	8	$ 0.00	$ 535.00
5 pan electric steamer	$ 3,111.00	15,013.00	-	8	$ 0.00	$ 670.00
6 pan electric steamer	$ 1,020.02	17,906.00	-	8	$ 0.00	$ 805.00
10 or larger pan electric steamer	$ 4,287.00	29,954.00	-	8	$ 0.00	$ 1,343.00
Efficient combination oven (>= 16 pan and <= 20 pan) electric	$ 547.17	5,540.00	-	8	$ 0.00	$ 359.00
Efficient combination oven (>= 6 pan and <= 15 pan) electric	$ 974.76	5,113.00	-	8	$ 0.00	$ 517.00
Efficient Electric convection oven full size	$ 488.33	987.00	-	9	$ 0.00	$ 0.00
Efficient hot food holding cabinet, 1/2 size	$ 280.59	1,607.00	-	14	$ 0.00	$ 0.00
Efficient hot food holding cabinet, full size	$ 597.41	2,860.00	-	14	$ 0.00	$ 0.00
Efficient hot food holding cabinet, Double Size NEW	$ 2,520.75	5,238.00	-	14	$ 0.00	$ 0.00
Electric fryer (Large Vat Size)	$ 255.62	1,703.00	-	6	$ 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
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
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	-	10	$ 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	-	10	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Refrigerator - Glass Door, 50 or greater cuft Federal Standard to ENERGY STAR Refrigerator - Glass Door, 50 or greater cuft	$ 1,760.66	590.00	-	10	$ 0.00	$ 0.00
Refrigerator - Glass Door,< 15 cuft Federal Standard to ENERGY STAR Refrigerator - Glass Door, < 15 cuft	$ 191.59	166.00	-	10	$ 0.00	$ 0.00
Refrigerator - Solid Door, < 15 cuft Federal Standard to ENERGY STAR Refrigerator - Solid Door,< 15 cuft	$ 208.95	231.00	-	10	$ 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	-	10	$ 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	-	10	$ 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	-	10	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door 15 to 29.9 cu.ft.	$ 640.39	626.00	-	10	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door 30 to 49.9 cu.ft	$ 1,554.77	1,212.00	-	10	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door 50 cu.ft. and greater	$ 2,156.05	1,598.00	-	10	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door Less than 15 cu.ft.	$ 359.66	446.00	-	10	$ 0.00	$ 0.00
Freezer - Energy Star Glass Door Chest Freezer	$ 559.37	310.00	-	10	$ 0.00	$ 0.00
Freezer - Energy Star Solid Door Chest Freezer	$ 1,036.59	233.00	-	10	$ 0.00	$ 0.00
Freezer - Solid Door, < 15 cuft Federal Standard to ENERGY STAR Freezer - Solid Door, < 15 cuft	$ 331.28	215.00	-	10	$ 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	-	10	$ 0.00	$ 0.00
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	-	10	$ 0.00	$ 0.00
Freezer - Solid Door, 50 ≤ cuft Federal Standard to ENERGY STAR Freezer - Solid Door, 50 ≤ cuft	$ 1,985.91	741.00	-	10	$ 0.00	$ 0.00
12 ft reach-in walk in case wo door to new door wo case (hvac and refrigeration)	$ 0.01	12,202.00	-	10	$ 0.00	$ 0.00
Standard Efficiency Appliance to Energy Star ice maker, air cooled, ice making head, 200 to 399 lbs./day capacity	$ 185.00	592.00	-	10	$ 0.00	$ 0.00
Standard Efficiency Appliance to Energy Star ice maker, air cooled, ice making head, 400 to 599 lbs./day capacity	$ 204.00	804.00	-	10	$ 0.00	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Standard Efficiency Appliance to Energy Star ice maker, air cooled, ice making head, 600 to 799 lbs./day capacity	$ 220.00	1,000.00	-	10	$ 0.00	$ 0.00
Standard Efficiency Appliance to Energy Star ice maker, air cooled, ice making head, 800 to 999 lbs./day capacity	$ 129.00	173.00	-	10	$ 0.00	$ 0.00
Standard Efficiency Appliance to Energy Star ice maker, air cooled, ice making head, under 200 lbs./day capacity	$ 317.67	940.00	-	10	$ 0.00	$ 0.00
Commercial/Industrial – AirGuardian – Electric						
Idaho AirGuardian	$ 1,440.00	6,000.00	-	10	$ 0.00	$ 0.00
Residential Prescriptive – Natural Gas						
G Windows Single Pane <0.30 U-value	$ 22.32	-	0.60	45	$ 0.00	$ 0.00
G Web Tstat Gas DIY	$ 240.35	-	26.00	15	$ 0.00	$ 0.00
G Web Tstat Gas Cont	$ 294.25	-	26.00	15	$ 0.00	$ 0.00
NG FURNACE/BOILER 90% AFUE	$ 682.00	-	130.81	20	$ 0.00	$ 0.00
G TANKLESS WH (0.82+)	$ 1,035.00	-	78.00	20	$ 0.00	$ 0.00
NG Storm Windows	$ 9.90	-	0.60	20	$ 0.00	$ 0.00
E STAR HOME - GAS ONLY	$ 1,059.00	-	66.99	25	$ 0.00	$ 0.00
G HE Water Heaters (<= 55)	$ 315.85	-	20.90	13	$ 0.00	$ 0.00
G Wall Insulation	$ 1.38	-	0.07	45	$ 0.00	$ 0.00
G Floor Insulation	$ 1.31	-	0.06	45	$ 0.00	$ 0.00
G Attic Insulation	$ 1.30	-	0.15	45	$ 0.00	$ 0.00
Low-Income – Natural Gas						
G AIR INFILTRATION	$ 1,509.36	-	16.00	15	$ 0.00	$ 0.00
G ENERGY STAR DOORS	$ 391.48	-	12.60	40	$ 391.48	$ 0.00
G ENERGY STAR WINDOWS	$ 22.58	-	0.53	45	$ 22.58	$ 0.00
G HE FURNACE AFUE 95%	$ 823.10	-	87.55	20	$ 823.10	$ 0.00
G HE WH < 55 Gal	$ 529.00	-	7.05	13	$ 500.00	$ 0.00
G INS - CEIL/ATTIC	$ 1.04	-	0.13	45	$ 0.00	$ 0.00
G INS - DUCT	$ 0.29	-	0.03	45	$ 0.00	$ 0.00
G INS - FLOOR	$ 1.31	-	0.08	45	$ 0.00	$ 0.00
G INS - WALL	$ 1.38	-	0.07	45	$ 0.00	$ 0.00
G duct sealing	$ 793.95	-	20.17	20	$ 0.00	$ 0.00
Tankless Water Heater (<=55 Gal)	$ 962.89	-	66.50	20	$ 0.00	$ 0.00
HE Boiler AFUE 96%	$ 2,855.13	-	103.84	20	$ 0.00	$ 0.00
Residential – Simple Steps, Smart Savings – Natural Gas						
Showerhead 2.0 GPM	$ 18.22	-	6.44	10	$ 3.41	$ 0.00
Showerhead 1.75 GPM	$ 18.22	-	3.00	10	$ 9.32	$ 0.00
Showerhead 1.5 GPM	$ 18.22	-	11.21	10	$ 14.33	$ 0.00

Measure Description	Customer Incremental Cost	Y1 KWh Savings	Y1 Therm Savings	Measure Life	Y1 PV NEBs	Recurring NEBs
Commercial/Industrial – HVAC – Natural Gas						
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 – Shell – Natural Gas						
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 – Food Services – Natural Gas						
0.81 to 1 GPM gas pre-rinse sprayer	$ 108.42	-	16.81	4	$ 0.00	$ 1.40
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
Efficient convection oven full size	$ 5,717.00	-	450.00	10	$ 0.00	$ 0.00
H.E. gas convection oven, 40% effic. or better	$ 700.00	-	323.00	12	$ 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	$ 0.00	$ 0.00
Low temp gas hot water dishwasher	$ 2,297.00	-	140.10	12	$ 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

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CADMUS

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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.

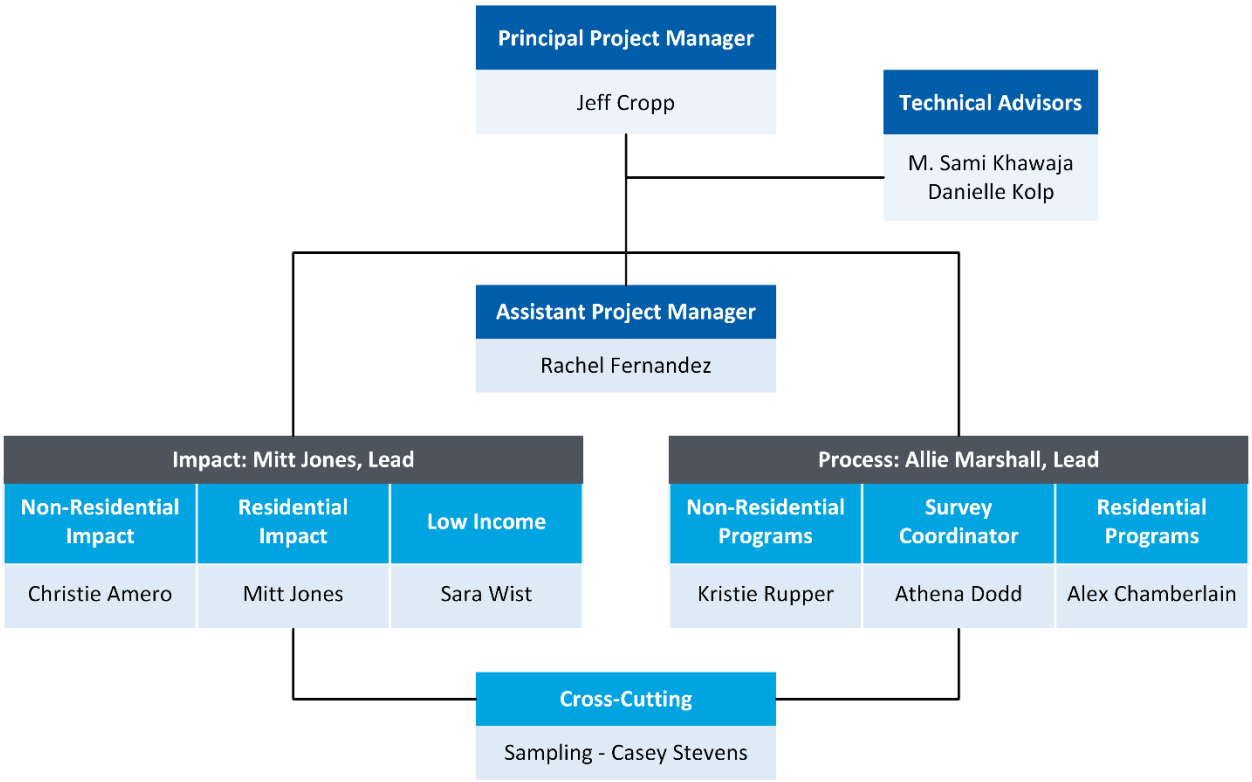
The following chapter summarizes the overall evaluation effort, followed by a chapter providing details of cross-cutting evaluation tasks (that is, general descriptions of the EM&V approaches applied as appropriate across individual programs). The remainder of this document addresses program-specific 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%

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Avista corporate headquarters, Spokane, Washington