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List Key Words for this report. We use these to improve search results.

Demand-Side Management 2017 Annual Report, Supplement 1: Cost-Effectiveness, and Supplement 2: Evaluation.

Send the completed Cover Sheet and the Report in an email addressed to PUC.FilingCenter@state.or.us

Send confidential information, voluminous reports, or energy utility Results of Operations Reports to PUC Filing Center, PO Box 1088, Salem, OR 97308-1088 or by delivery service to 201 High Street SE Suite 100, Salem, OR 97301.

Print

JULIA A. HILTON
Senior Counsel
jhilton@idahopower.com

April 9, 2018

VIA ELECTRONIC FILING AND HAND DELIVERY

Attention: Filing Center
Public Utility Commission of Oregon
201 High Street SE, Suite 100
Salem, Oregon 97301-3398

Re: Docket No. UM 1710
In the Matter of Idaho Power Company's Request for Cost-Effectiveness Exceptions for Specific Demand-Side Management Electric Measures and Programs – *Demand-Side Management 2017 Annual Report*

Filing Center:

Public Utility Commission of Oregon Order No. 15-200 in the above-referenced docket states that Idaho Power Company ("Idaho Power" or "Company") is to electronically file the Company's demand-side management annual report in years that Idaho Power does not file for a cost-effectiveness exception request. Although Idaho Power did have a cost-effectiveness exceptions request in 2017, the Company is filing its *Demand-Side Management 2017 Annual Report* ("2017 DSM Annual Report"), including Supplement 1: Cost-Effectiveness and Supplement 2: Evaluation, as an informational copy. Because the 2017 DSM Annual Report is over 100 pages, two copies of the report and its supplements will be hand delivered on April 10, 2018.

The 2017 DSM Annual Report and its supplements are also available on Idaho Power's website via the following link: https://www.idahopower.com/ways-to-save/energy-efficiency-program-reports/.

If you have any questions regarding this filing, please contact Paul Goralski at (208) 388-2608 or pgoralski@idahopower.com.

Sincerely,

Julia A. Hilton, OSB #142457

JAH:csb
Enclosures

IDAHO POWER
An IDACORP Company

2017 Annual Report

SUPPLEMENT 1: COST-EFFECTIVENESS

DEMAND-SIDE MANAGEMENT

MARCH 15 • 2018

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Supplement 1: Cost-Effectiveness

Cost-Effectiveness

Idaho Power considers cost-effectiveness of primary importance in the design, implementation, and tracking of energy efficiency and demand response programs. Idaho Power's energy efficiency and demand response opportunities are preliminarily identified through the Integrated Resource Plan (IRP) process. Idaho Power uses third-party energy efficiency potential studies to identify achievable cost-effective energy efficiency potential, which is added to the resources included in the IRP. Idaho Power's Program Planning Group (PPG) explores new opportunities to expand current demand-side management (DSM) programs and offerings.

Prior to the actual implementation of energy efficiency or demand response programs, Idaho Power performs a preliminary cost-effectiveness analysis to assess whether a potential program design or measure may be cost-effective from the perspective of Idaho Power and its customers. Incorporated in these models are inputs from various sources that use the most current and reliable information available. When possible, Idaho Power leverages the experiences of other utilities in the region and/or throughout the country to help identify specific program parameters. This is accomplished through discussions with other utilities' program managers and researchers. Idaho Power also uses electric industry research organizations, such as E Source, NEEA Regional Emerging Technology Advisory Committee, the Consortium for Energy Efficiency (CEE), American Council for an Energy-Efficient Economy (ACEEE), Advanced Load Control Alliance (ALCA), and Association of Energy Service Professionals (AESP) to compare similar programs and their results. Additionally, Idaho Power relies on the results of program impact evaluations and recommendations from consultants.

Idaho Power's objective is for all programs to have benefit/cost (B/C) ratios greater than 1.0 for the total resource cost (TRC) test, utility cost (UC) test, and participant cost test (PCT) at the program and measure level where appropriate. Each cost-effectiveness test provides a different perspective, and Idaho Power believes each test provides value when evaluating program performance. If a measure or program is found to be not cost-effective from one or more of the three tests, Idaho Power assesses it and runs the cost-effectiveness calculations under a variety of scenarios and assumptions. For some measures within the programs, savings can vary based on factors such participation levels or the participants' locations. For instance, heat pumps installed in the Boise area will have less savings than heat pumps installed in the McCall area. If program participation and savings increase, fixed costs such as labor and marketing are spread out more and the program cost-effectiveness increases.

When a program or measure is shown to be not cost-effective, Idaho Power works with the Energy Efficiency Advisory Group (EEAG) to get additional input. If the measure or program is indeed offered, the company explains to stakeholders why the measure or program was implemented or continued and what steps the company plans to take to improve its cost-effectiveness. The company believes this aligns with the expectations of the Idaho Public Utilities Commission (IPUC) and Public Utility Commission of Oregon (OPUC).

In IPUC Order No. 33365, page 9, the IPUC states the following:

> We thus find it reasonable for the Company to continue screening potential programs using each test as a guideline, and to advise us on how the Company's programs fare under each test. When the Company ultimately seeks to recover its prudent investment in such programs, however, we believe the Company may (but need not exclusively) emphasize the UCT—and that test's focus on Company-controlled benefits and costs—to argue whether the programs were cost-effective.

In the OPUC Order No. 94-590, issued in Utility Miscellaneous (UM) 551, the OPUC outlines specific cost-effectiveness guidelines for energy efficiency measures and programs managed by program administrators. It is the expectation of the OPUC that measures and programs pass both the UC and TRC tests. Measures and programs that do not pass these tests may be offered by a utility if they meet one or more of the following additional conditions specified by Section 13 of Order No. 94-590:

A. The measure produces significant non-quantifiable non-energy benefits (NEB)
B. Inclusion of the measure will increase market acceptance and is expected to lead to reduced cost of the measure
C. The measure is included for consistency with other DSM programs in the region
D. Inclusion of the measure helps increase participation in a cost-effective program
E. The package of measures cannot be changed frequently, and the measure will be cost-effective during the period the program is offered
F. The measure or package of measures is included in a pilot or research project intended to be offered to a limited number of customers
G. The measure is required by law or is consistent with OPUC policy and/or direction

If Idaho Power determines a program or measure is not cost-effective but meets one or more of the exceptions set forth by Order No. 94-590, the company files an exceptions request with the OPUC to continue offering the measure or program within it its Oregon service area.

For operational and administrative efficiency, Idaho Power endeavors to offer identical programs in its Oregon and Idaho jurisdictions for a variety of reasons. Some customers, contractors, and trade allies operate in both states. Program consistency is important for the participants' overall satisfaction with the programs. Offering different program designs would create confusion in the marketplace and could inhibit participation. In addition, program infrastructure is designed to implement consistent programs across the service area.

Methodology

For its cost-effectiveness methodology, Idaho Power relies on the Electric Power Research Institute (EPRI) *End Use Technical Assessment Guide* (TAG); the *California Standard Practice Manual* and its subsequent addendum, the National Action Plan for Energy Efficiency's (NAPEE) *Understanding*

Cost Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers; and the *National Action Plan on Demand Response*. For resource planning, Idaho Power primarily uses the TRC test. This test is used because, as defined in the TAG and *California Standard Practice Manual*, it is the most similar to supply-side tests, and it provides a useful basis to compare demand-side and supply-side resources. For program planning and evaluation the company primarily uses the TRC and the UC test to develop B/C ratios to determine the cost-effectiveness of DSM programs. The PCT provides the company the opportunity to assess a program or measure from the participant perspective and to determine if it is in the best interest of the average customer.

For energy efficiency programs, each program's cost-effectiveness is reviewed annually from a one-year perspective. The annual energy-savings benefit value is summed over the life of the measure or program and is discounted to reflect 2017 dollars. The result of the one-year perspective is shown in *Supplement 1: Cost-Effectiveness*. Appendix 4 of the main *Demand-Side Management 2017 Annual Report* includes the program cost-effectiveness to date by including the culmination of actual historic savings values and expenses, as well as the ongoing energy-savings benefit over the life of the measures included in a program.

The goal of demand response programs is to minimize or delay the need to build new supply-side resources. Unlike energy efficiency programs or supply-side resources, demand response programs must acquire and retain participants each year to maintain a level of demand-reduction capacity for the company.

As part of the public workshops on Case No. IPC-E-13-14, Idaho Power and other stakeholders agreed on a new methodology for valuing demand response. The settlement agreement, as approved in IPUC Order No. 32923 and OPUC Order No. 13-482, defined the annual cost of operating the three demand response programs for the maximum allowable 60 hours to be no more than $16.7 million. The annual value calculation will be updated with each IRP based on changes that include, but are not limited to, need, capital cost, or financial assumptions. This amount was reevaluated in the 2015 IRP to be $18.5 million.

This $18.5 million value is the levelized annual cost of a 170-megawatt (MW) deferred resource over a 20-year life. The demand response value calculation will include this value even in years when the IRP shows no peak-hour capacity deficits. In 2017, the cost of operating the three demand response programs was $8.8 million. Idaho Power estimates that if the three programs were dispatched for the full 60 hours, the total costs would have been approximately $11.1 million and would have remained cost-effective.

Assumptions

Idaho Power relies on research conducted by third-party sources to obtain savings and cost assumptions for various measures. These assumptions are routinely reviewed internally and with EEAG and updated as new information becomes available. For many of the measures within *Supplement 1: Cost-Effectiveness*, savings and costs were derived from either the Regional Technical Forum (RTF) or the *Idaho Power Energy Efficiency Potential Study* conducted by Applied Energy Group (AEG) in

2014. Idaho Power received end-use load shapes from AEG which have been applied to each program and measure when applicable. AEG refreshed the energy efficiency potential analysis in 2016. Due to the timing of the 2016 potential study, Idaho Power will use any updated assumptions from the 2016 potential study for the 2018 cost-effectiveness analyses.

The RTF regularly reviews, evaluates, and recommends eligible energy efficiency measures and the estimated savings and costs associated with those measures. For instance, because of the rapid changes in the lighting market, the RTF currently evaluates lighting measures annually. As the RTF updates these assumptions, Idaho Power applies them to current program offerings and assesses the need to make any program changes. Idaho Power staff participates in the RTF by attending monthly meetings and contributing to various sub-committees. Because cost data from the RTF information is in 2006 or 2012 dollars, measures with costs from the RTF are escalated to 2017 dollars. For workbooks still in 2006 dollars, the costs are escalated by 19.6 percent. For workbooks in 2012 dollars, the costs are escalated by 7.8 percent. This percentage is provided by the RTF in workbook RTFStandardInformationWorkbook_v3_1.xlsx.

Idaho Power uses a technical reference manual (TRM) developed by ADM Associates, Inc., for the Commercial and Industrial Energy Efficiency Program's New Construction and Retrofit options. In 2017, the company has contracted with ADM to update the TRM in preparation for changes that will be made to the program in 2018. Idaho Power also relies on other sources, such as the Northwest Power and Conservation Council (NWPCC), Northwest Energy Efficiency Alliance (NEEA), the Database for Energy Efficiency Resources (DEER), the Energy Trust of Oregon (ETO), the Bonneville Power Administration (BPA), third-party consultants, and other regional utilities. Occasionally, Idaho Power will also use internal engineering estimates and calculations for savings and costs based on information gathered from previous projects.

The company freezes savings assumptions when the budgets are established for the next calendar year unless code and standard changes or program updates necessitate a need to use updated savings. As a general rule, the 2017 energy savings reported for most programs will use the assumption set at the beginning of the program year. These assumptions are discussed in more detail in the cost-effectiveness sections for each program.

The remaining inputs used in the cost-effectiveness models are obtained from the IRP process. Idaho Power's 2015 IRP was acknowledged by the IPUC on December 23, 2015 and by the OPUC April 28, 2016 and is the source of all the financial assumptions for the cost-effectiveness analysis. *Appendix C—Technical Appendix* of Idaho Power's 2015 IRP contains the DSM Alternate costs, discount rate, and escalation rate. These DSM Alternate costs vary by season and time of day and are applied to an end-use load shape to obtain the value of a measure or program. The DSM Alternate energy costs are based on both the projected fuel costs of a peaking unit and forward electricity prices as determined by Idaho Power's power supply model, AURORAxmp® Electric Market Model. The avoided capital cost of capacity is based on a gas-fired, simple-cycle turbine. In the 2015 IRP, the annual avoided capacity cost is $119 per kilowatt (kW).

As part of the 2015 IRP Case IPC-E-15-19 and 2014 DSM prudence Case IPC-E-15-06, parties requested Idaho Power review how transmission and distribution (T&D) costs are treated in the IRP. Idaho Power committed to reviewing the T&D benefits, and the analysis was presented to EEAG in August 2016. The estimated average value of energy efficiency on T&D deferral is $3.76/kW per year or $0.000429/kilowatt-hour (kWh). In compliance with Order No. 33365, this value was added to the 2015 DSM Alternate energy costs and included in the cost-effectiveness analysis for 2017.

Idaho Power's 2017 IRP was filed on June 30, 2017 with the IPUC under case IPC-E-17-11 and with the OPUC under case LC 68. Idaho Power's 2017 IRP was acknowledged by the IPUC on February 9, 2018, in Order No. 33983. As of the publication of this report, the company has not received an acknowledgement of the 2017 IRP from Oregon. Since the 2017 IRP was acknowledged after the budgets were set for 2018, the 2015 IRP will remain the source for all financial assumptions and cost-effectiveness analysis in 2018. The 2017 IRP is expected to be the source of all assumptions and analysis for the 2019 program year. For the demand response programs, with inputs from the 2017 IRP, the Company determined the maximum annual cost of running all three demand response programs for the maximum allowable hours of 60 hours has been calculated to be no more than $19.8 million.

As recommended by the NAPEE *Understanding Cost-Effectiveness of Energy Efficiency Programs*, Idaho Power's weighted average cost of capital (WACC) of 6.74 percent is used to discount future benefits and costs to today's dollars. Once the DSM Alternate costs and load shapes are applied to the annual kWh savings of a measure or program, the WACC is used to calculate the net present value (NPV) of the annual benefit for the UC and TRC B/C ratios. However, determining the appropriate discount rate for participant cost and benefits is difficult because of the variety of potential discount rates that can be used by the different participants as described in the TAG. Since the participant benefit is based on the anticipated bill savings of the customer, Idaho Power believes the WACC is not an appropriate discount rate to use. Because the customer bill savings is based on Idaho Power's 2017 average customer segment rate and is not escalated, the participant bill savings is discounted using a real discount rate of 4.44 percent, which is based on the 2015 IRP's WACC of 6.74 percent and an escalation rate of 2.2 percent. The real discount rate is used to calculate the NPV of any participant benefits or costs for the PCT or ratepayer impact measure (RIM) B/C ratios.

The formula to calculate the real discount rate is as follows:

$$((1 + \text{WACC}) \div (1 + \text{Escalation})) - 1 = \text{Real}$$

Line-loss percentages are applied to the metered-site energy savings to find the energy savings at the generation level. The *Demand-Side Management 2017 Annual Report* shows the estimated electrical savings at the customer meter level. Cost-effectiveness analyses are based on generation-level energy savings. The demand response program reductions are reported at the generation level with the line losses. In 2014, Idaho Power reviewed the system loss coefficients from 2012. Based on this study, the line-loss factors were updated and reduced from 10.9 to 9.6 percent. The summer peak line-loss factor was reduced from 13 to 9.7 percent.

Conservation Adder

The *Pacific Northwest Electric Power Planning and Conservation Act* (Northwest Power Act) states the following:

> …any conservation or resource shall not be treated as greater than that of any non-conservation measure or resource unless the incremental system cost of such conservation or resource is in excess of 110 per centum of the incremental system cost of the nonconservation measure or resource.

As a result of the Northwest Power Act, most utilities in the Pacific Northwest add a 10-percent conservation adder in energy efficiency cost-effectiveness analyses. In OPUC Order No. 94-590, the OPUC states:

> We support the staff's position that the effect of conservation in reducing uncertainty in meeting load growth is included in the ten percent cost adder and that no separate adjustment is necessary.

Additionally, in IPUC Order No. 32788 in Case No. GNR-E-12-01, "Staff noted that Rocky Mountain Power and Avista use a 10% conservation adder when calculating the cost-effectiveness of all their DSM programs." Staff recommended the utilities have the option to use a 10-percent adder, and the IPUC agreed with the recommendation to allow utilities to use the 10-percent adder in the cost-effectiveness analyses for low-income programs.

After reviewing the practices of other utilities in the Pacific Northwest, as well as the OPUC Order No. 94-590 and IPUC Order 32788, Idaho Power began applying the 10-percent conservation adder in all energy efficiency measure and program cost-effectiveness analyses in 2014. However, on further examination, Idaho Power observed that both Avista and Rocky Mountain Power only apply the 10-percent conservation adder when calculating the TRC test. Previously, Idaho Power had applied the adder to the TRC test and the UC and RIM tests. Beginning in 2016, Idaho Power removed the conservation adder from the UC and RIM tests in the program and measure cost-effectiveness calculations.

Net-to-Gross

Net-to-gross (NTG), or net-of-free-ridership (NTFR), is defined by NAPEE's *Understanding Cost Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers* as a ratio that does as follows:

> Adjusts the impacts of the programs so that they only reflect those energy efficiency gains that are the result of the energy efficiency program. Therefore, the NTG deducts energy savings that would have been achieved without the efficiency program (e.g., 'free-riders') and increases savings for any 'spillover' effect that occurs as an indirect result of the program. Since the NTG attempts to measure what the customers would have done in the

absence of the energy efficiency program, it can be difficult to determine precisely.

Capturing the effects of Idaho Power's energy efficiency efforts on free-ridership and spillover is difficult. Due to the uncertainty surrounding NTG percentages, Idaho Power used an NTG of 100 percent for all measure cost-effectiveness analyses. For the program cost-effectiveness analyses, the B/C ratios shown are based on a 100-percent NTG. A sensitivity analysis was conducted to show what the minimum NTG percentage needs to be for the program to remain (or become) cost-effective from either the TRC or UC perspective. These NTG percentages are shown in the program cost-effectiveness results in *Supplement 1: Cost-Effectiveness*.

Results

Idaho Power determines cost-effectiveness on a measure basis, where relevant, and program basis. As part of *Supplement 1: Cost-Effectiveness* and where applicable, Idaho Power publishes the cost-effectiveness by measure, calculating the PCT and RIM test at the program level, listing the assumptions associated with cost-effectiveness, and citing sources and dates of metrics used in the cost-effectiveness calculation.

The B/C ratio from the participant cost perspective is not calculated for the Educational Distributions, Energy House Calls, Fridge and Freezer Recycling Program, Multifamily Energy Savings Program, Weatherization Assistance for Qualified Customers (WAQC), and Weatherization Solutions for Eligible Customers programs. These programs have few or no customer costs. For energy efficiency programs, the cost-effectiveness models do not assume ongoing participant costs.

For most programs, the *Demand-Side Management 2017 Annual Report* Appendix 4 contains program UC and TRC B/C ratios using actual cost information over the life of the program through 2017. *Supplement 1: Cost-Effectiveness* contains annual cost-effectiveness metrics for each program using actual information from 2017 and includes results of the PCT. Current customer energy rates are used in the calculation of the B/C ratios from a PCT and RIM perspective. Rate increases are not forecasted or escalated. A summary of the cost-effectiveness by program can be found in Table 3.

The application of the 2015 DSM Alternate costs impacted the cost-effectiveness ratios for all programs and measures within the DSM portfolio. The DSM Alternate costs declined on average 24 percent between the 2013 and 2015 IRPs. However, in 2017, most of Idaho Power's energy efficiency programs were cost-effective from the UC or TRC perspective with the exception of the Fridge and Freezer Recycling Program, Heating & Cooling Efficiency (H&CE) Program, Home Improvement Program, and the weatherization programs for income-qualified customers.

The Fridge and Freezer Recycling Program has a UC of 0.60 and a TRC of 1.14. The program's cost-effectiveness has been an ongoing discussion with EEAG since 2014 due to declining deemed savings values from the RTF and Idaho Power's DSM Alternate costs. In an attempt to lower program administrative costs, the $30 incentive was removed in 2015 and customers were given two LED lightbulbs for additional energy savings. When the incentives were removed, participation declined from over 3,194 units in 2014 to 1,630 units in 2015. The program faced additional challenges when the original program vendor entered into receivership and ceased operations in late 2015. Idaho Power temporarily suspended the program and re-launched it in June 2016 under a new name and with a new program vendor. At that time, the OPUC authorized the program's reinstatement in Idaho Power's Oregon service territory; however, it imposed certain specific reporting requirements. Specifically, the OPUC requested that in 2017, the company re-evaluate the program's cost-effectiveness using the unit energy savings based on the vintage (e.g., "1992 and earlier" and "1993 and later") of the recycled unit as well as the "any vintage."

When the program began in 2009, 90 percent of the freezer recycled were 1992 an older. In 2017, 55 percent of freezers were of that vintage. In 2009, 78 percent of refrigerators recycled in the program were vintage year 1992 and older. By 2017, 26 percent of the refrigerators were that vintage. Because older units have higher savings and fewer of those units have been recycled through the program, the program was increasingly becoming less cost-effective. In early 2017, Idaho Power projected that if the program recycled 1,800 units, it would fail the UC and the TRC tests. The company continued to monitor the program and by mid-summer, the program had recycled only 790 units. It appeared the program would be on pace to only recycle 1,500 units by year end. Based on the projected lower participation levels, the program was expected to be not be cost-effective under either test. Other regional utilities such as Avista, Rocky Mountain Power, Energy Trust of Oregon had recently discontinued their programs. Seattle City Light was in the process of suspending its program. Idaho Power presented these findings at the August 2, 2017, EEAG meeting. The EEAG members in attendance supported the recommendation to end the program.

The program's higher than anticipated UC and TRC for 2017 was largely due to the large push toward the end of the year to increase the program's participation before its discontinuation as well as a reduction to the program's administrative costs. Due to updated savings from the RTF, the program is still anticipated to be not cost-effective in future years.

The Heating & Cooling Efficiency Program has a UC of 1.48, TRC of 0.85, PCT of 1.47. In 2016, Idaho Power reviewed the program's cost-effectiveness and notified EEAG at the August 30, 2016, meeting that the program was anticipated to be not cost-effective from the TRC perspective. Throughout 2017, Idaho Power discussed with EEAG proposed tactics it would implement to improve the program's overall cost-effectiveness. These tactics include re-assigning non-program labor, reducing marketing spend while improving other tactics, and reducing the stipend to participating contractors.

Idaho Power also proposed to report the cost-effectiveness of the ductless heat pumps (DHP), which are not cost-effective, separately from the rest of the program. After reviewing the costs that were allocated to the DHP portion of the program compared to the rest of the program, it appears that the DHP portion of the program was assigned only 13 percent of the total administrative costs. As a result, the DHP portion of the program had a UC of 1.87 and TRC of 0.80 while the rest of the program had a UC of 1.35 and TRC of 0.89.

Idaho Power filed changes to the program in October 2017 with the OPUC. Effective January 1, 2018, the program has reduced the contractor stipend from $150 to $50 and added heat pump water heaters to the measure offerings. The inclusion of the heat pump water heater measure may increase the potential energy savings in the program without significantly increasing administrative costs, which may improve the program's overall cost-effectiveness. The company plans to continue to monitor this program and seek opportunities to improve the program's overall cost-effectiveness.

The Home Improvement Program has a UC of 2.54, a TRC of 0.41, and a PCT of 0.70. Due to the reduced weatherization savings from the RTF, as well as the DSM Alternate costs from the 2015 IRP, further reduce the cost-effectiveness of the program. Idaho Power analyzed ways to modify the program to improve the cost-effectiveness, but despite the long 45-year life of the program and measures, the company concluded the program would remain not cost-effective. The company ended the program in June 2017.

WAQC had a TRC of 0.48 and a UC ratio of 0.37, and Weatherization Solutions for Eligible Customers had a TRC of 0.46 and a UC ratio of 0.34. The programs showed a decrease in savings and cost-effectiveness ratios over 2016. The decrease to the program's overall cost-effectiveness is due in part to the lower DSM Alternate costs from the 2015 IRP as well as the updated load shapes that reflect most of the savings for the program occur in the non-summer months.

In 2017, Idaho Power began using the load shape for the programs' analysis that was used for electric space heating in Idaho Power's 2015 and 2017 potential studies. The load shapes reflect the time periods of the energy savings end uses. The load shape change reduced the value of the savings allocated to summer months and better aligns with the electric heat nature of the program savings.

To calculate the programs' cost-effectiveness, Idaho Power adopted the following IPUC staff's recommendations from Case No. GNR E-12-01:

- Applied a 100-percent NTG.
- Claimed 100 percent of energy savings for each project.
- Included indirect administrative overhead costs. The overhead costs of 6.13 percent were calculated from the $2,929,093 of indirect program expenses divided by the total DSM expenses of $47,757,496 as shown in Appendix 3 of the *Demand-Side Management 2017 Annual Report*.
- Applied the 10 percent conservation preference adder.
- Amortized evaluation expenses over a three-year period.
- Claimed one dollar of NEBs for each dollar of utility and federal funds invested in health, safety, and repair measures.

Thirty-seven out of 268 individual measures in various programs are shown to not be cost-effective from either the UC or TRC perspective. The increase in non cost-effective measures largely due to the lower DSM Alternate costs. These measures will be discontinued, analyzed for additional NEBs, modified to increase potential per-unit savings, or monitored to examine their impact on the specific program's overall cost-effectiveness. Specifically, of the 37 non cost-effective measures, 12 have been removed from the programs, 12 have ratios between 0.90-0.99, and 7 have ratios between 0.80-0.89. For several measures, Idaho Power filed cost-effectiveness exception requests with the OPUC in compliance with Order No. 94-590. Measures and programs that do not pass these tests may be offered by the utility if they meet one or more of the additional conditions specified by Section 13 of Order No. 94-590. These exception requests were approved under Order No. 15-200 on June 23, 2015, or with the specific program advice filings. The filings and exception requests are noted in Table 1.

Table 1. 2017 non-cost-effective measures

Program	Number of Measures	Notes
Energy Efficient Lighting	3	Program is cost-effective with a UC of 4.09 and TRC of 4.63. The non-cost-effective measures were a CFL decorative and mini base bulb, a CFL globe, and a CFL reflector. These 107 bulbs were carry overs from 2016 and represent 0.0061% of overall bulbs purchased in the program. Additionally, CFL bulbs have been removed from the Simple Steps, Smart Savings lighting promotion.
Fridge and Freezer Recycling Program	4	Program was discontinued on December 31, 2017.
H&CE Program	6	Cost-effectiveness exception request for ductless heat pumps (DHP) and open-loop water source heat pumps filed with the OPUC under UM-1710. OPUC Order No. 94-590, Section 13. Approved under Order No. 15-200. Exception request for the program and smart thermostat requested and approved with OPUC Advice No. 17-09. Air-source heat pump and duct sealing measures would be cost-effective at 1.33 and 1.03 respectively without the inclusion of administration costs. Meets OPUC Order No. 94-590, Section 10.
Home Improvement Program	5	Program was discontinued on June 30, 2017.
Rebate Advantage	2	ENERGY STAR and Eco-Rated manufactured homes built in Heating Zone 1 have a TRC of 0.94 and 0.95 respectively. Measures would be cost-effective with TRCs of 1.11 and 1.12 without the inclusion of administration costs. Meets OPUC Order No. 94-590, Section 10. Program to be reviewed in 2018 with updated RTF assumptions.
New Construction and Retrofits	4	Measures offered in both options. Cost-effectiveness exception request filed and approved with OPUC Advice No. 14-06, 14-10, and 16-08. OPUC Order No. 94-590, Section 13. Exceptions C and D. Program to be reviewed in 2018 with program updates.
New Construction	2	Cost-effectiveness exception request filed and approved with OPUC Advice No. 14-10 and 16-08. OPUC Order No. 94-590, Section 13. Exceptions A and D. Program to be reviewed in 2018 with program updates.
Retrofit	10	UC and TRC ranges from 0.76 to 0.99. Cost-effectiveness exception request filed and approved with OPUC Advice No. 14-06 and 16-08. OPUC Order No. 94-590, Section 13. Exceptions C and D. Program to be reviewed in 2018 with program updates.
Irrigation Efficiency Rewards Program	1	Measure has a UC of 3.71 and TRC of 0.92. Cost-effectiveness exception request for rebuilt or new brass impact sprinklers filed with the OPUC under UM-1710. OPUC Order No. 94-590, Section 13. Exception A, D, and D. Approved under Order No. 15-200.
Total	**37**	

Following the annual program cost-effectiveness results are tables that include measure-level cost-effectiveness. Exceptions to the measure-level tables are programs that are analyzed at the project level. These programs include, Custom Projects, the custom option of Irrigation Efficiency Rewards, WAQC, and Weatherization Solutions for Eligible Customers.

The measure-level cost-effectiveness includes inputs of measure life, energy savings, incremental cost, incentives, program administration cost, and net benefit. Program administration costs include all non-incentive costs: labor, marketing, training, education, purchased services, and evaluation. Energy and expense data have been rounded to the nearest whole unit.

2017 DSM Detailed Expenses by Program

Included in this supplement is a detailed breakout of program expenses as shown in Appendix 2 of the *Demand Side Management 2017 Annual Report*. These expenses are broken out by funding source major-expense type (labor/administration, materials, other expenses, purchased services, and incentives).

Table 2. 2017 DSM detailed expenses by program (dollars)

Sector/Program	Idaho Rider	Oregon Rider	Idaho Power	Total Program
Energy Efficiency/Demand Response Total	**$ 28,624,709**	**$ 1,129,736**	**$ 1,574,128**	**$ 31,328,572**
Residential Total	**$ 11,661,597**	**$ 227,882**	**$ 1,497,964**	**$ 13,387,443**
Easy Savings	–	–	**149,813**	**149,813**
Labor/Administrative Expense	–	–	24,772	**24,772**
Materials and Equipment	–	–	125,000	**125,000**
Other Expense	–	–	40	**40**
Educational Distributions	**3,323,024**	**141,860**	**1,143**	**3,466,027**
Labor/Administrative Expense	41,055	2,132	1,143	**44,330**
Materials and Equipment	2,706,267	129,731	–	**2,835,998**
Other Expense	341,442	9,997	–	**351,439**
Purchased Services	234,260	–	–	**234,260**
Energy Efficient Lighting	**4,787,259**	**84,223**	**1,406**	**4,872,888**
Labor/Administrative Expense	61,567	3,317	1,406	**66,291**
Materials and Equipment	1	–	–	**1**
Other Expense	1,073	56	–	**1,130**
Purchased Services	2,082,484	30,358	–	**2,112,841**
Incentives	2,642,134	50,491	–	**2,692,626**
Energy House Calls	**170,691**	**12,008**	**337**	**183,035**
Labor/Administrative Expense	15,152	816	337	**16,305**
Materials and Equipment	2,371	125	–	**2,496**
Other Expense	15,710	732	–	**16,442**
Purchased Services	137,457	10,336	–	**147,793**
Fridge and Freezer Recycling Program	**259,480**	**6,155**	**307**	**265,942**
Labor/Administrative Expense	18,356	978	307	**19,641**
Materials and Equipment	6,012	316	–	**6,328**
Other Expense	27,207	1,103	–	**28,310**
Purchased Services	207,905	3,757	–	**211,662**
Heating & Cooling Efficiency Program	**575,404**	**18,920**	**2,874**	**597,198**
Labor/Administrative Expense	112,185	6,057	2,874	**121,115**
Materials and Equipment	6,374	335	–	**6,709**
Other Expense	70,139	621	–	**70,760**
Purchased Services	139,381	5,607	–	**144,988**
Incentives	247,325	6,300	–	**253,625**
Home Energy Audit	**281,125**	–	**1,683**	**282,809**
Labor/Administrative Expense	59,478	–	1,683	**61,161**
Materials and Equipment	20,639	–	–	**20,639**
Other Expense	71,515	–	–	**71,515**
Purchased Services	129,494	–	–	**129,494**
Home Improvement Program	**165,483**	–	**1,347**	**166,830**
Labor/Administrative Expense	51,670	–	1,347	**53,017**
Other Expense	237	–	–	**237**
Purchased Services	2,393	–	–	**2,393**
Incentives	111,183	–	–	**111,183**
Multifamily Energy Savings Program	**167,342**	–	**874**	**168,216**
Labor/Administrative Expense	34,556	–	874	**35,430**
Materials and Equipment	72,324	–	–	**72,324**
Other Expense	907	–	–	**907**

Sector/Program	Idaho Rider	Oregon Rider	Idaho Power	Total Program
Purchased Services	59,555	–	–	**59,555**
Oregon Residential Weatherization	–	**2,384**	**0**	**2,384**
Labor/Administrative Expense	–	1,955	0	**1,955**
Other Expense	–	114	–	**114**
Incentives	–	315	–	**315**
Rebate Advantage	**93,891**	**10,861**	**244**	**104,996**
Labor/Administrative Expense	10,080	543	244	**10,867**
Other Expense	14,429	709	–	**15,137**
Purchased Services	11,382	1,610	–	**12,992**
Incentives	58,000	8,000	–	**66,000**
Residential New Construction Pilot Program	**320,637**	**2,232**	**650**	**323,520**
Labor/Administrative Expense	27,695	1,494	650	**29,839**
Materials and Equipment	59	3	–	**62**
Other Expense	15,603	721	–	**16,323**
Purchased Services	281	15	–	**296**
Incentives	277,000	–	–	**277,000**
Shade Tree Project	**194,695**	–	**1,122**	**195,817**
Labor/Administrative Expense	40,301	–	1,122	**41,423**
Materials and Equipment	4	–	–	**4**
Other Expense	24,858	–	–	**24,858**
Purchased Services	53,975	–	–	**53,975**
Incentives	75,557	–	–	**75,557**
Simple Steps, Smart Savings™	**185,354**	**5,811**	**456**	**191,621**
Labor/Administrative Expense	42,414	2,256	456	**45,127**
Other Expense	70	4	–	**74**
Purchased Services	44,446	1,315	–	**45,762**
Incentives	98,423	2,236	–	**100,659**
Weatherization Assistance for Qualified Customers	–	–	**1,307,485**	**1,307,485**
Labor/Administrative Expense	–	–	40,242	**40,242**
Materials and Equipment	–	–	4,246	**4,246**
Other Expense	–	–	7,390	**7,390**
Purchased Services	–	–	1,255,607	**1,255,607**
Weatherization Solutions for Eligible Customers	**1,137,209**	**(56,571)**	**28,224**	**1,108,862**
Labor/Administrative Expense	7,963	–	28,224	**36,186**
Materials and Equipment	4,246	–	–	**4,246**
Other Expense	14,996	–	–	**14,996**
Purchased Services	1,110,004	(56,571)	–	**1,053,433**
Commercial/Industrial	**$ 14,732,314**	**$ 709,437**	**$ 23,701**	**$ 15,465,452**
Custom Projects	**8,352,626**	**311,028**	**16,266**	**8,679,919**
Labor/Administrative Expense	539,367	29,009	16,202	**584,577**
Materials and Equipment	3,575	188	–	**3,763**
Other Expense	308,873	15,413	64	**324,350**
Purchased Services	1,300,586	60,548	–	**1,361,134**
Incentives	6,200,225	205,870	–	**6,406,095**
New Construction	**2,186,213**	**243,129**	**4,254**	**2,433,596**
Labor/Administrative Expense	198,195	10,660	4,254	**213,110**
Other Expense	37,257	1,961	–	**39,218**
Purchased Services	156,893	7,927	–	**164,820**
Incentives	1,793,869	222,581	–	**2,016,449**
Retrofits	**4,193,475**	**147,180**	**3,180**	**4,343,835**
Labor/Administrative Expense	282,373	15,025	3,180	**300,578**
Materials and Equipment	262	14	–	**275**

Sector/Program	Idaho Rider	Oregon Rider	Idaho Power	Total Program
Other Expense	50,204	2,642	–	**52,847**
Purchased Services	735,754	38,547	–	**774,300**
Incentives	3,124,883	90,952	–	**3,215,835**
Oregon Commercial Audits	**–**	**8,102**	**–**	**8,102**
Labor/Administrative Expense	–	3,848	–	**3,848**
Materials and Equipment	–	74	–	**74**
Other Expense	–	880	–	**880**
Purchased Services	–	3,300	–	**3,300**
Irrigation Total	**$ 2,230,798**	**$ 192,416**	**$ 52,463**	**$ 2,475,677**
Irrigation Efficiency Rewards	**2,230,798**	**192,416**	**52,463**	**2,475,677**
Labor/Administrative Expense	309,863	16,759	52,450	**379,072**
Materials and Equipment	1,746	92	–	**1,837**
Other Expense	72,622	3,822	13	**76,457**
Purchased Services	4,006	710	–	**4,716**
Incentives	1,842,561	171,033	–	**2,013,594**
Market Transformation Total	**$ 2,563,818**	**$ 134,938**	**$ –**	**$ 2,698,756**
NEAA	**2,563,818**	**134,938**	**–**	**2,698,756**
Purchased Services	2,563,818	134,938	–	**2,698,756**
Other Program and Activities Total	**$ 1,837,807**	**$ 97,468**	**$ 47,958**	**$ 1,983,232**
Commercial/Industrial Energy Efficiency Overhead	**336,335**	**18,472**	**33,329**	**388,135**
Labor/Administrative Expense	194,875	10,986	33,329	**239,189**
Materials and Equipment	324	17	–	**341**
Other Expense	114,538	6,028	–	**120,567**
Purchased Services	26,598	1,441	–	**28,039**
Energy Efficiency Direct Program Overhead	**290,251**	**17,628**	**5,694**	**313,574**
Labor/Administrative Expense	205,674	11,127	5,694	**222,495**
Other Expense	84,577	6,501	–	**91,078**
Residential Energy Efficiency Education Initiative	**210,215**	**11,152**	**2,514**	**223,880**
Labor/Administrative Expense	84,214	4,560	2,492	**91,265**
Materials and Equipment	1,322	70	–	**1,392**
Other Expense	131,544	6,884	22	**138,451**
Purchased Services	(6,866)	(361)	–	**(7,228)**
Residential Energy Efficiency Overhead	**1,001,005**	**50,217**	**6,421**	**1,057,643**
Labor/Administrative Expense	164,629	9,001	6,342	**179,972**
Materials and Equipment	209	11	–	**220**
Other Expense	707,200	37,014	79	**744,293**
Purchased Services	128,967	4,191	–	**133,158**
Indirect Program Expenses Total	**$ 2,733,799**	**$ 46,651**	**$ 148,957**	**$ 2,929,407**
All Sectors Total	**$ 2,733,799**	**$ 46,651**	**$ 148,957**	**$ 2,929,407**
Energy Efficiency Accounting and Analysis	**878,239**	**45,728**	**148,830**	**1,072,797**
Labor/Administrative Expense	510,954	27,662	125,334	**663,950**
Materials and Equipment	52	3	–	**54**
Other Expense	18,935	1,006	23,497	**43,437**
Purchased Services	348,299	17,057	–	**365,356**
Energy Efficiency Advisory Group	**21,685**	**1,148**	**126**	**22,959**
Labor/Administrative Expense	4,537	245	126	**4,909**
Other Expense	17,147	902	–	**18,050**
Special Accounting Entries	**1,833,875**	**(225)**	**–**	**1,833,651**
Special Accounting Entry	1,833,875	(225)	–	**1,833,651**

Sector/Program	Idaho Rider	Oregon Rider	Idaho Power	Total Program
Demand Response Total	**$ 1,325,951**	**$ 476,305**	**$ 7,015,273**	**$ 8,817,529**
Residential Total	**$ 495,142**	**$ 39,493**	**$ 401,638**	**$ 936,272**
A/C Cool Credit	**495,142**	**39,493**	**401,638**	**936,272**
Labor/Administrative Expense	54,783	2,960	1,525	**59,268**
Materials and Equipment	5,231	275	–	**5,506**
Other Expense	23,192	1,221	–	**24,412**
Purchased Services	411,940	29,791	–	**441,731**
Incentives	(4)	5,245	400,112	**405,353**
Commercial/Industrial Total	**$ 86,861**	**$ 231,285**	**$ 340,010**	**$ 658,156**
Flex Peak Program	**86,861**	**231,285**	**340,010**	**658,156**
Labor/Administrative Expense	72,582	3,924	2,021	**78,527**
Other Expense	3,260	179	218	**3,657**
Purchased Services	11,019	–	–	**11,019**
Incentives	–	227,183	337,771	**564,954**
Irrigation Total	**$ 743,948**	**$ 205,528**	**$ 6,273,625**	**$ 7,223,101**
Irrigation Peak Rewards	**743,948**	**205,528**	**6,273,625**	**7,223,101**
Labor/Administrative Expense	63,714	3,448	28,103	**95,264**
Materials and Equipment	198,184	10,431	–	**208,615**
Other Expense	2,065	111	92	**2,267**
Purchased Services	479,986	24,671	–	**504,656**
Incentives	–	166,869	6,245,430	**6,412,299**
Grand Total	**$ 37,086,084**	**$ 1,885,098**	**$ 8,786,314**	**$ 47,757,496**

Table 3. Cost-effectiveness of 2017 programs by B/C test

Program/Sector	UC	TRC	RIM	PCT
Educational Distributions	3.02	6.33	0.53	N/A
Energy Efficient Lighting	4.09	4.63	0.56	7.07
Energy House Calls	1.26	1.65	0.38	N/A
Fridge and Freezer Recycling Program	0.60	1.14	0.32	N/A
Heating & Cooling Efficiency Program	1.48	0.85	0.52	1.47
Home Improvement Program	2.54	0.41	0.48	0.70
Multifamily Energy Savings Program	1.75	3.55	0.46	N/A
Rebate Advantage	1.88	1.19	0.42	2.59
Residential New Construction Pilot Program (ENERGY STAR ® Homes Northwest)	2.36	1.47	0.56	2.46
Simple Steps, Smart Savings	2.38	5.05	0.52	6.94
Weatherization Assistance for Qualified Customers	0.37	0.48	0.22	N/A
Weatherization Solutions for Eligible Customers	0.34	0.46	0.21	N/A
Residential Energy Efficiency Sector	**2.69**	**3.64**	**0.52**	**7.78**
Custom Projects	3.53	1.95	1.09	1.71
New Construction	3.90	4.64	0.80	6.22
Retrofits	2.92	1.11	0.75	1.38
Commercial/Industrial Energy Efficiency Sector*	**3.42**	**1.81**	**0.93**	**1.87**
Irrigation Efficiency Rewards	4.75	3.64	1.27	3.33
Irrigation Energy Efficiency Sector**	**4.78**	**3.65**	**1.28**	**3.33**
Energy Efficiency Portfolio	**2.75**	**2.50**	**0.72**	**3.67**

*Commercial/Industrial Energy Efficiency Sector cost-effectiveness ratios include savings and participant costs from Green Motors Rewinds.
**Irrigation Energy Efficiency Sector cost-effectiveness ratios include savings and participant costs from Green Motors Rewinds.

Cost-Effectiveness Tables by Program

Educational Distributions

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	3,466,027	
Program Incentives		–	I
Total UC	**$**	**3,466,027**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	–	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	10,481,423	$	3,466,027	3.02
TRC Test		21,929,694		3,466,027	6.33
RIM Test		10,481,423		19,663,302	0.53
PCT		N/A		N/A	N/A

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	21,187,261			
NPV Cumulative Energy (kWh)	193,777,127	$	10,481,423	S
10% Credit (Northwest Power Act)			1,048,142	
Total Electric Savings		**$**	**11,529,566**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	16,197,275	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	10,400,128	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P
RIM Test	= S * NTG	= P + (B * NTG)
PCT	N/A	N/A

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	33%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: Energy savings as reported by the *Resource Action Plan* for the 2016 to 2017 student kits.
NEBs for giveaway bulbs, student kit bulbs, and energy-savings kits include PV of periodic bulb (capital) replacement costs.
NEBs for student kit and energy-savings kit showerheads include the NPV of water and wastewater savings.
No participant costs.

Year: 2017 **Program**: Educational Distributions **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
General Purpose LED Give away	Efficient Technology: LED Lamp Type: General purpose and dimmable Lumen Category: 250 to 1049 lumens Space Type: Any	Baseline bulb	Lamp	ENRes_SF_Lighting	13	9.00	$5.06	$8.95	–	–	$0.164	3.44	9.86	1
Student Energy Efficiency Kit (SEEK) Program	2016–2017 kit offering. Kits include: high-efficiency showerhead, shower timer, 3 LEDs, FilterTone alarm, digital thermometer, LED nightlight.	No kit	Kit	IPC_Student Kits	11	226.50	$111.94	$106.29	–	–	$0.164	3.02	6.19	2
Energy-Savings Kit	Nine 250–1049-lumen general purpose bulbs One 1.75-gallons per minute (gpm) high-efficiency showerheads or showerhead and thermostatic shower valve combo (electric kit only) Three faucet aerators (electric kit only)	No kit	Kit	IPC_Energy-savings Kits	11	370.83	$183.47	$178.95	–	–	$0.164	3.02	6.28	3

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] No participant costs.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResLighting_Bulbs_v4_2.xlsm. 2016.
[2] Resource Action Programs. *2016–2017 Idaho Power Energy Wise Program Summary Report*. 2016.
[3] Lightbulbs—RTF. ResLighting_Bulbs_v4_2.xlsm. Showerhead - RTF. ResShowerheads_v2_4.xlsm. 2011. Faucet aerators—AEG. Potential Study.

Energy Efficient Lighting

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	2,180,262	
Program Incentives		2,692,626	I
Total UC	$	**4,872,888**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	8,898,728	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	19,946,368	$	4,872,888	4.09
TRC Test		51,259,943		11,078,990	4.63
RIM Test		19,946,368		35,746,840	0.56
PCT		62,885,516		8,898,728	7.07

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	37,765,190			
NPV Cumulative Energy (kWh)	366,265,652	$	19,946,368	S
10% Credit (Northwest Power Act)			1,994,637	
Total Electric Savings		**$**	**21,941,005**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	30,873,952	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	29,318,938	NEB

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	25%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Note: NEBs include PV of periodic bulb (capital) replacement costs.

Year: 2017 **Program**: Energy Efficient Lighting **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Decorative and Mini-Base	Retail_CFL_Decorative and Mini-Base_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	8	22.29	$8.43	$8.19	$1.32	$1.25	$0.058	3.32	6.68	1
Decorative and Mini-Base	Retail_CFL_Decorative and Mini-Base_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	8	18.44	$6.98	$24.94	–	$1.50	$0.058	2.71	12.69	1
Decorative and Mini-Base	Retail_CFL_Decorative and Mini-Base_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	11	1.64	$0.81	$6.56	–	$2.00	$0.058	0.39	3.56	1, 2
General Purpose, Dimmable, and Three-Way	Retail_CFL_General Purpose, Dimmable, and Three-Way_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	6	10.07	$2.95	$6.29	$0.75	$0.50	$0.058	2.72	7.14	1
General Purpose, Dimmable, and Three-Way	Retail_CFL_General Purpose, Dimmable, and Three-Way_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	6	16.96	$4.96	$6.23	$0.96	$0.50	$0.058	3.34	6.01	1
General Purpose, Dimmable, and Three-Way	Retail_CFL_General Purpose, Dimmable, and Three-Way_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	6	9.92	$2.90	$6.22	$0.53	$0.50	$0.058	2.70	8.51	1
Globe	Retail_CFL_Globe_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	12.21	$6.45	$8.28	$2.97	$1.00	$0.058	3.78	4.18	1
Globe	Retail_CFL_Globe_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	10	1.09	$0.50	$9.46	–	$1.00	$0.058	0.47	9.41	1, 2
Globe	Retail_CFL_Globe_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	8	24.95	$9.44	$18.26	$1.14	$1.00	$0.058	3.86	11.07	1
Reflectors and Outdoor	Retail_CFL_Reflectors and Outdoor_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	5	30.05	$7.44	$18.12	$0.77	$2.00	$0.058	1.99	10.47	1
Reflectors and Outdoor	Retail_CFL_Reflectors and Outdoor_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	5	36.20	$8.96	$26.32	$1.11	$2.00	$0.058	2.19	11.27	1
Reflectors and Outdoor	Retail_CFL_Reflectors and Outdoor_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	4	8.38	$1.69	$4.67	–	$2.00	$0.058	0.68	2.62	1, 2
General Purpose, Dimmable, and Three-Way	Retail_LED_General Purpose, Dimmable, and Three-Way_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	13.14	$6.94	$9.09	$2.76	$1.20	$0.058	3.54	4.75	1

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
General Purpose, Dimmable, and Three-Way	Retail_LED_General Purpose, Dimmable, and Three-Way_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	22.11	$11.68	$10.85	$8.02	$2.00	$0.058	3.56	2.55	1
General Purpose, Dimmable, and Three-Way	Retail_LED_General Purpose, Dimmable, and Three-Way_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	17.17	$9.07	$11.66	$7.23	$2.60	$0.058	2.52	2.63	1
Globe	Retail_LED_Globe_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	13.87	$7.32	$9.82	$4.68	$1.20	$0.058	3.65	3.26	1
Globe	Retail_LED_Globe_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	34.79	$18.37	$21.84	$5.06	$1.20	$0.058	5.71	5.94	1
Reflectors and Outdoor	Retail_LED_Reflectors and Outdoor_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	37.29	$19.69	$38.90	$3.08	$2.50	$0.058	4.22	11.55	1
Reflectors and Outdoor	Retail_LED_Reflectors and Outdoor_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	48.24	$25.48	$59.71	$7.14	$3.00	$0.058	4.39	8.83	1
Reflectors and Outdoor	Retail_LED_Reflectors and Outdoor_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	16.75	$8.85	$12.99	$9.25	$3.00	$0.058	2.23	2.22	1
Decorative and Mini-Base	Retail_LED_Decorative and Mini-Base_250 to 1049 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	26.38	$13.93	$12.69	$6.51	$1.50	$0.058	4.60	3.48	1
Decorative and Mini-Base	Retail_LED_Decorative and Mini-Base_1050 to 1489 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	23.00	$12.15	$26.46	$0.06	$1.50	$0.058	4.29	28.57	1
Decorative and Mini-Base	Retail_LED_Decorative and Mini-Base_1490 to 2600 lumens	baseline bulb	Fixture	ENRes_SF_Lighting	12	3.82	$2.02	$7.76	$0.50	$1.50	$0.058	1.17	13.83	1
LED Fixture Retailer	LED Indoor Fixture	baseline bulb	Fixture	ENRes_SF_Lighting	12	29.64	$15.65	$5.48	$20.09	$3.06	$0.058	3.27	1.04	3
LED Fixture Retailer	LED Outdoor Fixture	baseline bulb	Fixture	IPC_Outdoor Lighting	12	114.40	$42.34	$7.43	$25.10	$11.45	$0.058	2.34	1.70	3

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResLighting_Bulbs_v4_2.xlsm. 2016.
[2] Measure not cost-effective. Carry-over bulb sales from 2016. CFLs removed from the program in 2017.
[3] BPA. UES_Measures_List.xlsx. 2016. Weighted average of actual fixture sales.

Energy House Calls

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	183,035	
Program Incentives		–	I
Total UC	**$**	**183,035**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	–	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	230,920	$	183,035	1.26
TRC Test		302,082		183,035	1.65
RIM Test		230,920		615,316	0.38
PCT		N/A		N/A	N/A

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	428,819			
NPV Cumulative Energy (kWh)	4,966,101	$	230,920	S
10% Credit (Northwest Power Act)			23,092	
Total Electric Savings		**$**	**254,012**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	432,280	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	48,070	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P
RIM Test	= S * NTG	= P + (B * NTG)
PCT	N/A	N/A

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	79%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: NEBs include PV of periodic bulb (capital) replacement costs for direct install LED bulbs.
NEBs for showerheads include the NPV of water and wastewater savings.
No participant costs.

Year: 2017 **Program**: Energy House Calls **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
PTCS Duct Sealing	Manufactured Home Prescriptive Duct Sealing - Electric FAF - Heating Zone 1	Pre-existing duct leakage	Home	ENRes_MH_Heater	18	973.00	$520.69	–	–	–	$0.427	1.25	1.38	1
PTCS Duct Sealing	Manufactured Home Prescriptive Duct Sealing - Electric FAF - Heating Zone 2 or 3	Pre-existing duct leakage	Home	ENRes_MH_Heater	18	1,248.00	$667.85	–	–	–	$0.427	1.25	1.38	1
PTCS Duct Sealing	Manufactured Home Prescriptive Duct Sealing - Heat Pump - Heating Zone 1	Pre-existing duct leakage	Home	ENRes_MH_Heater	18	615.00	$329.11	–	–	–	$0.427	1.25	1.38	1
PTCS Duct Sealing	Manufactured Home Prescriptive Duct Sealing - Heat Pump - Heating Zone 2 or 3	Pre-existing duct leakage	Home	ENRes_MH_Heater	18	876.00	$468.78	–	–	–	$0.427	1.25	1.38	1
General Purpose LED Direct Install	Direct install - LED_General Purpose, Dimmable, and Three-Way_250 to 1049 lumens (Average High Use and Moderate Use)	baseline bulb	Lamp	ENRes_SF_Lighting	12	16.00	$8.45	$8.31	–	–	$0.427	1.24	2.58	2
Low-flow faucet aerator	1.0-1.5 gpm kitchen or bathroom faucet aerator	non- low flow faucet aerator	Aerator	ENRes_SF_WtrHtr	10	106.00	$48.63	–	–	–	$0.427	1.07	1.18	3
Low-flow showerheads	Residential Showerhead Replacement_2_00gpm_Any Shower_ Electric Water Heating_Direct Install	any showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_WtrHtr	10	145.00	$66.52	$152.20	–	–	$0.427	1.07	3.64	4
Low-flow showerheads	Residential Showerhead Replacement_1_75gpm_Any Shower_ Electric Water Heating_Direct Install	any showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_WtrHtr	10	212.00	$97.26	$220.65	–	–	$0.427	1.07	3.62	4

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] No participant costs.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResMHHeatingCoolingPrescriptiveDuctSeal_v2_0.xlsm. 2015.
[2] RTF. ResLighting_Bulbs_v4_2.xlsm. 2016.
[3] AEG. Potential Study.
[4] RTF. ResShowerheads_v2_4.xlsm. 2016.

Fridge and Freezer Recycling Program

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	265,942	
Program Incentives		–	I
Total UC	**$**	**265,942**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	–	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	159,299	$	265,942	0.60
TRC Test		304,472		265,942	1.14
RIM Test		159,299		496,136	0.32
PCT		N/A		N/A	N/A

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	498,513			
NPV Cumulative Energy (kWh)	2,877,247	$	159,299	S
10% Credit (Northwest Power Act)			15,930	
Total Electric Savings		**$**	**175,228**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	230,194	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	129,244	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P
RIM Test	= S * NTG	= P + (B * NTG)
PCT	N/A	N/A

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	167%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: Program discontinued on December 31, 2017.
No participant costs.

Year: 2017 **Program**: Fridge and Freezer Recycling Program **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Freezer Recycling (1992 and earlier)	Freezer removal and decommissioning	–	Freezer	ENRes_SF_ Freezer	4	605.00	$137.87	$49.35	–	–	$0.533	0.43	0.62	1, 2
Refrigerator Recycling (1992 and earlier)	Refrigerator removal and decommissioning	–	Refrigerator	ENRes_SF_ SecRef	5	535.00	$144.19	$46.94	–	–	$0.533	0.51	0.72	1, 2
Freezer Recycling (1993 and later)	Freezer removal and decommissioning	–	Freezer	ENRes_SF_ Freezer	10	66.00	$33.91	$42.66	–	–	$0.533	0.96	2.27	1, 2
Refrigerator Recycling (1992 and later)	Refrigerator removal and decommissioning	–	Refrigerator	ENRes_SF_ SecRef	8	79.00	$32.50	$45.16	–	–	$0.533	0.77	1.92	1, 2
General Purpose LED Give away	Give away_LED_General Purpose, Dimmable, and Three-Way_250 to 1049 lumens	–	Lamp	ENRes_SF_ Lighting	13	9.00	$5.06	$8.95	–	–	$0.533	1.06	3.03	3

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] No participant costs.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResFridgeFreezeDecommissioning_v4_3.xlsm. 2016
[2] Measure not cost-effective. Program discontinued in 2017.
[3] RTF. ResLighting_Bulbs_v4_2.xlsm. 2016.

Heating & Cooling Efficiency Program

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	343,573	
Program Incentives		253,625	I
Total UC	**$**	**597,198**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	1,089,783	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	884,641	$	597,198	1.48
TRC Test		1,224,770		1,433,357	0.85
RIM Test		884,641		1,694,371	0.52
PCT		1,602,463		1,089,783	1.47

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	1,138,744			
NPV Cumulative Energy (kWh)	12,703,931	$	884,641	S
10% Credit (Northwest Power Act)			88,464	
Total Electric Savings		**$**	**973,105**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	1,097,173	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	251,665	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	152%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Note: NEBs include NPV of RTF values for annual operation and maintenance (O&M) savings and monetized comfort savings.

Year: 2017 **Program**: Heating & Cooling Efficiency Program **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Heat Pump Conversion	Existing Single Family and Manufactured Home HVAC Conversion to Heat Pump with Commissioning and Sizing (Heating & Cooling Zone Weighted Average)	Conversion to high efficiency heat pump	Unit	ENRes_SF_HeatPump	15	4,982.25	$3,869.98	$976.60	$3,933.10	$800.00	$0.302	1.68	0.96	1, 2, 3, 4, 5
Heat Pump Upgrade	Existing Single Family and Manufactured Home HVAC Heat Pump Upgrade (Heating & Cooling Zone Weighted Average)	Heat pump to heat pump upgrade	Unit	ENRes_SF_HeatPump	15	933.06	$724.76	$15.45	$259.83	$250.00	$0.302	1.36	1.50	1, 2, 3, 4
Heat Pump Upgrade	New Construction Single Family and Manufactured Home HVAC Heat Pump Upgrade (Heating & Cooling Zone Weighted Average)	Heat pump to heat pump upgrade	Unit	ENRes_SF_HeatPump	15	787.05	$611.34	$21.10	$256.12	$250.00	$0.302	1.25	1.40	1, 2, 3, 4
Open Loop HP	Open loop water source heat pump for existing homes - 14.00 EER 3.5 COP (Heating & Cooling Zone Weighted Average)	Electric resistance/Oil Propane	Unit	ENRes_SF_HeatPump	20	8,894.67	$8,490.38	–	$9,086.46	$1,000.00	$0.302	2.30	0.79	5, 6
Open Loop HP	Open loop water source heat pump for new construction - 14.00 EER 3.5 COP (Heating & Cooling Zone Weighted Average)	Electric resistance/Oil Propane	Unit	ENRes_SF_HeatPump	20	9,499.33	$9,067.56	–	$9,655.65	$1,000.00	$0.302	2.34	0.80	5, 6
Ductless Heat Pump	Zonal to DHP. (Heating & Cooling Zone Weighted Average)	Zonal Electric	Unit	ENRes_SF_HeatPump	15	2,351.88	$1,826.83	$1,064.44	$3,525.68	$750.00	$0.302	1.25	0.73	1, 5
Evaporative Cooler	Evaporative Cooler	Central Air Conditioning	Unit	ENRes_SF_CAC	12	383.59	$494.25	–	$220.70	$150.00	$0.302	1.86	1.62	7
Prescriptive Duct Sealing	Duct Tightness - PTCS Duct Sealing - Average Heating System. Weighted average of Heating Zones 1-3.	Pre-existing duct leakage	Unit	ENRes_SF_Heater	20	1,044.00	$613.90	–	$656.05	$300.00	$0.302	1.00	0.70	5, 8
Electronically Commutated Motor (ECM) Blower Motor	ECM Blower Motor	Permanent split capacitor (PSC) motor	Unit	ENRes_SF_HVAC	18	515.00	$456.96	–	$300.00	$50.00	$0.302	2.22	1.10	9
Whole House Fan	Whole House Fan	Displaced forced air dx cooling	Unit	ENRes_SF_CAC	18	446.00	$758.82	–	$700.00	$200.00	$0.302	2.27	1.00	9
Smart Thermostat	Smart Thermostat	Non wi-fi enabled thermostat/no thermostat	Unit	ENRes_SF_Heater	5	722.81	$127.00	–	$341.94	$75.00	$0.302	0.43	0.25	10, 11

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResSFExistingHVAC_v4_1.xlsx. Weighted average of 2017 participants in heating and cooling zones 1-3.
[2] RTF. ResHeatingCoolingCommissioningControlsSizingSF_v3_6.xlsm. Weighted average of 2017 participants in heating and cooling zones 1-3.
[3] RTF. ResMHExistingHVAC_v3_3.xlsx. Weighted average of 2017 participants in heating and cooling zones 1-3.
[4] RTF. ResMHHeatingCoolingCommissioningControlsSizing_v3_3.xlsx. Weighted average of 2017 participants in heating and cooling zones 1-3.
[5] Measure not cost-effective. Measure included in the program to due to unquantifiable non-energy benefits, to increase participation in the program, and to encourage adoption of higher-efficiency equipment.
[6] RTF. ResGSHP_v2_6. 2016. Median 2014-2016 participant costs. Weighted average of 2016 participants in heating and cooling zones 1-3.
[7] AEG. Potential Study.
[8] RTF. ResSFPerformanceBasedDuctSealing_v3_2.xlsm.
[9] Idaho Power engineering calculations based on Integrated Design Lab inputs. 2015.
[10] RTF. ResConnectedTstats_v1.1.xlsm
[11] Measure not cost-effective. Measure is being piloted and will be monitored in 2018.

Home Improvement Program

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	55,647	
Program Incentives		111,183	I
Total UC	**$**	**166,830**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	1,289,355	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	424,087	$	166,830	2.54
TRC Test		544,740		1,345,002	0.41
RIM Test		424,087		884,978	0.48
PCT		907,576		1,289,355	0.70

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	415,824			
NPV Cumulative Energy (kWh)	7,045,675	$	424,087	S
10% Credit (Northwest Power Act)			42,409	
Total Electric Savings		**$**	**466,495**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	718,148	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	78,245	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	N/A
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: Program discontinued on June 30, 2017.
NEBs include NPV of RTF values for annual wood fuel savings.

Year: 2017 **Program**: Home Improvement Program **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	**Measure Descriptions**	**Replacing**	**Measure Unit**	**End Use**	**Measure Life (yrs)[a]**	**Annual Gross Energy Savings (kWh/yr)[b]**	**NPV DSM Avoided Costs[c]**	**NEB**	**Gross Incremental Participant Cost[d]**	**Incentive/ Unit**	**Admin Cost ($/kWh)[e]**	**UC Ratio[f]**	**TRC Ratio[g]**	**Source**
Multi Family—Floor Insulation	Greater than R38. Electric heat. Program weighted average.	Attic Insulation R20 or less	Square Feet	ENRes_MF_Heater	45	1.45	$1.34	–	$0.92	$0.15	$0.134	3.90	1.33	1
Multi Family—Windows	U-Factor of 0.30 or lower. Electric heat. Program weighted average.	Single pane metal, Single pane wood or double pane metal.	Square Feet	ENRes_MF_Heater	45	22.93	$21.25	–	$28.58	$2.50	$0.134	3.81	0.74	1, 2, 3
Single Family—Attic Insulation	Greater than R38. Electric heat. Program weighted average.	Attic Insulation R20 or less	Square Feet	ENRes_SF_Heater	45	0.52	$0.48	$0.16	$1.04	$0.15	$0.134	2.19	0.62	3, 4
Single Family—Floor Insulation	Greater than R30 or fill floor cavity. Electric heat. Program weighted average.	Floor Insulation R5 or less	Square Feet	ENRes_SF_Heater	45	0.70	$0.65	$0.21	$1.41	$0.50	$0.134	1.09	0.61	3, 4
Single Family—Wall Insulation	Greater than R11 or fill wall cavity. Electric heat. Program weighted average.	Wall Insulation R5 or less	Square Feet	ENRes_SF_Heater	45	0.97	$0.90	$0.39	$4.78	$0.50	$0.134	1.43	0.28	3, 4
Single Family—Window	U-Factor of 0.30 or lower. Electric heat. Program weighted average.	Single pane metal, Single pane wood or double pane metal.	Square Feet	ENRes_SF_Heater	45	7.89	$7.32	$2.46	$44.48	$2.50	$0.134	2.06	0.23	3, 4, 5

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Based on average 2017 customer costs.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. Weighted average of savings by heating and cooling zone, heating and cooling system, and insulation level or U-Factor. ResMFWeatertherization3_2.xlsm. 2016.
[2] RTF. Incremental costs from ResMFWeatertherization3_2.xlsm. 2016.
[3] Measure not cost-effective. Program suspended in 2017.
[4] RTF. Weighted average of savings by heating and cooling zone, heating and cooling system, and insulation level or U-Factor. ResSFWX_v3_5.xls. 2016.
[5] RTF. Incremental costs from ResSFWX_v3_5.xls. 2016.

Multifamily Energy Savings Program

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	168,216	
Program Incentives		–	I
Total UC	**$**	**168,216**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	–	M

Summary of Cost-Effectiveness Results				
Test	**Benefit**	**Cost**	**Ratio**
UC Test	$ 294,038	$ 168,216	1.75
TRC Test	597,772	168,216	3.55
RIM Test	294,038	640,316	0.46
PCT	N/A	N/A	N/A

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	617,542			
NPV Cumulative Energy (kWh)	5,647,958	$	294,038	S
10% Credit (Northwest Power Act)			29,404	
Total Electric Savings		**$**	323,442	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	472,100	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	274,330	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P
RIM Test	= S * NTG	= P + (B * NTG)
PCT	N/A	N/A

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	57%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: NEBs include PV of periodic bulb (capital) replacement costs for direct-install LED lightbulbs.
NEBS for showerheads include the NPV of water and waste water savings.
No participant costs.

Year: 2017 **Program**: Multifamily Energy Savings Program **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
General Purpose LED Direct Install	Efficient Technology: LED Lamp Type: General Purpose and Dimmable Lumen Category: 250 to 1049 lumens Space Type: Average of Moderate and High Use Interior	Baseline bulb	Lamp	ENRes_SF_ Lighting	12	16.00	$8.45	$8.31	–	–	$0.272	1.94	4.05	1
General Purpose LED Direct Install	Efficient Technology: LED Lamp Type: General Purpose and Dimmable Lumen Category: 1490 to 2600 lumens Space Type: Exterior	Baseline bulb	Lamp	IPC_ Outdoor Lighting	12	60.00	$22.21	$18.11	–	–	$0.272	1.36	2.61	1
Reflector LED Direct Install	Efficient Technology: LED Lamp Type: Reflectors and Outdoor Lumen Category: 250 to 1049 lumens Space Type: High-use Interior	Baseline bulb	Lamp	ENRes_SF_ Lighting	12	47.00	$24.82	$41.42	–	–	$0.272	1.94	5.38	1
Globe LED Direct Install	Efficient Technology: LED Lamp Type: Globe Lumen Category: 250 to 1049 lumens Space Type: Moderate Use Interior	Baseline bulb	Lamp	ENRes_SF_ Lighting	13	14.00	$7.88	$10.19	–	–	$0.272	2.07	4.95	1
Decorative LED Direct Install	Efficient Technology: LED Lamp Type: Decorative or Minibase Lumen Category: 250 to 1049 lumens Space Type: Moderate Use Interior	Baseline bulb	Lamp	ENRes_SF_ Lighting	13	21.00	$11.81	$7.51	–	–	$0.272	2.07	3.59	1
Low flow showerheads	Residential Showerhead Replacement_2_00gpm_ Any Shower_ Electric Water Heating_Direct Install	Any showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_ WtrHtr	10	145.00	$66.52	$152.20	–	–	$0.272	1.69	5.71	2
Low flow showerheads	Residential Showerhead Replacement_2_00gpm_ Primary Shower_ Electric Water Heating_Direct Install	Any showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_ WtrHtr	10	182.00	$83.50	$191.56	–	–	$0.272	1.69	5.72	2

Low flow showerheads	Residential Showerhead Replacement_2_00gpm_ Secondary Shower_ Electric Water Heating_ Direct Install	Any showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_ WtrHtr	10	91.00	$41.75	$95.83	–	–	$0.272	1.69	5.73	2
Low flow showerheads and thermostatic shower valve combination unit	Residential_Direct install_Valve and 1.75 gpm showerhead_Electric resistance DHW	Any showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_ WtrHtr	10	267.00	$122.49	$245.74	–	–	$0.272	1.69	5.24	3
Water heater pipe covers	Up to 6 feet	No existing coverage	Pipe wrap	ENRes_SF_ WtrHtr	15	150.00	$94.90	–	–	–	$0.272	2.33	2.56	4
Low flow faucet aerator	1.0-1.5 gpm kitchen or bathroom faucet aerator	Non low-flow faucet aerator	Aerator	ENRes_SF_ WtrHtr	10	106.00	$48.63	–	–	–	$0.272	1.69	1.86	4

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] No participant costs.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResLighting_Bulbs_v4_2.xlsm. 2016.
[2] RTF. ResShowerheads_v2_4.xlsm. 2016.
[3] RTF. ResThermostaicShowerRestrictionValve_v1_2.xlsm. 2016.
[4] AEG. Potential Study.

Rebate Advantage

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	38,996	
Program Incentives		66,000	I
Total UC	**$**	**104,996**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	190,107	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	197,336	$	104,996	1.88
TRC Test		272,197		229,104	1.19
RIM Test		197,336		475,412	0.42
PCT		491,543		190,107	2.59

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	214,479			
NPV Cumulative Energy (kWh)	3,634,408	$	197,336	S
10% Credit (Northwest Power Act)			19,734	
Total Electric Savings		**$**	**217,069**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	370,416	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	55,127	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	71%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Year: 2017 **Program**: Rebate Advantage **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
ENERGY STAR® manufactured home	New Energy Star Manufactured Home with Electric FAF - Heating Zone 1	Manufactured home built to Housing and Urban Development (HUD) code.	Home	ENRes_MH_Heater	45	2,697.00	$2,480.65	$456.92	$2,880.46	$1,000.00	$0.182	1.66	0.94	1, 2
ENERGY STAR manufactured home	New Energy Star Manufactured Home with Electric FAF - Heating Zone 2	Manufactured home built to HUD code.	Home	ENRes_MH_Heater	45	3,748.00	$3,447.35	$1,266.88	$2,880.46	$1,000.00	$0.182	2.05	1.42	1
ENERGY STAR manufactured home	New Energy Star Manufactured Home with Electric FAF - Heating Zone 3	Manufactured home built to HUD code.	Home	ENRes_MH_Heater	45	4,656.00	$4,282.51	$1,570.94	$2,880.46	$1,000.00	$0.182	2.32	1.69	1
Eco Rated manufactured home	New Eco Rated Manufactured Home with Electric FAF - Heating Zone 1	Manufactured home built to HUD code.	Home	ENRes_MH_Heater	45	2,807.00	$2,581.83	$388.41	$2,880.46	$1,000.00	$0.182	1.71	0.95	1, 2

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] Regional Technical Forum (RTF). NewMHEStarEcorated_v2_1.xlsm
[2] Measure not cost-effective. Measure to be monitored in 2018. Measure included in the program to increase participation in a cost-effective program.

Residential New Construction Pilot Program (ENERGY STAR® Homes Northwest)

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	46,520	
Program Incentives		277,000	I
Total UC	**$**	**323,520**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	556,900	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	765,041	$	323,520	2.36
TRC Test		885,023		603,420	1.47
RIM Test		765,041		1,374,069	0.56
PCT		1,371,028		556,900	2.46

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	608,292			
NPV Cumulative Energy (kWh)	10,307,263	$	765,041	S
10% Credit (Northwest Power Act)			76,504	
Total Electric Savings		**$**	**841,545**	A
Participant Bill Savings				
NPV Cumulative Participant Savings		$	1,050,550	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	43,478	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	54%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: 2012 International Energy Conservation Code (IECC) with amendments adopted in Idaho in 2014.

Year: 2017 **Program**: Residential New Construction Pilot Program **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
ENERGY STAR home	Multifamily - Central Electric - Heating Zone 1 Cooling Zone 3	Multi-family home built to IECC 2012 Code. Adopted 2014.	Home	Prog_Energy Star Homes NW	45	2,196.00	$2,761.88	$156.92	$2,010.64	$1,000.00	$0.076	2.37	1.47	1

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. ResNewConstructionNEEAMFHomesIDMTv1.3.xlsm. 2016.

Simple Steps, Smart Savings™

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	90,962	
Program Incentives		100,659	I
Total UC	**$**	**191,621**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	393,418	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	456,551	$	191,621	2.38
TRC Test		2,443,716		484,380	5.05
RIM Test		456,551		879,786	0.52
PCT		2,730,334		393,418	6.94

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	900,171			
NPV Cumulative Energy (kWh)	8,232,935	$	456,551	S
10% Credit (Northwest Power Act)			45,655	
Total Electric Savings		**$**	**502,206**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	688,165	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	1,941,510	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	42%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Note: NEBs include the NPV of water savings from low-flow showerheads and clothes washers.

Year: 2017 **Program**: Simple Steps, Smart Savings **Market Segment**: Residential **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Clothes Washer	ENERGY STAR® clothes washer—Any	Baseline clothes washers	Clothes washer	ENRes_SF_Washer	14	101.12	$60.65	$212.95	$98.41	$30.00	$0.101	1.51	2.57	1, 2
Low-Flow Showerhead	Low-flow showerhead 2.0 gpm Any shower any water Heating Retail	Showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_WtrHtr	10	65.00	$29.82	$141.61	$28.70	$7.00	$0.101	2.20	4.95	3
Low-Flow Showerhead	Low-flow showerhead 1.75 gpm Any shower any water Heating Retail	Showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_WtrHtr	10	89.00	$40.83	$192.68	$28.70	$7.00	$0.101	2.55	6.30	3
Low-Flow Showerhead	Low-flow showerhead 1.5 gpm Any shower any water Heating Retail	Showerhead 2.2 gpm or higher	Showerhead	ENRes_SF_WtrHtr	10	111.00	$50.92	$235.71	$28.70	$7.00	$0.101	2.80	7.31	3

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] BPA. UES_Measures_List.xlsx. 2016.
[2] NEBs from RTF. ResClothesWashersSF_v5_3.xlsm. 2015.
[3] RTF. ResShowerheads_v2_4.xlsm. 2016. Adjusted savings by changing Electric Water Heating saturation from 64% to 49% to match IPC mix.

Weatherization Assistance for Qualified Customers

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	208,146	
Community Action Partnership (CAP) Agency Payments		1,099,339	
Total UC	**$**	**1,307,485**	P
Idaho Power Indirect Overhead Expense Allocation—6.133%	$	80,188	OH
Additional State Funding		475,203	M

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	669,538			
NPV Cumulative Energy (kWh)	10,284,480	$	514,805	S
10% Credit (Northwest Power Act)			51,480	
Total Electric Savings		**$**	**566,285**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	981,205	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs				
Health and Safety		$	171,424	
Repair		$	–	
Other			155,332	
NEBs Total		**$**	**326,756**	NEB

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	514,805	$	1,387,673	0.37
TRC Test		893,041		1,862,876	0.48
RIM Test		514,805		2,368,878	0.22
PCT		N/A		N/A	N/A

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P + OH
TRC Test	= (A + NUI + NEB) * NTG	= P + OH + M
RIM Test	= S * NTG	= P + OH + (B * NTG)
PCT	N/A	N/A

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	269%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: Savings from the billing analysis of the 2013–2014 weatherization projects.
Program cost-effectiveness incorporated IPUC staff recommendations from case GNR-E-12-01. Recommendations include: Claimed 100% of savings; increased NTG to 100%; added a 10% conservation preference adder; health, safety, and repair NEBs; and allocation of indirect overhead expenses.
No customer participant costs. Costs shown are from the DOE state weatherization assistance program.

Weatherization Solutions for Eligible Customers

Segment: Residential
2017 Program Results

Cost Inputs			Ref
Program Administration	$	158,402	
Weatherization LLC Payments		950,460	
Total UC	**$**	**1,108,862**	P
Idaho Power Indirect Overhead Expense Allocation—6.133%	$	68,007	OH
Additional State Funding		12,209	M

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	604,733			
NPV Cumulative Energy (kWh)	8,403,208	$	401,650	S
10% Credit (Northwest Power Act)			40,165	
Total Electric Savings		**$**	**441,815**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	768,803	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs				
Health and Safety			46,366	
Repair			–	
Other			54,831	
NEBs Total		**$**	**101,197**	NEB

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	401,650	$	1,176,869	0.34
TRC Test		543,012		1,189,077	0.46
RIM Test		401,650		1,945,672	0.21
PCT		N/A		N/A	N/A

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P +OH
TRC Test	= (A + NUI + NEB) * NTG	= P + OH + M
RIM Test	= S * NTG	= P + OH + (B * NTG)
PCT	N/A	N/A

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	292%
Average Customer Segment Rate/kWh	$0.087
Line Losses	9.60%

Notes: Savings from the billing analysis of the 2013–2014 weatherization projects.
Program cost-effectiveness incorporated IPUC staff recommendations from case GNR-E-12-01. Recommendations include: Claimed 100% of savings; increased NTG to 100%; added a 10% conservation preference adder; health, safety, and repair NEBs; and allocation of indirect overhead expenses.
No customer participant costs.

Custom Projects

Segment: Industrial
2017 Program Results

Cost Inputs			Ref
Program Administration	$	2,273,824	
Program Incentives		6,406,095	I
Total UC	**$**	**8,679,919**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	15,005,293	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	30,636,511	$	8,679,919	3.53
TRC Test		33,700,162		17,279,117	1.95
RIM Test		30,636,511		27,989,502	1.09
PCT		25,715,678		15,005,293	1.71

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	44,765,354			
NPV Cumulative Energy (kWh)	518,392,043	$	30,636,511	S
10% Credit (Northwest Power Act)			3,063,651	
Total Electric Savings		**$**	**33,700,162**	A
Participant Bill Savings				
NPV Cumulative Participant Savings		$	19,309,583	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	–	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	35%
Average Customer Segment Rate/kWh	$0.037
Line Losses	9.60%

Notes: Energy savings are unique by project and are reviewed by Idaho Power engineering staff or third-party consultants. Each project must complete a certification inspection.
Green Rewind initiative is available to agricultural, commercial, and industrial customers. Commercial and industrial motor rewinds are paid under Custom Projects, but the savings are not included in the program cost-effectiveness.
Green Rewind savings are included in the sector cost-effectiveness.

Year: 2017 **Program**: Custom Projects—Green Motors **Market Segment**: Industrial **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	**Measure Descriptions**	**Replacing**	**Measure Unit**	**End Use**	**Measure Life (yrs)[a]**	**Annual Gross Energy Savings (kWh/yr)[b]**	**NPV DSM Avoided Costs[c]**	**NEB**	**Gross Incremental Participant Cost[d]**	**Incentive/ Unit**	**Admin Cost ($/kWh)[e]**	**UC Ratio[f]**	**TRC Ratio[g]**	**Source**
Green Motors Program Rewind: Motor size 15 HP	Green Motors Program Rewind: Motor size 15 HP	Standard rewind practice	Motor	MF_Motors	8	601.00	$251.27	–	$160.18	$30.00	$0.050	4.18	1.45	1
Green Motors Program Rewind: Motor size 20 HP	Green Motors Program Rewind: Motor size 20 HP	Standard rewind practice	Motor	MF_Motors	8	804.00	$336.15	–	$178.70	$40.00	$0.050	4.19	1.69	1
Green Motors Program Rewind: Motor size 25 HP	Green Motors Program Rewind: Motor size 25 HP	Standard rewind practice	Motor	MF_Motors	8	1,052.00	$439.84	–	$204.18	$50.00	$0.050	4.29	1.88	1
Green Motors Program Rewind: Motor size 30 HP	Green Motors Program Rewind: Motor size 30 HP	Standard rewind practice	Motor	MF_Motors	8	1,133.00	$473.70	–	$224.25	$60.00	$0.050	4.06	1.86	1
Green Motors Program Rewind: Motor size 40 HP	Green Motors Program Rewind: Motor size 40 HP	Standard rewind practice	Motor	MF_Motors	8	1,319.00	$551.47	–	$274.04	$80.00	$0.050	3.78	1.78	1
Green Motors Program Rewind: Motor size 50 HP	Green Motors Program Rewind: Motor size 50 HP	Standard rewind practice	Motor	MF_Motors	8	1,418.00	$592.86	–	$303.37	$100.00	$0.050	3.47	1.74	1
Green Motors Program Rewind: Motor size 60 HP	Green Motors Program Rewind: Motor size 60 HP	Standard rewind practice	Motor	MF_Motors	9	1,476.00	$681.61	–	$357.80	$120.00	$0.050	3.52	1.74	1
Green Motors Program Rewind: Motor size 75 HP	Green Motors Program Rewind: Motor size 75 HP	Standard rewind practice	Motor	MF_Motors	9	1,519.00	$701.47	–	$386.74	$150.00	$0.050	3.10	1.67	1
Green Motors Program Rewind: Motor size 100 HP	Green Motors Program Rewind: Motor size 100 HP	Standard rewind practice	Motor	MF_Motors	9	2,005.00	$925.90	–	$479.76	$200.00	$0.050	3.08	1.76	1
Green Motors Program Rewind: Motor size 125 HP	Green Motors Program Rewind: Motor size 125 HP	Standard rewind practice	Motor	MF_Motors	8	2,598.00	$1,086.21	–	$538.82	$250.00	$0.050	2.86	1.79	1
Green Motors Program Rewind: Motor size 150 HP	Green Motors Program Rewind: Motor size 150 HP	Standard rewind practice	Motor	MF_Motors	8	3,089.00	$1,291.49	–	$600.19	$300.00	$0.050	2.84	1.88	1
Green Motors Program Rewind: Motor size 200 HP	Green Motors Program Rewind: Motor size 200 HP	Standard rewind practice	Motor	MF_Motors	8	4,088.00	$1,709.17	–	$722.54	$400.00	$0.050	2.83	2.03	1
Green Motors Program Rewind: Motor size 250 HP	Green Motors Program Rewind: Motor size 250 HP	Standard rewind practice	Motor	MF_Motors	9	4,972.00	$2,296.04	–	$928.64	$500.00	$0.050	3.07	2.15	1
Green Motors Program Rewind: Motor size 300 HP	Green Motors Program Rewind: Motor size 300 HP	Standard rewind practice	Motor	MF_Motors	9	5,935.00	$2,740.75	–	$938.68	$600.00	$0.050	3.06	2.44	1
Green Motors Program Rewind: Motor size 350 HP	Green Motors Program Rewind: Motor size 350 HP	Standard rewind practice	Motor	MF_Motors	9	6,919.00	$3,195.16	–	$983.84	$700.00	$0.050	3.05	2.64	1

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Green Motors Program Rewind: Motor size 400 HP	Green Motors Program Rewind: Motor size 400 HP	Standard rewind practice	Motor	MF_Motors	9	7,848.00	$3,624.16	–	$1,098.86	$800.00	$0.050	3.04	2.67	1
Green Motors Program Rewind: Motor size 450 HP	Green Motors Program Rewind: Motor size 450 HP	Standard rewind practice	Motor	MF_Motors	9	8,811.00	$4,068.87	–	$1,201.14	$900.00	$0.050	3.04	2.73	1
Green Motors Program Rewind: Motor size 500 HP	Green Motors Program Rewind: Motor size 500 HP	Standard rewind practice	Motor	MF_Motors	9	9,804.00	$4,527.43	–	$1,297.63	$1,000.00	$0.050	3.04	2.79	1
Green Motors Program Rewind: Motor size 600 HP	Green Motors Program Rewind: Motor size 600 HP	Standard rewind practice	Motor	MF_Motors	7	14,689.00	$5,458.46	–	$1,912.23	$1,200.00	$0.050	2.82	2.27	1
Green Motors Program Rewind: Motor size 700 HP	Green Motors Program Rewind: Motor size 700 HP	Standard rewind practice	Motor	MF_Motors	7	17,065.00	$6,341.38	–	$2,086.24	$1,400.00	$0.050	2.81	2.37	1
Green Motors Program Rewind: Motor size 800 HP	Green Motors Program Rewind: Motor size 800 HP	Standard rewind practice	Motor	MF_Motors	7	19,461.00	$7,231.74	–	$2,314.75	$1,600.00	$0.050	2.81	2.42	1
Green Motors Program Rewind: Motor size 900 HP	Green Motors Program Rewind: Motor size 900 HP	Standard rewind practice	Motor	MF_Motors	7	21,847.00	$8,118.38	–	$2,551.91	$1,800.00	$0.050	2.81	2.45	1
Green Motors Program Rewind: Motor size 1,500 HP	Green Motors Program Rewind: Motor size 1,500 HP	Standard rewind practice	Motor	MF_Motors	7	35,891.00	$13,337.16	–	$3,763.37	$3,000.00	$0.050	1.92	1.90	1

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. IndGreenMotorsRewind_v2_2.xlsm. 2016..

New Construction

Segment: Commercial
2017 Program Results

Cost Inputs			Ref
Program Administration	$	417,147	
Program Incentives		2,016,449	I
Total UC	**$**	**2,433,596**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	1,831,460	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	9,491,547	$	2,433,596	3.90
TRC Test		10,440,702		2,248,607	4.64
RIM Test		9,491,547		11,816,341	0.80
PCT		11,399,194		1,831,460	6.22

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	17,353,820			
NPV Cumulative Energy (kWh)	168,290,970	$	9,491,547	S
10% Credit (Northwest Power Act)			949,155	
Total Electric Savings		**$**	**10,440,702**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	9,382,745	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	–	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	26%
Average Customer Segment Rate/kWh	$0.058
Line Losses	9.60%

Year: 2017 **Program**: New Construction **Market Segment**: Commercial **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	**Measure Descriptions**	**Replacing**	**Measure Unit**	**End Use**	**Measure Life (yrs)[a]**	**Annual Gross Energy Savings (kWh/yr)[b]**	**NPV DSM Avoided Costs[c]**	**NEB**	**Gross Incremental Participant Cost[d]**	**Incentive/ Unit**	**Admin Cost ($/kWh)[e]**	**UC Ratio[f]**	**TRC Ratio[g]**	**Source**
Lighting	Interior Light Load Reduction. Part A: 10-19.9% below code.	Code standards	ft²	ENComm_InsLt	14	0.51	$0.35	–	$0.26	$0.10	$0.045	2.83	1.35	1
Lighting	Interior Light Load Reduction. Part B: 20-29.9% below code.	Code standards	ft²	ENComm_InsLt	14	1.03	$0.70	–	$0.51	$0.20	$0.045	2.85	1.39	1
Lighting	Interior Light Load Reduction. Part C: Equal to or greater than 30% below code.	Code standards	ft²	ENComm_InsLt	14	2.33	$1.59	–	$0.89	$0.30	$0.045	3.93	1.76	1
Lighting	Exterior Light Load Reduction. Minimum of 15% below code.	Code standards	kW	IPC_Outdoor Lighting	15	4,059.00	$1,817.26	–	$168.00	$200.00	$0.045	4.76	5.72	1
Lighting	Daylight Photo Controls	Code standards	ft²	ENComm_InsLt	14	0.94	$0.64	–	$0.91	$0.25	$0.045	2.19	0.74	1, 2
Lighting	Occupancy sensors	Code standards	sensor	ENComm_InsLt	8	366.00	$159.42	–	$38.26	$25.00	$0.045	3.85	3.21	1
Lighting	High Efficiency Exit Signs	Code standards	sign	IPC_8760	16	28.00	$19.02	–	$10.83	$7.50	$0.045	2.17	1.73	1
Air conditioning (AC) IECC 2009	> 5-11 ton AC unit that meets CEE Tier 1 > 11-19 ton AC unit that meets CEE Tier 1 > 19-25 ton AC unit that meets CEE Tier 1 (≥ 65,000 Btu/hr & ≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	40.30	$39.17	–	$36.18	$30.00	$0.045	1.23	1.13	3
Air conditioning (AC) IECC 2012	> 5-11 ton AC unit that meets CEE Tier 1 > 11-19 ton AC unit that meets CEE Tier 1 > 19-25 ton AC unit that meets CEE Tier 1 (≥ 65,000 Btu/hr & ≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	96.30	$93.59	–	$81.57	$30.00	$0.045	2.73	1.20	3
Air conditioning (AC) IECC 2009 & 2012	≤ 5 ton AC unit that meets CEE Tier 2 > 5-11 ton AC unit that meets CEE Tier 2 > 11-19 ton AC unit that meets CEE Tier 2 > 19-25 ton AC unit that meets CEE Tier 2 (≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	90.16	$87.63	–	$115.37	$75.00	$0.045	1.11	0.81	4, 5
Air conditioning (AC) IECC 2009	≤ 5 ton HP unit that meets CEE Tier 1 > 5-11 ton HP unit that meets CEE Tier 1 > 11-19 ton HP unit that meets CEE Tier 1 > 19-25 ton HP unit that meets CEE Tier 1 (≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	27.25	$26.48	–	$31.83	$30.00	$0.045	0.85	0.88	4, 5

Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Benefit: Annual Gross Energy Savings (kWh/yr)[b]	Benefit: NPV DSM Avoided Costs[c]	Benefit: NEB	Cost: Gross Incremental Participant Cost[d]	Cost: Incentive/ Unit	Cost: Admin Cost ($/kWh)[e]	B/C Tests: UC Ratio[f]	B/C Tests: TRC Ratio[g]	Source
Air conditioning (AC) IECC 2012	≤ 5 ton HP unit that meets CEE Tier 1 > 5-11 ton HP unit that meets CEE Tier 1 > 11-19 ton HP unit that meets CEE Tier 1 > 19-25 ton HP unit that meets CEE Tier 1 (≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	45.18	$43.91	–	$28.03	$30.00	$0.045	1.37	1.61	4
Air conditioning (AC) IECC 2009	> 5-11 ton AC VRF unit that meets CEE Tier 1 > 11-19 ton AC VRF unit that meets CEE Tier 1 > 19-25 ton AC VRF unit that meets CEE Tier 1 (≥ 65,000 Btu/hr & ≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	132.60	$128.87	–	$115.37	$75.00	$0.045	1.59	1.17	3
Air conditioning (AC) IECC 2012	> 5-11 ton AC VRF unit that meets CEE Tier 1 > 11-19 ton AC VRF unit that meets CEE Tier 1 > 19-25 ton AC VRF unit that meets CEE Tier 1 (≥ 65,000 Btu/hr & ≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	188.51	$183.21	–	$161.54	$75.00	$0.045	2.20	1.19	3
Air conditioning (AC) IECC 2009	> 5-11 ton HP VRF unit that meets CEE Tier 1 > 11-19 ton HP VRF unit that meets CEE Tier 1 > 19-25 ton HP VRF unit that meets CEE Tier 1 (≥ 65,000 Btu/hr & ≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	138.52	$134.63	–	$97.36	$75.00	$0.045	1.66	1.43	3
Air conditioning (AC) IECC 2012	> 5-11 ton HP VRF unit that meets CEE Tier 1 > 11-19 ton HP VRF unit that meets CEE Tier 1 > 19-25 ton HP VRF unit that meets CEE Tier 1 (≥ 65,000 Btu/hr & ≤ 300,000 Btu/hr)	Code standards	tons	ENComm_Cooling	15	56.80	$55.20	–	$91.88	$75.00	$0.045	0.71	0.64	3, 5
Air conditioning	Air-cooled chiller condenser, IPLV 14.0 EER or higher	Code standards	tons	ENComm_Cooling	20	472.44	$559.60	–	$86.12	$80.00	$0.045	5.53	5.74	1
Air conditioning	Water-cooled chiller electronically operated, reciprocating and positive displacement	Code standards	tons	ENComm_Cooling	20	212.96	$252.25	–	$38.82	$40.00	$0.045	5.09	5.74	6
Air conditioning	Airside economizer	Code standards	ton of cooling	ENComm_Cooling	15	190.00	$184.66	–	$81.36	$75.00	$0.045	2.21	2.26	6
Air conditioning	Direct evaporative cooler IECC 2009	Code standards	tons	ENComm_Cooling	15	399.00	$387.79	–	$364.00	$200.00	$0.045	1.78	1.12	1

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Air conditioning	Direct evaporative cooler IECC 2012	Code standards	tons	ENComm_Cooling	15	386.00	$375.16	–	$364.00	$200.00	$0.045	1.73	1.08	1
Evaporative Pre-Cooler	Pre-cooler added to condenser	Standard air-cooled chiller unit	ton	IPC_Evap Cooler (ky)	15	106.00	$150.08	–	$173.00	$20.00	$0.045	6.07	0.93	1, 5
Building Shell	Reflective roof treatment	Code standards	ft² roof area	ENComm_Cooling	15	0.12	$0.11	–	$0.05	$0.05	$0.045	2.04	2.25	1
Controls	Energy Management System (EMS) controls. Part A: 2 strategies	Code standards	tons of cooling	ENComm_Cooling	15	418.00	$406.26	–	$162.49	$70.00	$0.045	4.58	2.47	1
Controls	EMS controls. Part B: 3 strategies	Code standards	tons of cooling	ENComm_Cooling	15	484.00	$470.40	–	$162.49	$80.00	$0.045	4.63	2.81	7
Controls	EMS controls. Part C: 4 strategies	Code standards	tons of cooling	ENComm_Cooling	15	484.00	$470.40	–	$162.49	$90.00	$0.045	4.21	2.81	1
Controls	EMS controls. Part D: 5 strategies	Code standards	tons of cooling	ENComm_Cooling	15	633.00	$615.22	–	$162.49	$100.00	$0.045	4.80	3.55	7
Controls	Guest room energy management system, IECC 2009	Code standards	ton	ENComm_HVAC	11	581.00	$371.42	–	$57.50	$50.00	$0.045	4.89	4.89	1
Controls	Guest room energy management system, IECC 2012	Code standards	ton	ENComm_HVAC	11	572.00	$365.66	–	$57.50	$50.00	$0.045	4.84	4.84	1
Controls	Part A. Variable speed drive on HVAC system applications: • chilled water pumps • condenser water pumps • cooling tower fans	Code standards	HP	ENComm_HVAC	15	268.00	$216.91	–	$165.33	$60.00	$0.045	3.01	1.35	1
Controls	Part B. Variable speed drive on HVAC system applications: • supply • return • outside air • make-up air • hot water pumps	Code standards	HP	ENComm_HVAC	15	996.00	$806.12	–	$142.05	$100.00	$0.045	5.58	4.75	1
Variable speed controls	Part C: Variable speed drive on Potato/Onion Storage Shed Ventilation	No VFD	HP	IPC_Onion Potato VSD	10	1,993.00	$767.64	–	$300.00	$200.00	$0.045	2.66	2.17	8
Demand Controlled Kitchen Ventilation Exhaust Hood	Demand Controlled Kitchen Ventilation Exhaust Hood	Kitchen ventilation hood	HP	ENComm_Cooking	15	3,838.00	$2,746.01	–	$2,000.00	$200.00	$0.045	7.39	1.39	9
Appliances with Electric Water Heating	Efficient Laundry Machines (electric)	Code standards	unit	ENComm_WtrHtr	10	756.00	$365.20	–	$200.00	$125.00	$0.045	2.30	1.72	1
Appliances with Electric Water Heating	ENERGY STAR® undercounter (residential style) dishwasher	Code standards	machine	ENComm_Misc	12	2,210.00	$1,278.42	$246.01	$232.00	$200.00	$0.045	4.28	4.99	1, 10

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Appliances with Electric Water Heating	ENERGY STAR commercial dishwasher	Code standards	machine	ENComm_Misc	12	5,561.00	$3,216.88	$663.48	$3,978.00	$500.00	$0.045	4.30	0.99	1, 5, 10
Refrigeration	Refrigeration head pressure controls	Code standards	horsepower	ENComm_ Refrigeration	16	225.00	$162.96	–	$166.60	$40.00	$0.045	3.26	1.01	1
Refrigeration	Refrigeration floating suction controls	Code standards	horsepower	ENComm_ Refrigeration	16	77.00	$55.77	–	$53.75	$10.00	$0.045	4.15	1.07	1
Refrigeration	Efficient refrigeration condensers	Code standards	tons of refrigeration	ENComm_ Refrigeration	15	114.00	$78.67	–	$35.00	$20.00	$0.045	3.13	2.16	1
Smart Power Strips	Load-sensing, motion-sensing, or timer-controlled power strip	No existing load or motion-sensing, or timer-controlled power strip	power strip	ENComm_Office	4	118.00	$25.62	–	$21.00	$10.00	$0.045	1.68	1.07	11

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] Idaho Power TRM prepared by ADM Associates, Inc. 2015.
[2] Measure not cost-effective. Measure includes unquantifiable non-energy benefits.
[3] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Weighted average of 5–25 ton units.
[4] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Weighted average of 0–25 ton units.
[5] Measure not cost-effective. Measure to be monitored in 2018. Measure included in the program to increase participation in a cost-effective program and to encourage adoption of higher efficiency equipment.
[6] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Averaged water cooled chillers.
[7] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Calculated from TRM spreadsheets.
[8] RTF. AgPotatoOnionShedVFD_v3_0.xlsm. IPC Costs.
[9] IPC engineering analysis.
[10] Idaho Power TRM prepared by ADM Associates, Inc. 2015. NEBs from water savings from RTF. ComDishwasher_v1_2.xlsm. 2012.
[11] RTF. ComSmartPlugPower_v3_1.xlsm. Updated incremental costs based on IPC research.

Retrofits

Segment: Commercial
2017 Program Results

Cost Inputs			Ref
Program Administration	$	1,128,000	
Program Incentives		3,215,835	I
Total UC	**$**	**4,343,835**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	11,372,303	M

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	12,668,222	$	4,343,835	2.92
TRC Test		13,935,045		12,500,303	1.11
RIM Test		12,668,222		16,866,840	0.75
PCT		15,738,840		11,372,303	1.38

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	23,161,877			
NPV Cumulative Energy (kWh)	224,615,373	$	12,668,222	S
10% Credit (Northwest Power Act)			1,266,822	
Total Electric Savings		**$**	**13,935,045**	A
Participant Bill Savings				
NPV Cumulative Participant Savings		$	12,523,005	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	–	NEB

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	75%
Average Customer Segment Rate/kWh	$0.058
Line Losses	9.60%

Note: Measure inputs from Evergreen Consulting Group or the TRM prepared by ADM Associates, Inc., unless otherwise noted.

Year: 2017 **Program**: Retrofits **Market Segment**: Commercial **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Standard/High Performance T8 Fluorescents	4-foot T8	4-foot T12	Fixture	ENComm_InsLt	11	180.28	$101.88	–	$61.15	$34.42	$0.045	2.40	1.62	1
Standard T8 Fluorescents	6-foot T8	6-foot T12	Fixture	ENComm_InsLt	11	332.20	$187.73	–	$76.03	$16.00	$0.045	6.09	2.27	1
Standard T8 Fluorescents	8-foot T8	8-foot T12	Fixture	ENComm_InsLt	11	262.06	$148.09	–	$80.56	$22.75	$0.045	4.30	1.77	1
Standard/High Performance T8 Fluorescents	4-foot & 8-foot T8	8-foot T12HO	Fixture	ENComm_InsLt	11	564.84	$319.20	–	$75.36	$47.52	$0.045	4.39	3.49	1
T5 (Non-HO) Fluorescents	4-foot T5	4-foot T12	Fixture	ENComm_InsLt	11	156.85	$88.64	–	$76.21	$36.18	$0.045	2.05	1.17	1
T5/T8 High Bay— New Fixture	4-foot T8/T5	Fixture using >200 input watts	Fixture	ENComm_InsLt	11	1,194.00	$674.75	–	$216.24	$137.04	$0.045	3.54	2.75	1
Relamp T8/ T5HO to Reduced Wattage T8/ T5HO	Reduced wattage T8/T5 re-lamp	–	Fixture	ENComm_InsLt	8	130.58	$56.88	–	$23.07	$1.00	$0.045	8.32	2.16	1
Permanent Fixture Removal	Permanent fixture removal	–	Fixture	ENComm_InsLt	8	878.14	$382.49	–	$35.78	$19.09	$0.045	6.56	5.61	1
Screw-in CFLs/ cold-cathode	Screw-in CFLs/ cold-cathode	Fixture using >40 input watts	Fixture	ENComm_InsLt	6	164.23	$55.46	–	$33.23	$5.08	$0.045	4.46	1.50	1
Hardwired CFLs	Hardwired CFLs	Fixture using >90 input watts	Fixture	ENComm_InsLt	6	366.94	$123.92	–	$94.75	$50.00	$0.045	1.87	1.23	1
LED Replacement Lamps	LED replacement lamps	Fixture using >20 input watts	Fixture	ENComm_InsLt	12	154.10	$93.21	–	$48.66	$15.00	$0.045	4.26	1.85	1
Pulse Start/ Electronic Metal Halide	Pulse start/electronic metal halide	Fixture using >170 input watts	Fixture	ENComm_InsLt	11	1,091.70	$616.94	–	$153.66	$105.55	$0.045	4.00	3.35	1
LED Exit Sign	LED exit sign	Exit sign using ≥18 watts	Fixture	IPC_8760	12	230.68	$125.24	–	$68.69	$40.00	$0.045	2.49	1.74	1
Lighting Controls	Lighting controls	Manual controls	Fixture	ENComm_InsLt	10	187.75	$98.38	–	$94.75	$47.51	$0.045	1.76	1.05	1
Standard/High Performance T8 Fluorescents	4-foot T8	4-foot T12	Fixture	IPC_Outdoor Lighting	11	166.42	$57.19	–	$61.15	$13.80	$0.045	2.69	0.92	1, 2
Standard T8 Fluorescents	6-foot T8	6-foot T12	Fixture	IPC_Outdoor Lighting	11	386.42	$132.80	–	$76.03	$14.00	$0.045	4.25	1.57	1
Standard T8 Fluorescents	8-foot T8	8-foot T12	Fixture	IPC_Outdoor Lighting	11	303.92	$104.45	–	$80.56	$19.50	$0.045	3.16	1.22	1

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Measure Name	Measure Descriptions	Replacing	Measure unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Standard/High-Performance T8 Fluorescents	4-foot & 8-foot T8	8-foot T12HO	Fixture	IPC_Outdoor Lighting	11	913.16	$313.82	–	$75.36	$21.48	$0.045	5.04	2.97	1
T5 (Non-HO) Fluorescents	4-foot T5	4-foot T12	Fixture	IPC_Outdoor Lighting	11	181.22	$62.28	–	$76.21	$20.47	$0.045	2.18	0.81	1, 2
T5/T8 High Bay—New Fixture	4-foot T8/T5	Fixture using >200 input watts	Fixture	IPC_Outdoor Lighting	11	1,643.60	$564.84	–	$216.24	$102.71	$0.045	3.21	2.14	1
Permanent Fixture Removal	Permanent Fixture Removal	–	Fixture	IPC_Outdoor Lighting	8	1,018.40	$264.72	–	$35.78	$14.09	$0.045	4.44	3.58	1
Screw-in CFLs/ cold-cathode	Screw-in CFLs/cold-cathode	Fixture using >40 input watts	Fixture	IPC_Outdoor Lighting	6	190.46	$37.73	–	$33.23	$5.08	$0.045	2.78	0.99	1, 2
Hardwired CFLs	Hardwired CFLs	Fixture using >90 input watts	Fixture	IPC_Outdoor Lighting	6	425.55	$84.30	–	$94.75	$35.00	$0.045	1.56	0.82	1, 2
LED Replacement Lamps	LED Replacement Lamps	Fixture using >20 input watts	Fixture	IPC_Outdoor Lighting	12	178.71	$66.14	–	$48.66	$19.25	$0.045	2.43	1.28	1
Pulse Start/ Electronic Metal Halide	Pulse Start/Electronic Metal Halide	Fixture using >170 input watts	Fixture	IPC_Outdoor Lighting	11	1,265.40	$434.87	–	$153.66	$45.68	$0.045	4.25	2.28	1
Refrigeration Case Lighting	Case # 1—T8 fluorescent lighting and electronic ballast (per lamp)	Case #1— T12 fluorescent lighting	Lamp	ENComm_ Refrigeration	6	309.31	$99.92	–	$44.70	$15.00	$0.045	3.47	1.88	3
Refrigeration Case Lighting	Case # 2—LED display case lighting (per linear foot)	Case #2— T12 fluorescent lighting	Linear foot	ENComm_ Refrigeration	8	111.25	$46.43	$17.60	$44.41	$15.00	$0.045	2.32	1.39	4
Refrigeration Case Lighting	Case # 3—LED display case lighting (per linear foot)	Case #3— T8 fluorescent lighting	Linear foot	ENComm_ Refrigeration	8	77.75	$32.45	$16.18	$46.14	$10.00	$0.045	2.41	1.05	5
Refrigeration Case Lighting	Case #4—TLED display case lighting	Case #4— T12 fluorescent lighting	Linear foot	ENComm_ Refrigeration	12	34.49	$20.02	$2.38	$8.48	$1.50	$0.045	6.58	2.44	6
Refrigeration Case Lighting	Case #5—TLED display case lighting	Case #5— T8 fluorescent lighting	Linear foot	ENComm_ Refrigeration	12	9.86	$5.72	$2.38	$8.48	$1.50	$0.045	2.95	0.97	2, 6
A/C Units	≤5 ton A/C unit that meets CEE Tier 2 >5–11 ton A/C unit that meets CEE Tier 2 >11–19 ton A/C unit that meets CEE Tier 2 >19–25 ton A/C unit that meets CEE Tier 2 (≤300,000 Btu/hr)	Standard ≤5 ton A/C/HP unit Standard >5–11 ton A/C/HP unit Standard >11–19 ton A/C/HP unit Standard >19–25 ton A/C/HP unit (code standard)	Tons	ENComm_Cooling	15	90.16	$87.63	–	$115.37	$75.00	$0.045	1.11	0.81	2, 7

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A/C Units	>5–11 ton A/C unit that meets CEE Tier 1 >11–19 ton A/C unit that meets CEE Tier 1 >19–25 ton A/C unit that meets CEE Tier 1 (≥65,000 Btu/hr & ≤300,000 Btu/hr)	Standard >5–11 ton A/C/HP unit Standard >11–19 ton A/C/HP unit Standard >19–25 ton A/C/HP unit (code standard)	Tons	ENComm_Cooling	15	96.30	$93.59	–	$81.57	$30.00	$0.045	2.73	1.20	8
A/C Units	>5–11 ton A/C VRF unit that meets CEE Tier 1 >11–19 ton A/C VRF unit that meets CEE Tier 1 >19–25 ton A/C VRF unit that meets CEE Tier 1 (≥65,000 Btu/hr & ≤300,000 Btu/hr)	Standard >5–11 ton A/C/HP unit Standard >11–19 ton A/C/HP unit Standard >19–25 ton A/C/HP unit (code standard)	Tons	ENComm_Cooling	15	188.51	$183.21	–	$161.54	$75.00	$0.045	2.20	1.19	8
Heat Pump (HP) units	≤5 ton HP unit that meets CEE Tier 1 >5–11 ton HP unit that meets CEE Tier 1 >11–19 ton HP unit that meets CEE Tier 1 >19–25 ton HP unit that meets CEE Tier 1 (≤300,000 Btu/hr)	Standard ≤5 ton A/C/HP unit Standard >5–11 ton A/C/HP unit Standard >11–19 ton A/C/HP unit Standard >19–25 ton A/C/HP unit (code standard)	Tons	ENComm_Cooling	15	45.18	$43.91	–	$28.03	$30.00	$0.045	1.37	1.61	7
HP Units	>5–11 ton HP VRF unit that meets CEE Tier 1 >11–19 ton HP VRF unit that meets CEE Tier 1 >19–25 ton HP VRF unit that meets CEE Tier 1 (≥65,000 Btu/hr & ≤300,000 Btu/hr)	Standard >5–11 ton A/C/HP unit Standard >11–19 ton A/C/HP unit Standard >19–25 ton A/C/HP unit (code standard)	Tons	ENComm_Cooling	15	56.80	$55.20	–	$91.88	$75.00	$0.045	0.71	0.64	2, 8
Chillers	Air-cooled chiller condenser, IPLV 14.0 EER or higher	Standard air-cooled chiller	Tons	ENComm_Cooling	20	472.44	$559.60	–	$86.12	$80.00	$0.045	5.53	5.74	9
Chillers	Water-cooled chiller electronically operated, reciprocating and positive displacement	Standard water-cooled chiller	Tons	ENComm_Cooling	20	212.96	$252.25	–	$38.82	$40.00	$0.045	5.09	5.74	10
Economizers	Airside economizer control addition	No prior control	Ton of cooling	ENComm_Cooling	15	285.00	$276.99	–	$155.01	$100.00	$0.045	2.46	1.82	9
Economizers	Airside economizer control repair	Non-functional economizer	Ton of cooling	ENComm_Cooling	15	285.00	$276.99	–	$73.65	$50.00	$0.045	4.41	3.53	9
Evaporative coolers/ Pre-coolers	Direct evaporative cooler	Replacing standard A/C unit	Tons	ENComm_Cooling	15	386.00	$375.16	–	$364.00	$200.00	$0.045	1.73	1.08	9

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Automated Controls	EMS controls with 2 strategies	Proposed strategy not existing (retrofit system)	Tons of cooling	ENComm_Cooling	15	636.00	$618.13	–	$197.98	$125.00	$0.045	4.03	3.00	9
Automated Controls	EMS controls with 3 strategies	Proposed strategy not existing (retrofit system)	Tons of cooling	ENComm_Cooling	15	794.00	$771.69	–	$197.98	$150.00	$0.045	4.16	3.64	11
Automated Controls	EMS controls with 4 strategies	Proposed strategy not existing (retrofit system)	Tons of cooling	ENComm_Cooling	15	794.00	$771.69	–	$197.98	$175.00	$0.045	3.67	3.64	9
Automated Controls	EMS controls with 5 strategies	Proposed strategy not existing (retrofit system)	Tons of cooling	ENComm_Cooling	15	1,842.00	$1,790.25	–	$197.98	$200.00	$0.045	6.34	7.02	11
Automated Controls	EMS controls with 2 strategies	Proposed strategy not existing (new system)	Tons of cooling	ENComm_Cooling	15	418.00	$406.26	–	$162.49	$70.00	$0.045	4.58	2.47	9
Automated Controls	EMS controls with 3 strategies	Proposed strategy not existing (new system)	Tons of cooling	ENComm_Cooling	15	484.00	$470.40	–	$162.49	$80.00	$0.045	4.63	2.81	11
Automated Controls	EMS controls with 4 strategies	Proposed strategy not existing (new system)	Tons of cooling	ENComm_Cooling	15	484.00	$470.40	–	$162.49	$90.00	$0.045	4.21	2.81	9
Automated Controls	EMS controls with 5 strategies	Proposed strategy not existing (new system)	Tons of cooling	ENComm_Cooling	15	633.00	$615.22	–	$162.49	$100.00	$0.045	4.80	3.55	11
Automated Controls	Lodging room occupancy controls	Manual controls	Ton	ENComm_HVAC	11	665.00	$425.12	–	$150.61	$75.00	$0.045	4.06	2.59	9
Evaporative Pre-Cooler	Pre-cooler added to condenser	Standard air-cooled chiller unit	Ton	IPC_Evap Cooler (ky)	15	106.00	$150.08	–	$173.00	$20.00	$0.045	6.07	0.93	2, 9
Electronically Commutated Motor (ECM)	ECM motor in HVAC application	Shaded pole or permanent split capacitor motor	Motor	ENComm_HVAC	15	724.00	$585.97	–	$140.00	$100.00	$0.045	4.43	3.74	5
Notched V-Belt in HVAC Applications	Type AX notched V-belt Type BX notched V-belt	Type A solid V-belt Type B solid V-belt	hp	ENComm_HVAC	6	54.92	$21.09	–	$7.52	$5.00	$0.045	2.83	2.33	5
Premium Windows	Low U-value, U-factor of .30 or less	Standard windows	ft² window area	ENComm_HVAC	25	5.89	$6.71	–	$5.92	$2.50	$0.045	2.43	1.19	9
Reflective Roofing	Adding reflective roof treatment	Non-reflective low pitch roof	ft² roof area	ENComm_Cooling	15	0.12	$0.11	–	$0.05	$0.05	$0.045	2.04	2.25	9
Wall Insulation	Increase to R11 min. insulation	Insulation level, R2.5 or less	ft² wall area	ENComm_HVAC	25	0.41	$0.47	–	$0.66	$0.40	$0.045	1.13	0.76	2, 9
Wall Insulation	Increase to R19 min. insulation	Insulation level, R2.5 or less	ft² wall area	ENComm_HVAC	25	0.47	$0.53	–	$0.66	$0.55	$0.045	0.93	0.86	2, 9
Computers	PC network power management	No central control software in place	Unit	ENComm_Office	4	135.00	$29.32	–	$12.00	$10.00	$0.045	1.83	1.79	9

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Laundry Machines	High efficiency washer	Standard washer, electric HW	Unit	ENComm_WtrHtr	10	756.00	$365.20	–	$200.00	$125.00	$0.045	2.30	1.72	9
Stock Tank/ Fountain	Energy free freeze-resistant stock tank	Thermostatically controlled electric resistance element freeze protection	Unit	Comm_Agriculture	10	1,176.00	$868.26	–	$450.59	$100.00	$0.045	5.69	1.90	12
Residential-Type Electric Water Heater	EF 0.94 or higher, 25–54 gallon EF 0.95 or higher, 45–54 gallon EF 0.93 or higher, 55–74 gallon EF 0.92 or higher, 75–99 gallon EF 0.85 or higher, 100–119 gallon	Standard electric water heater	Unit	ENComm_WtrHtr	13	154.14	$91.65	–	$69.11	$50.00	$0.045	1.61	1.33	13
Commercial-Type Electric Water Heater	25–34 gallon, standby loss 157 or lower 35–44 gallon, standby loss 185 or lower 45–54 gallon, standby loss 201 or lower 55–74 gallon, standby loss 238 or lower 75–99 gallon, standby by loss 249 or lower 100–119 gallon, standby loss 287 or lower	Standard electric water heater	Unit	ENComm_WtrHtr	13	68.17	$40.53	–	$30.27	$20.00	$0.045	1.76	1.34	14
Commercial Showerhead, Electric Water Heat	2.0 gpm or less installed in health club/fitness business	Showerhead using 2.2 gpm or greater	Unit	ENComm_WtrHtr	10	2,431.00	$1,174.34	–	$13.56	$15.00	$0.045	9.50	10.57	15
Commercial Showerhead, Electric Water Heat	2.0 gpm or less installed in commercial business (non-health club/fitness business)	Showerhead using 2.2 gpm or greater	Unit	ENComm_WtrHtr	10	129.00	$62.32	–	$13.56	$9.00	$0.045	4.22	3.55	15
Smart Power Strips	Load-sensing, motion-sensing, or timer-controlled power strip	No existing load or motion-sensing, or timer-controlled power strip	Power strip	ENComm_Office	4	118.00	$25.62	–	$21.00	$10.00	$0.045	1.68	1.07	16
Standby Generator Engine Block Heater	Stationary pump-driven circulating block heater; must operate continuously	Thermosiphon electric resistance circulating block heater <3 kW	Unit	IPC_Engine Block	10	3,415.00	$1,115.49	–	$1,287.31	$200.00	$0.045	3.16	0.85	2, 6

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Standby Generator Engine Block Heater	Stationary pump-driven circulating block heater; must operate continuously	Thermosiphon electric resistance circulating block heater 3 kW or greater	Unit	IPC_Engine Block	10	17,524.00	$5,724.10	–	$3,090.77	$1,500.00	$0.045	2.51	1.63	6
Refrigeration	Add refrigeration line insulation	No insulation present	Linear ft	ENComm_ Refrigeration	11	9.75	$5.28	–	$4.46	$2.00	$0.045	2.17	1.19	9
Refrigeration	Install auto-closer—walk-in	No/damaged auto-closer, low temp	Door	ENComm_ Refrigeration	8	2,547.00	$1,063.01	–	$139.32	$125.00	$0.045	4.45	4.62	9
Refrigeration	Install auto-closer—reach-in	Damaged auto-closer, low temp	Door	ENComm_ Refrigeration	8	560.00	$233.72	–	$139.32	$100.00	$0.045	1.87	1.56	9
Refrigeration	Install auto-closer—walk-in	No/damaged auto-closer, med. temp	Door	ENComm_ Refrigeration	8	575.00	$239.98	–	$139.32	$100.00	$0.045	1.91	1.60	9
Refrigeration	Install auto-closer—reach-in	Damaged auto-closer, med. temp	Door	ENComm_ Refrigeration	8	373.00	$155.67	–	$139.32	$70.00	$0.045	1.80	1.10	9
Refrigeration	Add anti-sweat heat controls	Low/med. temp case w/out controls	Linear ft	ENComm_ Refrigeration	8	208.00	$86.81	–	$40.00	$40.00	$0.045	1.76	1.94	9
Evaporative Fans	Add evaporative fan controls	Low or med. temp. walk-in or reach-in with no controls	Fan	ENComm_ Refrigeration	15	408.00	$281.56	–	$161.74	$75.00	$0.045	3.02	1.72	9
Evaporative Fans	Install ECM/PSC evap fan motor	Med. or low temp. walk-in	Motor	ENComm_ Refrigeration	15	593.00	$409.23	–	$296.78	$100.00	$0.045	3.23	1.39	9
Evaporative Fans	Install ECM/PSC evap fan motor	Med. or low temp. reach-in	Motor	ENComm_ Refrigeration	15	318.00	$219.45	–	$84.45	$60.00	$0.045	2.96	2.45	9
Floating Head/Suction Pressures	Head pressure controller	Standard head pressure control	Horsepower	ENComm_ Refrigeration	16	440.00	$318.67	–	$272.60	$80.00	$0.045	3.20	1.20	9
Floating Head/Suction Pressures	Suction pressure controller	Standard suction pressure control	Horsepower	ENComm_ Refrigeration	16	104.00	$75.32	–	$86.91	$20.00	$0.045	3.06	0.90	2, 9
Demand Controlled Kitchen Ventilation Exhaust Hood	VFD installed on kitchen exhaust and/or makeup air fan	Kitchen hood with constant speed ventilation	HP	ENComm_Cooking	15	3,838.00	$2,746.01	–	$2,000.00	$200.00	$0.045	7.39	1.39	5
Vending Machines	Non-cooled snack control	Vending machine with no sensor	Sensor	ENComm_Misc	5	387.00	$105.56	–	$75.00	$50.00	$0.045	1.57	1.26	9
Commercial kitchen equipment	ENERGY STAR® undercounter (residential style) dishwasher	Standard dishwasher	Machine	ENComm_Misc	12	2,210.00	$1,278.42	$246.01	$232.00	$200.00	$0.045	4.28	4.99	17

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Commercial kitchen equipment	ENERGY STAR commercial dishwasher	Standard commercial dishwasher	Machine	ENComm_Misc	12	5,561.00	$3,216.88	$663.48	$3,978.00	$500.00	$0.045	4.30	0.99	2, 17
Commercial kitchen equipment	ENERGY STAR listed electric combination oven (6–14 pans)	Standard electric oven	Oven	ENComm_Cooking	10	12,999.00	$6,786.46	–	$1,704.06	$1,100.00	$0.045	4.04	3.27	18
Commercial kitchen equipment	ENERGY STAR listed electric combination oven (15–20 pans)	Standard electric oven	Oven	ENComm_Cooking	10	17,877.00	$9,333.15	–	$465.58	$300.00	$0.045	8.49	8.12	18
Commercial kitchen equipment	ENERGY STAR listed electric convection oven	Standard electric oven	Oven	ENComm_Cooking	10	1,672.00	$872.91	–	$963.31	$300.00	$0.045	2.33	0.92	2, 19
Commercial kitchen equipment	ENERGY STAR listed electric fryer	Standard fryer	Fryer	ENComm_Cooking	8	2,671.00	$1,159.09	–	$822.68	$400.00	$0.045	2.23	1.35	20
Commercial kitchen equipment	ENERGY STAR listed electric steamer—3 pan	Standard steamer	Steamer	ENComm_Cooking	9	21,470.00	$10,286.81	–	$376.93	$80.00	$0.045	9.89	8.46	21
Commercial kitchen equipment	ENERGY STAR listed electric steamer—4 pan	Standard steamer	Steamer	ENComm_Cooking	9	28,564.00	$13,685.72	–	$143.88	$100.00	$0.045	9.94	10.60	21
Commercial kitchen equipment	ENERGY STAR listed electric steamer—5 pan	Standard steamer	Steamer	ENComm_Cooking	9	35,659.00	$17,085.11	–	$(281.85)	$150.00	$0.045	9.80	14.32	21
Commercial kitchen equipment	ENERGY STAR listed electric steamer—6 pan	Standard steamer	Steamer	ENComm_Cooking	9	42,754.00	$20,484.50	–	$62.40	$175.00	$0.045	9.82	11.42	21
Commercial kitchen equipment	ENERGY STAR listed electric steamer—10 pan or larger	Standard steamer	Steamer	ENComm_Cooking	9	71,133.00	$34,081.59	–	$4,272.87	$200.00	$0.045	10.08	5.03	21
Variable-speed controls	Variable-speed drive on HVAC system applications: • Chilled water pumps • Condenser water pumps • Cooling tower fans	Single speed HVAC system fan/pump	HP	ENComm_HVAC	15	268.00	$216.91	–	$165.33	$60.00	$0.045	3.01	1.35	9
Variable-speed controls	Variable-speed drive on HVAC system applications: • Supply • Return • Outside air • Make-up air • Hot water pumps	Single speed HVAC system fan/pump	HP	ENComm_HVAC	15	996.00	$806.12	–	$142.05	$100.00	$0.045	5.58	4.75	9

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Variable-speed controls	Variable-speed drive (VSD) on potato and onion storage shed ventilation	No existing VSD	HP	IPC_Onion Potato VSD	10	1,993.00	$767.64	–	$300.00	$200.00	$0.045	2.66	2.17	22

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] Evergreen Consulting Group, LLC. Idaho Power Lighting Tool. 2016.
[2] Measure not cost-effective. Measure to be monitored in 2018. Measure included in the program to increase participation in a cost-effective program and to encourage adoption of higher efficiency equipment.
[3] Idaho Power Demand-Side Management Potential Study by Nexant, Inc. IPC DSM Potential - Commercial Model 081209.xlsm. 2009.
[4] RTF. ComGroceryDisplayCaseLEDs_v2_2 and ComGroceryCaseLEDs_v1.1.xls. 2013. T12 to LED. Averaged the measures for less than 4 W/ln ft and 4-8.5 W/ln ft.
[5] IRTF. ComGroceryDisplayCaseLEDs_v2_2 and ComGroceryCaseLEDs_v1.1.xls. 2013. T8 to LED. Averaged the measures for less than 4 W/ln ft and 4-8.5 W/ln ft.
[6] IPC engineering analysis.
[7] Idaho Power Technical Reference Manual (TRM) prepared by ADM Associates, Inc. 2015. Weighted average of 0-25 ton units.
[8] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Weighted average of 5-25 ton units.
[9] Idaho Power TRM prepared by ADM Associates, Inc. 2015.
[10] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Averaged water cooled chillers.
[11] Idaho Power TRM prepared by ADM Associates, Inc. 2015. Calculated from TRM spreadsheets.
[12] RTF. AgStockWateringTank_v2_0.xlsm. 2013. Simple average of heating zones 1, 2, & 3.
[13] RTF. ComDHWEfficientTank_v3_0.xlsm. 2014. Simple average of residential style water heaters.
[14] RTF. ComDHWEfficientTank_v3_0.xlsm. 2014. Simple average of commercial style water heaters.
[15] RTF. ComDHWShowerhead_v3_0.xlsm. 2013.
[16] RTF. ComSmartPlugPower_v3_1.xlsm. Updated incremental costs based on IPC research.
[17] Idaho Power TRM prepared by ADM Associates, Inc. 2015. NEBs from water savings from RTF. ComDishwasher_v1_2.xlsm. 2012.
[18] RTF. ComCookingCombinationOven_v2_0.xlsm. 2013.
[19] RTF. ComCookingConvectionOven_v2_0.xlsm. Simple average of half and full-size ovens. 2013.
[20] RTF. ComCookingFryer_v2_0.xlsm. 2013.
[21] RTF. ComCookingSteamer_v2_0.xlsm. 2013.
[22] RTF. AgPotatoOnionShedVFD_v3_0.xlsm. IPC costs.

Irrigation Efficiency Rewards

Segment: Irrigation
2017 Program Results

Cost Inputs			Ref
Program Administration	$	462,083	
Program Incentives		2,013,594	I
Total UC	**$**	**2,475,677**	P
Measure Equipment and Installation (Incremental Participant Cost)	$	7,920,879	M

Net Benefit Inputs (NPV)				Ref
Resource Savings				
2017 Annual Gross Energy (kWh)	16,824,266			
NPV Cumulative Energy (kWh)	122,069,596	$	11,751,810	S
10% Credit (Northwest Power Act)			1,175,181	
Total Electric Savings		**$**	**12,926,991**	A
Participant Bill Savings				
NPV Cumulative Participant Bill Savings		$	6,747,576	B
Other Benefits				
Non-Utility Rebates/Incentives		$	–	NUI
NEBs		$	17,612,282	NEB

Summary of Cost-Effectiveness Results					
Test		**Benefit**		**Cost**	**Ratio**
UC Test	$	11,751,810	$	2,475,677	4.75
TRC Test		30,539,274		8,382,962	3.64
RIM Test		11,751,810		9,223,252	1.27
PCT		26,373,452		$7,920,879	3.33

Benefits and Costs Included in Each Test		
UC Test	= S * NTG	= P
TRC Test	= (A + NUI + NEB) * NTG	= P + ((M-I) * NTG)
RIM Test	= S * NTG	= P + (B * NTG)
PCT	= B + I + NUI + NEB	= M

Assumptions for Levelized Calculations	
Discount Rate	
Nominal (WACC)	6.74%
Real ((1 + WACC) / (1 + Escalation)) – 1	4.44%
Escalation Rate	2.20%
Net-to-Gross (NTG)	100%
Minimum NTG Sensitivity	21%
Average Customer Segment Rate/kWh	$0.059
Line Losses	9.60%

Notes: Energy savings are combined for projects under the Custom and Menu program. Savings under each Custom project is unique and individually calculated and assessed.
NEBs including yield, labor, and other benefits reported by the customer.
Green Rewind initiative is available to agricultural, commercial, and industrial customers. Agricultural motor rewinds are paid under Irrigation Efficiency Rewards, but the savings are not included in the program cost-effectiveness.
Green Rewind savings are included in the sector cost-effectiveness.

Year: 2017 **Program**: Irrigation Efficiency Rewards **Market Segment**: Irrigation **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name[a]	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[b]	Annual Gross Energy Savings (kWh/yr)[c]	NPV DSM Avoided Costs[d]	NEB	Gross Incremental Participant Cost[e]	Incentive/ Unit	Admin Cost ($/kWh)[f]	UC Ratio[g]	TRC Ratio[h]	Sources
Nozzle Replacement	New flow-control-type nozzles replacing existing brass nozzles or worn out flow control nozzles of same flow rate or less	Brass nozzles or worn out flow control nozzles of same flow rate or less	Unit	IPC_Irrigation	4	40.60	$15.28	–	$6.78	$1.50	$0.027	5.89	2.13	1
Nozzle Replacement	New nozzles replacing existing worn nozzles of same flow rate or less	Worn nozzle of same flow rate or less	Unit	IPC_Irrigation	4	40.60	$15.28	–	$2.54	$0.25	$0.027	11.35	4.62	1
Sprinklers	Rebuilt or new brass impact sprinklers	–	Unit	IPC_Irrigation	5	28.26	$13.04	–	$14.75	$2.75	$0.027	3.71	0.92	1, 2
Levelers	Rebuilt or new wheel line levelers	–	Unit	IPC_Irrigation	5	41.76	$19.27	–	$3.89	$0.75	$0.027	10.27	4.23	1
Sprinklers	Center pivot/linear move: Install new sprinkler package on an existing system	–	Unit	IPC_Irrigation	5	100.19	$46.24	–	$30.53	$8.00	$0.027	4.32	1.53	1
Gasket Replacement	New gaskets for hand lines, wheel lines, or portable mainline	–	Unit	IPC_Irrigation	5	170.00	$78.47	–	$4.69	$1.00	$0.027	14.04	9.30	1
Drain Replacement	New drains, hand lines, wheel lines, or portable mainline	–	Unit	IPC_Irrigation	5	176.25	$81.35	–	$16.35	$3.00	$0.027	10.48	4.24	1
Hub Replacement	New wheel line hubs	–	Unit	IPC_Irrigation	10	73.06	$60.83	–	$59.80	$12.00	$0.027	4.35	1.08	1
New Goose Necks	New goose neck with drop tube or boomback	–	Outlet	IPC_Irrigation	15	14.50	$16.27	–	$4.99	$1.00	$0.027	11.70	3.33	1
Pipe Repair	Cut and pipe press or weld repair of leaking hand lines, wheel lines, and portable mainline	–	Joint	IPC_Irrigation	8	84.48	$59.01	–	$21.53	$8.00	$0.027	5.74	2.73	1
Gasket Replacement	New center pivot base boot gasket	–	Unit	IPC_Irrigation	8	1,456.40	$1,017.35	–	$299.00	$125.00	$0.027	6.19	3.31	1

[a] Available measures in the Irrigation Efficiency Rewards Menu Incentive Option. For the Custom Incentive Option, projects are thoroughly reviewed by Idaho Power staff.
[b] Average measure life.
[c] Estimated peak demand reduction measured at the customer's meter, excluding line losses.
[d] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[e] Incremental participant cost prior to customer incentives.
[f] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[g] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[h] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. AgIrrigationHardware_v3.xlsm. 2013. Weighted average of Western Idaho (13%), Eastern Washington & Oregon (4%), and Eastern & Southern Idaho (83%).
[2] Measure not cost-effective. Measure includes unquantifiable non-energy benefits and increases participation in a cost-effective program.

Year: 2017 **Program**: Irrigation Efficiency Rewards—Green Motors **Market Segment**: Irrigation **Program Type**: Energy Efficiency

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Green Motors Program Rewind: Motor size 15 HP	Green Motors Program Rewind: Motor size 15 HP	Standard rewind practice	Motor	IPC_Irrigation	18	317.00	$403.25	–	$160.18	$30.00	$0.050	8.79	2.52	1
Green Motors Program Rewind: Motor size 20 HP	Green Motors Program Rewind: Motor size 20 HP	Standard rewind practice	Motor	IPC_Irrigation	18	425.00	$540.63	–	$178.70	$40.00	$0.050	8.83	2.97	1
Green Motors Program Rewind: Motor size 25 HP	Green Motors Program Rewind: Motor size 25 HP	Standard rewind practice	Motor	IPC_Irrigation	17	595.00	$727.70	–	$204.18	$50.00	$0.050	9.12	3.42	1
Green Motors Program Rewind: Motor size 30 HP	Green Motors Program Rewind: Motor size 30 HP	Standard rewind practice	Motor	IPC_Irrigation	17	640.00	$782.74	–	$224.25	$60.00	$0.050	8.51	3.36	1
Green Motors Program Rewind: Motor size 40 HP	Green Motors Program Rewind: Motor size 40 HP	Standard rewind practice	Motor	IPC_Irrigation	17	746.00	$912.38	–	$274.04	$80.00	$0.050	7.78	3.22	1
Green Motors Program Rewind: Motor size 50 HP	Green Motors Program Rewind: Motor size 50 HP	Standard rewind practice	Motor	IPC_Irrigation	17	802.00	$980.87	–	$303.37	$100.00	$0.050	7.00	3.14	1
Green Motors Program Rewind: Motor size 60 HP	Green Motors Program Rewind: Motor size 60 HP	Standard rewind practice	Motor	IPC_Irrigation	20	765.00	$1,042.84	–	$357.80	$120.00	$0.050	6.59	2.90	1
Green Motors Program Rewind: Motor size 75 HP	Green Motors Program Rewind: Motor size 75 HP	Standard rewind practice	Motor	IPC_Irrigation	20	788.00	$1,074.19	–	$386.74	$150.00	$0.050	5.67	2.77	1
Green Motors Program Rewind: Motor size 100 HP	Green Motors Program Rewind: Motor size 100 HP	Standard rewind practice	Motor	IPC_Irrigation	20	1,040.00	$1,417.72	–	$479.76	$200.00	$0.050	5.63	2.93	1
Green Motors Program Rewind: Motor size 125 HP	Green Motors Program Rewind: Motor size 125 HP	Standard rewind practice	Motor	IPC_Irrigation	20	1,157.00	$1,577.21	–	$538.82	$250.00	$0.050	5.12	2.91	1
Green Motors Program Rewind: Motor size 150 HP	Green Motors Program Rewind: Motor size 150 HP	Standard rewind practice	Motor	IPC_Irrigation	20	1,376.00	$1,875.75	–	$600.19	$300.00	$0.050	5.09	3.08	1
Green Motors Program Rewind: Motor size 200 HP	Green Motors Program Rewind: Motor size 200 HP	Standard rewind practice	Motor	IPC_Irrigation	20	1,821.00	$2,482.37	–	$722.54	$400.00	$0.050	5.06	3.36	1
Green Motors Program Rewind: Motor size 250 HP	Green Motors Program Rewind: Motor size 250 HP	Standard rewind practice	Motor	IPC_Irrigation	20	2,823.00	$3,848.29	–	$928.64	$500.00	$0.050	6.00	3.96	1
Green Motors Program Rewind: Motor size 300 HP	Green Motors Program Rewind: Motor size 300 HP	Standard rewind practice	Motor	IPC_Irrigation	20	3,370.00	$4,593.96	–	$938.68	$600.00	$0.050	5.98	4.56	1
Green Motors Program Rewind: Motor size 350 HP	Green Motors Program Rewind: Motor size 350 HP	Standard rewind practice	Motor	IPC_Irrigation	20	3,929.00	$5,355.98	–	$983.84	$700.00	$0.050	5.97	4.99	1

						Benefit			Cost			B/C Tests		
Measure Name	Measure Descriptions	Replacing	Measure Unit	End Use	Measure Life (yrs)[a]	Annual Gross Energy Savings (kWh/yr)[b]	NPV DSM Avoided Costs[c]	NEB	Gross Incremental Participant Cost[d]	Incentive/ Unit	Admin Cost ($/kWh)[e]	UC Ratio[f]	TRC Ratio[g]	Source
Green Motors Program Rewind: Motor size 400 HP	Green Motors Program Rewind: Motor size 400 HP	Standard rewind practice	Motor	IPC_Irrigation	20	4,456.00	$6,074.38	–	$1,098.86	$800.00	$0.050	5.94	5.06	1
Green Motors Program Rewind: Motor size 450 HP	Green Motors Program Rewind: Motor size 450 HP	Standard rewind practice	Motor	IPC_Irrigation	20	5,003.00	$6,820.05	–	$1,201.14	$900.00	$0.050	5.93	5.17	1
Green Motors Program Rewind: Motor size 500 HP	Green Motors Program Rewind: Motor size 500 HP	Standard rewind practice	Motor	IPC_Irrigation	20	5,567.00	$7,588.89	–	$1,297.63	$1,000.00	$0.050	5.94	5.30	1
Green Motors Program Rewind: Motor size 600 HP	Green Motors Program Rewind: Motor size 600 HP	Standard rewind practice	Motor	IPC_Irrigation	20	6,193.00	$8,442.25	–	$1,912.23	$1,200.00	$0.050	5.59	4.18	1
Green Motors Program Rewind: Motor size 700 HP	Green Motors Program Rewind: Motor size 700 HP	Standard rewind practice	Motor	IPC_Irrigation	20	7,195.00	$9,808.16	–	$2,086.24	$1,400.00	$0.050	5.57	4.41	1
Green Motors Program Rewind: Motor size 800 HP	Green Motors Program Rewind: Motor size 800 HP	Standard rewind practice	Motor	IPC_Irrigation	20	8,205.00	$11,184.99	–	$2,314.75	$1,600.00	$0.050	5.56	4.52	1
Green Motors Program Rewind: Motor size 900 HP	Green Motors Program Rewind: Motor size 900 HP	Standard rewind practice	Motor	IPC_Irrigation	20	9,211.00	$12,556.36	–	$2,551.91	$1,800.00	$0.050	5.55	4.58	1
Green Motors Program Rewind: Motor size 1,500 HP	Green Motors Program Rewind: Motor size 1,500 HP	Standard rewind practice	Motor	IPC_Irrigation	20	12,681.00	$17,286.63	–	$3,763.37	$3,000.00	$0.050	3.81	3.58	1

[a] Average measure life.
[b] Estimated kWh savings measured at the customer's meter, excluding line losses.
[c] Sum of NPV of avoided cost. Based on end-use load shape, measure life, savings including line losses, and alternative costs by pricing period as provided in the 2015 IRP. TRC test benefit calculation includes 10% conservation adder from the Northwest Power Act.
[d] Incremental participant cost prior to customer incentives.
[e] Average program administration and overhead costs to achieve each kWh of savings. Calculated from 2017 actuals.
[f] UC Ratio = (NPV DSM Avoided Costs) / ((Admin Cost/kWh * kWh Savings) + Incentives)
[g] TRC Ratio = ((NPV DSM Avoided Costs * 110%) + NEB) / ((Admin Cost/kWh * kWh Savings) + Incentives + (Incremental Participant Cost - Incentives))
[1] RTF. AgMotorsRewind_v2_3.xlsm. 2016.

IDAHO POWER

An IDACORP Company

2017 Annual Report

SUPPLEMENT 2: EVALUATION

DEMAND-SIDE MANAGEMENT

MARCH 15 • 2018

Printed on recycled paper

LIST OF CONTENTS

Evaluation and Research Summary

Idaho Power considers program evaluation an essential component of its demand-side management (DSM) operational activities. The company contracts with third-party contractors to conduct impact, process, and other evaluations on a scheduled and as-required basis.

Third-party contracts are generally awarded using a competitive bid process managed by Idaho Power's Strategic Sourcing department. In some cases, research and analysis is conducted internally and managed by Idaho Power's Research and Analysis team within the Customer Relations and Energy Efficiency (CR&EE) department. Third-party evaluations are specifically managed by the company's energy efficiency evaluator.

Idaho Power uses industry-standard protocols for its internal and external evaluation efforts, including the *National Action Plan for Energy Efficiency—Model Energy Efficiency Program Impact Evaluation Guide*, the *California Evaluation Framework, the International Performance Measurement and Verification Protocol* (IPMVP), the *Database for Energy Efficiency Resources*, and the Regional Technical Forum's (RTF) evaluation protocols.

The company also supports regional and national studies to promote the ongoing cost-effectiveness of programs, the validation of energy savings and demand reduction, and the efficient management of its programs. Idaho Power considers primary and secondary research, cost-effectiveness analyses, potential assessments, impact and process evaluations, industry best practice analyses, and customer surveys as important resources in providing accurate and transparent program savings estimates. Recommendations and findings from evaluations and research are used to continuously refine Idaho Power's DSM programs.

In 2017, Idaho Power contracted with KEMA, Inc. (DNV GL) to conduct two program impact evaluations and two program process evaluations. Impact evaluations were performed for Home Energy Audits and Heating and Cooling Efficiency Program. Process evaluations were performed for Commercial/Industrial Energy Efficiency and Heating and Cooling Efficiency Program. Idaho Power conducted internal analyses on the 2017 demand response events for A/C Cool Credit, Irrigation Peak Rewards, and Flex Peak Program.

Throughout 2017, Idaho Power administered several surveys regarding energy efficiency programs to measure customer satisfaction. Some surveys were administered by a third-party contractor; other surveys were administered by Idaho Power either through traditional paper and electronic surveys or through the company's em**powered** community online survey.

An evaluation schedule and final reports from all evaluations, research, and surveys completed in 2017 are provided in *Supplement 2: Evaluation*.

EVALUATION PLAN

Energy Efficiency 2013–2018 Program Evaluation Plans

	2013			2014			2015			2016			2017			2018		
Residential Programs	Impact	Process	Other	Impact	Process	Other	Impact	Process	Other	Impact	Process	Other	Impact	Process	Other	Impact	Process	Other
Ductless Heat Pump Pilot							✓	✓										
Educational Distributions[a]																		✓
Energy Efficient Lighting		✓		✓														
Energy House Calls															✓			
ENERGY STAR® Homes Northwest		✓		✓														
Heating & Cooling Efficiency Program		✓											✓	✓				
Home Energy Audit					✓								✓					
Home Energy Reports																		✓
Rebate Advantage										✓	✓							
Residential Energy Efficiency Education Initiative															✓			
Multi-Family Energy Savings Program																✓	✓	
Shade Tree Project					✓											✓		
Simple Steps, Smart Savings™[b]																		
Weatherization Assistance for Qualified Customers		✓				✓									✓			✓
Weatherization Solutions for Eligible Customers		✓				✓									✓			✓
Commercial/Industrial Programs																		
New Construction										✓				✓				
Custom				✓	✓									✓		✓		
Retrofits		✓								✓				✓				
Irrigation Programs																		
Irrigation Efficiency Rewards	✓				✓					✓	✓							
Demand Response Programs																		
A/C Cool Credit			✓	✓			✓			✓					✓			✓
Flex Peak Program		✓	✓				✓			✓					✓			✓
Irrigation Peak Rewards			✓	✓			✓								✓			✓

[a] Designated as a specific program in 2015, the Educational Distributions effort is administered through the Residential Energy Efficiency Education Initiativ

[b] Simple Steps, Smart Savings™ includes promotional based appliances, showerheads.

ENERGY EFFICIENCY ADVISORY GROUP MINUTES

The following pages include minutes from EEAG meetings held on February 16, May 3, August 2, and November 1, 2017.

Energy Efficiency Advisory Group (EEAG)
Notes dated February 16, 2017

Present:

Kent Hanway-CSHQA
Jim Hall–Bodybuilding.com
Stacey Donohue–Idaho Public Utilities Commission
Diego Rivas–Northwest Energy Coalition
Tami White–Idaho Power
Nadine Hanhan–Public Utility Commission of Oregon (via phone)
Elfreda Higgins-Garden City Council
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
John Chatburn–Office of Energy & Mineral Resources
Sid Erwin–Idaho Irrigation Pumpers Association
Pete Pengilly*-Idaho Power
Tina Jayaweera-Northwest Power & Conservation Council (via phone)

Not Present:

Ken Robinette–South Central Comm. Action Partnership

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Billie McWinn*–Idaho Power
Shelley Martin–Idaho Power
Amy Hawkins–Idaho Power
Joe Bonocore–Bonocore Technology Partners
Nick Bengston*–CLEAResult
Tracey Burtch*–Idaho Power
Lisa Grow*-Idaho Power
Don Reading–Industrial Customers of Idaho Power
Cory Read-Idaho Power
Tonja Dyke-Idaho Power
Chris Pollow-Idaho Power
Randy Thorn-Idaho Power
Suzanne Smith-Idaho Power
Zeke VanHooser-Idaho Power
Connie Aschenbrenner-Idaho Power
Lynette Standley-Idaho Power
Mindi Shodeen-Idaho Power
Phil DeVol–Idaho Power
Theresa Drake*–Idaho Power
Andrea Simmonsen–Idaho Power
Billie McWinn*–Idaho Power
Steve Hubble–City of Boise
Anne Alenskis–Idaho Power
Annie Meyer*–Idaho Power
Peter Richardson- Industrial Customers of Idaho Power
Gary Grayson-Idaho Power
Todd Greenwell-Idaho Power
Dan Axness-Idaho Power
Chellie Jensen-Idaho Power
Sheree Willhite-Idaho Power
Brianna Stafford-Idaho Power
Denise Humphreys-Idaho Power
Melissa Thom-Idaho Power
Jill Simpson-Idaho Power
Jennifer Pope-Office of Energy & Mineral Resources

Meeting Facilitator: Rosemary Curtin

Note Takers:

Shawn Lovewell (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Convened at 9:29am

Pete started the meeting with the introduction of the two new members, Elfreda Higgins and Jim Hall, EEAG members and guests. There were no comments or questions on the November notes. Pete explained the two financial documents that were sent out prior to the meeting; Appendix 1 and the 2016 DSM Actual Expenses and Preliminary Energy Savings. There was some discussion surrounding both the Idaho and Oregon Rider balances. Idaho Power emphasized that these balances, regardless of whether they are negative or positive, do not impact the company's commitment to pursuing all cost effective energy efficiency.

9:45 am Energy Efficiency Potential Study and IRPAC—Pete Pengilly

Pete highlighted the purpose of a potential study, and presented the following key points:

- The potential study is done every two years and is completed by a third party, Applied Energy Group (AEG)

- AEG determines three levels of energy efficiency potential; technical, economic, and achievable. All of the achievable potential is put into the IRP portfolio.

- The potential study is not a program planning document but rather a way to assess energy efficiency potential. Measures can change or go away during the time between each study being completed.

There were questions and comments around having EEAG take a deeper look into the potential study in order to help the company find ways to acquire more energy savings, if the company is doing any oversampling with the Commercial Building Stock Assessment (CBSA) and the Residential Building Stock Assessment (RBSA) and if so, could the company present those findings at a future meeting.

10:00 am- Demand Response Programs Evaluation—Nick Bengston-CLEAResult

Nick Bengston of CLEAResult provided the evaluation result of two demand response programs; Flex Peak and A/C Cool Credit. The following key points were presented

- There were three events called for each program in 2016. For the benefit of the new EEAG members, Nick explained the difference between energy efficiency and demand response. He gave a brief explanation of what each program does and how customers participate in the programs.

- The goal of this evaluation was to determine and verify demand reduction from at least three curtailment events. Demand response programs are not designed to save energy but to offset energy use during peak times.

- A predictive calculator was created four years ago for the A/C Cool Credit Program. This calculator is a planning tool based on a regression formula. Every time an evaluation is done this calculator is updated with the new data.

- The Flex Peak program had about a 70% increase in number of customers and about a 90% increase in participating sites. Nomination was about 27% increase from 2015 to 2016.

- Both of these programs are performing and functioning very well.

There were questions and discussion around snapback, participant geographic areas, and opportunities to improve the regression formula of the predictive calculator by adding night time temperatures as one of the data point inputs.

10:56 am- Break

11:11 am- Irrigation Peak Rewards 2016 Recap —Quentin Nesbitt

Quentin explained the Irrigation Peak Rewards program for new EEAG members and provided 2016 program highlights, costs, event data results and data calculation methods.

- This program was evaluated in house and a detailed report will be included in Supplement 2 of the DSM Annual Report.

- 85% of Irrigation Peak participants have been switched over to AMI devices. In 2017, the contract between Idaho Power and M2M/EnerNOC will no longer be in effect. By this spring the remaining participants will be moved to either AMI or a cell phone device for the rural customers who don't have AMI.

- Irrigation represents about 30% of Idaho Power's summertime load.

There was discussion around the causes of the AMI communication issue, manual pumps and how those are used in a demand response event, and that the Irrigation customers would like the program to expand but that they acknowledge that the company doesn't need the program to be enlarged at this time.

11:45 am-2016 Year End Wrap-up—Kathy Yi

Kathy provided preliminary savings numbers for the 2016 energy efficiency and demand response programs. The following points were highlighted:

- Between 2015 and 2016 program savings have gone up slightly. Expenses do not include demand response but do include educational efforts and marketing.

- The temporary suspension of the demand response programs in 2013 was explained for new members

- An incentive expense was defined as a monetary incentive to a customer to offset their cost. It could also be a buy down item, such as a LED bulb purchased at a retailer.

There was discussion around the demand response programs and the benefits of bringing the Flex Peak program in house.

12:06 pm-Company Updates—Theresa Drake

Theresa informed the group of a few new projects that the company is currently working on. A new Customer Solutions Advisor position is being developed. This position will perform outbound calls to the commercial customer segment assisting them on rate or pricing questions, energy efficiency programs, and assistance with myAccount, among other things. The company is also planning to launch a new web service for large commercial and industrial customers that will provide their interval usage data. Through the new customer relations management (CRM) software, the company has begun offering outage alerts via text. Through the outage map a customer can enter their cell phone number which allows the company to text them outage information.

12:15 Lunch

1:00 Meeting Reconvened

1:00 pm-Comments—Lisa Grow, Senior Vice President & Chief Operating Officer

Lisa gave a brief history of her education and work career at Idaho Power. Utility planning is complex and involves a lot of forecasting that requires balance. Energy efficiency is a critical piece of the company's planning portfolio. Any new technology that is looked at has to be balanced with customer satisfaction and needs to be cost effective. Idaho Power and EEAG may not always agree on things, but these conversations are important and can aid the company on its final decisions regarding programs. She thanked members of EEAG for their time and effort to help Idaho Power help its customers use energy wisely and efficiently

1:10 pm-Residential Programs—Billie McWinn

Billie presented the 2016 residential program performance which included program energy savings and participation. She provided an update on Home Improvement, Fridge & Freezer recycling, and Heating & Cooling Efficiency program changes. She requested input on thermostatic shower valves and Pete provided an update on the Home Energy Report pilot.

- Educational distributions and lighting make up the bulk of energy savings for the residential sector.

- The bulk of energy savings for E*Homes® is from multi-family homes. Because home occupancy rates are so high right now, there is less incentive for builders to participate and build more efficient homes.

- The uptick in participation for Home Energy Audits was due to expanding this offering to gas heated homes. It made it much easier to market to all customers vs. targeting all electric homes.

- At the November 2016 EEAG meeting, members provided feedback on ways to try to continue the Home Improvement Program using limited measures and on ways to sunset the program. Idaho Power took that feedback and evaluated different scenario. The evaluation revealed that the program passed the Utility Cost Test (UCT) but failed the Total Resource Cost Test (TRC). Therefore the goal is to sunset this program with minimal customer and contractor impact.

- Participation has increased in the Heating & Cooling Efficiency program (H&CE) but savings on a per unit basis have declined**.** The heat pump federal standard changed in January of 2015. The company had to apply the new standard in 2016 so savings were reduced on a per measure basis for air source heat pumps. The company sees value in keeping ductless heat pumps because of regional efforts. The company is proposing to continue ductless heat pumps as a separate line item with several proposed changes, including re-assigning non-program labor, reducing marketing spend while improving tactics and removing the stipend to participating contractors.

- Billie explained the different distribution options along with cost effectiveness challenges for the thermostatic shower valve and valve showerhead combo.

- Pete provided an update on the Home Energy Reports pilot. Idaho Power is contracting with consultants to help with the design and implementation. Idaho Power is working to roll this out in quarter two.

There was questions and discussion about the changing building codes and how housing stock incentives are administered, having someone from the Division of Building Safety present housing code information to the group, consumer education on the cost of operating a home. During the discussion of the cost effectiveness of the Home Improvement program, a few members stated their concerns with Idaho Power sun setting this program despite it passing the UCT. They stated that they would feel ok having the company offer it with only passing the UCT. During the Heating & Cooling Efficiency program discussion, some members stated that since trade ally relationships are an important piece of this program, they wouldn't want to see the participating contractor stipend eliminated. During the presentation on thermostatic shower valves there was discussion around how to use the thermostatic shower valve and shower valve combo as a customer engagement piece and in the Energy Savings Kits in the future.

2:23 pm- Commercial Programs—Quentin Nesbitt

Quentin updated the group on 2016 program performance and 2017 plans for the Commercial & Industrial offerings, Flex Peak, Irrigation Efficiency, and Irrigation Peak Rewards. He presented the following key points**:**

- 116 projects were completed in the New Construction program (formerly Building Efficiency). In 2017 Idaho Power will continue in code education efforts with the code collaborative and NEEA, in person visits with architects and engineers, and continuing with educating customers on programs.

- The Retrofit program (formerly Easy Upgrades) saw an increase in energy savings and projects in 2016. In 2017 trade ally outreach will increase with an emphasis on training.

- Custom projects (formerly Custom Efficiency) experience smaller savings but more projects in 2016 compared to 2015. Plans for 2017 include coordination with the local Refrigeration Engineer group to reinvigorate monthly meetings, reaching out to local Data Center Professionals group, School Cohort kick off, and continuation of commercial & industrial trainings.

- The tariff changes for automatic re-enrollment in Flex Peak have been approved. Those applications will be sent to existing participants at the end of February.
- In 2017, the Irrigation Efficiency program will hold a few more workshops in the spring compared to last year. The company will continue to work with dealers who aren't as engaged in the program and work with them to find ways to get them more engaged.

There was questions and discussion about lighting making up the bulk of the retrofit program, if there are repeat customers changing out fluorescent lamps to LED's, trade ally training and how important it is, and the focus of the school cohort offering.

3:10pm- Program Marketing—Tracey Burtch & Annie Meyer

Tracey and Annie provided updates on the Smart Saver Pledge, the Spring Awareness campaign, the Energy-Saving Kits, and the new Commercial & Industrial Ad Campaign. The following key points were presented:

- A new giveaway was passed out to the group. These are energy savings playing cards. Each card has an energy efficiency tip located on one side.

- The Smart-Saver Pledge lessons learned were discussed and EEAG was asked for their thoughts on the timing of doing another pledge for 2017.

- The spring awareness campaign will have the same look and feel as the previous campaign with some new concepts incorporated, such as multi-family housing, ductless heat pump, and home energy audit.

- Based on prior suggestions from EEAG, Idaho Power has reached out to the first time home buyer market with the Winter Energy Efficiency guide. Annie asked EEAG for suggestions on other types of distribution channels for this guide.

- The first Commercial & Industrial campaign ad was shown to the group. It featured two current EEAG members.

There were questions and suggestions on the timing of doing another Smart-Saver Pledge. The company should think about timing and keeping with the 21 day pledge, having a way for customers to share what they do on social media. In general EEAG likes the idea of the company doing this type of pledge again. The group provided suggestions to Idaho Power on different distribution channels for the Winter Energy Efficiency guide. Some suggestions were: University papers, real estate offices, mortgage companies, HOA newsletters, and Idaho Housing Association.

3:40 pm-Open Discussion/Wrap-up

- Would like to see a future presentation of the potential study that was recently completed.
- There was a comment made by someone from the audience about Idaho Power continuing with demand response programs. Two members commented that as Industrial and Irrigation customers, they think these programs should continue keep customers engaged when it is needed.
- Are there any updates from Idaho Power on motivating the small business customer to participate in programs? Quentin answered that all of the commercial programs are available for the small business customer. Idaho Power has reached out to other utilities to find out how they have handled the issues surrounding small business customer participation and communication challenges.
- Would like more information on the Next Step home in McCall. This was a good meeting.
- Being a new member, everyone's comments and explanations were appreciated.
- Excited for the new members and for their perspective.
- If there is time on the next agenda would like to have a discussion on the potential study and how that informs program planning.
- Enjoyed hearing about customer engagement and the energy savings kits.

4:05 pm Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated 5-3-2017

Present:

Pete Pengilly*-Idaho Power
Jim Hall-Bodybuilding.com
Connie Aschenbrenner-Idaho Power
Stacey Donohue–Idaho Public Utilities Commission
Diego Rivas–Northwest Energy Coalition
Ben Otto-Idaho Conservation League
Nadine Hanhan (on phone)–Public Utility Commission of Oregon
Sid Erwin–Idaho Irrigation Pumpers Association
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Kent Hanway-CSHQA
Don Strickler–Simplot
Ken Robinette–South Central Comm. Action Partnership
John Chatburn–Office of Energy Resources

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Billie McWinn*–Idaho Power
Shelley Martin–Idaho Power
Dan Axness-Idaho Power
Catherine Chertudi–City of Boise
Tami White–Idaho Power
Chellie Jensen–Idaho Power
Gary Grayson-Idaho Power
Dan Johnson-Avista
Bryan Wewers-Idaho Power
Cheryl Paoli-Idaho Power
Bill Shawver*-Idaho Power
Sheree Willhite-Idaho Power
Steve Hubble-City of Boise
Lynn Tominaga-Irrigation Pumpers Association
Randy Thorn-Idaho Power
Cory Read*–Idaho Power
Theresa Drake–Idaho Power
Rob Ord–Idaho Power
Stace Campbell–McCain Foods
Becky Andersohn–Idaho Power
Mindi Shodeen-Idaho Power
Peter Richardson–Industrial Customers of Idaho Power
Todd Greenwell-Idaho Power
Zeke VanHooser-Idaho Power
Becky Arte-Howell-Idaho Power
Jill Simpson-Idaho Power
Denise Humphreys-Idaho Power
Donn English-Idaho Public Utilities Commission
Joe Bonocore–Bonocore Technology Partners
Don Reading-Industrial Customers of Idaho Power
Bridget Kester-Applied Energy Group (on phone)

Note Takers:

Shawn Lovewell (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30am

Rosemary started the meeting with introduction of members and guests. Connie Aschenbrenner was introduced as the new member of EEAG that will be replacing Tami White. There were no comments or questions on the

February notes. Pete explained the two financial documents that were sent to EEAG members prior to the meeting; Appendix 1 and the 2017 DSM Actual Expenses and Preliminary Energy Savings by Program. Appendix 1 had to be modified due to the timing of Idaho Power's earnings release. An updated version will be sent out next week. The expenses by program and year to date savings will be covered in more detail during the Program Planning presentation by Billie and Quentin and there is also time set aside for open discussion at the end of the meeting.

9:48 am-Program Planning—Billie McWinn and Quentin Nesbitt

Billie started her presentation by recognizing the work that the program specialist and engineers put into these programs. She pointed out the poster boards around the room that Idaho Power used to engage customers in a text-to-win contest during Treefort as a part of the residential education initiative. There were about 100 participants that took part. Billie provided information and updates for the thermostatic shower valves (TSV), heat pump water heaters (HPWH) and home energy reports (HER). Quentin spoke to the group about commercial energy efficiency kits and the new Customer Solutions Advisor (CSA) positions.

- In the near-term, the TSV will be included in direct install programs when appropriate. In the long-term, they will be included in the Energy Saving Kits.

- Billie provided information regarding heat pump hot water heaters, including the history of these units in the Pacific Northwest, cost effectiveness, and considerations. She asked EEAG for their comments on whether Idaho Power should add this measure to its residential portfolio.

- Participating customers will begin receiving HER in July or August. At this time, only Idaho customers will be eligible and Idaho Power expects approximately 15,000 to 20,000 people will be included in the pilot.

- Due to the success of the Energy Saving Kits for residential customers, the company is researching a similar idea for small commercial customers. The cost effectiveness options are being reviewed and the company would like feedback and ideas from EEAG on what types of items to include in the kits.

- Quentin updated the group on the new Customer Solutions Advisor positions, what their role in the company will be and that some of their time will be charged to the Energy Efficiency Rider.

There were questions and comments around the HPWH and how to market these to the consumer; planned purchase vs. emergency purchase. Education will be key for contractors on the benefits of HPWH's, product availability, and proper installation considerations and protocols. NEEA has convened a regional strategy for consumer products and the HPWH are a priority product being focused on. The general regional consensus is that 2017 will be a turning year for these units. The federal water heater standards are expected to change in 2021 with an expectation of more consumer adoption of HPWH. There was discussion around making sure that an incentive amount will actually drive a customer toward purchasing a HPWH. There was also a comment that Idaho Power should consider partnering with the local gas company to jointly offer energy efficiency programs. Feedback on the small commercial energy kits focused on having kit categories depending on the type of business that requests one. For instance, a restaurant might get a sprayer but an office might get a smart strip. A suggestion was made to include stickers or clings to remind people to turn machines and lights off and there was another suggestion to have the kits customizable. Generally, the group seemed pleased that Idaho Power is looking into additional ways to engage the small business customer.

11:10 am-2016 Residential End-Use Study—Kathy Yi

Kathy provided highlights of the 2016 residential end use study. She reminded members that with this survey, while the company believes the questions are straight forward; it does not imply or predict how customers interpret the questions. A copy of this report is included in the DSM Annual Report-Supplement 2. The following key points were presented:

- The most recent studies were completed in 1994, 2004, and 2010.

- The largest difference between the 2010 survey and the 2016 survey is how it was distributed to participants. The survey in 2010 was proportional in the different regions, 2016's was disproportional and then weighted the results after. In the 2016 survey, Idaho Power followed the vendor's recommendation and increased the sample size due to timing, holidays and the presidential election.

- The content of the 2016 survey was similar to the 2010 survey with only a few differences. Questions about LEDs, smart thermostats, and program participation were added for 2016.

11:41 am-2017 Demand Response Preview—Quentin Nesbitt

Quentin provided the history of demand response from 2004-2016 along with current status of all three programs; A/C Cool Credit, Flex Peak and Irrigation Peak Rewards. The following key points were presented:

- Approximately 96% of the devices for Irrigation Peak Rewards were replaced last winter due to changing to AMI devices.

- The Flex Peak program has 5 new sites enrolled for 2017. The auto enrollment option has worked very well. This program tends to experience a higher realization rate than what is nominated.

- The A/C Cool Credit program has experienced a small drop in participation levels due to customers moving.

There were questions and comments regarding the number of A/C Cool Credit switches remaining in inventory, why we are not marketing to get additional customers to participate in the A/C Cool Credit program, and if Idaho Power will be providing some sort of real time data tool to Flex Peak participants. Quentin answered that we are continuing to follow the demand response settlement with regards to marketing the A/C Cool Credit Program and that the company is working on purchasing software to help make large customer interval metering data more readily available to customers online.

12:05 Lunch

Catherine Chertudi, former EEAG member, was acknowledged for her participation on the board and presented her an appreciation gift recognizing her years of service.

12:50 Meeting Reconvened

12:50 pm-Cost-Effectiveness Methods Review—Pete Pengilly

Pete presented a summary of the different cost-effectiveness tests, a cost-effectiveness example for lighting, explained what cost-effectiveness is and some of the myths. The following key points were presented:

- Net present value is the idea that the value of a dollar today is worth more than its value tomorrow.

- The Participant Cost Test (PCT) looks at the benefits from a participants point of view, that is, will it make sense for the customer to participate from a payback perspective. The Utility Cost Test (UCT) looks at the costs and benefits from the utility's perspective, and the Total Resource Cost Test (TRC) looks at the costs and benefits from the point of view of all customers (both participants and non-participants).

- Cost-effectiveness tests are not an exact science. All utilities calculate cost-effectiveness differently.

- Idaho Power uses all three cost-effectiveness test when evaluating programs.

There were questions and discussion regarding quantifying non-energy benefits and the benefits of using all three tests in regards to programs. The DSM Annual Report-Supplement 1 has all of the cost effectiveness information for each program. The company was complimented on its hard work in putting this information together.

1:26 pm-2016 Energy Efficiency Potential Study—Cory Read & Bridget Kester (AEG)

Cory highlighted the results of the overall energy efficiency potential study along with the top measures for residential, commercial, industrial, and irrigation customer segments. The following key points were presented:

- Bridget explained that the baseline forecast is what the load would be if there were no more programs. Codes and standards are taken in to account. Realistic achievable potential is what Idaho Power can achieve.

- Technical potential is if all technologies are adopted. Economic potential is calculated using Idaho Powers avoided costs.

- The differences between economic and achievable are based on ramp rates from the Northwest Power and Conservation Council (Council). The factors that determine ramp rates use the 2015 actual program results along with the 7th Plan Council ramp rates and look at how many of those measures are being turned over. Then compared what the ramp rate shows vs. what Idaho Power is achieving.

- For this potential study, just the TRC was used. Once program planning begins, however, the other cost-effectiveness tests are used.

There were questions and discussion around ramp rate order of operation, why CFLs are still part of the measure list for residential customers, commissioning and retro-commissioning for commercial customers and if Idaho Power has done any pilot programs around Low Elevation Sprinkler Application (LESA).

2:50 pm-Program Marketing—Bill Shawver

Bill informed the group that as of Monday May 1st, his department will now be called Corporate Communications and Marketing. He updated the group on the spring campaign and Zignal, a new media intelligence tool being used by his department. The following points were presented:

- Customers have indicated that Connections is the most effective communication channel in regards to the spring ad campaign. The animation for this ad campaign was updated this year and will run again in the fall.

- Earned media is very important to Idaho Power because it is based on the company's reputation and relationships with news outlets and there is no cost associated with it.

- Zignal is a new media intelligence tool that provides real time data every 10 seconds on what is being said about the company in traditional media and social media. The tool was demonstrated to the group. There was question and discussion around how to use Zignal to promote energy efficiency. This could be used as a way to engage customers. Since this tool is reacting to the stories in the media and who is talking about them, it could be used as a way to respond to complaints in a more targeted way. The company will need to target its audience based on whether or not they are on the internet. Target marketing could be another way to use this and to see how effective a marketing campaign actually is.

3:30 pm-Wrap-Up/Discussion

There was some further discussion on agenda flexibility and how these meetings are the forum in which to bring up topics and work collaboratively to resolve any issues that arise.

- Appreciated the forward look of new program measures, the presentations by Pete and Cory, and Bill. Also appreciated the flexibility to override the agenda.

- Like the forward look and the end use and potential studies.

- Appreciate all the members of EEAG. The company wanted to make this meeting more educational rather than just program reporting. In reply to an earlier comment about financial information, the company will be able to discuss this in the future, but was just a timing issue. The company will look into having the Division of Building Safety provide a presentation on building codes.

  Enjoyed being able to attend this meeting in person. Glad the company is looking into HPWH. It would be nice to see the company do a pilot program on LESA and discuss Strategic Energy Management (SEM) more.

4:00 Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated August 2nd, 2017

Present:

Kent Hanway-CSHQA
Ken Robinette–South Central Comm. Action Partnership
Don Strickler–Simplot
Stacey Donohue–Idaho Public Utilities Commission
Connie Aschenbrenner–Idaho Power
Diego Rivas–Northwest Energy Coalition
Nadine Hanhan–Public Utility Commission of Oregon (on phone)
Pete Pengilly*-Idaho Power
Scott Pugrud-Office of Energy and Mineral Resources
John Chatburn–Office of Energy and Mineral Resources
Sid Erwin–Idaho Irrigation Pumpers Association
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Ben Otto-Idaho Conservation League
Elfreda Higgins–City of Garden City
Jim Hall–Bodybuilding.com

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Billie McWinn*–Idaho Power
Shelley Martin–Idaho Power
Mindi Shodeen–Idaho Power
Gary Grayson–Idaho Power
Don Reading– Industrial Customers of Idaho Power
Peter Richardson–Industrial Customers of Idaho Power
Amanda Richardson-Honeywell
Denise Humphreys-Idaho Power
Tonja Dyke-Idaho Power
Tracey Burtch*-Idaho Power
Lynette Standley-Idaho Power
Jordan Rodriguez-Idaho Power
Lisa Nordstrom-Idaho Power
Jerry Peterson-Division of Building Safety
Cory Read–Idaho Power
Theresa Drake–Idaho Power
Andrea Simmonsen–Idaho Power
Cheryl Paoli–Idaho Power
Joe Bonocore–Bonocore Technology Partners
Tom Giffin*–Leidos
Dan Johnson (on phone)–Avista
Rob Ord-Idaho Power
Chellie Jensen-Idaho Power
Zeke VanHooser-Idaho Power
Annie Meyer*-Idaho Power
Rachelle Farnsworth-Idaho Public Utilities Commission
Sheree Willhite-Idaho Power
Todd Greenwell-Idaho Power

Note Takers:

Shawn Lovewell (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30 am

Rosemary started the meeting with introduction of members and guests. There were no comments or questions on the May notes. Pete went over the two financial documents that were sent to EEAG members prior to the meeting: Appendix 1 and the 2017 DSM Actual Expenses and preliminary Energy Savings by Program. He stated that a more detailed version of Appendix 1 will be sent out after the company's earnings release.

9:40 am–Residential Programs Update—Billie McWinn

Billie provided an update of the 2017 YTD savings for all residential programs. She highlighted Home Energy Reports (HER) and Thermostatic Shower Valves (TSV) and asked members of EEAG for input regarding residential lighting, heat pump water heaters (HPWH), and fridge and freezer recycling.

- The first set of Home Energy Reports has been sent out to customers. A subset of customers (electric heating) will only receive reports during the winter, all other customers will receive reports periodically over the year. The Customer Solutions Advisors will handle inbound customer calls regarding the reports. So far, they have taken three calls. Two wanted to opt out and one wanted to update the characteristics of their home. The company will continue to log the types of calls that come in.

- Based on feedback from EEAG, the TSV will now be incorporated into the Energy Saving Kits. They will also be used in the Multi-Family Savings Program, Home Energy Audits, and Energy House Calls as appropriate.

- The history of residential lighting programs was presented along with market baseline changes, lighting sales, YTD savings and participation, and the Regional Technical Forum (RTF) savings numbers. In 2018, the RTF shows the per unit kWh savings decreasing. With the current pace of LED technology adoption far exceeding expectations, the company wanted to present this to EEAG to start the discussion on any potential flags with continuing this program considering potential market transformation.

- The history of the Fridge and Freezer Recycling program was presented along with updated cost effectiveness and participation estimates. The company is planning to discontinue the program as of Jan 1, 2018. The company would like input from EEAG on ways to communicate this to customers.

- At the May EEAG meeting, the group discussed the potential for adding a HPWH measure to the Heating & Cooling Efficiency program. The program design was presented along with a marketing strategy. The company's program design did not include a mandatory training requirement for participating customers, however suggested that trainings would be made available to everyone. EEAG was asked for input on whether the company should or should not require these trainings to participate.

There were questions and comments on why the company would discontinue the lighting program if it is cost-effective. Billie assured the group that the company is not proposing to discontinue the program. Rather the purpose of the discussion was to start a discussion with EEAG before the decline in savings becomes an issue and to see if there were any concerns about the current pace of lighting adoption as it relates to market transformation and cost-effectiveness. The group did not indicate they had any concerns about either. Everyone agreed that if the program is cost effective it would be continued. The group agreed that the Fridge and Freezer Recycling program should be discontinued by the end of the year, but there were several suggestions for the company to consider in the future, including: (1) could Idaho Power create a partnership with different counties as a consideration for future offerings, (2) making sure customers are made aware quickly so they still have time to participate, and (3) to look at the program again when the new avoided costs are made available. The consensus of the group was to not make training a requirement for HPWH participation. Highlighting the training and making it available to customers if needed was acceptable.

11:04 am-Break

11:14 am-C&I and Irrigation Programs Update-—Quentin Nesbitt

Quentin provided year-to-date savings and participation for the Commercial & Industrial, Irrigation, and Flex Peak programs. The following points were presented:

- The New Construction program has a large project that has significant savings. Project numbers are up but as building codes increase, the savings per project may decrease. The Technical Reference Manual will be updated later in 2017 to align with 2015 International Energy Conservation Code (IECC)

- The company is looking at updating the lighting measures in the Retrofit program in 2018. The new Customer Solutions Advisors (CSA) are reaching out specifically to the small business customers in part to promote awareness of energy efficiency programs and have made approximately 2000 contacts so far.

- The company is still researching the commercial energy savings kits. There aren't that many utilities doing this so the savings assumptions associated with them are not well documented.

- The savings for the Custom program are down from this time last year, however, there are quite a few projects in the pipeline.

- The School Cohort had a midterm workshop on July 20th in Twin Falls. Each facility has a regression model like the other cohorts. If they do a capital project it is removed out of the model.

- There have been two events in the Flex Peak program. A new system peak of 3422 MW was set on July 7th.

- The RTF finished the study on scientific irrigation scheduling and the report showed that the market has been transformed. The RTF is now reviewing a new measure Low Energy Spray Application (LESA). This measure could be paid in the Irrigation Efficiency Program right now.

There were questions and comments on whether the company has done anything to adapt the New Construction program during this current building boom. The incentive for architects and engineers has help but it really comes down to contractor and builder priorities. Including a postcard or survey link in the Commercial Energy Savings Kits could be a way for the company to gauge installation rates. Also, having an evaluation completed sooner on that project could ensure the company is providing exactly what the customer needs. The company has a done a great job with the cohort model. Are there other ones lined up for the future? The company is looking for ways to continue the current cohort by locating new participation.

12:00 Lunch

12:45 Meeting Reconvened

12:45 pm-Demand Response—Quentin Nesbitt

Connie Aschenbrenner reminded the audience and EEAG that Idaho Power is in the middle of an open case and the purpose of the discussion is educational in nature. It is not intended to resolve any issues raised by parties in the open case. There was internal legal counsel present during the presentation. Quentin explained what demand response (DR) is, the history of DR, the 2013 DR Workshops, and the settlement structure.

There were questions and comments about impact of the settlement on participation. Participation dropped in the irrigation program primarily due to the decreased incentive levels. A/C Cool Credit participation has continued to decline because of participants moving in and out, and when the Flex Peak program was brought in house to administer, essentially all those customers who were enrolled through the former third party had to be signed up again along with acquiring different customers. Keeping these programs active and having three events each year is important for the times when the extra capacity is needed. The irrigation customers that are currently participating are pleased with the program and want it to continue.

1:20 pm-2016 Program Evaluations—Tom Giffin, Leidos

Tom Giffin of Leidos provided a summary of the evaluations done for several residential and commercial programs. Impact evaluations were done for the Retrofit (Easy Upgrades), New Construction (Building Efficiency), Irrigation Efficiency Rewards, and Rebate Advantage programs. Process evaluations were also done on the Irrigation Efficiency Rewards and Rebate Advantage programs. The evaluations covered the 2015 program year and were completed in 2016. He also went over the results of the Best Practices Review of the Residential Energy Efficiency Education Initiative.

There were questions and comments about billing analysis or metering studies, how many registered users of myAccount have accessed the energy efficiency program information, and the redesign of the book: 30 Simple Things You Can Do.

2:13 pm-Break

2:39 pm-Program Marketing—Tracey Burtch & Annie Meyer

Tracey announced that the current Corporate Communications Director, Bill Shawver, will be retiring and that Lynette Standley, Corporate Communications Leader, will be the interim Corporate Communication Director. Tracey also informed the group that Anne Alenskis retired in June and introduced her replacement, Jordan Rodriguez. She presented the following information:

- The demographic makeup of the Empowered Community and the Spring Ad Campaign Empowered Community survey results. The survey was only taken by members who had not completed a survey in the past.

- The Summer Energy Efficiency guide was highlighted and a copy was provided to each member.

- The company's latest earned media clips were shown to the group.

- Idaho Power recently partnered with Twin Falls County Pest Abatement on a commercial to promote the Irrigation Efficiency Rewards programs while educating the public on mosquito abatement.

- The industry-specific tips brochures have been updated and new ones will be created for dairies and assisted living facilities in the future. These brochures are primarily distributed by Customer Reps but are also available on the company website.

The Marketing presentation concluded early so Rosemary asked for EEAG Roundtable before the next presenter arrived.

EEAG Roundtable

- Appreciate the hard work being done by the company. It was an enjoyable meeting

- It was a good meeting. Would like to discuss the upcoming evaluation plan.
- It was nice to have the guest speaker; the meeting flow was good. Appreciated having the residential and commercial updates as one discussion without interruption. It would be good if the group could talk about evaluation scope of work.
- It was a good meeting, thank you.
- Impressed with the evaluation presentation. It looks like Idaho Power is on track. Would like to see more time to digest those number and ask questions.
- I learned some new things today, thank you.
- I appreciated everyone's input at these meetings.
- It is helpful to see the effectiveness of the programs over time. Enjoyed learning about the marketing.
- Acknowledgement of Billie's presentation. Appreciated that the company solicited feedback from EEAG on specific programs. Also, enjoyed Quentin's presentation on the cohorts.
- Thank you for bringing the tiny house today.
- Thank you for going to the effort of bringing the tiny house. It is evident the company has broadened and deepened its efforts. The only thing I take issue with was the discussion around LED lighting. Overall it was a good meeting and it is good to see that the irrigation reps are appreciated in the field.

3:05 pm-Comments—Adam Richins, VP of Customer Operations and Business Development

Adam provided his professional and personal background, thanked the group for its guidance and let them know how important their input is to Idaho Power. He informed the group of a current company focus; The Customer Intent Statement. Idaho Power is focusing on becoming a trusted energy advisor for customers, creating innovative solutions, being reliable and prompt, and making it easier for customers to do business with the company. He spoke about customer experience touchpoints and provided some examples of what the company is currently working on.

3:20 pm EV Discussion—Billie McWinn.

Billie spoke about the company's increased activity around electric vehicles (EV) and EV charging stations. She wanted to get feedback from EEAG on a partnership concept that could be a potential opportunity to provide mutual benefit between energy efficiency and EV. No rider money would be used in any way to fund EV activity. Rather, it would be a partnership opportunity to leverage resources already in place for both energy efficiency and EV. EEAG has brought up in past meetings, that the company should leverage partnerships with other entities. This could be an opportunity to leverage non-rider company resources. Billie provided an example of leveraging internal resources: a green builder has a desire to have new homes be EV ready. Idaho Power has a program for energy efficient homes. If the company provides an incentive on energy efficient EV charging stations, does it make sense to have the customer fill out two different applications or could these be combined to provide better customer satisfaction. Billie also brought up the fact that combining offerings could bring increased visibility to both energy efficiency and EV, and that combining all incentives in one place is a more customer-focused way to create offerings

The consensus of the group is that it would be worth considering these types of potential partnerships and leveraging resources the company currently has. There could be some overlap however, it needs to be made clear that it isn't energy efficiency and that it is separate. It could be marketed in such a way as to acknowledge that a customer will be using more energy due to the charging station so energy efficiency is a great way to offset that extra usage.

3:42 pm- Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated November 1st, 2017

Present:

- Kent Hanway-CSHQA
- Ken Robinette–South Central Comm. Action Partnership
- Stacey Donohue–Idaho Public Utilities Commission
- Diego Rivas–Northwest Energy Coalition (on phone)
- Connie Aschenbrenner–Idaho Power
- Nadine Hanhan–Public Utility Commission of Oregon
- Jim Hall-Bodybuilding.com
- Don Strickler–Simplot
- Ben Otto-Idaho Conservation League
- Scott Pugrud–Office of Energy & Mineral Resources
- Sid Erwin–Idaho Irrigation Pumpers Association
- Pete Pengilly*-Idaho Power
- Tina Jayaweera-Northwest Power & Conservation Council (on phone)

Not Present:

- Elfreda Higgins–City of Garden City
- Name–Company
- Name–Company

Guests and Presenters*:

- Quentin Nesbitt*-Idaho Power
- Annie Meyer*–Idaho Power
- Shelley Martin–Idaho Power
- Billie McWinn*–Idaho Power
- Joe Bonocore–Bonocore Technology Partners
- Peter Richardson–Industrial Customers of Idaho Power
- Donn English– Idaho Public Utilities Commission
- Dan Axness-Idaho Power
- Tonja Dyke-Idaho Power
- Sheree Willhite-Idaho Power
- Randy Thorn-Idaho Power
- Phil DeVol-Idaho Power
- Todd Greenwell-Idaho Power
- Mitch McClellin-Idaho Power
- Lynn Tominaga-Idaho Irrigation Pumpers Association
- Stephen Goodson- Idaho Public Utilities Commission
- Katie Pegan-Office of Energy & Mineral Resources
- Cheryl Paoli*–Idaho Power
- Theresa Drake–Idaho Power
- Andrea Simmonsen–Idaho Power
- Tracey Burtch*–Idaho Power
- Jerry Peterson–Division of Building Safety
- Don Reading–Industrial Customers of Idaho Power
- Rachelle Farnsworth– Idaho Public Utilities Commission
- Chellie Jensen-Idaho Power
- Chris Pollow-Idaho Power
- Mindi Shodeen-Idaho Power
- Denise Humphreys-Idaho Power
- Rob Ord-Idaho Power
- Ken Miller-Snake River Alliance
- Lisa Nordstrom-Idaho Power
- Jonathan Farley- Idaho Public Utilities Commission
- Kevin Keyt- Idaho Public Utilities Commission

Note Takers:

Shawn Lovewell (Idaho Power) with Kathy Yi (Idaho Power)

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30am

Rosemary started the meeting with introduction of members and guests. There were no comments or questions on the August meeting notes. Pete highlighted the two financial documents that were sent to EEAG members prior to the meeting: Appendix 1 and the 2017 DSM Actual Expenses and Preliminary Energy Savings by Program. He stated that a more detailed version of Appendix 1 will be sent out after the company's earnings release. Connie recognized the efforts of EEAG members and the Program Specialists and provided a recap of the 2016 Prudence order recently issued by the Idaho Public Utilities Commission.

9:40 am-C/I & Irrigation Programs—Quentin Nesbitt

Quentin provided year-to-date savings and participation for the Commercial, Industrial, and Irrigation programs:

- In the New Construction program, some of the prescriptive measures may be removed due to building code changes.
- With the current building boom, trade allies are more inclined to take on new construction projects rather than retrofits. Idaho Power is continually working to increase Trade Ally engagement in the Retrofit Program and Quentin requested feedback or ideas on how the company could do this.
- Quentin provided a status update for the Commercial Energy Efficiency (EE) Kits and asked the group for feedback on distribution options.
- The company is looking at expanding the School Cohort and creating a new cohort group that would include other interested school districts, private schools, and charters. Quentin requested feedback on the best time to launch the new group.
- Quentin provided the highlights and successes of the Water Cohort. The company is considering a joint Water Cohort in Eastern Idaho and members were asked for feedback on this idea.
- The company is considering providing a dealer incentive for the menu portion of Irrigation Efficiency program to increase customer engagement. EEAG members were asked for feedback on that idea.

There were questions and comments regarding building codes and what measures will have to be removed in the New Construction Program. Idaho Power can try to engage with Trade Allies in the Retrofit program by offering an additional incentive like the architect/engineer bonus or some sort of endorsement from the company, and streamlining the application process to make it more efficient. The feedback regarding Commercial EE Kits distribution channel is to make it as easy as possible for small businesses because time is usually stretched thin for this demographic. It is important that the company provide messaging in the kit that someone will follow up with them. It is good that the company is working on ways to reach these customers. The company should let schools inform the best time to launch a new cohort. The consensus of the group is that an Eastern Idaho Water Cohort is a great idea. The company should focus more on continued education rather than a dealer incentive for the Irrigation Efficiency program.

10:36 am-Residential Programs—Billie McWinn

Billie provided an update of the 2017 YTD savings for all residential programs. She highlighted the following programs and products: Home Energy Reports, Multifamily Direct Install, Heat Pump Water Heaters, Appliance Recycling, CFL reflector bulbs, showerheads, and Energy Saving Kits. She also highlighted some new offerings the company is exploring. The following key points were presented:

- The residential lighting program accounts for 61% of the overall savings achieved in the residential portfolio, but lighting also contributes to the savings in most of the other residential programs.

- The company has been collecting feedback from customers who have received their Home Energy Report. Because customers are chosen randomly, there isn't an "opt-in" option. The company is working on internal email policies that will, in the future, support customers who choose to receive an email report instead of a paper copy.

- Heat pump water heaters (HPWH) will launch early 2018. Based on feedback from EEAG, specific training for contractors or self-install is not a requirement to participate. The company is meeting with installers and wholesalers to educate them on the measure. Installers will be critical in ensuring customers have access to HPWHs as an emergency replacement.

- The timeline to sunset the Fridge and Freezer program was discussed. As this program ramps down, there will still be some savings realized and the company will be communicating this timeline so customers are not caught off guard when it ends.

- The company purchased CFL reflector bulbs with ARRA funds and has a surplus of 1300 that were not distributed. Billie asked EEAG for ideas on how the company could use these.

- Residential showerhead savings are declining but incremental costs are very low so they are still cost-effective. Billie asked EEAG if the company should continue to incentivize the purchase of showerheads when efficient showerheads are not more expensive than their non-efficient counterparts

- The thermostatic shower valve combo was added to the Energy Saving Kits. A cling for water heaters was included in the kit to make customers aware that Idaho Power has a program for heat pump water heaters.

- Cheryl Paoli, Program Specialist for the Weatherization Programs was introduced to the group and she spoke about a new pilot the company is implementing as part of Idaho Power's annual Low Income Education Program; a coupon for a free electric furnace/AC & heat pump tune up.

- The company is exploring a new pilot program that would replace Energy Star® Homes NW incentives. Billie provided details and considerations and asked EEAG for feedback on this new idea.

- As part of a Customer Onboarding redesign, the company decided to provide energy efficiency kits to new customers. Billie recognized that the EEAG had previously recommended onboarding of new customers as an opportunity to educate on energy efficiency. Billie provided details on two kit options for customers when they sign up for new service and asked EEAG for feedback on the two options.

There were questions and comments regarding the Fridge & Freezer Recycling program regarding the company efforts to revive this program despite the challenges it faced. EEAG likes the idea of the company using the remaining CFL reflector bulbs and suggested that maybe a non-profit could benefit from those. EEAG thinks it's appropriate to consider market indicators when deciding on whether to continue offering showerheads in the Simple Steps, Smart Savings program. The group was supportive of the Easy Savings coupon pilot and the liked the idea of the kits for new customers. Most of the group were in favor of option 2, which was a four-bulb kit, vs option 1 which was a full kit for non-all-electric customers.

11:47 am-Cost-Effectiveness Preview—Kathy Yi

Kathy provided an overview of cost-effectiveness and a refresher of the Utility Cost Test (UCT) and Total Resource Cost Test (TRC). The preliminary 2018 cost-effectiveness summary and 2017-2019 program assumptions were explained. The following points were presented:

- The company will use the 2015 IRP DSM alternative costs for the 2018 program year.

- The Technical Resource Manual is currently being revised and those new savings and assumptions will be applied to the programs in mid-2018.

12:10 pm-Lunch. We will continue the Cost-Effectiveness presentation after lunch.

1:00 Meeting Reconvened

Cost Effective presentation continued

- Savings for lighting will decrease in 2018. There is a storage assumption in the bulb savings for 2018. These numbers are from the Regional Technical Forum (RTF). The EISA standards are going up which changes the baseline. The baseline is a blend of many different things including sales data and Regional Building Stock Assessment (RBSA) data.

There were questions and comments regarding market transformation. The presentation shows how this is happening. There was discussion amongst EEAG and other attendees regarding the timing of the inputs used for cost-effectiveness.

1:20 pm-Program Evaluations—Pete Pengilly-

Based on feedback EEAG provided at the August meeting, Pete provided information on why Idaho Power does evaluations, the objectives and types of evaluation and research done. The following points were presented:

- Evaluations help Idaho Power improve existing programs, provide accountability in using customer funds prudently and provide transparency.

- The Request for Bid (RFP) process starts in early spring. They are sent to a list of known contractors and posted on industry web-sites. Once the RFP's are received, a committee is selected to review and score each bid based on responses to questions, price, and experience.

- All the evaluations and reports are published every year in Supplement II of the DSM Annual Report.

There were questions and comments on whether the Energy Saving Kits will be evaluated. The kits would fall under the umbrella of the Educational Distributions but the company will consider that. Idaho Power's evaluations are well written and rigorous.

1:45 pm-Customer Alerts —Todd Schultz

Todd updated the group on a couple of improvements that were made this year to the billing and payment options. The following points were presented:

- Paperless billing and Autopay have been modernized to give customers more convenient payment options.

- These new options and upgrades have impacted the number of customers signing up for My Account. On average Idaho Power receives about 500k unique visits to My Account.

There were questions and comments regarding My Account being a great platform for incorporating energy efficiency tips and ideas because customers are already in there and engaged. There were also comments on the types of customer alerts that will be available to sign up for.

2:00 pm-Residential Portal—Billie McWinn

Billie presented an idea that was brought to Idaho Power by a third-party vendor. The idea is a web based application that has potential for residential energy efficiency customer education and a call to action. The following points were presented:

- Idaho Power and the Division of Building Safety (DBS) want to help customers make better energy efficient choices in the home. This idea would be a pilot to help customers better understand not only the steps in making their homes more efficient, but where to find training, what questions they need to ask of their contractors and what resources they will need to complete projects.

- DBS's contribution will bring credibility to the pilot. Idaho Power may not have access to the homes that are having the issues where DBS will.

- Custom information will be provided to customers based on the home profile they build and a cross-reference of the DBS database which identifies trends and opportunities in specific areas and with specific home types. The custom reports will provide suggestions for recommended upgrades.

There were comments and questions regarding having this as a pilot for at least a year. Having something like this as a tool when a home performance contractor is working in a home and interacting with a customer could be a useful tool. The ability to target homes that are similar would be a great way to target efficiencies. There is a sense of credibility with DBS being part of this, it's not just a third party but rather an entity with the State of Idaho. The company might want to make sure to provide a link back to the original site if they are posted on YouTube. There may be some cost-sharing partnerships with retail stores that want to be on preferred shopping stores listed on the website.

2:20 pm-30 Simple Things/Residential Marketing—Billie McWinn/Tracey Burtch

Tracey and Billie passed out copies of 30 Simple Things and two new marketing pieces to members. They provided background on the original book produced and showed the differences between the two new options. Idaho Power would like feedback from the group on which option they prefer and company should move forward with.

The group stated that they saw value in both options depending on the customer being addressed.

2:40 pm-Marketing Update—Tracey Burtch & Annie Meyer

Tracey and Annie presented an update on marketing activities since the last EEAG Meeting. The following points were presented:

- A video highlighting the energy efficiency efforts at Hope House in Marsing was shown.

- The fall energy efficiency campaign is underway. The October Connections focused on energy efficiency. Annie passed around the marketing pieces workbook.

- The 2017 Smart-saver pledge is running until November 17th. Customer can now enter via social media.

- Idaho Power's website is being re-designed with a scheduled launch date of November 4th. The goal for re-design was to make it adaptive responsive, easier navigation, and updated look.

- The company has been working on the addition of email marketing with the goal of beginning that in 2018.

There were questions and comments regarding the Smart-saver pledge being a commitment and that the company should be following up with customers to make sure they are honoring their commitment by providing reminders. Having a way for customers to utilize social media to publicize their commitment may be an option. The marketing has improved over the last two years with the goal of savings acquisition. At the next EEAG meeting we would like to see how these increased marketing tactics have driven program participation.

3:15 pm—Wrap up/Discussion

- I'm glad Idaho Power is working with EEAG on cost effectiveness. I appreciate the company looking at the Custom Home Pilot program and approach to cost effectiveness on it.

- Enjoyed the cost effectiveness preview presentation.

- I enjoyed the Program Specialist speaking to the group. I also appreciate hearing how comments made during EEAG meetings have been incorporated.

- I liked being able to attend this meeting in person. I see how much Idaho Power does and it has been very educational.

- This was a good meeting. The residential portal is a great idea and could tie in well with the 30 Simple Things booklet.

- It was a very informational meeting. Even though the meeting ran a little longer, I appreciate having the opportunity to provide input. I still like the 30 Simple Things book and feel it still has relevance.

- I appreciate hearing about new programs. I would still like to talk about building codes. The City of Boise is stepping forward to enact 2015 residential conservation code. There will be a meeting on December 12th. This would be a great opportunity for people in this room and the company to support these new building codes.

- I appreciate everyone speaking up and sharing their ideas, it is very helpful.

3:22 pm- Rider Forecast - Idaho/Oregon—Pete Pengilly/Rob Ord CONFIDENTIAL

Lisa Nordstrom gave a brief statement before the next presentation. The financial numbers in this presentation have not been made public, therefore are to remain confidential. If this is a challenge for anyone, they were instructed to step out of the room. Pete provided a confidential rider forecast for Idaho and Oregon**.**

3:48pm Meeting Adjourned

NEEA Market Effects Evaluations

Table 1. 2017 NEEA Market Effects Evaluations

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2016 BOC Program Dataset Analysis	Commercial	Research Into Action	NEEA	Analysis
2016-2017 Northwest Residential Lighting Long-Term Monitoring and Tracking Study	Residential	Cadeo Group	NEEA	Tracking Study
Clothing Wear and Tear of Heat Pump vs Electric Resistance Clothes Dryers with Addendum Report	Residential	Ecos Research	NEEA	Research
Commercial Real Estate Infrastructure Market Progress Evaluation Report #1	Commercial	Navigant Consulting	NEEA	Market Progress
Commissioning Long-Term Monitoring and Tracking—2016 Square Footage Update	Commercial	Cadeo Group	NEEA	Update
DHP Quick Connect Phase 2 Report*	Residential	Clearesult	NEEA	Research
Efficient rigs in manufactured digs; Consumer and dealer research on energy efficiency in manufactured homes	Residential	Arrow G Consulting	NEEA	Research
Electric Motors Standard Evaluation	Industrial	Cadmus Group	NEEA	Effectiveness Evaluation
Energy Efficiency Test Procedure for Residential Clothes Dryers	Residential	NEEA, PG&E, Ecova	NEEA	Research
Exploring the Consumer Value Proposition for Super-Efficienct Dryer	Residential	Arrow G Consulting	NEEA	Research
Exploring the Customer Path-To-Purchase for New Construction Homes	Residential	Arrow G Consulting	NEEA	Research
Green Motor Rewinds—2016 Long Term Monitoring and Tracking Report	Industrial	Cadmus Group	NEEA	Monitoring and Tracking
Interaction Between Heat Pump Water Heaters or Other Internal Point Source Loads And A Central Heating System	Residential	Pacific Northwest National Laboratory	NEEA	Research
Market Characterization of the Northwest Natural Gas Hearth Market	Residential	Russell Research	NEEA	Market Progress
Market Progress Evaluation Report 1: Energy Codes Program	Market	Cadmus Group	NEEA	Effectiveness Evaluation
Marketing Message Testing for Super-Efficient-Dryers	Residential	Arrow G Consulting	NEEA	Research
Natural Gas Segmentation Study	Market	Illume	NEEA	Analysis
NEEA Natural Gas Portfolio Mid-Cycle Assessment	Market	Opinion Dynamics	NEEA	Assessment
NEEA: Commercial Lighting Decision Maker Groups	Commercial	SEEK, Inc.	NEEA	Assessment
Northwest Heat Pump Water Heater Initiative Market Progress Evaluation Report #3	Residential	Cadeo Group	NEEA	Market Progress
Retail Products Portfolio Market Test Assessment	Residential	Research Into Action	NEEA	Market Assessment
Rooftop HVAC Market Characterization Study	Market	Evergreen Economics	NEEA	Market Characterization

Report titles appearing in blue are links to the online versions of the reports. A PDF of this supplement can be found at idahopower.com/ways-to-save/energy-efficiency-program-reports/.

* Online version not available at publication time.

INTEGRATED DESIGN LAB

Table 2. 2017 Integrated Design Lab

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2017 Task 1: Foundational Services	Commercial	IDL	Idaho Power	EE Assistance & Education
2017 Task 2: Lunch and Learn	Commercial	IDL	Idaho Power	EE Training & Education
2017 Task 3: BSUG	Commercial	IDL	Idaho Power	EE Training & Education
2017 Task 4: New Construction Verifications	Commercial	IDL	Idaho Power	EE Verifications
2017 Task 5: Tool Loan Library	Commercial	IDL	Idaho Power	EE Assistance & Education
2017 Task 6: Absorption Chiller Feasibility Study	Commercial	IDL	Idaho Power	EE Research
2017 Task 7: Heat Pump Calculator	Commercial	IDL	Idaho Power	EE Assistance & Education
2017 Task 8: Daylighting Training	Commercial	IDL	Idaho Power	EE Training & Education

INTEGRATED DESIGN LAB
University of Idaho

2017 Task 1: Foundational Services

Summary of Projects

Idaho Power Company External Year-End Report

December 31, 2017

Prepared for:
Idaho Power Company

Author:
Elizabeth Cooper

Report Number: 1701_001-01

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Author:
Elizabeth Cooper

Prepared for:
Idaho Power Company

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While the recommendations in this report have been reviewed for technical accuracy and are believed to be reasonably accurate, the findings are estimates and actual results may vary. All energy savings and cost estimates included in the report are for informational purposes only and are not to be construed as design documents or as guarantees of energy or cost savings. The user of this report, or any information contained in this report, should independently evaluate any information, advice, or direction provided in this report.

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Acronyms and Abbreviations

AIA	American Institute of Architects
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
BEQ	Building Energy Quotient
BOMA	Building Owners and Managers Association
EMS	Energy Management System
HID	High Intensity Discharge
IDL	Integrated Design Lab
IPC	Idaho Power Company
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
Op-Ed	Opinion Editorial
TI	Tenant Improvement
UI	University of Idaho

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) provided technical assistance in 2017 for energy efficiency building projects through the Foundational Services task. This program, supported by Idaho Power Company (IPC), offered three phases of assistance from which customers could choose. A marketing flyer, developed in prior years, outlining the three phases is shown below. Phase I includes projects with budgets less than $2,000, Phase II is limited to projects from $2,000 to $4,000, and Phase III is any project with a budget greater than $4,000.

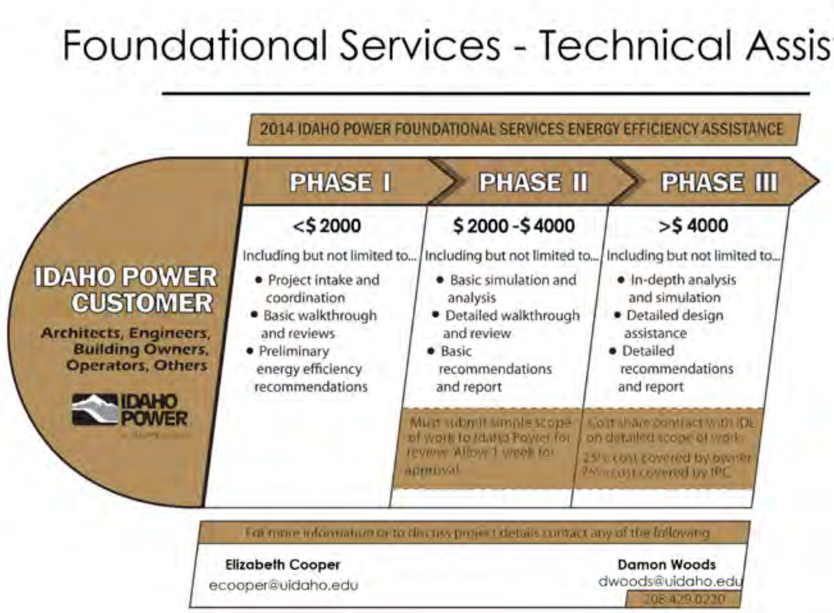

Figure 1: Foundational Services Flyer Outlining Phases

The Foundational Services program was marketed at numerous events and to multiple organizations in 2017, which included all IDL Lunch and Learn series presentations and BSUG presentations to local architecture and engineering firms, ASHRAE, AIA, and local government.

2. Project Summary

In addition to several on-going projects from 2016, twenty-five new projects received technical assistance through the Foundational Services program in 2017. Projects ranged from short phone call consultations to detailed building simulations. Building owners, property managers, building operators, architects, design engineers, utility customer representatives, government staff, energy management staff, program administrators, and contractors contacted the IDL. In total, there were twenty-two Phase I projects, and three Phase II projects. Seventeen of the projects were for work to be completed in existing buildings, and four were for new construction projects. The remaining projects are not building specific. Fewer projects were identified in 2017 than in 2016, but the total building area impacted was greater. In 2017, the IDL assisted with more than one million square feet of built area.

Table 1: 2017 Foundational Services Project Summary

Project Type	Area	New/Existing	Location
Educational	6,200	New	McCall
Educational	30,000	New	Notus
Educational	30,000	Existing	Boise
Office	15,000	Existing	Twin Falls

Church	15,000	Existing	Jerome
Mixed Use	40,000	Existing	Boise
Industrial		Existing	Boise
Office	24,000	Existing	Boise
Mixed Use	-	-	Boise
Office	268,000	Existing	Boise
Commercial Product Research	-	-	
Mixed Use	140,750	Existing	Boise
Office		Existing	Boise
Wall Detailing	-	-	Boise
Industrial	30,000	Existing	Boise
Mixed Use	20,000	Existing	Boise
Planning	-	-	-
Civic/government	9,600	New	Cambridge
Hotel	5,600	New	Boise
Mixed Use	60,000	Existing	Eagle
Office	82,000	Existing	Boise
Mixed Use	105,000	Existing	Meridian
Mixed Use	117,000	Existing	Boise
Educational	50,000	Existing	Boise
Restaurant		Existing	Boise

INTEGRATED DESIGN LAB
University of Idaho

2017 Task 2: Lunch and Learn

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2017

Prepared for:
Idaho Power Company

Authors:
Elizabeth Cooper
Dylan Agnes
Neha Pokhrel

Report Number: 1701_002-01

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Authors:
Elizabeth Cooper
Dylan Agnes
Neha Pokhrel

Prepared for:
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ACRONYMS AND ABBREVIATIONS

AIA	American Institute of Architects
Arch	Architect(ure)
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
BCGCC	Boise Green Building Code
BESF	Building Energy Simulation Forum (Energy Trust of Oregon)
Bldg.	Building
BOMA	Building Owners and Managers Association
CSI	Construction Specifications Institute
Cx	Customer Experience
DOE	Department of Energy
Elec.	Electrical
EUI	Energy Use Intensity
GSHP	Ground Source Heat Pump
HVAC	Heating, Ventilation, and Air Conditioning
IBOA	Intermountain Building Operators Association
IBPSA	International Building Performance Simulation Association
IDL	Integrated Design Lab
IECC	International Energy Conservation Code
IES	Illuminating Engineering Society
IPC	Idaho Power Company
LEED	Leadership in Energy & Environmental Design
LED	Light Emitting Diode
M&V	Measurement and Verification
Mech.	Mechanical
Mgmt.	Management
NCARB	National Council of Architectural Registration Boards
TBD	To Be Determined
UI	University of Idaho
USGBC	U.S. Green Building Council
WBS	WELL Building Standard

1. 2017 Summary and Cumulative Analysis

Table 1: 2017 Lunch and Learn Summary

	Date	Title	Presenter	Group / Location	Attendees
1	02/16	Daylight Performance Metrics for Human Health, Productivity, and Satisfaction.	Elizabeth Cooper	Architectural Organization 1	9
2	03/16	High performance Classrooms: The Indoor Environment	Nick Hansen	Architectural Firm 1	6
3	03/23	Energy Plus/Open Studio Work Flow	Damon Woods	Architectural Firm 2	14
4	03/28	Radiant Heating and Cooling Design	Damon Woods	Engineering Firm 1	6
5	03/30	High Performance Classrooms: The Indoor Environment	Nick Hansen	Architectural Firm 3	6
6	04/04	Daylight Performance Metrics for Human Health, Productivity and Satisfaction	Elizabeth Cooper	Architectural Firm 2	11
7	04/13	Radiant Heating and Cooling Design	Damon Woods	Architecture Firm 1	4
8	04/27	Dedicated Outdoor Air Systems(DOAS) Integration	Elizabeth Cooper	Engineering Firm 1	15
9	05/18	Hybrid Ground Source Heat Pump System	Sean Rosin	Architectural Organization 1	9
10	05/23	Daylight Performance Metrics for Human, Health, Productivity and Satisfaction.	Elizabeth Cooper	Architectural Firm 3	8
11	06/01	Radiant Heating and Cooling Design	Damon Woods	Engineering Firm 2	8
12	06/08	Dedicated Outdoor Air Systems (DOAS) Integration	Elizabeth Cooper	Architectural Firm 1	5
13	06/21	Dedicated Outdoor Air Systems (DOAS) Integration	Elizabeth Cooper	Engineering Firm 2	7
14	06/27	Radiant Heating and Cooling Design	Damon Woods	Architectural Organization 2	14
15	07/18	Dedicated Outdoor Air Systems(DOAS) Integration	Elizabeth Cooper	Architecture Organization 2	11
16	08/17	Dedicated Outdoor Air Systems(DOAS) Integration	Damon Woods	Architectural Firm 4	5
17	09/6	Radiant Heating and Cooling Design	Damon Woods	Architecture Firm 4	7
18	10/24	Radiant Heating and Cooling Design	Damon Woods	Architectural Firm 5	6
19	10/25	Cold Feet: Managing Controls and condensation for radiant slab cooling	Damon Woods	Architectural Organization 1	12
					163

Table 1 above summarizes all Lunch and Learn presentations given in 2017. The statistics in this section are cumulative for the 19 presentations. For session 20, the date has been rescheduled from December 15th due to a conflict with the client's, the presentation will be given in early 2018 and will not count towards the 20 sessions for 2018. At each presentation participants were asked to sign in and fill out an evaluation form. Presentations were judged on a scale of 1 to 5, please see table 2. Participants were also given the opportunity to provide hand written responses.

Table 2: Evaluation Form Scale

Evaluation	1	2	3	4	5
In general, today's presentation was:	Not Useful		Somewhat Useful		Very Useful
The content of the presentation was:	Too Basic		About Right		Too Advanced
Please rate the following parts of the presentation: Organization, Clarity, Opportunity for Questions, Instructor's Knowledge of Subject Matter, and Delivery of Presentation	Needs Improvement		Good		Excellent

Table 3: Overall Attendance Breakdown

Architect:	107	Electrician:	
Engineer:	6	Contractor:	
Mech. Engineer:	6	Other:	44
Elec. Engineer:		None Specified:	
Total (In-Person):	**163**		

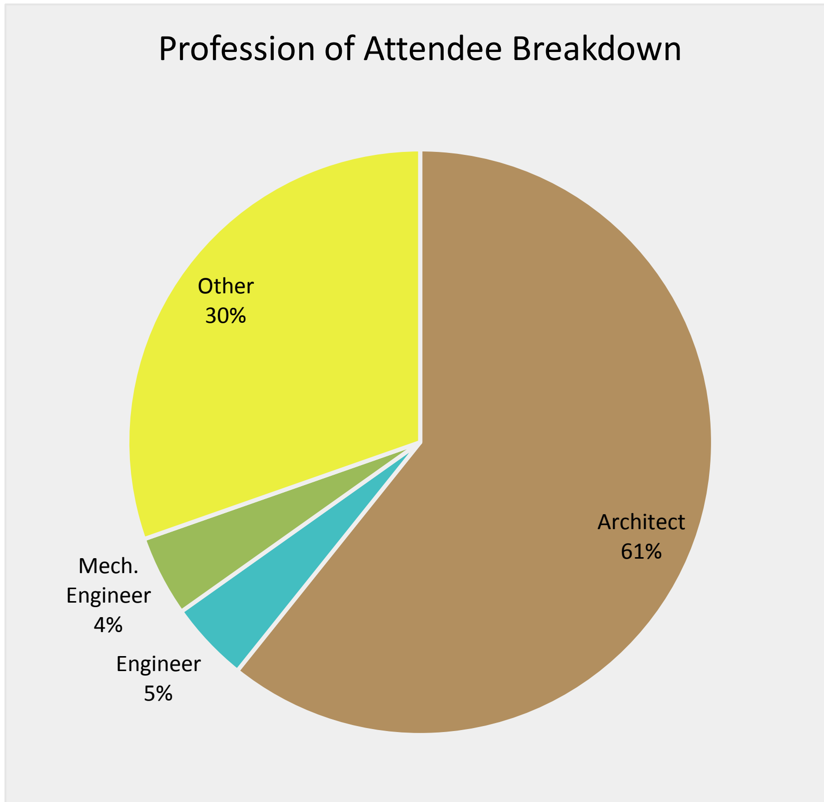

Figure 1: Attendee Profession

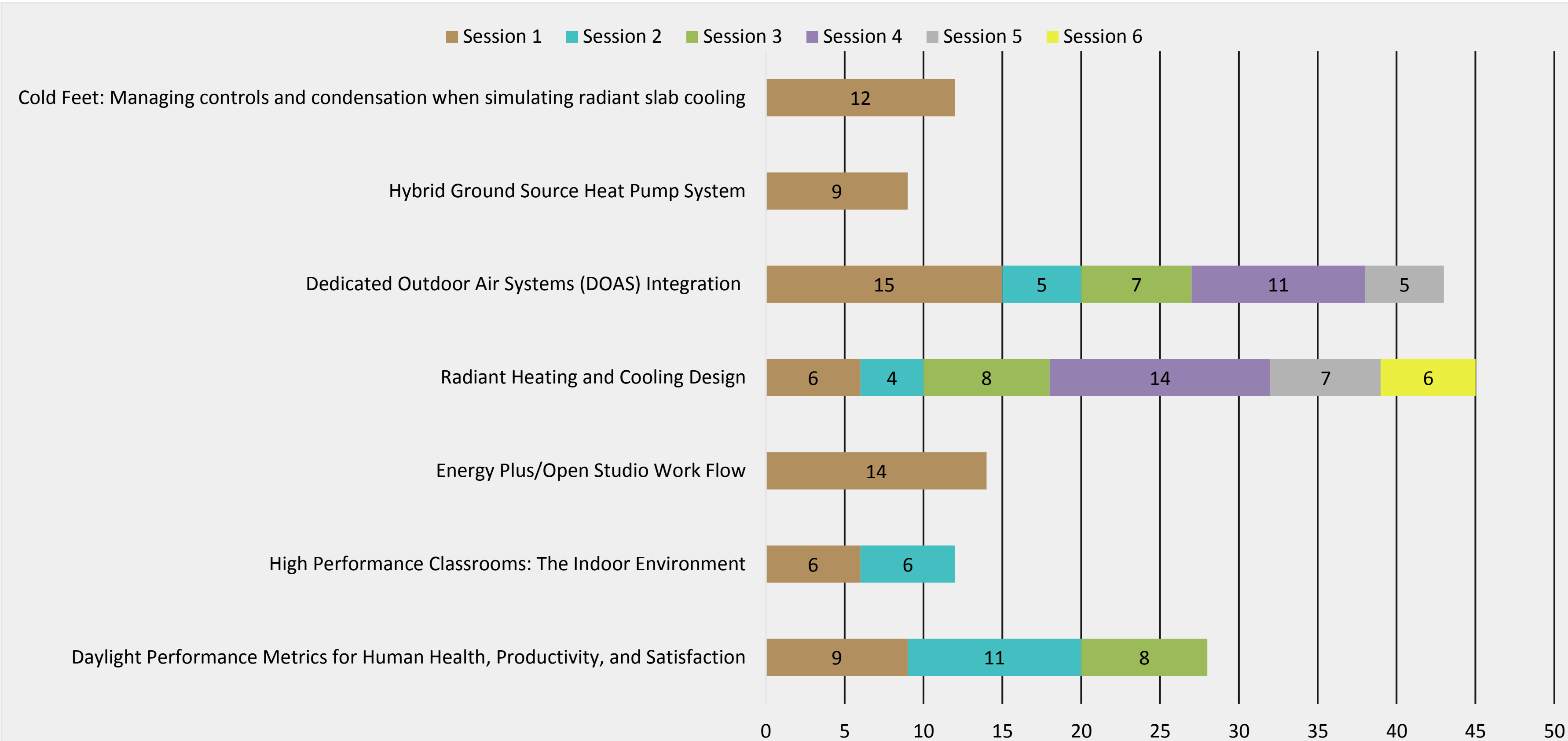

Figure 2: Attendee Count by Title and Number of Session

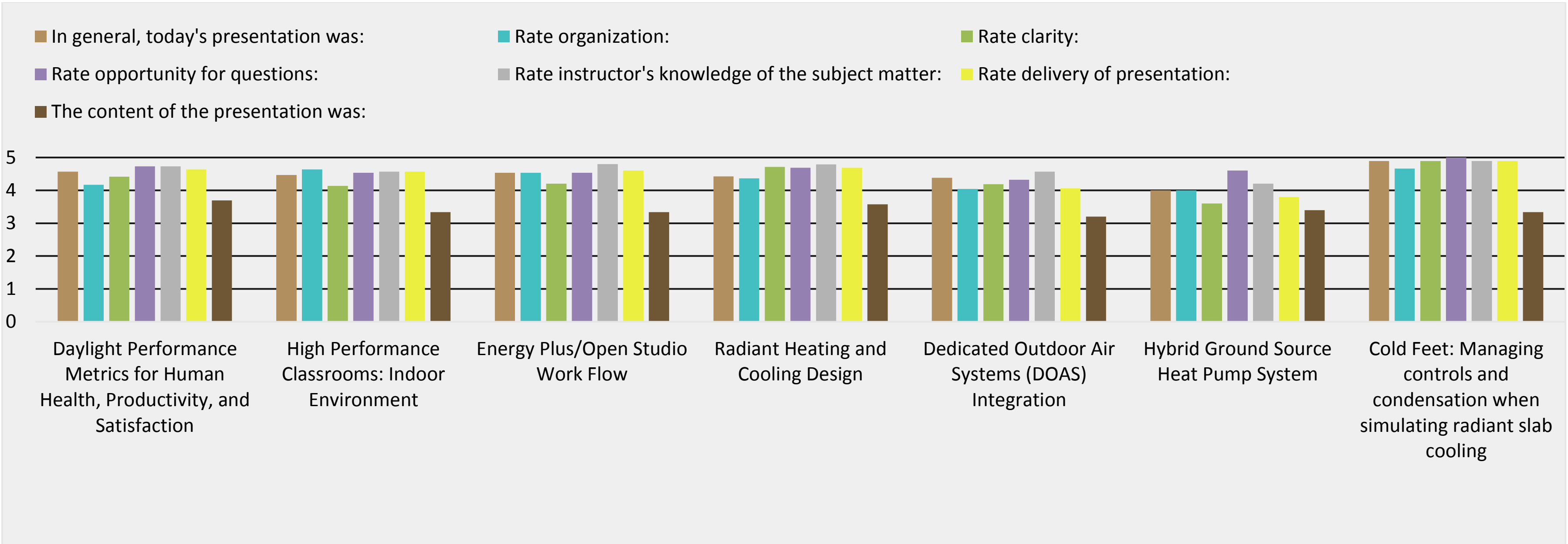

Figure 3: Average Evaluations by Session Title

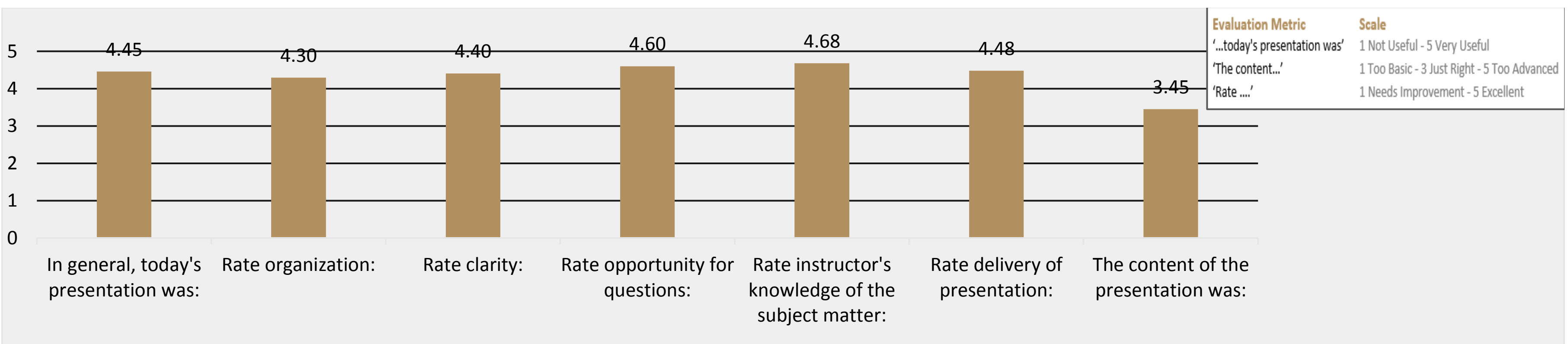

Figure 4: Overall Averages of Evaluations for all Sessions

2. Session Summaries

After each lunch and learn session, an evaluation form was requested from each participant. The feedback was used to improve future sessions. The feedback received from participants is generally constructive criticism used to keep sessions updated but also to propose other potential topics and questions to the Integrated Design Lab.

2.1 Session 1: Daylight Performance Metrics for Human Health, Productivity, and Satisfaction (02/16/2017)

Title: Daylight Performance Metrics for Human Health, Productivity, and Satisfaction.

Description: Daylight can breathe light and life into our buildings. Daylight can also make our buildings healthier and more energy efficient. However, designing effective, comfortable, and daylit buildings remains outside the capabilities of most designers. This session will discuss the impacts of daylight on humans in the built environment, the metrics associated with effective daylighting, and the tools available for designing daylight spaces with these metrics. It will highlight both the physical and psychological effects of daylight on the human visual and biological system and what can be feasibly achieved in terms of positive impacts upon worker productivity and improved user satisfaction through high quality daylighting design. It will explain the basis for daylighting metrics and how to utilize them in daylight and lighting design as well as capabilities of simulation tools to generate them, the effect of assumptions about blinds operation, implications for daylight performance and visual comfort, and the limitations of the metrics. Examples from real spaces present us with actionable knowledge about synthesizing the light of place with the specific needs of human activity as well as inform an intuitive understanding of the metrics and corresponding criteria.

Presentation Info:

Date:	02/16/17
Location:	Architectural Organization 1 – Pocatello, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:	9	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**9**		

2.2 Session 2: High Performance Classrooms: The Indoor Environment (03/16/2017)

Title: High Performance Classrooms: The Indoor Environment.

Description: Classrooms represent the indoor environment where children spend most of their time at school. Therefore, the quality of the classroom environment has a direct effect on children's health and academic performance. Studies have shown the relationship between improved air quality and higher performance and satisfaction for students. Heating, ventilation and air-conditioning represents a key area in the improvement of the environmental quality within a classroom, as well as significant opportunities for energy performance optimization. In addition to healthier higher performing student schools will see significant energy savings**.**

Presentation Info:

Date:	3/16/17
Location:	Architectural Firm 1 – Boise, ID
Presenter:	Nick Hansen

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**6**		

2.3 Session 3: Energy Plus/Open Studio Work Flow (03/23/2017)

Title: Energy Plus/Open Studio Work Flow.

Description: As a whole, building simulation software rapidly develops and evolves. Understanding an effective workflow between the tools and disciplines is critical to the integrated design process and resulting energy savings potential. Front-end graphic user interfaces have made powerful simulation engines like Energy Plus more accessible to both architects and engineers. It has also made the simulation process easier, smoother, and, perhaps, most importantly, faster. This presentation will focus on describing the integrated energy and daylight simulation workflow of Open Studio, a free graphic user interface developed by the Department of Energy, and its relationship with Radiance and Energy Plus.

Presentation Info:

Date:	03/23/17
Location:	Architectural Firm 2 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	7	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	7
Elec. Engineer:		None Specified:	
Total (In-Person):	**14**		

2.4 Session 4: Radiant Heating and Cooling Design (03/28/2017)

Title: Radiant Heating and Cooling Design**.**

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building facade reduces loads to levels achievable by radiant systems. This integration between the disciplines has a direct relationship to the performance of the system and comfort of the building, which is not always so closely related in more typical forced-air systems. Key design decisions must be made early in the design process to ensure the feasibility and performance of radiant systems down the road. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different strengths, capacities, and complexities according to their setup. This presentation will cover some general rules of thumb to consider for radiant systems, as well as provide an overview of the key architectural and engineering design decisions associated with each system configuration.

Presentation Info:

Date:	03/28/2017
Location:	Engineering Firm 1 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	6	Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**6**		

2.5 Session 5: High Performance Classrooms: The Indoor Environment (03/30/17)

Title: High Performance Classrooms: The Indoor Environment

Description: Classrooms represent the indoor environment where children spend the majority of their time at school. Therefore, the quality of the classroom environment has a direct effect on children's health and academic performance. Studies have shown the relationship between improved air quality and higher performance and satisfaction for students. Heating, ventilation and air-conditioning represents a key area in the improvement of the environmental quality within a classroom, as well as significant opportunities for energy performance optimization. In addition to healthier higher performing student schools will see significant energy savings.

Presentation Info:

Date:	03/30/2017
Location:	Architectural Firm 3 – Boise, ID
Presenter:	Nick Hansen

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**6**		

2.6 Session 6: Daylight Performance Metrics for Human, Health, Productivity, and Satisfaction (04/04/17)

Title: Daylight Performance Metrics for Human, Productivity, and Satisfaction.

Description: Daylight can breathe light and life into our buildings. Daylight can also make our buildings healthier and more energy efficient. However, designing effective, comfortable, and daylit buildings remains outside the capabilities of most designers. This session will discuss the impacts of daylight on humans in the built environment, the metrics associated with effective daylighting, and the tools available for designing daylight spaces with these metrics. It will highlight both the physical and psychological effects of daylight on the human visual and biological system and what can be feasibly achieved in terms of positive impacts upon worker productivity and improved user satisfaction through high quality daylighting design. It will explain the basis for daylighting metrics and how to utilize them in daylight and lighting design as well as capabilities of simulation tools to generate them, the effect of assumptions about blinds operation, implications for daylight performance and visual comfort, and the limitations of the metrics. Examples from real spaces present us with actionable knowledge about synthesizing the light of place with the specific needs of human activity as well as inform an intuitive understanding of the metrics and corresponding criteria.

Presentation Info:

Date:	04/04/2017
Location:	Architecture Firm 2- Boise, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:	10	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	1
Elec. Engineer:		None Specified:	
Total (In-Person):	**11**		

2.7 Session 7: Radiant Heating and Cooling Design (04/13/17)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building facade reduces loads to levels achievable by radiant systems. This integration between the disciplines has a direct relationship to the performance of the system and comfort of the building, which is not always so closely related in more typical forced-air systems. Key design decisions must be made early in the design process to ensure the feasibility and performance of radiant systems down the road. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different strengths, capacities, and complexities according to their setup. This presentation will cover some general rules of thumb to consider for radiant systems, as well as provide an overview of the key architectural and engineering design decisions associated with each system configuration.

Presentation Info:

Date:	04/13/2017
Location:	Architecture Firm 1 - Boise, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:	3	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	1
Elec. Engineer:		None Specified:	
Total (In-Person):	**4**		

2.8 Session 8: Dedicated Outdoor Air Systems (DOAS) Integration (04/27/17)

Title: Dedicated Outdoor Air Systems (DOAS) Integration

Description: Washington State has recently codified the requirement for DOAS in all new construction, and other states will likely follow. What this requirement means for the design, operation, and energy performance of buildings is the focus of this presentation. An introduction to the latest strategies and technologies in ventilation is included.

Presentation Info:

Date:	04/27/2017
Location:	Engineering Firm 1 – Boise, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:		Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:	7	Other:	3
Elec. Engineer:		None Specified:	
Total (In-Person):	**15**		

2.9 Session 9: Hybrid Ground Source Heat Pump System (05/18/17)

Title: Hybrid Ground Source Pump System

Description: The initial cost of ground-source heat pump systems can be substantially higher than conventional systems, limiting it as a design option. This presentation will highlight how, with a hybrid GSHP system it is possible to optimize the overall system life-cycle cost by reducing the initial cost, while still maintaining the low operating cost of a GSHP system. It will discuss how, to reduce initial costs, peak loads should be carefully calculated and minimized during the design phase, the GSHP system should be sized based on coincidental building loads with the use of simulation software, and the system components, including the ground heat exchanger and additional central plant equipment, should be sized to optimize life-cycle costs using appropriate economic assumptions.

Presentation Info:

Date:	05/18/2017
Location:	Architectural organization 1 –Pocatello, ID
Presenter:	Sean Rosin

Attendance:

Architect:	9	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**9**		

2.10 Session 10: Daylight Performance Metrics for Human, Health, Productivity and Satisfaction (05/23/17)

Title: Daylight Performance Metrics for Human, Health, Productivity and Satisfaction.

Description: Daylight can breathe light and life into our buildings. Daylight can also make our buildings healthier and more energy efficient. However, designing effective, comfortable, and daylit buildings remains outside the capabilities of most designers. This session will discuss the impacts of daylight on humans in the built environment, the metrics associated with effective daylighting, and the tools available for designing daylight spaces with these metrics. It will highlight both the physical and psychological effects of daylight on the human visual and biological system and what can be feasibly achieved in terms of positive impacts upon worker productivity and improved user satisfaction through high quality daylighting design. It will explain the basis for daylighting metrics and how to utilize them in daylight and lighting design as well as capabilities of simulation tools to generate them, the effect of assumptions about blinds operation, implications for daylight performance and visual comfort, and the limitations of the metrics. Examples from real spaces present us with actionable knowledge about synthesizing the light of place with the specific needs of human activity as well as inform an intuitive understanding of the metrics and corresponding criteria.

Presentation Info:

Date:	05/23/2017
Location:	Architectural Firm 2 –Boise, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	2
Total (In-Person):	**8**		

2.11 Session 11: Radiant Heating and Cooling Design (06/01/17)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building facade reduces loads to levels achievable by radiant systems. This integration between the disciplines has a direct relationship to the performance of the system and comfort of the building, which is not always so closely related in more typical forced-air systems. Key design decisions must be made early in the design process to ensure the feasibility and performance of radiant systems down the road. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different strengths, capacities, and complexities according to their setup. This presentation will cover some general rules of thumb to consider for radiant systems, as well as provide an overview of the key architectural and engineering design decisions associated with each system configuration.

Presentation Info:

Date: 06/01/2017

Location:	Engineering Firm 3 – Twin Falls, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:	3	Other:	3
Elec. Engineer:		None Specified:	1
Total (In-Person):	**8**		

2.12 Session 12: Dedicated Outdoor Air Systems (DOAS) Integration (06/08/2017)

Title: Dedicated Outdoor Air Systems (DOAS) Integration

Description: Washington State has recently codified the requirement for DOAS in all new construction, and other states will likely follow. What this requirement means for the design, operation, and energy performance of buildings is the focus of this presentation. An introduction to the latest strategies and technologies in ventilation is included.

Presentation Info:

Date:	06/08/2017
Location:	Architectural Firm 1 – Boise, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**5**		
*Other included:			

2.13 Session 13: Dedicated Outdoor Air Systems (DOAS) Integration (21/06/17)

Title: Dedicated Outdoor Air Systems (DOAS) Integration

Description: Washington State has recently codified the requirement for DOAS in all new construction, and other states will likely follow. What this requirement means for the design, operation, and energy performance of buildings is the focus of this presentation. An introduction to the latest strategies and technologies in ventilation is included.

Presentation Info:

Date:	6/21/2017
Location:	Engineering Firm 2 – Twin Falls, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:		Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other:	3
Elec. Engineer:		None Specified:	
Total (In-Person):	**7**		

2.14 Session 14: Radiant Heating and Cooling Design (06/27/17)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building facade reduces loads to levels achievable by radiant systems. This integration between the disciplines has a direct relationship to the performance of the system and comfort of the building, which is not always so closely related in more typical forced-air systems. Key design decisions must be made early in the design process to ensure the feasibility and performance of radiant systems down the road. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different strengths, capacities, and complexities according to their setup. This presentation will cover some general rules of thumb to consider for radiant systems, as well as provide an overview of the key architectural and engineering design decisions associated with each system configuration.

Presentation Info:

Date:	06/27/2017
Location:	Architectural Organization 2 – Ketchum, ID
Presenter:	Damon Woods

Attendance:

Architect:	14	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**14**		

2.15 Sessions 15: Dedicated Outdoor Air Systems (DOAS) Integration (07/18/17)

Title: Dedicated Outdoor Air System (DOAS) Integration

Description: Washington State has recently codified the requirement for DOAS in all new construction, and other states will likely follow. What this requirement means for the design, operation, and energy performance of buildings is the focus of this presentation. An introduction to the latest strategies and technologies in ventilation is included.

Presentation Info:

Date:	07/18/2017
Location:	Architectural Organization 2 – Ketchum, ID
Presenter:	Elizabeth Cooper

Attendance:

Architect:	11	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**11**		

2.16 Session 16: Dedicated Outdoor Air System (DOAS) Integration (08/17/2017)

Title: Dedicated Outdoor Air Systems (DOAS) Integration

Description: Washington State has recently codified the requirement for DOAS in all new construction, and other states will likely follow. What this requirement means for the design, operation, and energy performance of buildings is the focus of this presentation. An introduction to the latest strategies and technologies in ventilation is included.

Presentation Info:

Date:	08/17/2017
Location:	Architecture Firm 4 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:	3	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	
Total (In-Person):	**5**		

2.17 Session 17: Radiant Heating and Cooling Design (09/06/2017)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building facade reduces loads to levels achievable by radiant systems. This integration between the disciplines has a direct relationship to the performance of the system and comfort of the building, which is not always so closely related in more typical forced-air systems. Key design decisions must be made early in the design process to ensure the feasibility and performance of radiant systems down the road. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different strengths, capacities, and complexities according to their setup. This presentation will cover some general rules of thumb to consider for radiant systems, as well as provide an overview of the key architectural and engineering design decisions associated with each system configuration.

Presentation Info:

Date:	09/06/2017
Location:	Architecture Firm 4 – Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:	3	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	4
Elec. Engineer:		None Specified:	
Total (In-Person):	**7**		

2.18 Session 18: Radiant Heating and Cooling Design (10/24/17)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building facade reduces loads to levels achievable by radiant systems. This integration between the disciplines has a direct relationship to the performance of the system and comfort of the building, which is not always so closely related in more typical forced-air systems. Key design decisions must be made early in the design process to ensure the feasibility and performance of radiant systems down the road. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different strengths, capacities, and complexities according to their setup. This presentation will cover some general rules of thumb to consider for radiant systems, as well as provide an overview of the key architectural and engineering design decisions associated with each system configuration.

Presentation Info:

Date:	10/24/2017
Location:	Architecture Firm 5 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	1
Elec. Engineer:		None Specified:	
Total (In-Person):	**6**		

2.19 Session 19: Cold Feet: Managing Controls and Condensation for radiant Slab Cooling (11/25/2017)

Title: Cold Feet: Managing Controls and Condensation for radiant Slab Cooling

Description: Radiant slab systems have the potential to use significantly less energy than conventional all-air HVAC systems. In a 2012 survey by the New Buildings Institute, roughly 50% of net-zero buildings chose to pursue radiant designs for their HVAC systems. However, if not controlled properly, radiant slabs can lead to higher energy use and issues of simultaneous heating and cooling in both energy models and real buildings. This talk will cover current design guidelines for radiant slab systems, particularly when used for cooling. The lecture will also include a discussion of operational best practices, capacity calculations, and condensation management based on the current literature. Damon Woods will present some of the latest research on radiant systems, their unique load profiles, and control requirements to show that there's no need to have cold feet about installing radiant slabs systems

Presentation Info:

Date:	11/25/2017
Location:	Architecture Organization 1 – Idaho falls, ID
Presenter:	Damon Woods

Attendance:

Architect:	12	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	
Total (In-Person):	**12**		

3. Future Work

Feedback was gathered from the 100 Lunch and Learn evaluations received throughout 2017. The comments from these were valuable in defining possible future Lunch and Learn topics and informed the list of suggestions below.

Potential Future Topics:

- Chilled Beams
- VRFs & Heat pumps
- Efficient Educational Facilities
- Ventilating Well
- Absorption Cooling Technologies and Applications
- Thermal Comfort and its Implications in Building Design
- Drain Recovery Technologies

With the Lunch and Learn task, attendance at each session is determined mainly by the size of the firm or organization that is hosting. However, there may still be opportunities for increasing attendance. One suggestion would be to encourage the hosting entity to invite others who would find the information relevant such as, consultants or owners they work with.

2017 TASK 3: BSUG

SUMMARY OF EFFORT AND OUTCOMES

IDAHO POWER COMPANY EXTERNAL YEAR-END REPORT

December 31, 2017

Prepared for:

Idaho Power Company

Author:

Dylan Agnes

Elizabeth Cooper

Report Number: 1701_003-01

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Author:
Dylan Agnes
Elizabeth Cooper

Prepared for:
Idaho Power Company

Contract Number:
5277

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DISCLAIMER

While the recommendations in this report have been reviewed for technical accuracy and are believed to be reasonably accurate, the findings are estimates and actual results may vary. All energy savings and cost estimates included in the report are for informational purposes only and are not to be construed as design documents or as guarantees of energy or cost savings. The user of this report, or any information contained in this report, should independently evaluate any information, advice, or direction provided in this report.

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TABLE OF CONTENTS

1. Acronyms and Abbreviations

AIA	American Institute of Architects
App	Application
ARUP	London based multi-discipline firm
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
BCVTP	Building Controls Virtual Test-Bed
BEMP	Building Energy Modeling Professional
BESF	Building Energy Simulation Forum (Energy Trust of Oregon)
BIM	Building Information Modeling
BOMA	Building Owners and Managers Association
BSME	Bachelor of Science in Mechanical Engineering
BSUG	Building Simulation Users' Group
CBECS	Commercial Building Energy Consumption Survey
Comm	Commercial
Elec.	Electrical
HePESC	Heat Pump Energy Savings Calculator
HVAC	Heating, Ventilation, and Air Conditioning
IBPSA	International Building Performance Simulation Association
IDL	Integrated Design Lab
IPC	Idaho Power Company
LBNL	Lawrence Berkeley National Laboratory
LEED	Leadership in Energy & Environmental Design
M. Arch	Masters of Architecture
ME	Mechanical Engineer(ing)
Mech.	Mechanical
MEP	Mechanical, Electrical, and Plumbing
MS Arch	Masters of Science Architecture
NCARB	National Council of Architectural Registration Boards
RDA	Revit Daylighting Analysis
TMSF	Twenty-Mile-South-Farm
TMY	Typical Meteorological Year
UDC	Urban Design Center
UI	University of Idaho
USGBC	U.S. Green Building Council

2. Introduction

The 2017 Idaho Power scope of work for the Building Simulation Users' Group (BSUG) task included planning, organization and hosting of six meetings, recording attendance and evaluations, archiving video of the presentations, and maintaining the BSUG 2.0 website.

3. 2017 Summary and Cumulative Analysis

In 2017, six sessions were coordinated and hosted. Sessions are summarized below with details in the following sections.

Table 1: Overall Summary of Sessions

Date	Title	Presenter	Presenter Company	RSVPs		Attendees	
				In-person	Online	In-person	Online
3/22	TMSF Energy Optimization	Skylar Swinford & Scott Yribar	ESCO & AYA	10	11	8	10
4/26	Using Analytics to Optimize Equipment Operation and Reduce Energy Use	Jake MacArthur	ETC	4	9	3	5
5/24	The Power of the Hour: The Multitude of Uses for Hourly Energy Model Output	Mike Hatten	AG	5	7	7	4
6/28	Climate Design Tools	Damon Woods	IDL	8	7	5	4
10/25	Using Building Simulation to Analyze Energy Savings from a Smart Thermostat	Sukjoon Oh	BSU	3	2	5	2
11/15	LightStanza: Accurate Intuitive, Web-Based Daylighting	Daniel Galser & Sydney Nelson	LSA	8	31	5	16
			Total:	**38**	**67**	**33**	**41**
				105		**74**	

3.1 2017 Attendance

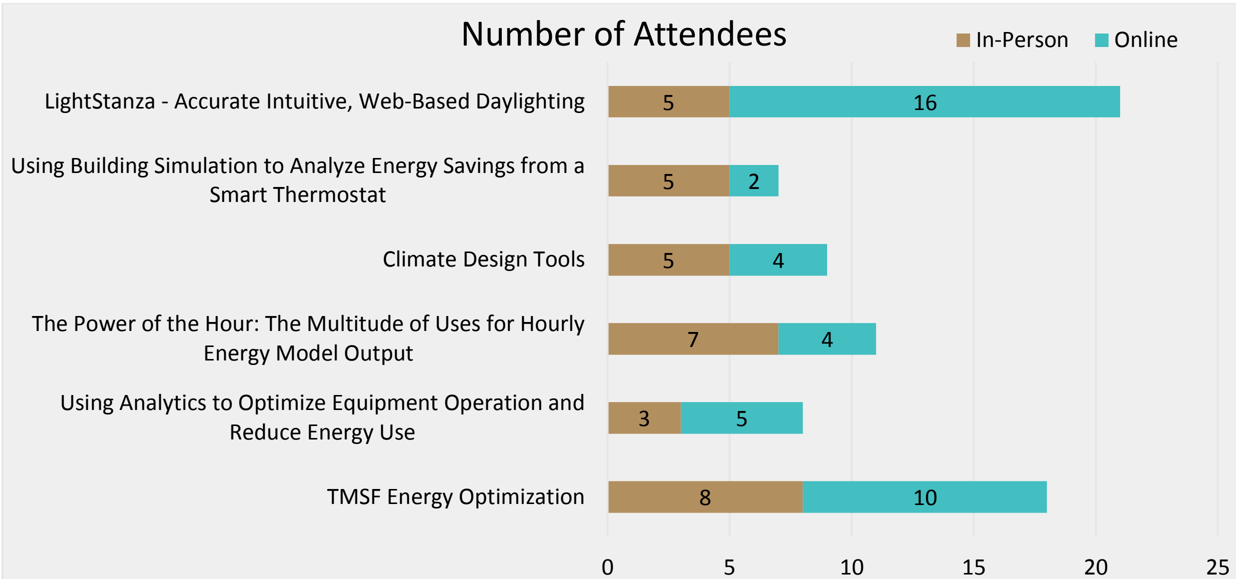


Figure 1: Attendee Count by Session and Type

Table 2: Overall Attendance Breakdown

Architect:	14	Electrician:	
Engineer:	14	Contractor:	
Mech. Engineer:	7	Other:	6
Elec. Engineer:		None Specified:	33
Total (In-Person):	**33**		
Total (Online):	**41**		
Total (Combined):	**74**		

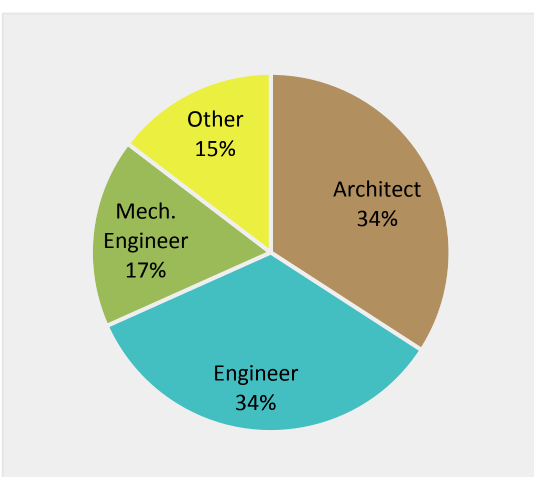


Figure 2: Attendee Profession Breakdown

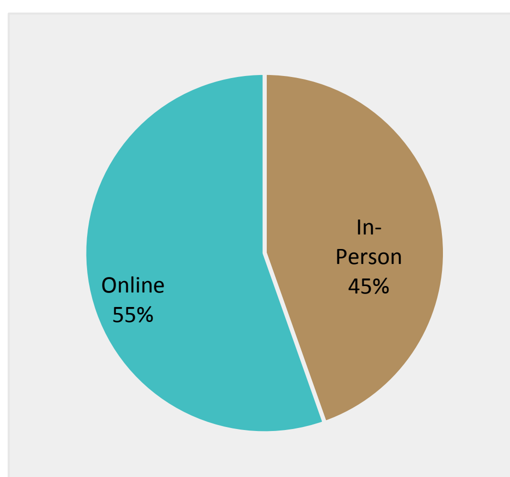


Figure 3: Attendee Type Breakdown

3.2 2017 Evaluations

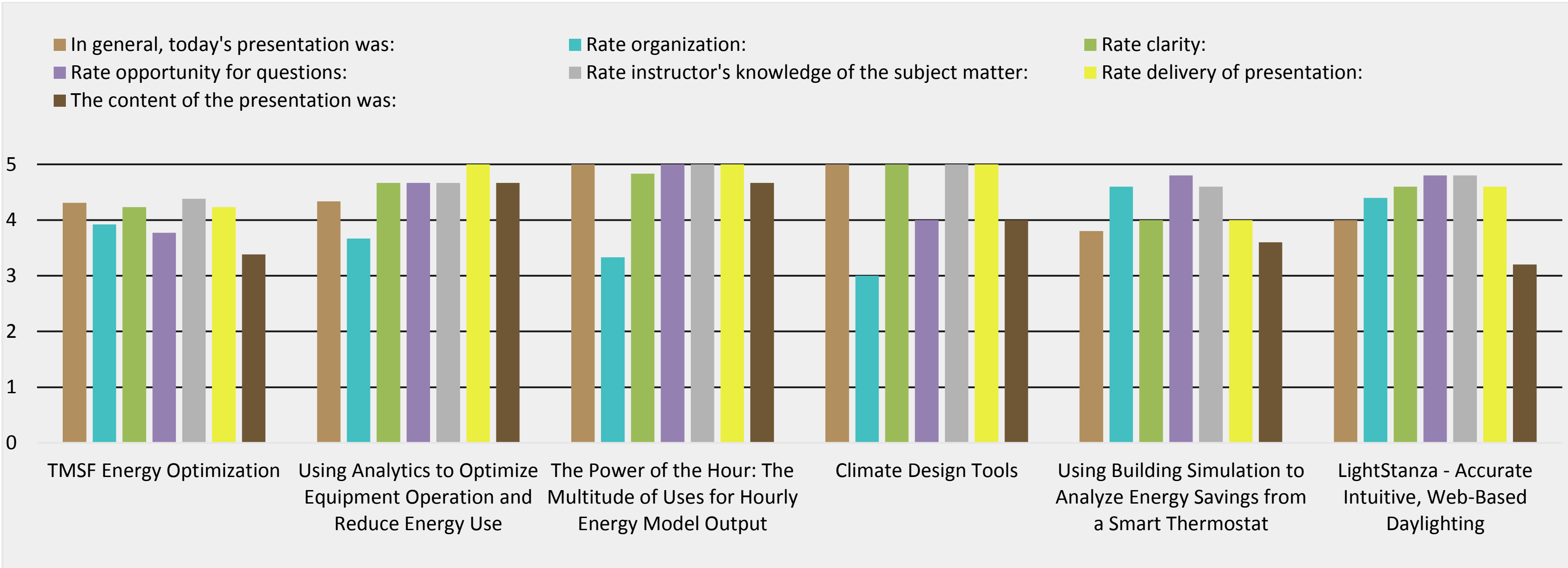
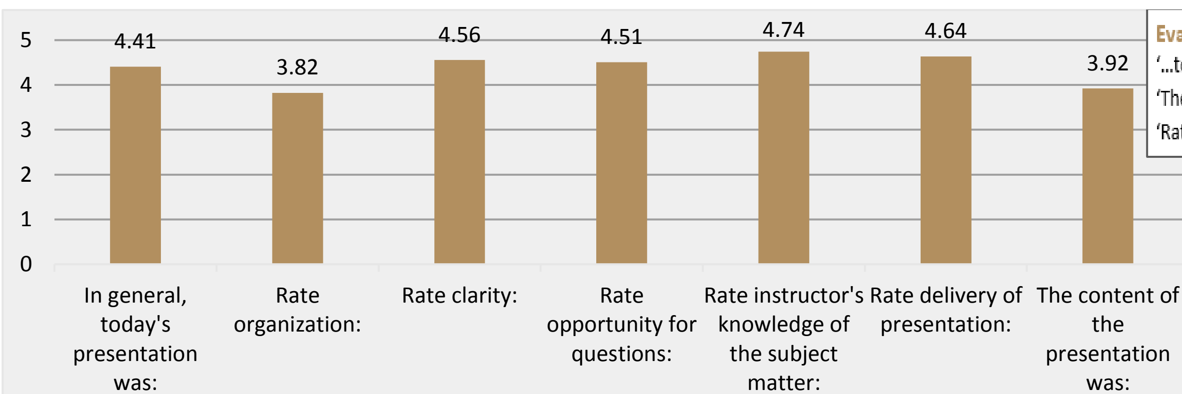


Figure 4: Average Evaluations by Session



Evaluation Metric	Scale
'...today's presentation was'	1 Not Useful - 5 Very Useful
'The content...'	1 Too Basic - 3 Just Right - 5 Too Advanced
'Rate ....'	1 Needs Improvement - 5 Excellent

Figure 5: Average Evaluation Scores for All Sessions

4. Session Summaries

4.1 Session 1: TMSF Energy Optimization (3/22/17)

Title: TMSF Energy Optimization

Date: 03/22/17

Description: The presentation will cover the energy related design and construction aspects of the City of Boise's recently completed Ultra-Low-Energy "Twenty-Mile South Farm" multi-use building. This LEED Gold (projected) building consists of an office building, maintenance shop, parts warehouse, and mechanic shop. In addition to LEED certification, the project is aiming to be Idaho's first Net-Zero Energy commercial building. The project's roof is outfitted with a 56.43kW PV array. Skylar will review the approaches and tools utilized to model and optimize the building's energy performance and how low tech and low maintenance strategies led to a reduction in heating and cooling demand of nearly 90% compared to conventionally constructed buildings. In addition, the rigorous onsite building enclosure testing and verification process will be discussed, as well as how it was utilized to minimize the performance gap between the energy model/design and actual building construction.

Presenter: Skylar Swinford & Scott Yribar

Attendance:

Architect:	5	Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:	2	Other*:	
Elec. Engineer:		None Specified:	6
Total (In-Person):	**8**		
Total (Online):	**10**		
*If 'Other' was noted:			

Evaluation Highlights (What attendees found most valuable):

- Great intro to passive house – new to me
- Air tight guide lines for building practice

4.2 Session 2: Using Analytics to Optimize Equipment Operation and Reduce Energy Use (04/26/17)

Title: Using Analytics to Optimize Equipment Operation and Reduce Energy Use

Date: 04/26/17

Description: Automated analytics can identify operational issues and improve energy performance of any building. Whether the building is large or small, new or old, LEED platinum or not, room for improvement always exists. This presentation will focus on the basics of setting up an analytics platform and then dive into a few brief case studies to understand how analytics can be used to comprehensively commission a building or find opportunities during retrocommissioning. Finally, we will discuss techniques to prevent performance drift.

Presenters: Jake MacArthur

Attendance:

Architect:	2	Contractor:	
Mech. Engineer:	1	Other*:	
Elec. Engineer:		None Specified:	5
Total (In-Person):	**3**		
Total (Online):	**5**		
*If 'Other' was noted:	IPC Programs (2)		

Evaluation Highlights (What attendees found most valuable):

- Hearing about local project, nice broad overview of things to be considered when looking for monitoring solutions

4.3 Session 3: The Power of the Hour: The Multitude of Uses for Hourly Energy Model Output (05/24/17)

Title: The Power of the Hour: The Multitude of Uses for Hourly Energy Model Output

Date: 05/24/17

Description: The ability to output results of whole building energy models on a hour-by-hour basis exists in most modeling tools, but remains an under-utilized capability on most projects. This presentation will highlight several creative uses of hourly modeling output including illustrating integrated energy design, energy model QA/QC, climate analysis, shading and facade optimization, loads analysis, solar system design support, and passive system design support. real-time examples will be demonstrated using Equest.

Presenter:

Attendance:

Architect:	1	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:	5	Other*:	1
Elec. Engineer:		None Specified:	4
Total (In-Person):	**7**		
Total (Online):	**4**		

*If 'Other' was noted: Building Enclosure

Evaluation Highlights (What attendees found most valuable):
- Ideas for reports to look at
- Demonstrated great perspective on how to use data in various forms to have a dialog with designers

4.4 Session 4: Climate Design Tools (06/28/17)

Title: Climate Design Tools

Date: 06/28/17

Description: The Idaho Power Company funded the University of Idaho Integrated Design Lab (UI-IDL) to produce a series of climate design resources to help assist in the conceptual and early design of passive strategies. Through their support, the UI-IDL has developed two generations of spreadsheet calculators that are capable of analyzing building loads and energy consumption impacts of passive design strategies in locations throughout Idaho. Currently, there are seven different advanced design considerations supported by this calculation spreadsheet:

Heat Gain Calculations, Cross Ventilation, Stack Ventilation, Night Ventilation with Thermal Mass, Balance Point Calculation, Passive Solar, and Earth Tube

These tools have been combined into a single spreadsheet that calculates the thermal energy savings associated with each of these strategies. The step-by-step input process directs the user to define the critical baseline and performance parameters of a building. These factors are linked to pre-defined equations within the spreadsheet that automatically provide the peak cooling loads, cooling capacities, and describe other critical design criteria. Wind roses, stacked charts, line graphs, and other forms of graphic information automatically populate the workspace to provide rich visual feedback to the user. The spreadsheets also contain a reference tab that consolidates a myriad of textbook, code, and other sources needed to complete the step-by-step instructions. Additionally, a variety of weather data, including hourly information from TMY weather files, are embedded into the calculations based upon cities throughout the Idaho. Once each tab is filled out, the results pages of the spreadsheets contains all of the important outputs needed to evaluate how much the passive design measures can contribute to the peak loads or energy savings of the building. Changes to the building parameters are reflected instantaneously to the user, making the Climate Tools Package an ideal instrument to explore different design iterations and how they might facilitate passive design strategies.

Presenter: Damon Woods

Attendance:

Architect:	3	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	4
Total (In-Person):	**5**		
Total (Online):	**4**		
*If 'Other' was noted:			

Evaluation Highlights (What attendees found most valuable):

- No evaluations were completed for this session, however, several customers requested the tool soon after the presentation.

4.5 Session 5: Using Building Simulation to Analyze Energy Savings from a Smart Thermostat (10/25/17)

Title: Using Building Simulation to Analyze Energy Savings from a Smart Thermostat

Date: 10/25/17

Description: "Smart" thermostats are becoming more and more common in a multitude of applications, from residential to small commercial, and understanding their potential impact in energy consumption is of growing interest. This month's BSUG presentation will demonstrate how building simulation can be used to analyze energy savings from a smart thermostat. The presentation will describe a calibration method and simulation results using data from a smart thermostat installed at a case-study residence in Texas.

Presenter: Sukjoon Oh

Attendance:

Architect:	2	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		Other*:	3
Elec. Engineer:		None Specified:	1
Total (In-Person):	**5**		
Total (Online):	**2**		
*If 'Other' was noted:	Student		

Evaluation Highlights (What attendees found most valuable):

- Simulated vs. Actual results, nice clear graphics. Plots of several variables together.
- Interesting occupancy trends, advanced application of smart thermostats

4.6 Session 6: LightStanza – Accurate Intuitive, Web-Based Daylighting (11/15/17)

Title: LightStanza – Accurate Intuitive, Web-Based Daylighting

Date: 11/15/17

Description: Learn how to successfully daylight buildings through the use of web-based computer modeling. During the first part of this session, challenges for building an easy to use, but high quality daylight tool are presented. Types of daylight analyses will be shown through small case studies. This will include ways of measuring the diurnal nature of daylight, the LEED and WELL certification system, and dynamic building products.

It will be followed by a demonstration of leading edge daylight design methods from schematic design to construction documents using web-based software. Participants will learn how to use their own 3D models to generate presentation-quality renderings and animations, false color analyses, and daylight glare probability scores. Attendees will also learn how to measure illuminance in the form of full-day animated illuminance grids, annual metrics, and even LEED v3 or v4 scorecards. The class will also show how users can apply daylighting strategies such as dynamic glass, daylight redirecting film, dynamic blinds, and more for a holistic, strategic, healthy, and beautiful daylight design.

Presenters: Daniel Glaser and Sydney Nelson

Attendance:

Architect:	1	Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	13
Total (In-Person):	**5**		
Total (Online):	**16**		
*If 'Other' was noted:	Energy Modeler		

Evaluation Highlights (What attendees found most valuable):
- Nice visual demonstration, quick set-up with power capabilities

5. Website Maintenance and Statistics

The Google site “BSUG 2.0” was maintained and updated monthly. Each month, details about the upcoming presentation were posted to the ‘UPCOMING EVENTS’ page. These pages also included links to both webinar and in-person registration. Monthly emails linked to these pages as well as directly to the registration sites. If the monthly session included a webinar recording, the video was edited and posted to the YouTube channel with a link from the BSUG 2.0 website.

Between January 1, 2017 and November 28, 2017, total page views summed to 994 with unique page views at 823 for 914 total sessions at the site. Of the 914 sessions, 234 (26%) of the sessions were by users in Idaho. Below are charts showing a summary of website activity for the most popular pages, as well as for the site as a whole.

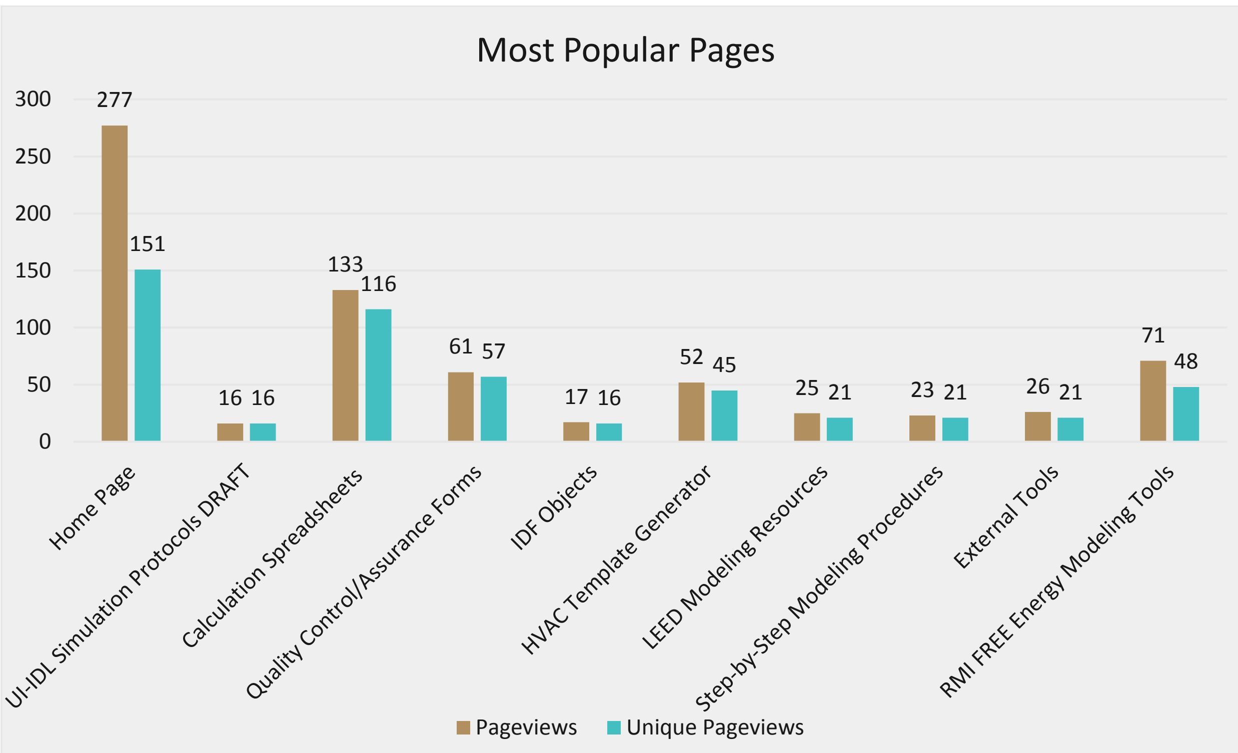


Figure 6: Number of Page Views for the Ten Most Popular Pages in 2017

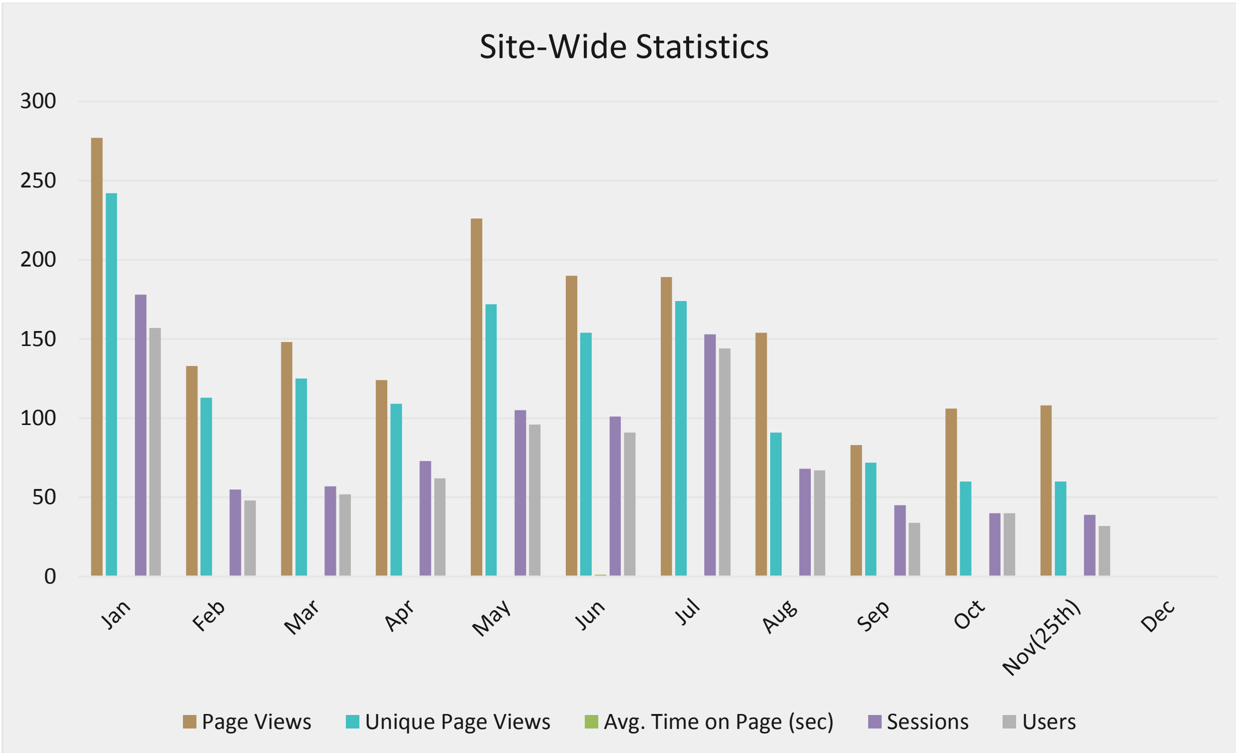


Figure 7: Monthly Site-Wide Statistics

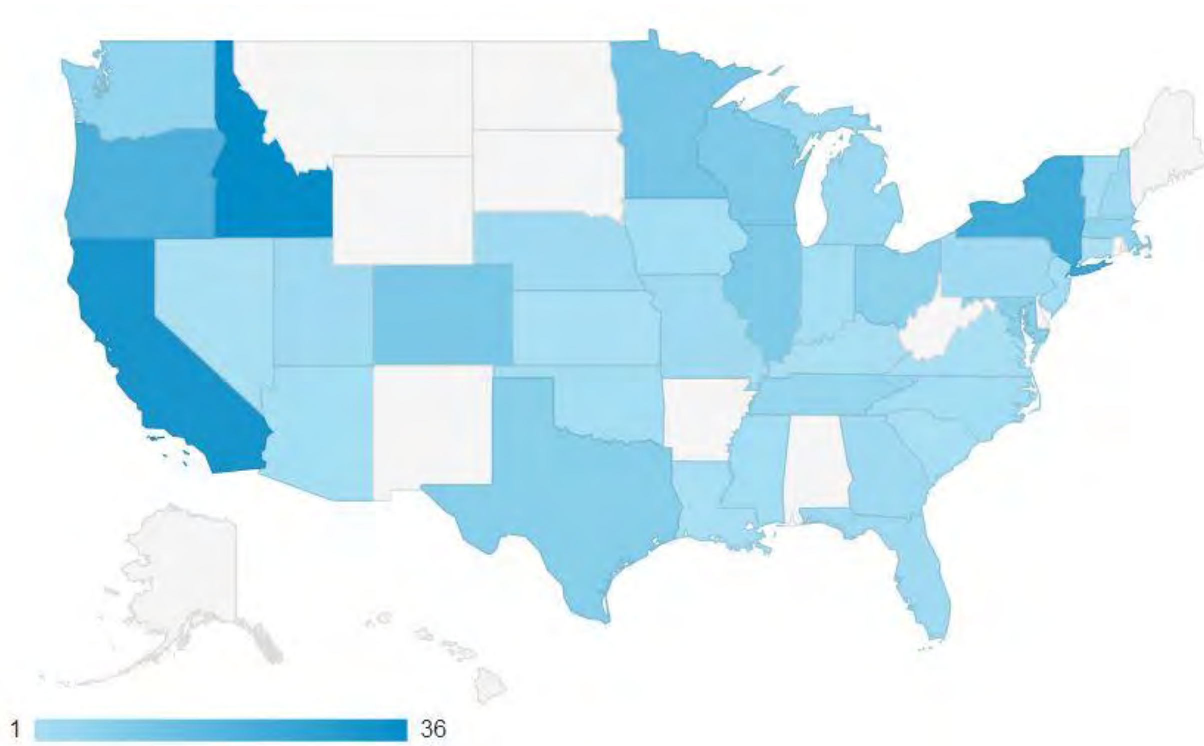
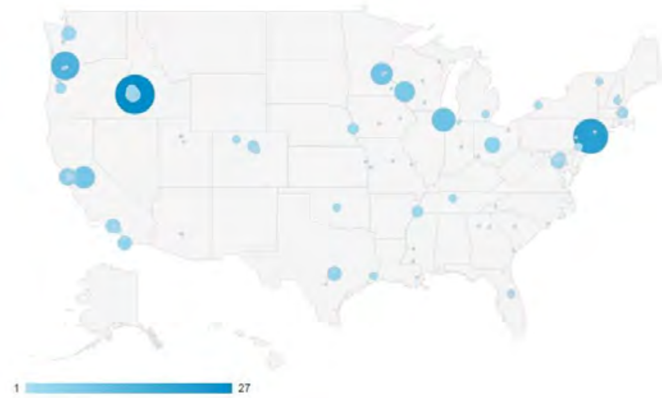


Figure 8: Heat Map of All U.S. Sessions in 2017



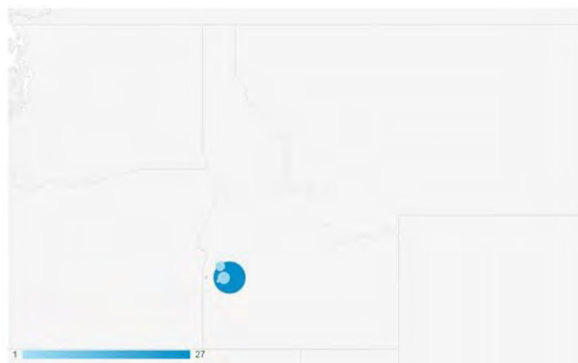


Figure 9: Bubble Maps of All Sessions and Idaho in 2015

6. Other Activities and Suggestions for Future Improvements

We saw a decrease in average attendance for each session this year and lost 41 in-person (58%) for overall attendance from 2016. However, online attendance is on par for what it was last year. Despite the decrease in attendance this year was successful for the BSUG task with 6 sessions completed and 74 total attendees – 33 in-person and 41 online. Feedback was provided by attendees via the evaluation forms, 26 of which were collected. These offered a starting point for determining future improvements to the program. Such as, reviewing and revising the mailing list, advertise with ASHRAE and AIA, host joint session with ASHRAE or AIA, and lastly creating physical flyers to hand out at lunch and learns.

2017 Task 4: New Construction Verifications

Summary of Projects

Idaho Power Company External Year-End Report

December 31, 2017

Prepared for:
Idaho Power Company

Author:
Elizabeth Cooper

Report Number: 1701_004-01

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Authors:
Robert Galarza

Prepared for:
Idaho Power Company

Contract Number:
5277

Please cite this report as follows: Cooper, E. (2017). *2017 TASK 4: New Construction Verifications – Summary of Projects* (1701_004-01). University of Idaho Integrated Design Lab, Boise, ID.

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Acronyms and Abbreviations

AC	Air Conditioning
NCV	New Construction Verification
HVAC	Heating, Ventilation, and Air Conditioning
IDL	Integrated Design Lab
IPC	Idaho Power Company
UI	University of Idaho
VRF	Variable Refrigerant Flow

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) had two roles for the New Construction Verification (NCV) task in 2017. The primary role was to conduct on-site verification reports for approximately 10%, typically thirteen to sixteen, of projects that participated in Idaho Power Company's (IPC) New Construction Program. The verified projects were randomly selected from the entire pool of projects, and at least four projects were required to be outside the Boise/Meridian/Eagle/Kuna area. The secondary role was to review the photo controls design and function for every project whose application included incentive L3: Daylight Photo Controls within the New Construction Program. Once each review was concluded, a letter of support for the incentive was submitted to Idaho Power. This review and letter were intended to increase energy savings and quality of design through the inclusion of additional design and commissioning recommendations.

2. 2017 New Construction Verification Projects

The UI-IDL completed fourteen New Construction Verification projects in 2017. A detailed report for each project was submitted to IPC, including claimed and actual installation for each specific incentive the project applied for. Six of the projects reviewed in 2017 were completed under the new Building Efficiency's 2014 Program, eight of the projects were completed under the 2016 Program, which supersedes the Building Efficiency's 2014 Program. The specific incentives for this program are outlined in Table 1.

Table 2 summarizes the fourteen projects and respective qualified incentive measures which were verified by UI-IDL. For the projects listed, more than 62.5% were conducted outside the Boise area.

Table 1: 2016 New Construction Program Specific Incentives

Lighting	L1	Interior Light Load Reduction
	L2	Exterior Light Load Reduction
	L3	Daylight Photo Controls
	L4	Occupancy Sensors
	L5	High Efficiency Exit Signs
Air Conditioning	A1	Efficient Air-Cooled AC & Heat Pump Units
	A2	Efficient VRF Units
	A3	Efficient Chillers
	A4	Air Side Economizers
	A5	Direct Evaporative Coolers
	A6	Evaporative Pre-coolers on Air-cooled Condensers
Building Shell	B1	Reflective Roof Treatment
Controls	C1	Energy Management Control System
	C2	Guest Room Energy Management System
	C3	HVAC Variable Speed Drives
	C4	Kitchen Hood Variable Speed Drives
	C5	Onion/Potato Shed Ventilation Variable Speed Drives
Appliances with Electric Water Heating	W1	Efficient Laundry Machines
	D1	EnergyStar Undercounter Dishwashers
	D2	EnergyStar Commercial Dishwasher
Refrigeration	R1	Head Pressure Controls
	R2	Floating Suction Controls
	R3	Efficient Condensers
Other	P1	Smart Strip Power Strips

Table 2: Project Summary

IPC Project #	Facility Description	Location	Incentive Measures	UI-IDL Site-Visit Date
14-286	Retail (non food)	Meridian, ID	L1, L5, A1, C1	12/18/17
14-306	Office Building	Pocatello, ID	L1, L2, L3, L4, L5, A4, B1, C1	08/28/17
14-310	Industrial	Pocatello, ID	L1, L2, A1	11/01/17
14-281	Other – Religious	Boise, ID	L1, L4, L5	09/11/17

14-285	Other – Warehouse	Filer, ID	L1, L5	08/28/17
14-308	Office Building	Twin Falls, ID	L1, L5	10/03/17
16-047	Other – Dairy	Vale, OR	L1	08/04/17
16-056	Retail	Jerome, ID	L1, L4, L5	07/25/17
16-087	Other – (Assisted Living)	Meridian, ID	L1, L5	06/06/17
16-108	Other- Religious	Gooding, ID	L1, L5	07/25/17
16-145	Office Building	Boise, ID	L1	10/26/17
16-162	Warehouse	Ontario, OR	L1	11/07/17
16-194	Hotel	McCall, ID	L1, L5	09/26/17
16-195	Hotel	Pocatello, ID	L1	11/01/17

3. 2017 Photo Controls Review Projects

In 2017, the UI-IDL received at least sixteen inquiries regarding the New Construction photo controls incentive review. Documentation was received and final letters of support were submitted to IPC for photo controls incentive applications for fifteen of these projects including offices, schools, retail, manufacturing, maintenance buildings, and warehouse.

INTEGRATED DESIGN LAB
University of Idaho

2017 Task 5: Tool Loan Library

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2017

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes
Elizabeth Cooper

Report Number: 1601_005-05

IDAHO POWER
An IDACORP Company

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Authors:
Dylan Agnes
Elizabeth Cooper

Prepared for:
Idaho Power Company

Contract Number:
5277

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ACRONYMS AND ABBREVIATIONS

AC	Air Conditioning
AIA	American Institute of Architects
AHU	Air Handling Unit
Amp	Ampere
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
BOMA	Building Owners and Managers Association
BSU	Boise State University
CO2	Carbon Dioxide
CT	Current Transducer
Cx	Commissioning
DCV	Demand Control Ventilation
EE	Energy Efficiency
EEM(s)	Energy Efficiency Measure(s)
fc	Foot-Candle
HVAC	Heating, Ventilation, and Air Conditioning
IAC	Industrial Assessment Center
IBOA	Intermountain Building Operators Association
IDL	Integrated Design Lab
Int.	International
IPC	Idaho Power Company
kW	Kilowatt
kWh	Kilowatt-Hour
M&V	Measurement and Verification
OSA	Outside Air
PG&E	Pacific Gas and Electric Company
PPM	Parts Per Million
RPM	Rotations Per Minute
RTU	Rooftop Unit
TLL	Tool Loan Library
TPS	Third Party Service
UI	University of Idaho
USGBC	U.S. Green Building Council
Verif.	Verification
VOC	Volatile Organic Compound
3P	Third Party

1. Introduction

The Tool Loan Library (TLL) is a resource supported by Idaho Power Company (IPC) and managed by the University of Idaho Integrated Design Lab (UI-IDL). The TLL at the UI-IDL is modeled after the Lending Library at the Pacific Energy Center, which is supported by Pacific Gas and Electric (PG&E). In the past years interest in these types of libraries has grown. Recently, the Smart Building Center which is a project of the Northwest Energy Efficiency Council has started a lending library and they cite other lending libraries spanning a large range of tools, including non-energy efficiency related tools.

The primary goal of the TLL is to help customers with energy efficiency (EE) needs, through the use of sensors and loggers deployed in buildings of various types. Loans are provided to individuals or businesses at no charge to the customer. Over 900 individual pieces of equipment are available for loan through the TLL. The equipment is focused on measuring parameters to quantify key factors related to building and equipment energy use, and factors which can affect worker productivity.

The loan process is started when a customer fills out the tool loan proposal form, which is found on the TLL webpage (http://www.idlboise.com/tool-loan-library). When completing a tool loan proposal, the customer includes basic background information, project and data measurement requirements, and goals. When a proposal is submitted, UI-IDL staff members are alerted of a pending proposal via email. The customer and a staff member communicate to verify and finalize equipment needs. Tools are picked up at the UI-IDL or shipped at the customer's expense.

2. Marketing

Marketing for the TLL was done at various UI-IDL and IPC activities throughout 2017, as well as on the UI-IDL website. The flyer layout was unchanged from 2013: it is in Figure 1 and Figure 2 below. The TLL was promoted in presentations given by the UI-IDL staff, including the Lunch and Learn series and lectures to professional organizations such as the American Institute of Architects (AIA), ASHRAE, City of Boise, and the Idaho Green Energy and Building Conference.

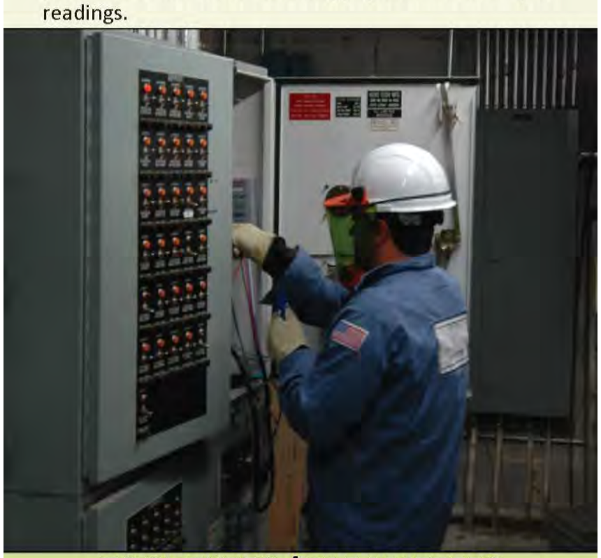
The TLL flyer and program slides direct potential users to the TLL website for more information about the library. The main UI-IDL website hosts the TLL portal where customers can submit proposals and request tools, all online. In 2017, the TLL home page had 2,498 visitors. Changes and progress for the TLL homepage can be found in Appendix D.

INTEGRATED idl DESIGN LAB
University of Idaho

TOOL LOAN LIBRARY

The Tool Loan Library is a free resource managed by the University of Idaho-Integrated Design Lab (UI IDL) available to Idaho Power Company customers to support energy efficiency, demand response, or demand reduction projects. Loans are free of charge for people working on projects in the Idaho Power Company service territory.

The Library has a large variety of tools to capture many parameters for both data logging and on-site spot readings.



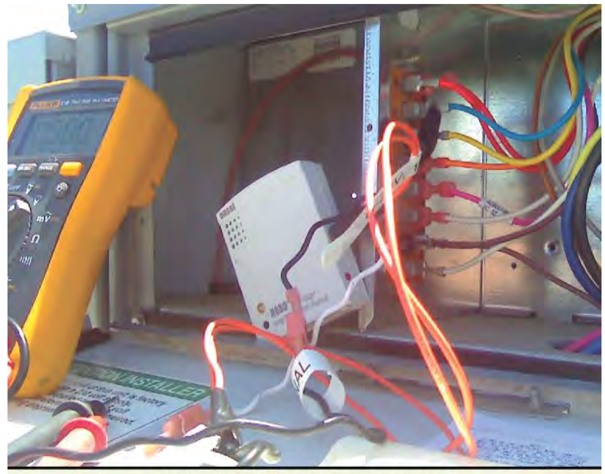
TOOL TYPES / PARAMETERS

Power (kW)	Temperature
Energy (kWh)	Relative Humidity
Power Factor	State Logging-Light
Voltage	State Logging-Magnetic
Solar flux (W/m^2)	Air Velocity
Plug loads (120V)	Air Pressure
RPM	Sound Level
Current	Gas-VOC
Flow-liquids	Light Level (lux,fc,ca)
Gas-(CO_2 ppm)	Thermal Imaging Camera
Flow-Natural Gas	Air Balance Equipment
Ultrasonic Leak Detection	

306 S. 6th Street
Boise, ID 83702
ph: 208.429.0220
fx: 208.343.0001
www.idlboise.com
www.idahopower.com

IDAHO POWER
An IDACORP Company

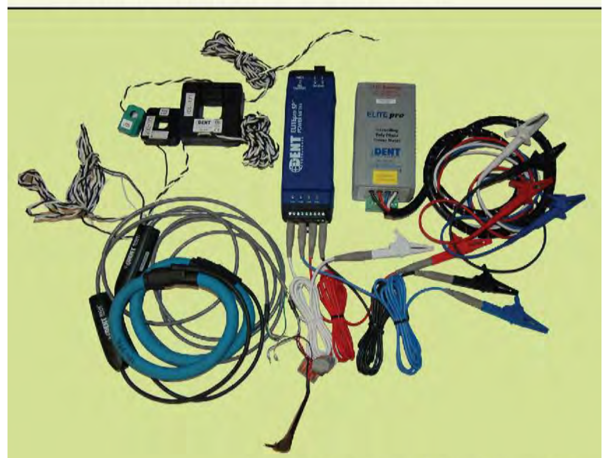
Figure 1: TLL Flyer Front



TOOL LOAN PROCESS

You will need to have a registered user account to access the tool request form. Creating an account is easy and free. An available tool inventory can be viewed online with information on how specific tools are used.

STEP 1: Access the UI-IDL website at (idlboise.com)
STEP 2: Select the Tool Loan Library tab
STEP 3: Log in, if you don't have an account click the register button on the top right of the IDL website, or follow the prompts to register from the Tool Request Form link.
STEP 4: Select the Tool Request Form link and complete the form.
STEP 5: The form will be sent to staff at the UI-IDL who will determine which tools are best for your application, and will contact you and provide the best equipment available to fulfill your request.



www.idlboise.com/tool-loan-library

Figure 2: TLL Flyer Back

3. New Tools & Tool Calibration Plan

In 2017, no new tools were added to the TLL, however, manuals and guidelines were made available to more tools for lending. Four data cables used for extracting data from Dent ElitePro Energy Loggers were bought and added to the Library. Regardless if a customer requested one it is always offered when pick-up of the Tool Loan proposal is schedule and so far they have been checked out regularly with every energy logger request this year.

Equipment items included in the tool loan program are typically distributed with a manufacturer guaranteed calibration period between 1 and 3 years. While many items may remain within recommended tolerances for years after the guaranteed calibration period ends, verifying the item is properly calibrated after initial and subsequent periods is recommended. Calibration services are available on most tools, sometimes from the manufacturer, and from various certified calibration services nationwide.

Third party (3P), certified tool calibration is ideal, but an extensive 3P calibration program would be expensive. Based on research and pricing from quotes, formal calibration would be cost prohibitive for much of the library tools. In several cases, cost of calibration can well exceed 30% of the item cost. As a certified calibration is typically only valid for 1-2 years, an alternative measurement and verification plan for most sensors and loggers is recommended. This will be possible with most of the tool loan inventory. A few exceptions to this must be made on a case by case basis to allow for factory calibration of items that cannot be compared or tested in any other way. An example of one item in this category would be the Shortridge Digital Manometer and Air-Data Multimeter which would have to be recalibrated by the manufacturer.

The IDL will continue to perform the following to ensure items are within specified calibration tolerances, but also, to create a tracking plan for calibration cycles and type:

1. Equipment will be cross-checked against new equipment of the same type for accuracy in a test situation where data is logged. The IDL plan would cross-check older items against multiple newer items at the end of each calibration period (i.e. every two years) to ensure readings are within specified tolerances.
2. Those items found to be out of tolerance will be assessed for factory re-calibration or replacement.

Calibration tracking columns have been added to an inventory spreadsheet which will allow the IDL to determine which items are due for calibration testing. Updates to calibration and references to testing data will be maintained in the inventory spreadsheet and has been expanded to include tool use, quotes, and budget estimates, please see Appendix C for more details.

4. 2017 Summary Of Loans

In 2017, loan requests totaled 58 with 55 loans completed, 3 Loans were canceled by the customer or were rejected, 19 loans were to the Integrated Design Lab, where the majority of loans, 11, were used for internal research. The second quarter had the highest volume of loans at 20 total. Loans were made to 12 different locations and 30 unique users. A wide range of tools were borrowed, as listed in Figure 8. The majority of tools were borrowed for principle investigations or audits, although loans were also made for determining baselines before EEMs were implemented. Tools were borrowed to verify these EEMs as well.

Table 1 and the following figures outline the usage analysis for TLL in 2017.

Table 1: Project and Loan Summary

	Request Date	Location		Project	Type of Loan	# of Tools Loaned
1	1/3/2017	Boise	ID	PT1	Audit	1
2	1/9/2017	Burley	ID	MCFPPL	Basline measurement of EEMs	8
3	1/17/2017	Garden City	ID	ASA	Audit	9
4	1/17/2017	Boise	ID	LE	Audit	1
5	1/17/2017	Boise	ID	SWHQ	Verification of EEMs	2
6	1/25/2017	Boise	ID	RA	Audit	6
7	1/30/2017	Notus	ID	NSD	Audit	1
8	3/6/2017	Parma	ID	TP	Audit	2
9	3/15/2017	Springfiled	ID	SFH	Verification of EEMs	1
10	3/17/2017	Boise	ID	DIPRT	Audit	1
11	3/20/2017	Boise	ID	AAHQB	Verification of EEMs	1
12	3/28/2017	Atomic City	ID	INLA	Basline measurement of EEMs	26

13	4/10/2017	Boise	ID	RAIAQ	Verification of EEMs	8
14	4/11/2017	Boise	ID	LRTT	Audit	1
15	4/13/2017	Boise	ID	LBCD	Audit	6
16	4/19/2017	Boise	ID	CBDW	Audit	25
17	4/24/2017	Eagle	ID	MLRS	Audit	1
18	5/4/2017	Boise	ID	BTD	Audit	3
19	5/4/2017	Boise	ID	IACCB	Audit	16
20	5/15/2017	Boise	ID	FWU	Audit	1
21	5/15/2017	Boise	ID	ERBCP	Audit	1
22	5/26/2017	Boise	ID	GBSR	Basline measurement of EEMs	30
23	5/30/2017	Boise	ID	ANSCP	Audit	1
24	6/1/2017	Boise	ID	BCCDC	Basline measurement of EEMs	1
25	6/1/2017	Boise	ID	RHEM	Audit	14
26	6/9/2017	Boise	ID	RHPM	Audit	2
27	6/12/2017	Star	ID	SWWEA	Audit	10
28	6/12/2017	Emmett	ID	COE	Audit	6
29	6/13/2017	Boise	ID	BTD	Audit	1
30	6/16/2017	Meridian	ID	WCN	Audit	1
31	6/27/2017	Ketchum	ID	MTIBD	Basline measurement of EEMs	1
32	6/27/2017	Fruitland	ID	IACSV	Audit	2
33	7/5/2017	Boise	ID	BHCPA	Audit	8
34	7/6/2017	Ketchum	ID	MIBD	Basline measurement of EEMs	1
35	7/10/2017	Boise	ID	FWU2	Audit	9
36	7/14/2017	Boise	ID	ANSCP2	Audit	2
37	7/27/2017	Boise	ID	FWU3	Audit	9
38	7/31/2017	New Meadows	ID	IRTB	Audit	1
39	8/2/2017	Boise	ID	BBES	Verification of EEMs	0
40	8/7/2017	Boise	ID	HBTT	Audit	10
41	8/16/2017	Meridian	ID	VSL	Audit	1
42	8/22/2017	Boise	CA	OTPCT	Audit	33
43	8/30/2017	Meridian	ID	SLIAQS	Audit	3
44	9/5/2017	Boise	ID	EFT	Audit	1
45	9/13/2017	Boise	ID	FRP	Canceled	4

46	9/15/2017	Boise	ID	AVNP	Audit	1
47	9/29/2017	Boise	ID	COTT	Audit	34
48	10/12/2017	Boise	ID	IWCDW	Audit	22
49	10/13/2017	Boise	ID	IWCDW2	Audit	21
50	10/17/2017	Boise	ID	OPTSPV	Audit	21
51	10/27/2017	Nampa	ID	NWWTP	Audit	5
52	10/31/2017	Boise	ID	IWCDW3	Audit	25
53	11/10/2017	Boise	ID	OPTSYC	Audit	35
54	11/13/2017	Gooding	ID	PWC	Cancled	0
55	12/13/2017	Boise	ID	YPPS	Audit	2

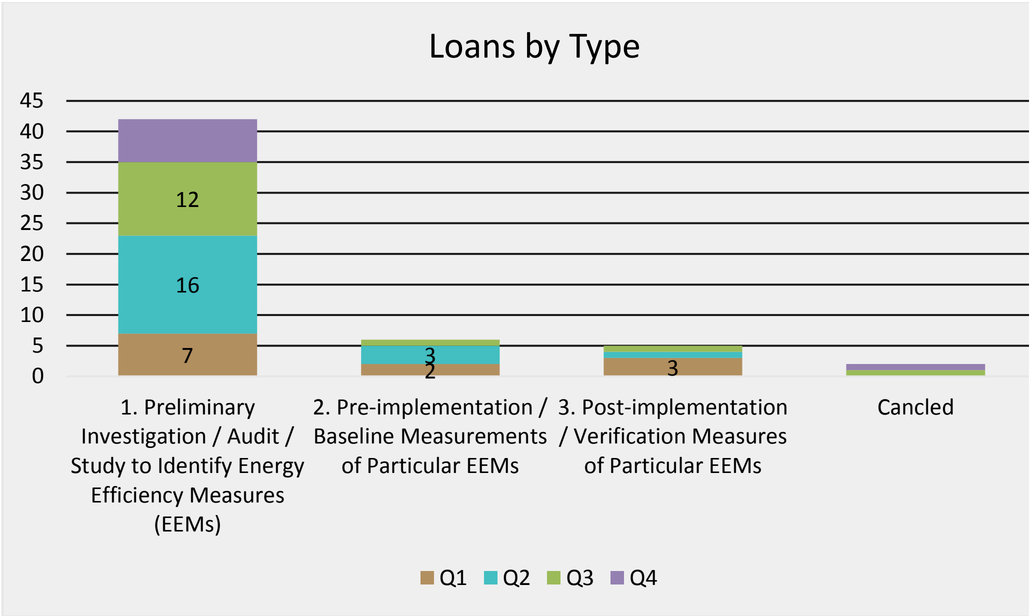


Figure 3: Loans by Type

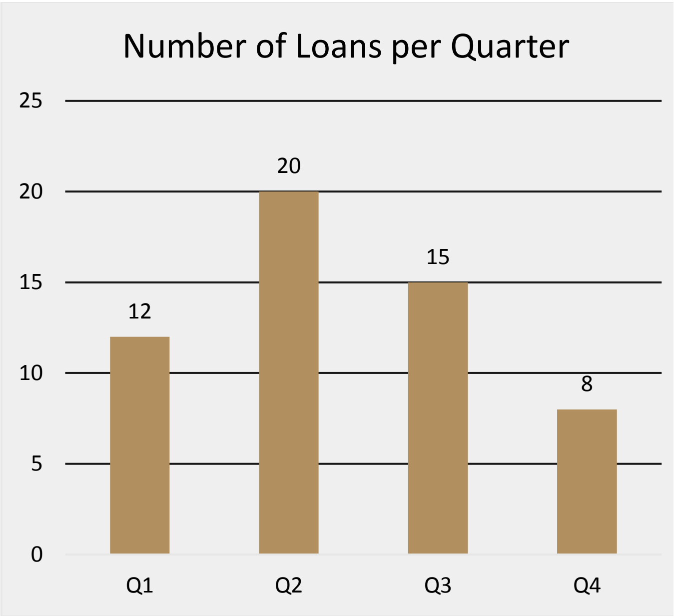


Figure 4: Number of Loans per Quarter

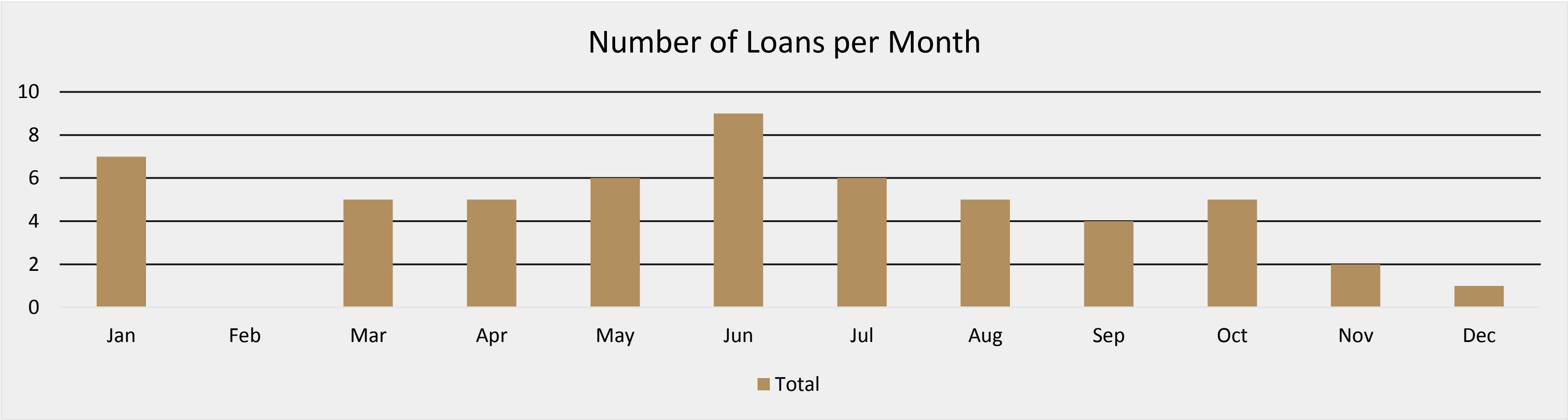


Figure 5: Number of Loans per Month

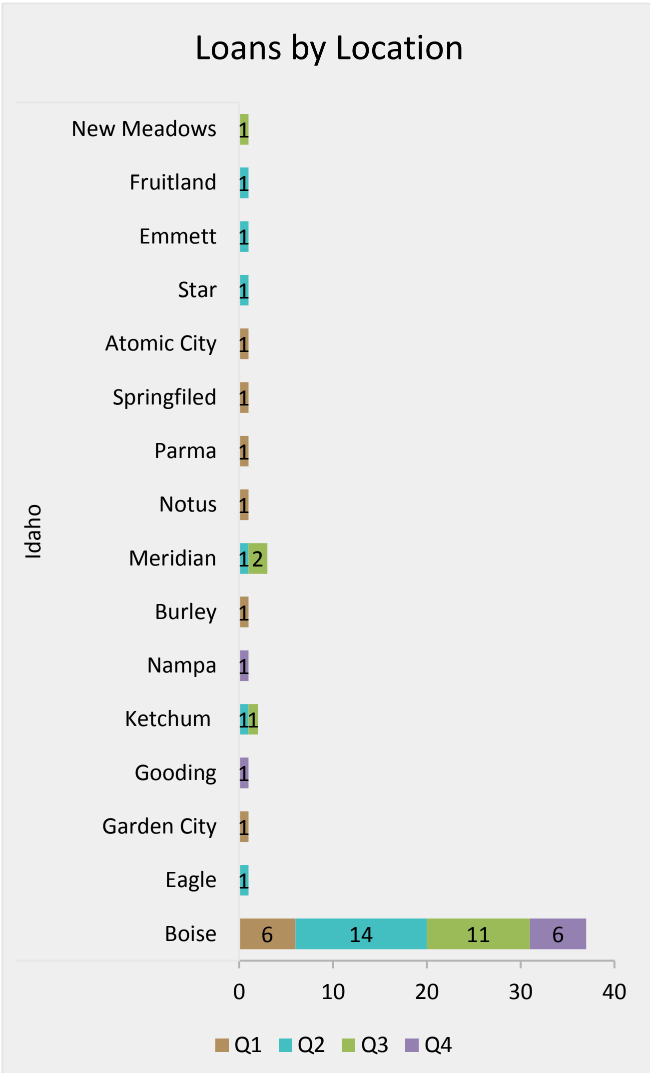


Figure 6: Number of Loans by Location

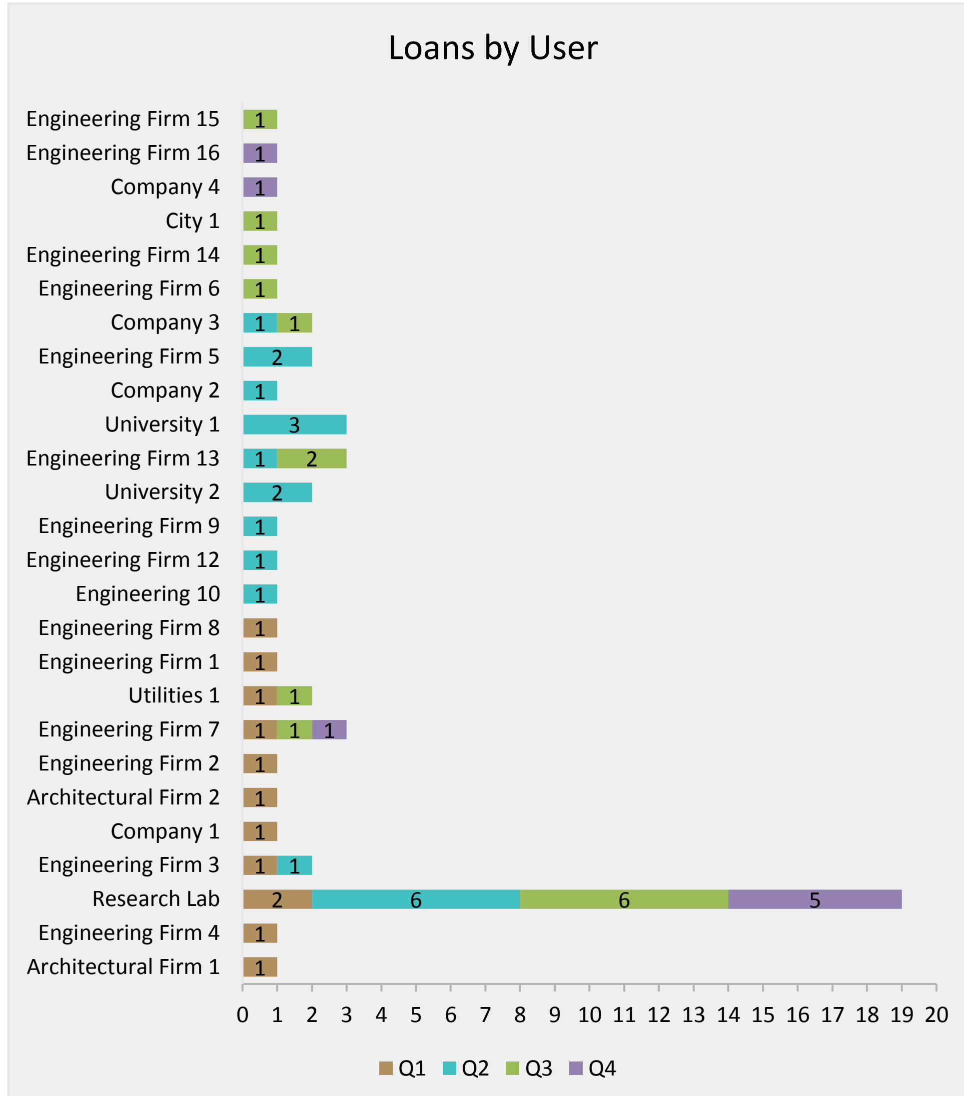


Figure 7: Number of Loans by User

TOTAL TOOLS LOANED: **388**	Q1=56	Q2=110	Q3=100	Q4=122

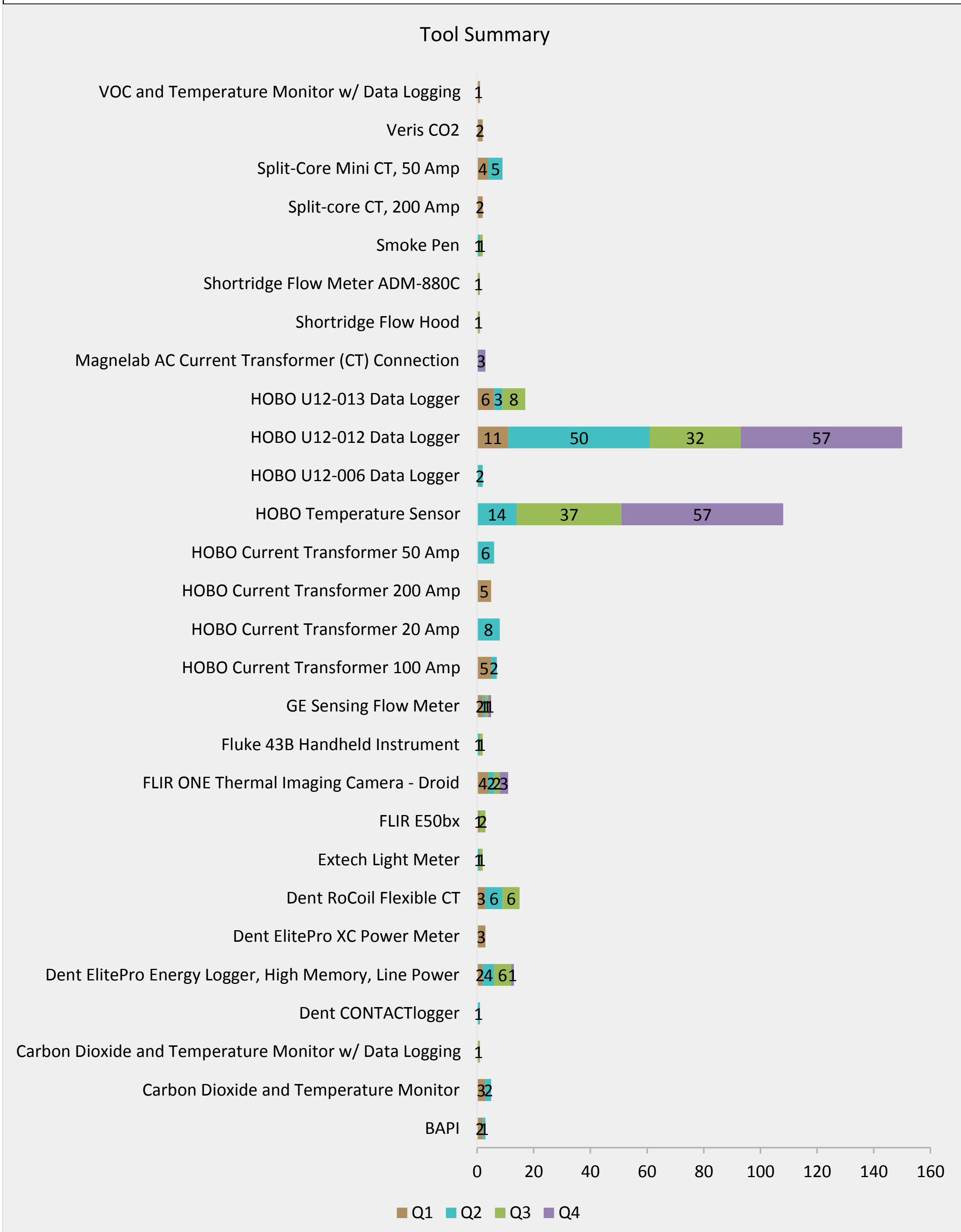


Figure 8: Summary of Tools Loaned

2017 Task 6: Absorption Chiller Feasibility Study

Idaho Power Company External Year-End Report

December 31, 2017

Prepared for:
Idaho Power Company

Authors:
Jinchao Yuan
Damon Woods
Elizabeth Cooper

Report Number: 1701_006-01

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Authors:
Jinchao Yuan
Damon Woods
Elizabeth Cooper

Prepared for:
Idaho Power Company

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Absorption Chiller Applications in Southern Idaho

Jinchao Yuan, Damon Woods, and Elizabeth Cooper

Integrated Design Lab

Introduction

Absorption chillers use thermochemical absorption processes to replace the vapor compression cycles in conventional electric chillers. Instead of relying on high grade electricity to drive a compressor, absorption chillers derive most of their cooling energy from a low grade heat source. Since absorption chiller technology emerged more than half a century ago, it has achieved a market share in bespoke applications where inexpensive or free low grade heat sources are available.

This document provides an overview of the absorption refrigeration technology and its differences from conventional vapor compression, followed by applications and economic considerations. The investigation follows potential applications in southern Idaho. Three existing facilities of different sizes were selected in southern Idaho where this technology might benefit their current operation. The study focused on the cooling capacity that could be achieved at each location, the market availability of required equipment, and the lifecycle costs of the equipment compared to conventional systems. Two other potential applications in other parts of Idaho were identified.

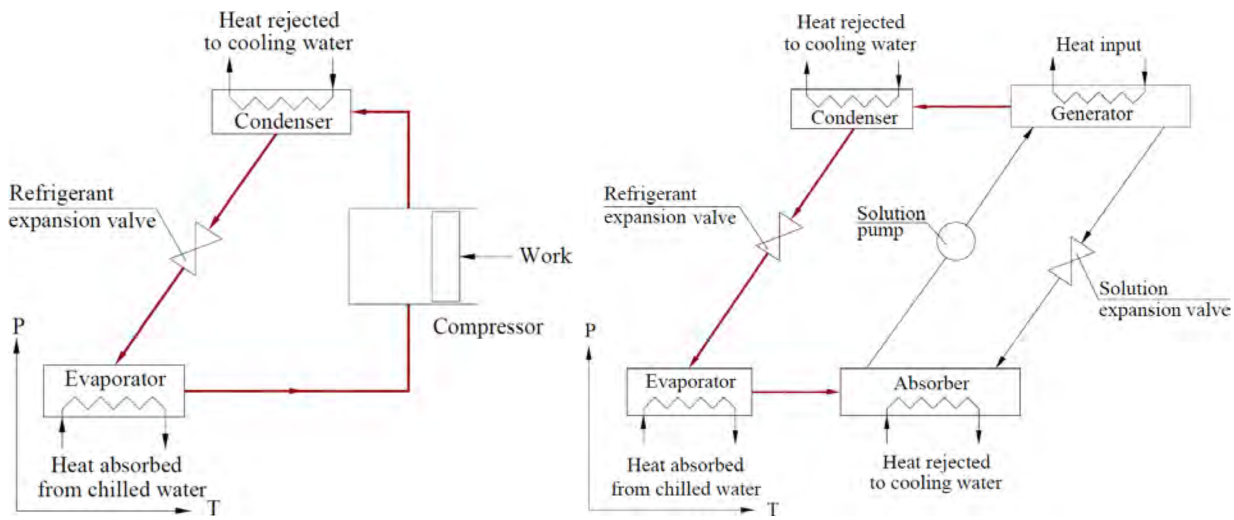
Technology Overview

Working Principles

A conventional refrigeration cycle has four components. First, the refrigerant is compressed to a high pressure by some mechanical device that draws electricity. From the compressor, the high pressure fluid releases heat and becomes a liquid. This high pressure liquid then flows through a nozzle and expands into a lower pressure. The fluid at this low pressure absorbs heat from the environment and evaporates (this is the cooling coil). After the refrigerant evaporates, it is compressed into a high pressure fluid once again and the cycle repeats as shown in Figure 1a.

For absorption chillers, the refrigeration cycle components and processes are more complex. The main difference is that instead of using an electrically driven compressor to drive a phase-change in the refrigerant, a heat source is combined with a secondary fluid to drive this process. In this way, the cooling energy comes mainly from a heat source instead of an electrical source. A basic absorption refrigeration cycle is shown in Figure 1b. Like the vapor compression cycle, it includes a condenser, evaporator, and expansion device, but the compressor is replaced with an absorber, generator, and expansion valve.

Instead of sending the evaporated refrigerant into a compressor, an absorption chiller sends the evaporated gas into a chamber where the gas can be dissolved into another fluid (sometimes water) [M000]. The mix of fluid and absorbed refrigerant is sent to the generator, where heat is added. As heat is added to the generator, the refrigerant evaporates out of the fluid at a higher pressure and temperature. This high temperature refrigerant then is sent to the condenser as in a normal refrigeration cycle. A small pump is required to keep the secondary fluid circulating, but no compressor is required. A cross-section of a typical absorption chiller illustrating this process is shown in Figure 2.



(a). Vapor Compression Cycle (b). Absorption Refrigeration Cycle

Figure 1. A conventional vapor compression cycle vs. an absorption refrigeration cycle (source: [M006])

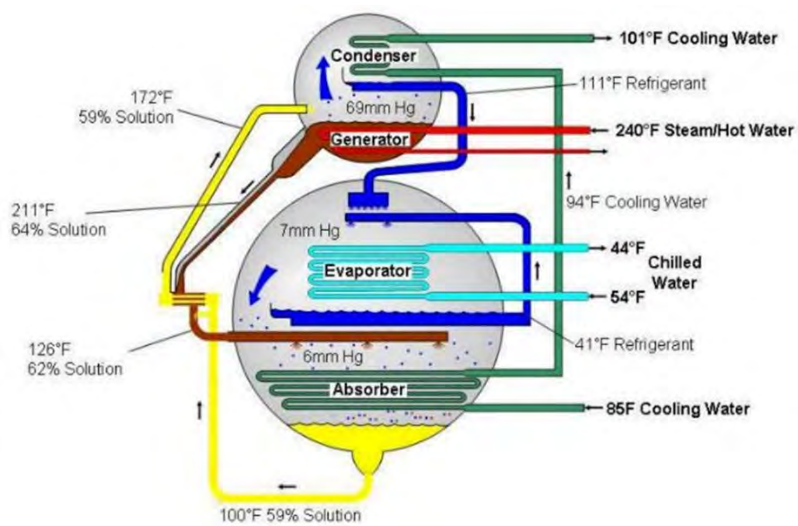


Figure 2. The absorption chiller cycle system and components diagram (Source: [M014])

Components of absorption chiller systems

Absorber

In the absorber, the low-pressure refrigerant vapors condense and are absorbed into the secondary working fluid, releasing some amount of heat in the process. In a typical absorption chiller this working fluid comes from its own heat rejection system (e.g. the water from a cooling tower). As the working fluid absorbs the refrigerant vapor, the solution become more concentrated with the refrigerant and the solution's ability to continue absorbing the refrigerant decreases. At the end of the absorption process, the absorbent solution is pumped to the generator.

Generator

The generator is where the refrigerant/working fluid solution is heated, increasing the pressure. This heat may be provided in a number of ways – it could come directly from combustion (like a boiler), but more often the heat is taken from another hot fluid or steam loop passing through a heat exchanger in parallel with the solution. The addition of this heat drives out (vaporizes) the refrigerant from the solution. The remaining solution is pumped back into the absorber while the high temperature vaporized refrigerant is then sent to a condenser, expansion valve, and evaporator as in a conventional refrigeration system.

Type of Absorption chillers

Depending on the configuration and working media, absorption chillers can be divided into different categories. Figure 3 shows the classification of conventional vapor compression chillers and the absorption chillers for HVAC applications (source [M009]):

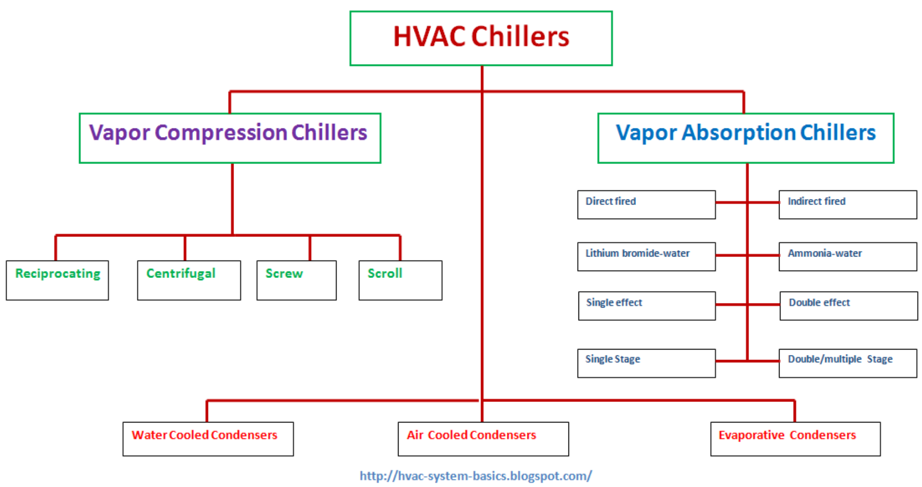
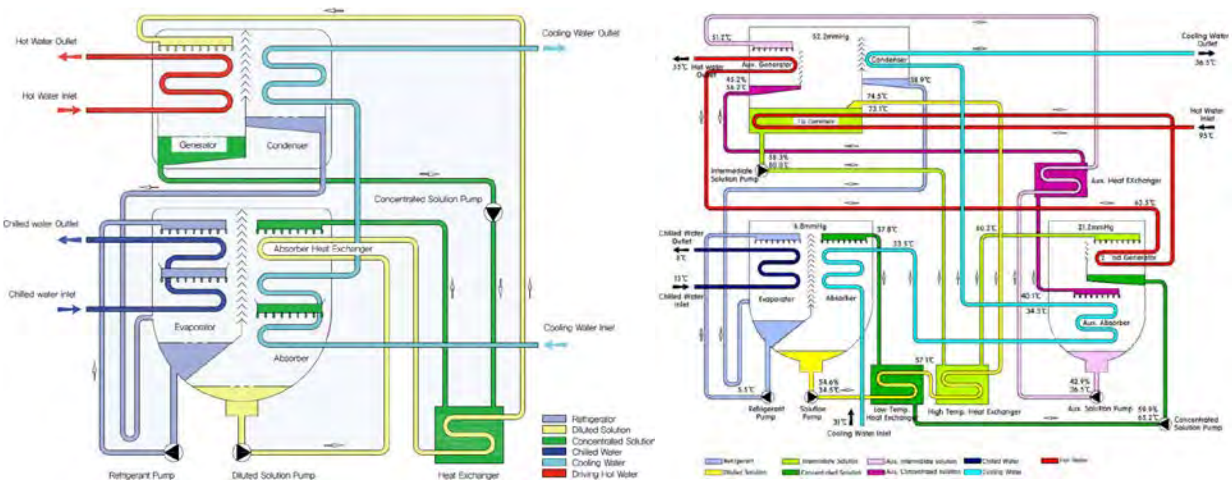


Figure 3. Types of vapor compression chillers and absorption chillers (Source: [M009])

Similar to the classification of different types of vapor compression chillers, absorption chillers can also be classified as different types according to the differences in refrigerant type, firing type, and number of stages. They can be directly or indirectly fired, and can be single-effect or double-effect. Indirect-fired chillers use heat from another source, while direct-fired chillers use a natural gas burner to power the cycle. The direct-fired chiller will have the combusting fuel to directly heat up the generator; while the indirectly fired chiller will have a secondary heat exchanging devices to heat the generator.

Figure 4 shows configurations of a single stage absorption chiller vs. a double-stage absorption chiller. Double effect absorption chillers recycle part of the intermediate heat produced in the cycle, and therefore can be more efficient on per unit heat input bases, although the higher efficiency is obtained at a cost of requiring a higher steam or natural gas combustion temperatures [M012].



a. A single effect absorption chiller; b. A double effect absorption chiller

Figure 4. Single-Effect vs. Double-Effect Absorption Chiller (Source: [M015])

Single-stage absorption chillers typically require hot water temperature of about 200F-240F (but applications with heat sources as low as 185-200F have been documented), or steam at pressure of 15psig (in the 10-20psig range) [M009]. Double stage absorption chillers typically use higher temperature heat source of about 350F water (other sources indicate 360-400F range), or 115psig steam (range: 40-200psig) [M009].

Two common types of media can be used for absorption cooling: Ammonia-Water or Lithium Bromide. Ammonia systems can provide low refrigeration temperatures (i.e. less than 40F), which can work well for ice-making or food storage applications. Lithium-Bromide absorption chillers have lower efficiencies and cannot cool to such low temperatures, but are cheaper, require less heat input, and are typically used for building air-conditioning [M008]. The Ammonia-Water based absorption chiller typically require temperature sources of 230F or above [M021]. The Lithium Bromide type absorption chiller can use relatively lower temperature sources (around 200F).

Absorption chiller performance

Absorption chiller efficiency is defined by Coefficient of Performance (COP) as:

$$\text{COP} = Q_{evap} / Q_{gen}, \tag{1}$$

Where Q_{evap} is the cooling out of the absorption chiller evaporator; and Q_{gen} is the heat input to the generator that drives the cycle.

For a single effect absorption chiller, the COP is typically around 0.7 to 0.79 [M008]; and for double effect absorption chillers, the efficiency is typically 1.35 to 1.42 [M008]. This is in contrast to a conventional chiller which might have a COP of 2.8 or higher [M022]. However, an absorption chiller has the advantage of having a heat input that is sometimes free and does not require high electrical consumption. Absorption chillers still uses some electricity for running small systems such as the pump for the solution circulation. However, this electricity usage is much smaller compared to the electricity consumption for a regular vapor compression cycle. The absorption chiller electricity usage is only about 2% to 9% percent of that of a vapor compression chiller with the same cooling capacity [M003].

Technical benefits and shortcomings

Comparison between Absorption vs. Electric Chillers

A general comparison between the absorption chiller and the electric chiller is shown in Table 1. The major difference is the working cycle. Absorption chillers are driven by heat; and an electric chillers typically utilize electricity. The heat-driven mechanism of the absorption chiller make it possible for the absorption technology to utilize heat in many special situations (such as process waste heat) and save electricity, especially during peak electricity demands in the summer.

Table 1. Comparison between Absorption Chillers and Electrical Chillers [M005]

	Absorption Chiller	**Electric Chiller**
Basic Cycle	Heat	Work
Electric Power used	Low	High
Operation Cost	Low	High
Maintenance Cost	Low	High
Noise	Low	High
Environment Hazard	CFC Free	Potential CFC
Energy Source	Waste Heat (or Solar)	Only Electrical
Carbon Footprint	Low	High

Advantages of absorption chiller

The major advantage is the ability to use heat rather than electricity to drive the compression cycle; and the heat required can be low grade heat from various industrial processes. The electricity consumption of an absorption chiller is typically only about 2–9% of that required for an electric chiller of equivalent size [M003]. Absorption chillers also produce less noise than a conventional system and release fewer CFCs. Absorption chillers can also have lower operation and maintenance costs because the system contains no major moving parts such as a vapor compressor.

Disadvantages

The major disadvantage of absorption chillers is that they are relatively inefficient compared to an electric chiller. As stated in the previous section, a typical single stage absorption chiller has a COP (Coefficient of Performance) of only about 0.7; even a double stage absorption chiller, which typically requires higher operational temperatures, would only achieve a COP of 1.4. While an electric chiller will typically achieve a COP of 2.8 or higher.

The first costs of absorption chillers is also typically much higher than electric chillers. A typical electric chiller is estimated at around $350-1000 per ton installed (sources: [M016], [M017], [M018]). However, an absorption chiller can cost about $1800-6000 per ton installed (source [M008]).

While maintenance costs can be lower for absorption chillers due to fewer moving parts, the systems are complex and may requireM003 a special service provider as most facility staff and local providers are not familiar with the technology. Additional maintenance contracts with a major manufacturers may be required to service the equipment on a regular basis [M003].

General Applications of Absorption Chillers

According to the characteristics of absorption chillers, the typical scenarios where absorption chillers can be used is when there is a high electricity cost but a low fuel cost. This characteristic makes it most suitable for scenarios when free waste heat is available, such as in many food processing, manufacturing, and chemical production plants. For places where electricity grids have limited capacities but alternative fuels are available, absorption chillers can provide a viable way of providing cooling using available heat sources.

In addition to energy savings, for applications where noise and vibration control is of a concern, an absorption chiller can provide a possible alternative. Since absorption chillers have fewer moving mechanical parts (compared to vapor compression machines), they are generally used where noise and vibration levels are an issue, particularly in some hospitals, schools, and office buildings [M012].

Commercial and industrial applications

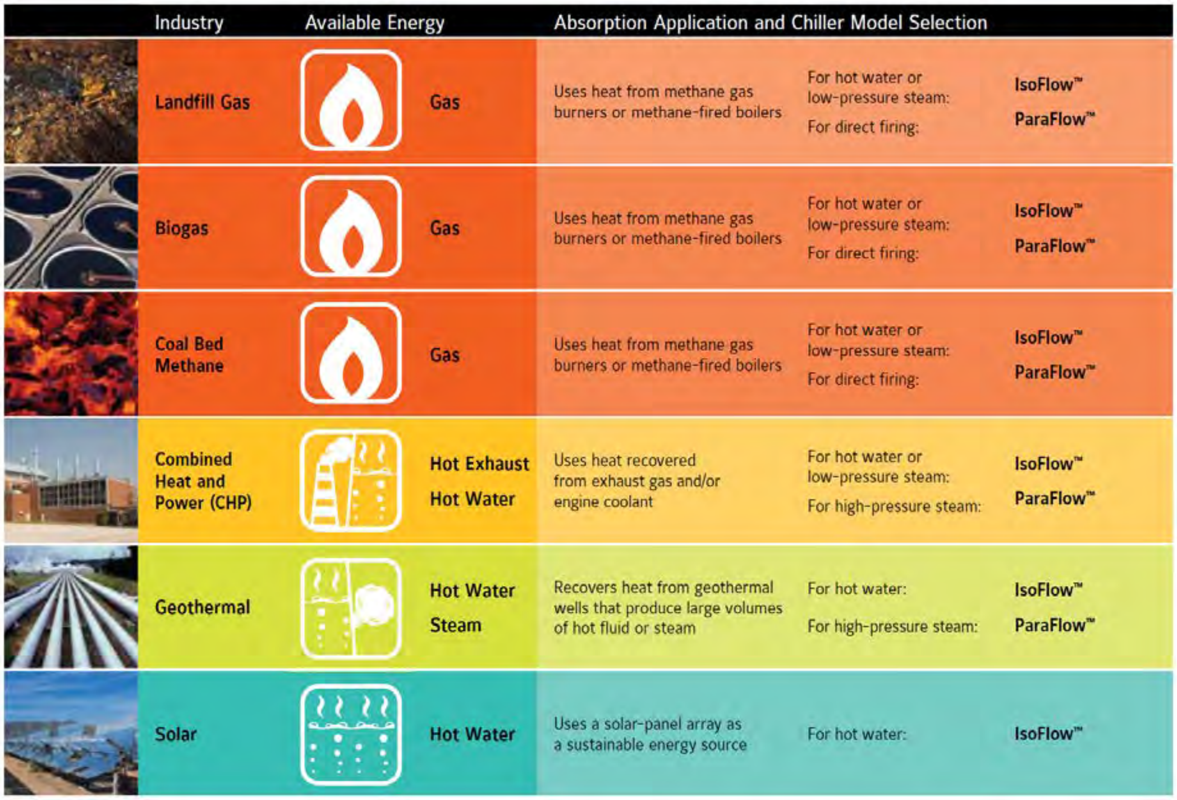
Another potential benefit of absorption chillers is for peak load reduction in the summer. During the summer time, the peak load is an important issue for both the rate payer and utilities companies. Since absorption chiller will not use electricity to drive the vapor compression (using only a small amount, about 2%-9% of the electricity of a similar size electric chiller [M003]).

In commercial applications where summer peak demand is of a concern, absorption chillers can team up with electric chillers in “hybrid” modes to lower the energy costs [M011]. In the summer, the absorption chillers can be used to reduce high peak electric demand charges; and during the winter, the electric chillers can be used (if there is a cooling need in winter) for higher efficiency [M011].

Due the possible availability of a waste heat source, industrial plants can provide good opportunities for the use of absorption chillers. Table 2 lists a range of typical industrial absorption cooling applications recommended by Johnson Controls [M004]). Most applications are associated with using cheaply available heat source or waste heat in industrial processes such as power generation, manufacturing, chemical production, or food processing. The waste heat can be in various forms such as steam, hot water, or exhaust gas suitable for different types of absorption chillers.

Table 2. Absorption chiller industrial application examples (source: [M004])

Industry	Available Energy	Absorption Application and Chiller Model Selection		
Petroleum and Chemical	Waste Heat	Uses heat from desalting and distillation (fractionation) processes	For hot water or low-pressure steam: For direct firing or high-pressure steam:	IsoFlow™ ParaFlow™
Brewery	Waste Heat	Uses heat recovered from cookers and kettles	For hot water or low-pressure steam:	IsoFlow™
Printing	Hot Air	Uses heat recovered from press drying units	For hot water:	IsoFlow™
Pulp Mill	Steam	Uses heat from the combustion of bark and lignin	For low-pressure steam:	IsoFlow™
Palm Oil Production	Steam	Uses heat recovered from sterilization, purification, and feed-stock preheating processes	For low-pressure steam:	IsoFlow™
District Energy	Steam	Uses low- and high-pressure district steam	For low-pressure steam: For high-pressure steam:	IsoFlow™ ParaFlow™
Incinerator	Hot Exhaust	Uses recovered heat from hot exhaust	For hot water or low-pressure steam:	IsoFlow™



Industry	Available Energy	Absorption Application and Chiller Model Selection		
Landfill Gas	Gas	Uses heat from methane gas burners or methane-fired boilers	For hot water or low-pressure steam: For direct firing:	IsoFlow™ ParaFlow™
Biogas	Gas	Uses heat from methane gas burners or methane-fired boilers	For hot water or low-pressure steam: For direct firing:	IsoFlow™ ParaFlow™
Coal Bed Methane	Gas	Uses heat from methane gas burners or methane-fired boilers	For hot water or low-pressure steam: For direct firing:	IsoFlow™ ParaFlow™
Combined Heat and Power (CHP)	Hot Exhaust Hot Water	Uses heat recovered from exhaust gas and/or engine coolant	For hot water or low-pressure steam: For high-pressure steam:	IsoFlow™ ParaFlow™
Geothermal	Hot Water Steam	Recovers heat from geothermal wells that produce large volumes of hot fluid or steam	For hot water: For high-pressure steam:	IsoFlow™ ParaFlow™
Solar	Hot Water	Uses a solar-panel array as a sustainable energy source	For hot water:	IsoFlow™

Major manufactures

The major chiller manufactures will also typically have absorption chiller product lines, such manufacturers include Carrier (United Technology Corporation), York (Johnson Controls), LG, and Daikin. As a manufacture specialized in absorption chillers, Broad has extensive product lines providing building related absorption chiller solutions [M001]. Another manufacture, Shanghai Shuangliang Eco-energy Systems (CO., LTD) also has a series of absorption chillers available [M002], some of which would be hot water based system that would be a good fit for building applications using moderate temperature heat sources (about 200F). Table 3 lists the major manufactures and their websites. Most of the manufactures provide a wide range of different types of absorption chillers for different applications.

Table 3. Example Absorption Chiller Manufactures

Manufacture	Website
Broad USA	http://www.broadusa.com
Shuangliang Eco-Energy Systems	www.shuangliang.com/en/
York International	http://www.york.com/
Carrier Corporation	http://www.carrier.com/
Trane	http://www.trane.com

LG	http://www.lg.com/
Daikin	http://www.daikinapplied.com/
Robur	http://www.robur.com/
Cooling Technologies, Inc.	http://www.coolingtechnologies.com/
Yazaki Energy Systems	http://www.yazakienergy.com
Thermax	http://www.thermax-usa.com/abcoolingbottom.htm
McQuay	http://www.mcquay.com

Economic Considerations

The economics of the implementation of absorption chillers can be affected by many factors. The major factor is the price ratio between the fuel price (or heat source price) and the electricity price. Figure 5 demonstrates this relationship.

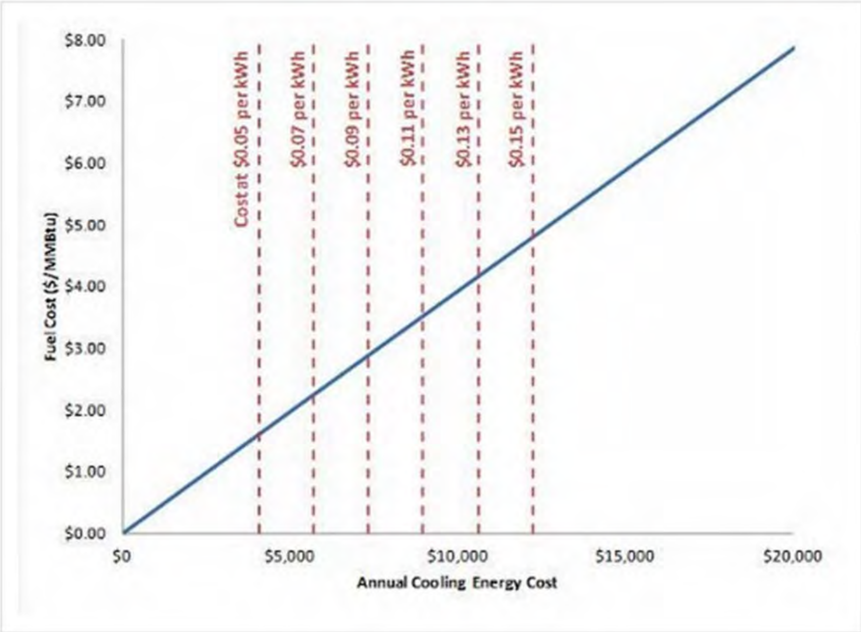


Figure 5. Fuel price vs. Electricity price for absorption chiller (Source: [M003])

When the electricity price is low, there is less of a cost advantage of using absorption chillers. However, when the electricity costs are high, absorption chillers become financially viable. For example, for the case shown in Figure 7, when a facility pays $0.10/kWh for electricity, the fuel needs to be cheaper than about $3/MMBtu in order for the absorption chiller to have an advantage. However, if the facility pays only $0.05/kWh for electricity, the fuel then needs to be no more than $1.5/MMBtu in order for the absorption chiller to be economical. There are also factors related to equipment costs, the chiller size, the application scenarios, and the fuel economy. In practice, many absorption chiller applications only prove economically feasible when the fuel is almost free (e.g. the waste heat scenario).

Equipment and installed cost

The equipment costs of absorption chillers are subject to various factors, such as type of absorption working media (e.g. ammonia-water vs. LiBr-Water), type of design (single effect vs. double effect), chiller size, and manufacturer. The focus of this report is on building cooling and heating related absorption technologies (specifically, LiBr-Water based). A 2017 study by the Department of Energy (DOE) [M008] reveals the following cost estimation according to chiller sizes:

Table 4. Absorption Chiller Capital and O&M Costs (Source: [M008])

(typical values for water/lithium bromide chillers)

Description	System						
	1	2	3	4	5	6	7
Design	Single stage			Two stage			
Heat Source	Hot Water		Steam (low pressure)	Steam (high pressure)		Exhaust Fired	
Nominal Cooling Capacity (tons)	50	440	1,320	330	1,320	330	1,000
Equipment Cost ($/ton)	$2,010	$930	$820	$1,190	$1,000	$1,330	$930
Construction and Installation ($/ton)	$3,990	$1,370	$980	$1,810	$1,200	$1,970	$1,070
Installed Cost ($/ton)	$6,000	$2,300	$1,800	$3,000	$2,200	$3,300	$2,000
O&M Costs (¢ / ton-hr)	0.6	0.2	0.1	0.3	0.1	0.3	0.1

Note: *Costs are based on multiple sources, including vendor data and discussions with industry experts. The values shown are composite results, and are not intended to represent a specific product.*

The equipment cost in the DOE study [M008] indicates that it is more economical to use larger size absorption chillers. For example, a relatively small 50 ton hot water driven single stage Li-Br absorption chiller will be much more expensive on a per ton basis compared to its larger counterpart (e.g. a 440-ton one). Therefore, from an economic perspective, it is beneficial to use large absorption chillers in current applications. Case studies further on in the report provide additional details on equipment and installation costs.

Southern Idaho climate adaption

Most of Idaho Power Company’s service territory is in southern Idaho. The 5b climate of this region is characterized by dry cold weather, but there are still significant cooling needs during the summer months.

Apart from building cooling needs, there could also be cooling needs in scenarios which are less climate dependent, such as large internal loads, ice-making needs, or the need to refrigerate or freeze food for processing.

Low grade heat source availability

There are several notable low grade heat sources in southern Idaho. For example, a municipally operated direct use geothermal energy system supplies hot water at about 175F, which is in the low range for driving an absorption chiller. Another type of heating source is the food processing industry in the region. In southern Idaho, there are a number of food processing, chemical and industrial processing plants that may be appropriate applications for absorption cooling.

A Case Study in South Idaho: food processing plant

A food processing facility was studied in detail. It generates waste heat that could be potentially used for absorption cooling. The plant has multiple glycol loops that remove heat and moisture generated from frying foods.

Basic setup

Through communication with the food processing plant facility managers, it was determined that with the current setup the glycol loops have a temperature of approximately 160-170F and the flow rate of the system is about 375 gpm at this condition. This temperature is slightly too low to drive a typical commercial absorption chiller, which typically operates in the temperature range of 185-200F. Therefore, some operational changes would be required to turn this into an effective heat source for absorption cooling.

The heat recovery glycol loop is shown in Figure 6 and Figure 7. The glycol loop takes heat from the chip frying exhaust to cool and remove moisture from the exhaust. The heated glycol loop then forms its own closed loop to heat the building (in winter) and provide domestic hot water.

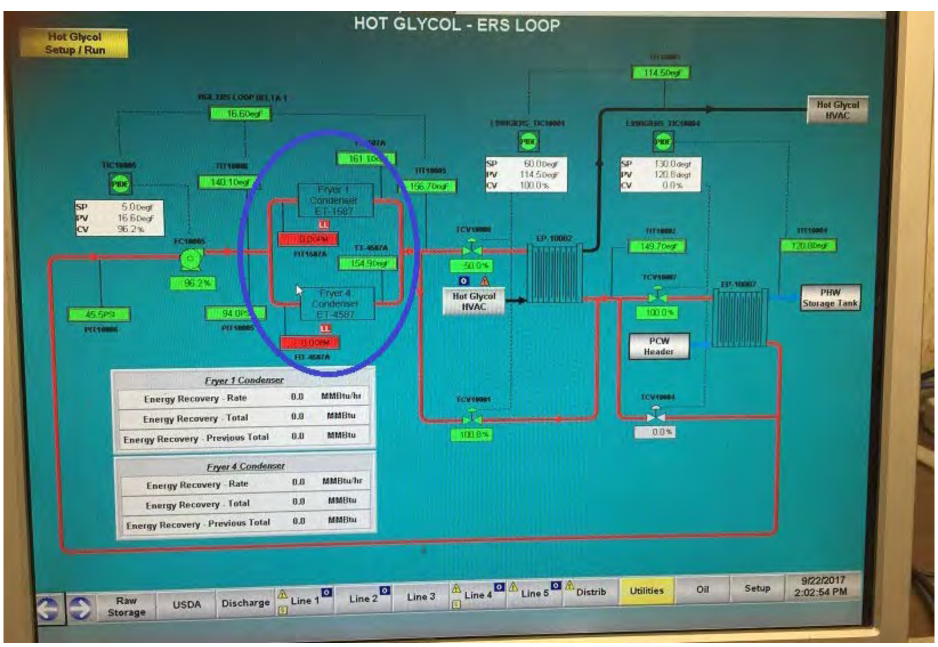


Figure 6. Configuration of the food processing plant heat recovery loop

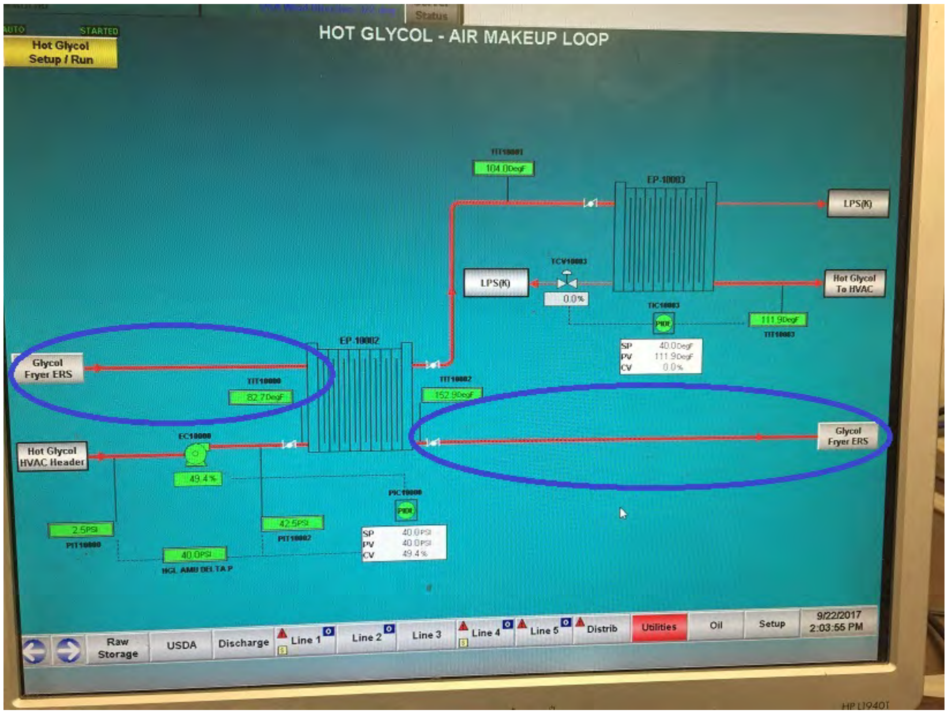


Figure 7. Configuration of food processing plant heat recovery loop (HVAC loop details)

Absorption cooling capabilities

The cooling capacity of any absorption chiller is related to the glycol flow rate, specific heat, density of the solution, and the temperature drop of the loop. The glycol solution specific heat is assumed to be full glycol at about 185 F, which is about 0.6 Btu/lb/F. The specific weight is around 1.09 times that of water. It is typical for the absorption chiller to have around 10 degrees of temperature drop (10 F) on the generator loop. Based on these assumptions, the heat recoverable could be estimated using the following equation:

Q = 375 gpm*1.09 * 8.1 lb/gallon * 0.6 Btu/lb/F * 10 F = 1191915 btu/hr. (2)

Now assuming that a single effect Lithium-Bromide-Water will be implemented, the COP of the absorption chiller is estimated to be about 0.7. This will allow the heat extracted from the glycol recovery loop to generate about 70 tons of cooling.

Right now, the plant has not actually tested raising the recovery loop water temperature to above 185-200F, which will presumably reduce the glycol flow rate (to < 375gpm). Therefore, as a conservative estimation, it can be assumed that 50 tons of cooling can be achieved if the temperatures could be adjusted to achieve a suitable temperature.

Cost related to the installation

For a typical 50-ton installation, the associated equipment cost for an absorption chiller is about $2000 per ton. Construction and installation cost is about $4000 per ton, which will yield an initial cost of $6000 per ton [M008]. The estimation is based on DOE studies that compared data from a few different manufactures and vendors quotes [M008]. The DOE source also shows that it is more economical to have larger absorption systems as the cost per-ton base is much smaller for larger equipment.

The absorption chiller cost is typically much higher than air-cooled or water-cooled electric chillers of the same cooling capacities. It is estimated that the equipment cost for an air-cooled chiller is typically around $350-$1000 per ton [M016], depending on the equipment size, with larger equipment being cheaper on the per-ton bases. For the water cooled electric chillers, the equipment cost is typically about $250-$600 per ton [M017]. Installed costs can vary widely based on different chiller types and application scenarios. Another source [M018], provided a total installed cost per ton estimated to be around $768 per ton for water cooled chillers and $703 for air cooled chillers of the size of 75 tons. Despite all the variation of the electric chiller installed costs, the initial cost of an absorption chiller is typically much larger than that of an electric chiller of the same size, especially for the case of smaller equipment.

Potential savings and payback period

The potential savings for the absorption chiller can be estimated with the following logic:

For a 50-ton absorption chiller, the heat source required to operate the chiller is assumed to be free in this setup, as they are treated as waste heat in the food processing. For an equivalent sized electric vapor compression chiller, by assuming an efficiency of 0.6kW/ton, the summer cooling season electricity consumption (for the four summer months from June to September) will be will be around 87,600 kWh.

Assuming that the absorption chiller will use 5% (source [M003] indicates 2-9%) of the electricity compared to an absorption chiller, the annual savings on summer cooling electricity usage for the absorption chiller over the electric chiller is around 83,220 kWh.

The food processing plant has an electricity rate of about $0.0585/kWh when combining the kWh and kW charges, according to an estimation based on the past three years of electric bills (information courtesy of Idaho Power Company). Assume this charge rate per kWh, a simple calculation yields the savings amount would be $4,869 per year.

Based on an initial equipment installed cost of about $300,000 ($6,000/ton for a 50-ton absorption chiller), and using a typical air-cooled chiller cost at about $35,000 (approximately $700/ton for an air-cooled chiller) [M018]. The payback period for the investment would be in the range of about 54 years.

Later when this analysis was conducted, the author also received another set of electricity cost data from the facility manager. The current electric structure is around $0.045 per kWh and on average a $5 per kW for demand charge. This will make the savings around $4,314 each year. This yields a simple payback of around 58 years, not far from the previous estimates.

Building cooling needs

It also necessary to know the facility cooling needs, in order to further examine if an absorption chiller is a feasible option. An investigation of the size of the facility indicates that the building needs much more cooling in summer than 50 tons. Although, at this site, only evaporative cooling fans are used in the space, so any additional cooling would significantly improve the thermal comfort of the employees. This could be an opportunity to apply larger absorption cooling equipment from the cooling demand side.

For the current building size, the 50 ton cooling is estimated to be only a small portion of the building's cooling load needs. However, if there are potentially more heat recovery loops available in the plants, and with adequate examination of the actual function of the each loop, there could be more loops adjusted to a higher operation temperature. It is recommended in the future to investigate the possibility of increasing the operating temperatures of other heat recovery loops to allow selection of a larger absorption chiller. This, of course, would involve operation experiments and careful feasibility validations to make sure the change would not affect the main food processing operations.

Extended investigation on the food processing plant case

Assuming that the food processing plant has potentially more heat sources (which is very possible as the facility management mentioned they had different loops of different temperatures), we can estimate the economics of absorption chiller installation if a 440 ton chiller was selected instead of a small 50-ton one. In this case, the estimated return on investment should be greatly improved, as the cost per ton will be greatly reduced for larger absorption chillers (according to source [M008]).

The estimated installed cost for a hypothetical 440 ton absorption chiller will be around $1,012,000 ($2,300 per ton based on source [M008]). The estimated cost of a water-cooled 440 ton electric chiller is approximately $220,000 ($500/ton based on source [M018]). The initial cost differential for the two types of systems is $792,000.

The savings differential for the absorption chiller vs. electric chiller (of 400 tons hypothetically) will be about 732,336 kWh based on the same estimation method used in the previous section.

For electricity rates, we will still use the same rate of about $0.0585/kWh combining the kWh and kW charge based on the past three years of electric bills analysis (courtesy of Idaho Power Company). Assuming this rate per kWh, a simple calculation yields the savings amount of a 440 ton absorption chiller would be $42,842 per year.

The overall return payback period will then be reduced to around 18.5 years. Considering that such a project will also be of value to the utilities, this simple payback period can be further reduced if the utility company is willing to offer incentives for the installation project.

Another factor to consider is the electricity price. Hypothetically, if the facility pays much higher electricity prices, for example $0.10/kWh, then the overall simple rate of return would be reduced from 18.5 years to about 10.8 years.

A Case Study in Boise: Brewery

A brewery with two major sites was studied in detail which are assumed to have similar brewery equipment. The IDL team focused on one of these sites.

The waste heat source in the brewery is in a desirable temperature range for absorption cooling applications. The brewery waste heat is at about 200-208F, which is an excellent range for the heat source to drive absorption chillers for building cooling. The current set up at the facility is to recover the heat using a cold water loop that harvests the heat from the brewery waste by cooling the waste heat flow from 200-208F to about 68F, and at the same time heating the cold water from 40F to around 180 degrees. For the size of the brewery, the waste heat source is flowing at a rate of flow rate of 30-33 gpm.

An attempt to visit the site was made in October but the arrangement could not be finalized in time to be included in this report. However, a general configuration for a Brewery application from a Johnson Controls' application document [M004] is illustrated in Figure 8 to explain the potential system setup. A difference between the system in Figure 8 and the one in the brewery is that the driving fluid is hot water of about 200-208F rather than steam indicated in the diagram. Nevertheless, it is still expected that such a configuration should have similarities to the brewery's system in terms of the general functionality and basic components.

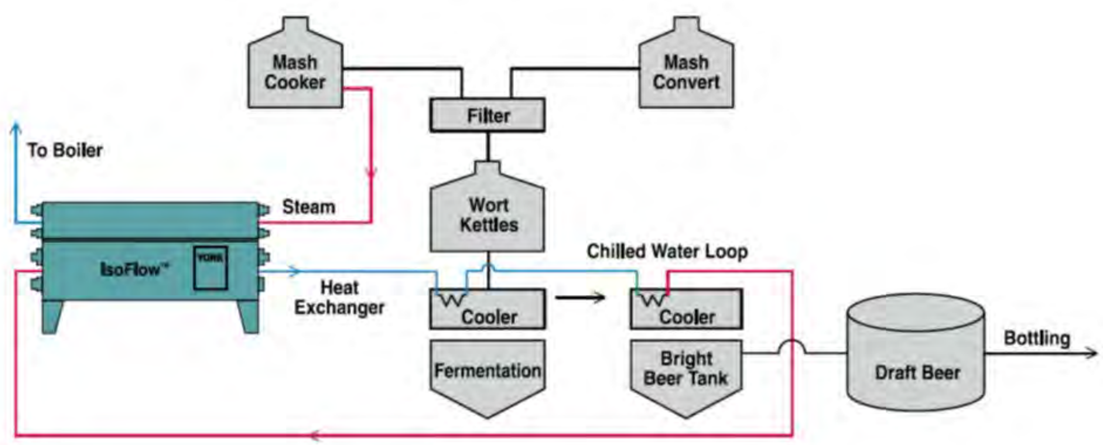


Figure 8. A typical absorption chiller and system setup to use waste heat from brewery [M004]

The amount of waste heat generated at this facility could generate 5 tons of cooling by using an absorption chiller. Practically, an absorption chiller of such a size would be more difficult to source from a typical manufacturer's catalog. However, it would be easy to scale up if the brewery has more capacity or plans for expansion.

The original cold water heat recovery can still be used after the waste heat fluid flows through the absorption chiller. After the absorption chiller cycle, the waste heat source temperature is still around 185F and a 40F cold water recovery loop can still very effectively take the waste heat out from the 185F waste heat water for domestic hot water heating.

If the building has a small need for HVAC cooling in the summer, it is very likely that simple DX system would be used for the current facility. Installing an absorption chiller at the site would require new chilled water loops, adding some complexities to its current systems. However, if the addition to a specific area is feasible and easy to implement, a smaller absorption chiller could be beneficial to the overall system performance. Moving forward, more coordination is required with the facility management team to conduct site visits and examine the mechanical design specifications in details.

For small applications, there are some developing trends for absorption chiller designs down to the size of 5 tons [M010]. However, for major manufactures, equipment this small is still not easily available—for example, Broad USA[M001] offers a minimum of 20 ton LiBr-Water hot water absorption chillers; Shuangliang Eco [M002] offers a minimum of 10 ton LiBr-Water hot water driven absorption chillers.

District Geothermal Heating Source

Another larger scale heat source is a municipal geothermal source. The system IDL studied supplies water to meet the heating demands in buildings along and around the municipal loop at 175F water. Although perfect for the district heating applications, the water temperature, is not efficient for absorption chiller applications at this temperature. Absorption chillers would require a higher supply temperature. This means that with the current district heating set up, using the distributed water to cool the buildings along the district is not a feasible solution.

In order to properly drive an absorption chiller, the heat source temperature typically needs to be higher than the heating water supply temperature. One plausible idea of saving energy is to use a natural gas fired boiler to raise the water temperature from 175F to around 200F to allow the end users to use absorption chillers in the summer. Although this seems to require only a small temperature rise by the natural gas fuel, there is actually no energy savings benefit in doing so compared to using a direct-fired absorption chiller. The reason is that, when the absorption chiller operates, the water temperature drop is typically small (e.g. around 10F). For example, for a 200F heating source, the outlet water of the absorption chiller will still be around 190F, which is well above the 175F. This means that the energy used by the absorption chiller is only on the top part of the heating source (from 190-200F), which is still of higher grade than 175F and is completely coming from the added heat by the natural gas burner. Therefore, the heat from geothermal water itself (175F) is in fact never used in the absorption cooling. Furthermore, if the exiting temperature of the absorption chiller is still higher than 175F, a portion of added heat is wasted (to the absorption chiller) compared to direct firing. Therefore, using a natural gas direct fired absorption chiller would actually be even more efficient than by using natural gas to raise the water temperature. For natural gas direct fired absorption chillers, since a higher flame temperature can be achieved, it is also possible to use more efficient double effect absorption chillers to gain higher efficiency. But in neither case would the absorption chillers be any more efficient than electric chillers.

Other potential applications in Idaho

Industrial chemical plant in eastern Idaho

An industrial chemical factory in eastern Idaho has a few chemical production plants that have waste heat resources. Currently, the waste heat is rejected via multiple cooling towers with a typical outlet temperature of 114F. A brief system summary was recently reviewed by the authors for the potential of using the waste heat for absorption cooling.

On the chemical reactor towers, there are two types of heat sources available: one is the 170F 93% sulfur acid; and the other is the 230F 98% sulfur acid. The 230F temperature could be a potential driving heat source for the absorption cooling. However, in the current design, the tower cooling water is existing only at a temperature of approximately 110-120F after harvesting the heat from the acid production towers. In order to use the 230F acid temperature, it is estimated that major changes may be needed on the cooling fluid side in order to obtain high enough temperatures for absorption chiller applications (185-200F). It is suggested to investigate this case in any future studies.

Northern Idaho

In the state of Idaho, it is not uncommon to have abundant wood and biofuel resources, especially in the northern part of the state. With biofuel or waste wood resources, direct fired absorption chillers can also be used in the summer, in remote locations where abundant natural fuel resources are available but power grid bears less load due to small populations. On the University of Idaho Moscow campus, an absorption chiller is used in the biofuel power generation plant to provide part of the summer cooling needs via the centralized district cooling and heating distribution system in the campus [M019]. Such direct fired absorption cooling applications would also be possible in southern Idaho when similar conditions of abundant biofuel resources exist.

Conclusions

In this study, absorption cooling technologies are introduced and their applications on potential projects in the southern Idaho region (Idaho Power Company's service territory) were investigated. As a technology with a history of more than half a century, the absorption cooling technology has gained ample development and reliable equipment for such applications has been developed for many years. The most suitable applications scenario for the technology features abundance of cheap or freely available waste heat sources of adequate grades (temperatures). Along with savings in total electricity consumptions, the absorption cooling technology is also a possible means to reduce summer peak loads to benefit the power grids.

Three potential application cases were selected for detailed studies in southern Idaho for the investigation of the feasibility and benefits of absorption technologies. These three cases represent three different application scales as well. The brewery is a local small business where adequate waste heat sources are available for absorption cooling in a small scale brewery plant. In this case, the waste heat from the brewery process is available with adequate temperatures to serve as the heat source to drive absorption cooling. The only limitation is the relatively small size of this facility. This small size limits the choices of commercially available equipment, and also increased the initial costs, and prolongs capital return periods. However, the application payback could be improved in the future if the brewery expands its production size or absorption cooling is used in breweries with larger production capacities.

The food processing plant case is a representative mid- to large scale application where a large amount of waste heat from food processing is available for absorption cooling. The investigation demonstrates potential for the waste heat to cover a small portion of summer cooling needs. The current limitation is the equipment size that makes the economic payback period very long. However, for this plant, there are other heat recovery loops that could be combined together to provide more heat source for additional absorption cooling. This will potentially increase the absorption cooling equipment size and also greatly improve the economics of the application. Further, a limitation at this stage is that some operation experiments and changes would be required to increase the waste heat recovery loop temperatures to adequately drive the absorption chiller. This change could involve moderate to high level of interactions with the food processing, which therefore needs very careful examination and concept validation before being implemented. It is recommended that these tests be coordinated in any future phases of the study.

The study also examined a larger scale a geothermal heat source. It is however, with the current setup, difficult to apply distributed absorption cooling applications due to the heating water distribution temperature limitations. Raising the geothermal loop temperature through biomass, solar thermal, or free waste heat from a power generation system is one possibility, but this would involve major capital investments and system modifications.

In addition, the study also briefly examined the available heat sources from a chemical production plant that has waste heat rejected by cooling towers at different temperatures. The cooling tower loop temperature is not high enough to be directly applied in absorption cooling. However, there are higher temperature sources from the acid towers that could be a possible heat source for absorption cooling, albeit major revisions to the production equipment might be required to utilize the heat from the source.

The report additionally examined the northern Idaho region, where wood and biofuel sources may be available for direct fired absorption chiller application. One example is the currently operating University of Idaho central plant which has an absorption chiller installed for part of the centralized cooling for the entire campus. For other regions in northern Idaho where wood and biofuel sources are easily retrievable, it would also feasible to use directly fired absorption technologies to meet summer cooling demands and reduce peak load in remote areas. This type of direct fired absorption technology is used globally through the use of household and industrial wastes, which may be available in southern Idaho where biomass from the forest product industry is not readily available.

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2017 TASK 7: HEAT PUMP CALCULATOR

SUMMARY OF PROGRESS

IDAHO POWER COMPANY EXTERNAL YEAR-END REPORT

December 31, 2017

Prepared for:
Idaho Power Company

Authors:
Elizabeth Cooper

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Authors:
Elizabeth Cooper

Prepared for:
Idaho Power Company

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Table of Contents

Acronyms and Abbreviations

GSHP	Ground-Source Heat Pump
HP	Heat Pump
IDL	Integrated Design Lab
IPC	Idaho Power Company
UI	University of Idaho
VRF	Variable Refrigerant Flow
WSHP	Water-Source Heat Pump

1. Introduction

The 2017 Heat Pump (HP) Calculator task was a continuation of work done by the University of Idaho Integrated Design Lab (UI-IDL) for Idaho Power Company (IPC) that was begun in 2013 and continued through 2016. Over the years, the tool has grown in its capabilities. Initially, a Heat Pump Energy Savings Calculator (HePESC) spreadsheet was developed in 2013, which was capable of hourly load calculations, energy consumption estimates using regression curves from simulation, and simple cost calculations. Details on 2013 effort, progress, and methods can be found in the IDL technical report number 1301_010-01, "*2013 Heat Pump Calculator – Development and Methodology*." The tool now does far more than estimate heat pump savings. It incorporates several climate design tools and has come to be known as the Thermal Energy Savings Tool (TEST). The work in 2014 improved the tool by means of verification and user feedback. The tool was further revised in 2015 based on outreach, adding a residential space-type, and incorporating several climate design tools. The work in 2016 included the unification of additional climate design tools to the calculator and the addition of seven unique weather files for sites around Idaho. The focus of the 2017 scope was on outreach, education, and customization. Details of this and the tool improvements based on feedback are outlined in this report.

2. Outreach and Education

The IDL reached out to several local architecture and engineering firms to gauge interest in the tool and receive feedback from new users. In addition to the calls and emails, the IDL presented a lecture on the tool at the Building Simulation User's Group meeting in May. The lecture was called TEST for Climate Design – how to use the Thermal Energy Savings Tool for efficient design. After this lecture, a number of viewers requested, and were sent a copy of the tool. Each time the tool was sent with a disclaimer that the tool could not guarantee savings, but was intended for general comparison between preliminary design iterations. IDL brought in a local HVAC supplier for an extended meeting to demonstrate the tool and receive feedback from someone in practice. This year also saw the acceptance of a journal article on the tool into the Energy & Buildings Magazine. The article is titled "Using a Passive Design Toolset to Evaluate Low-Cost Cooling Strategies for an Industrial Facility in a Hot and Dry Climate." The article is available online now on Science Direct. It was authored by Amir Nezamdoost, Elizabeth Cooper, and Damon Woods. The tool was also advertised at several lunch and learns that IDL delivered this past year. A brief write-up of the tool development will appear in the next Idaho ASHRAE newsletter. As a result, there continues to be intermittent requests for the tool. The IDL sends the tool with a disclaimer through the service WeTransfer as it is too large to attach in a traditional email. The goal is for the IDL to host the tool online as the IDL website is improved. Once there, the tool will be available for free download by those who create an account with IDL.

3. Feedback and Next Steps

Based on last year's feedback, several inputs were moved to the first page. This reduces the time that users had to spend going through different sheets to update the location and weather file. Now, the weather file and location on the first page feature drop-down selections. Once they are selected, the rest of the calculations automatically update to match that input.

There was concern that users would think the tool was limited to heat pump analysis. Therefore the Heat Pump Calculator was re-branded to the Thermal Energy Savings Tool (or TEST for climate design). This was to reflect the incorporation of the passive climate design tools and to show that the spreadsheet can be used for load analysis for any system. The IDL reached out to a dozen different architecture and engineering firms. The following table lists the contact point for each firm and individual who expressed interest in the tool as well as whether IDL received any feedback when the team followed up with that contact later in the year.

Firm	Engineer/Architect	Contact	Feedback?
		ENGINEERING	
Eng Firm 1	Redacted 1	redacted@engineeringFirm.com	No
Eng Firm 2	Redacted 2	redacted@engineeringFirm.com	Yes
Eng Firm 3	Redacted 3	redacted@engineeringFirm.com	No
HVAC Supplier	Redacted 4	redacted@engineeringFirm.com	Yes
Eng Firm 4a	Redacted 5	redacted@engineeringFirm.com	No
Eng Firm 4b	Redacted 6	redacted@engineeringFirm.com	Yes
Eng Firm 5	Redacted 7	redacted@engineeringFirm.com	No
Eng Firm 6	Redacted 8	redacted@engineeringFirm.com	Yes
		ARCHITECTURE	
Arch Firm 1	Redacted 1	redacted@archFirm.com	No
Arch Firm 2	Redacted 2	redacted@archFirm.com	No
Arch Firm 3	Redacted 3	redacted@archFirm.com	No
Arch Firm 4	Redacted 4	redacted@archFirm.com	Yes
Arch Firm 5	Redacted 5	redacted@archFirm.com	No
Arch Firm 6a	Redacted 6	redacted@archFirm.com	Yes
Arch Firm 6b	Redacted 7	redacted@archFirm.com	Yes

The most comprehensive feedback came from the HVAC supplier as the IDL provided an extended session going over the tool's operation together. The following points reflect all the feedback IDL received from different users based on the current state of the Thermal Energy Savings Tool:

- More information on the source of the equipment performance curves would be appreciated.
- The system selections are general and do not state some aspects, such as whether the VAV has a chiller or a cooling tower and whether the compressor is on/off or has a VFD.
- System costs need to be stated clearly – as the current costs are based solely on equipment, it can be disingenuous if piping costs etc. are not included.
- It needs to be stated clearly whether the heat pumps include electric back-up, how much is included and it needs to be clear how this is factored into the curves.
- It would be helpful to have the design day be adjustable by the user so that heat pumps are not sized the same way as VAV systems because they should rely on electric backups during the coldest conditions and not have their coils sized to it.
- The source of the equipment costs needs to be made explicitly clear.
- Prospective users could be small engineering firms that don't do sizing often such as […] Engineering Firm.
- The system setups were confusing for some.

- It would be helpful if one could upgrade just a portion of the system i.e. upgrading just the air handler as part of the VAV.
- The tool is great for early comparisons of simple systems.
- The graphical representations are very clean and could be used for early reporting.
- Further integration of the passive toolset so that the sizing is updated to reflect their implementation would be very interesting. Other tools offer comparisons between HVAC systems, but few offer a good method for including passive design strategies.
- The current code defaults in the tool are ASHRAE 90.1 – 2010. It would be more helpful if this were updated to the current code used in Idaho.

The IDL team has worked on some of these improvements already. There is now a method to enter custom equipment curves so that users may enter in their own values. The IDL will work with Idaho Power in order to prioritize future adjustments to the tool to make in 2018.

4. References

ASHRAE. (2013). Chapter 18: Nonresidential cooling and heating load calculations. In Ashrae handbook: Fundamentals. Atlanta, GA: ASHRAE.

Back-of-the-Envelope Calculator Version 2.0 (n.d.). Retrieved February 21, 2014 from Energy Center of Wisconsin website: http://www.ecw.org/project.php?workid=1&resultid=286.

Masy, G. (2008). *Definition and Validation of a Simplified Multizone Dynamic Building Model Connected to a Heating System and HVAC Unit* (Doctoral Thesis). Retrieved from website: http://bictel.ulg.ac.be/ETD-db/collection/available/ULgetd-11052008-145605/ (ULgetd-11052008-145605).

Mendon, V., & Taylor, T. (2014). Development of Residential Prototype Building Models and Analysis System for Large-Scale Energy Efficiency Studies Using EnergyPlus. *Building Simulation Conference* (pp. 457-464). Atlanta: ASHRAE/IBPSA-USA

Wilson, E., Metzger, D., Hrowitz, S., and Hendron, R. (2014). 2014 Building America House Simulation Protocols. National Renewable Energy Laboratory, Technical Reprot NREL/TP-5500-60988

5. Appendices

Appendix A: Climate Design Tools

INTEGRATED DESIGN LAB University of Idaho

Thermal Energy Savings Tabulator (TEST)

INTRODUCTION + INSTRUCTIONS

PURPOSE

This tool aims to provide designers, engineers, and manufacturers a quick and easy way to calculate energy savings from the application of different heat pump HVAC technologies early in the design process. Specifically, the tool supports analysis of air-source heat pumps (ASHP), water-source heat pumps (WSHP), and variable refrigerant flow (VRF) systems. The spreadsheet was developed by the University of Idaho Integrated Design Lab (UI-IDL) with funding from Idaho Power Company. To learn more about the development of the tool, please visit the UI-IDL's website here - idlboise.com.

The tool provides the means for detailed input of a custom building, geometry, and program, while using pre-cooked, whole-building simulations to aid in HVAC energy calculations. The tool always compares a baseline condition to a proposed condition. The baseline condition can represent a new construction code baseline, or could be used to define an existing building.

HOW TO USE THIS TOOL

The spreadsheets contain color coded cells that represent different functionalities. All cells, except for those that require user input, are locked to avoid confusion. However, the cells can be unlocked without a password for custom manipulation or for further insight into equations used for calculations. See below for the various cell's color-coded instructions and their specific descriptions:

Color Legend

Gold Cell:	Blue Cell:	Orange Text:	Flagged Cell:
user input	contains default value (overridable)	Reference hyperlink	hover for instructions

Introduction | Loads Input | Loads Results | AdvDesign | HVAC | Energy Cost Results | Results Summary | Calc Methods | TMY3 Data | LookupTables-Ref | Load_Calc_Engine | DailyCalcs | Solar HG | Custom Sched

TEST LOADS INPUT PAGE

Project : Climate: Boise Air Terminal Code Cycle: ASHRAE 90.1 2007

GENERAL BUILDING INFO

Building Location:	Boise, ID
Building Use:	Office
Total Building Area (ft²):	23500
Floor-to-Floor Height (ft):	10
Exposed Bldg Perimeter (linear ft)	314
Cooling Design Day Temp. (°F):	95
Heating Design Day Temp. (°F):	8
Number of Bedrooms:	3

Key Setpoints

Occupied Heating Setpoint (°F):	70
Unoccupied Heating Setback (°F):	64
Occupied Cooling Setpoint (°F):	76
Unoccupied Cooling Setback (°F):	82

Hours of Operation

Default Office Schedule Summary:
8a-5p, M-F. Low use Sat, vacant Sun.

View Other Schedules for Reference

Custom Schedule?: No

*Please click the hyperlink above to input a Custom Schedule.

**Custom schedule is required for Health, Assembly, or Other building use types.

ENVELOPE INPUTS

Code U-values of assemblies/glazing.

Construction Class: Heavy no carpet
Representative constructions

Floor Type	slab on grade
F-Factor:	0.73

Roof slope (degrees):	0
Roof azimuth (degree	

	Total Area (ft²)	U-Value (Btu/hr-ft²-°F)	Envelope Heat Rate (Btu/hr-°F)	Glazing Area (ft²)	Glazing U-Value (Btu/hr-ft²-°F)	Glazing SHGC	Percent Shaded
(All vert. walls)		0.064			0.20	0.32	0%
North	3800	0.064	189.4	840	0.20	0.32	0%
South	3800	0.064	189.4	840	0.20	0.32	0%
East	2480	0.064	112.0	730	0.20	0.32	20%
West	2480	0.064	112.0	730	0.20	0.32	0%
NW	0	-	0.0	0	-	-	0%
NE	0	-	0.0	0	-	-	0%
SW	0	-	0.0	0	-	-	0%
SE	0	-	0.0	0	-	-	0%
Roof	5890	0.048	282.7	0	-	-	0%
Floor	5890	0.033	229.2		(Btu/hr-°F)	(Btu/hr)	
Totals	24340		1,115	3,140	628	97,114	

INTERNAL HEAT GAIN INPUTS:

Occupant Heat Gains

People per 1000 ft2:	5
Activity Level:	
Seated, very light work (office, hotel, apartment)	
Sensible HG per Occupant (Btu/hr):	245
Latent HG per Occupant (Btu/hr):	155
Radiant Fraction:	44%
Total Building Area (ft²):	23500
Number of People:	117.5
Occupant Sensible HG (Btu/hr):	28788
Occupant Latent HG (Btu/hr):	18213
Occupant Total HG (Btu/hr):	47000

Plug Load Heat Gains

Use Inventory Method?	No
Inventoried Total Power (W):	
--OR--	
Equip. Power Density (W/ft2):	0.75
Radiant Fraction:	30%
Total Equipment HG (Btu/hr):	60,137

Lighting Heat Gains

Include Daylighting Calcs?	No
Luminaire Type:	
Downlight compact fluorescent	
Radiant Fraction:	10%
Lighting Power Density (W/ft2):	1
Special Allowance Factor:	1
Option 1 Lighting HG (Btu/hr):	80182
--OR--	
Daylight Factor (DF) (%):	2.67%
Toplighting:	
Toplighting Factor:	#N/A
DF from Toplighting (%):	#N/A
Total Daylight Factor (%):	#N/A
New Sens. HG Rate (BTU/hr-ft2):	
Option 2 Lighting HG (Btu/hr):	0
Total Lighting HG (Btu/hr):	80,182

OUTDOOR AIR INPUTS:

Mechanical Ventilation

Number of People:	117.5
Total Building Area (ft²):	23500
Occupant Ventilation (CFM/person):	5
Space Ventilation (CFM/ft2):	0.06
Total (CFM):	1997.5
Heat Gain Constant (Btu/hr*cfm°F):	0.99
Ventilation Heat Rate (Btu/hr-°F):	1,983.9

Infiltration

Total Building Exterior Area (ft²):	18450
Building Shell Tightness:	Leaky
Infiltration Rate (CFM/ft²):	0.1622
Infiltration (CFM):	2992.6
Heat Gain Constant: (Btu-min/ft3-°F-hr)	0.99
Infiltration Heat Rate (Btu/hr-°F):	2,972.3

Simple Balance Point

Average Operation (hrs/day):	7.98
Potential HG Rate (Btu/hr):	284432
Qi (Btu/hr):	94551.1
Heat Loss Rate (Btu/hr-°F):	6699.0
Balance Point (°F):	55.9

HVAC INPUT PAGE

System Parameters

Sizing Factors

Cooling:	1.15
Heating:	1.25

Loads w/ Sizing Factors (Equipment Sizing)

300,133 Clg (Btu/hr)
336,694 Htg (Btu/hr)

Reference Occupant Density

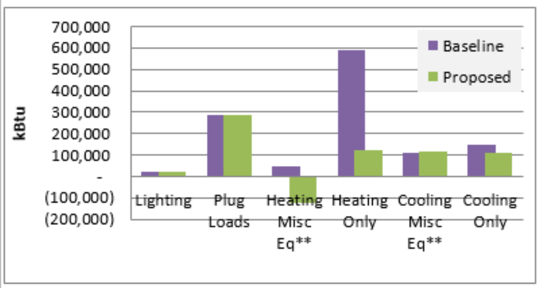
5 occ/1000sf
low density designation

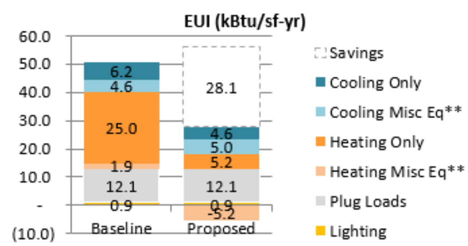
System Selection

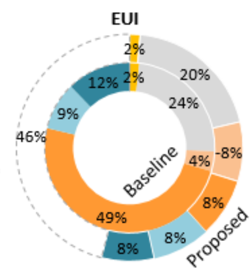
	Baseline			Proposed		
System Category:	Commercial			Commercial		
Comm. System Type:	System 7 - VAV			VRF		
Comm. System Size:	< 65,000 btu/hr			< 65,000 btu/hr		
Comm. Efficiency	Baseline			High Performance		
	SEER	COP	Therm Eff.	SEER	COP	Therm Eff.
Efficiency Report: Cooling	0	3.00	N/A	0.0	4.19	N/A
Heating	0	0	0.8	0	3.26	0

ENERGY RESULTS

Baseline EUI (kBtu/sf-yr)	Proposed EUI (kBtu/sf-yr)	EUI Savings	Baseline Annual Usage (kBtu)	Proposed Annual Usage (kBtu)	% Savings
50.8	22.7	28.1	1,193,160	532,775	55%





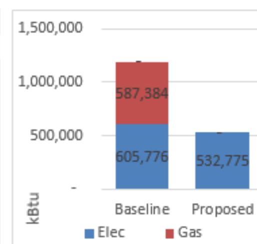


Energy Consumption by End Use

End Use	kBtu Baseline	kBtu Proposed	kBtu Savings	EUI Baseline	EUI Proposed	EUI Savings	% Savings
Lighting	21,512	21,512	-	0.9	0.9	-	0.0%
Plug Loads	284,885	284,885	-	12.1	12.1	-	0.0%
Heating Misc Eq**	45,291	(121,657)	166,948	1.9	(5.2)	7.1	368.6%
Heating Only	587,384	121,657	465,727	25.0	5.2	19.8	79.3%
Cooling Misc Eq**	108,626	118,661	(10,035)	4.6	5.0	(0.4)	-9.2%
Cooling Only	145,462	107,717	37,745	6.2	4.6	1.6	25.9%
Total	**1,193,160**	**532,775**	**660,385**	**50.8**	**22.7**	**28.1**	**55.3%**

Energy Consumption by Fuel Type

Fuel	kBtu Baseline	kBtu Proposed	kBtu Savings	EUI Baseline	EUI Proposed	EUI Savings	% Savings
Elec	605,776	532,775	73,001	25.8	22.7	3.1	12%
Gas	587,384	-	587,384	25.0	-	25.0	100%
Propane	-	-	-	-	-	-	
Oil	-	-	-	-	-	-	



**Miscellaneous Equipment is only reported separately for systems from the Commercial category.

TEST - Loads Results

PEAK LOAD RESULTS

Normalized Loads Table:

Component	Htg Load (Btu/hr-°F)	Cooling Load (Btu/hr-°F)
Envelope	1,115	1,115
Glazing (Cond)	628	628
Ventilation	1,984	1,984
Infiltration	2,972	2,972

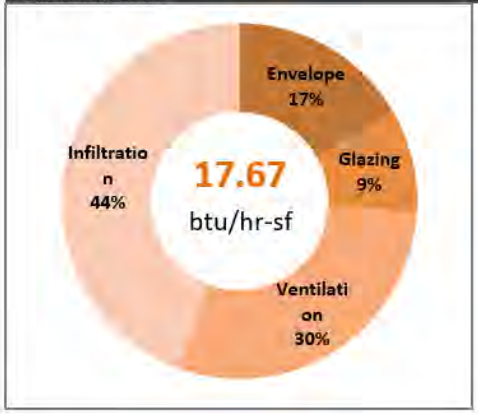
Internal Gains Summary Table:

Component	Htg Load (Btu/hr)	Cooling Load (Btu/hr)
Glazing (Solar)	n/a	97,114
People	n/a	47,000
Lights	n/a	80,182
Plug Loads	n/a	60,137

Peak Loads Summary (at Design Day Temps):

Component	Htg Load (Btu/hr)	Cooling Load (Btu/hr)
Envelope	69,119	21,182
Glazing	38,936	109,046
Ventilation	123,004	37,695
Infiltration	184,281	56,473
People	n/a	47,000
Lights	n/a	80,182
Plug Loads	n/a	60,137

Peak Heating Load:



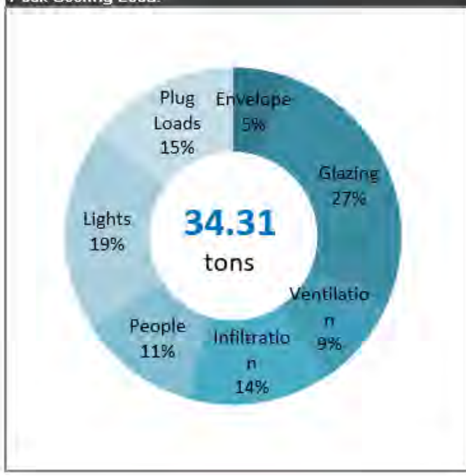
Non-Coincident Peak Heating Breakdown:

415,340	btu/hr
17.67	btu/hr-sf
121.73	kw

Coincident Peak Heating:

269,355	btu/hr
11.46	btu/hr-sf
78.94	kw

Peak Cooling Load:



Non-Coincident Peak Cooling Breakdown:

411,714	btu/hr
17.52	btu/hr-sf
34.31	tons
684.94	sf/ton

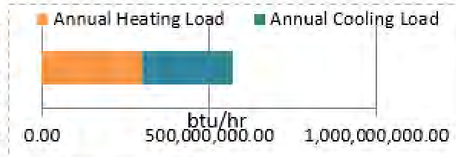
Coincident Peak Cooling:

260,985	btu/hr
11.11	btu/hr-sf
21.75	tons
1080.52	sf/ton

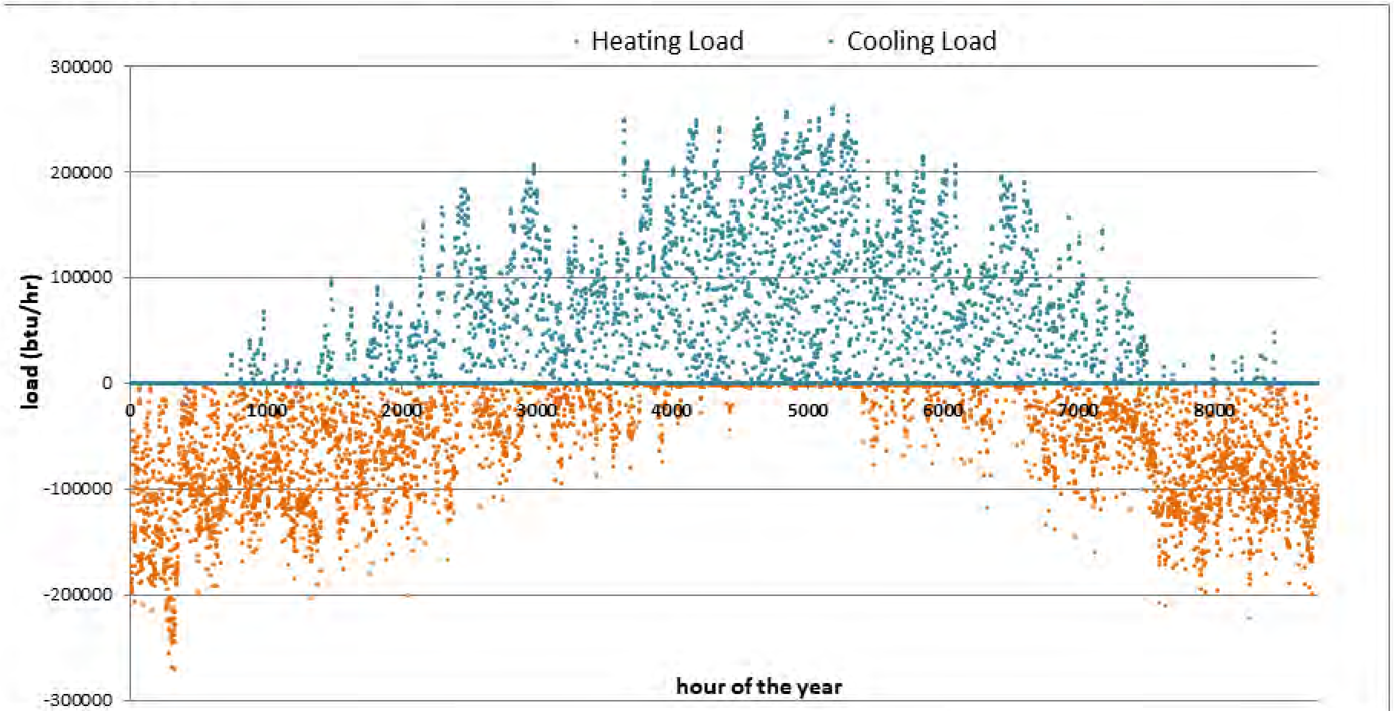
TEST - Loads Results

HOURLY LOADS:

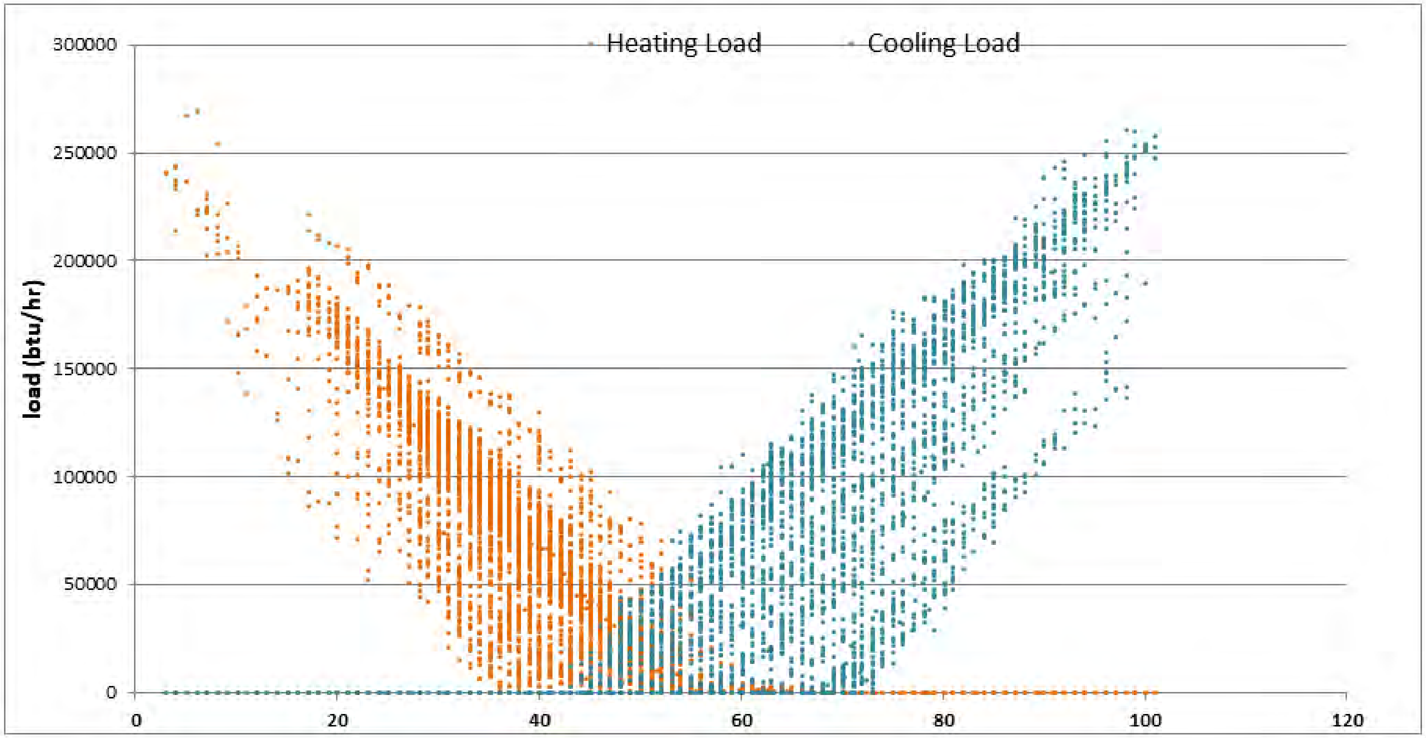
	btus	kBtu	kWh	Therms	%of total
Annual Heating Load	300,374,649	300,375	1,024,921	3,004	52%
Annual Cooling Load	272,023,701	272,024	928,183	2,720	48%
Total Annual Load	572,398,349	572,398	1,953,104	5,724	100%



Hourly Load Profile



TEST - Loads Results



TEST - Results Summary

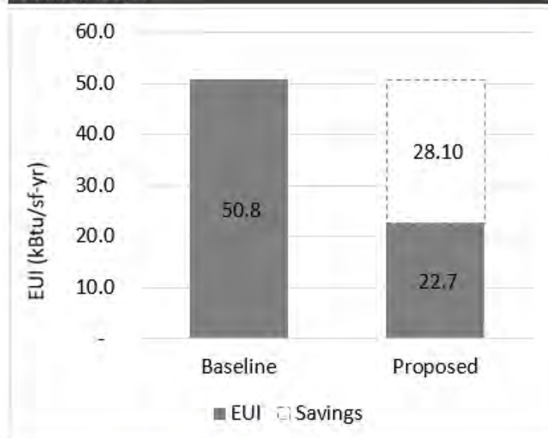
Final Comparison Stats

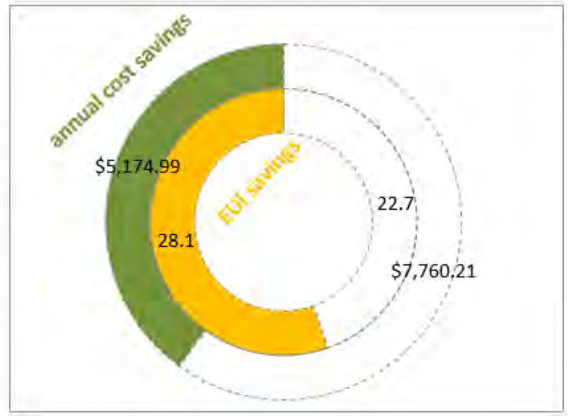
Syst	B+P	Baseline System = Furnace - Gas	roposed System = Heat Pump variable spee	Iteration:

Item	Units	Baseline	Proposed	Savings Value	Savings %
EUI	kBtu/sf-yr	50.8	22.7	28.1	55.3%
Total Energy	kBtu	1,193,160	532,775	660,385	55.3%
Energy (by fuel)	kWh	177,536	156,141	21,395	12.1%
Energy (by fuel)	therms	5,874	0	5,874	100.0%
Total Cost	$	$12,935	$7,760	$5,175	40.0%
Cost (by fuel)	kWh $	$8,824	$7,760	$1,063	12.1%
Cost (by fuel)	therm $	$4,112	$0	$4,112	100.0%

Item	Units	Baseline	Proposed	Incr Cost	Smp Payback
Capital Cost	$	$125,671	$178,279	$52,608	11 years
LCCA Savings	$	$14,751			

Summary Charts





TEST - Advanced Design Strategies

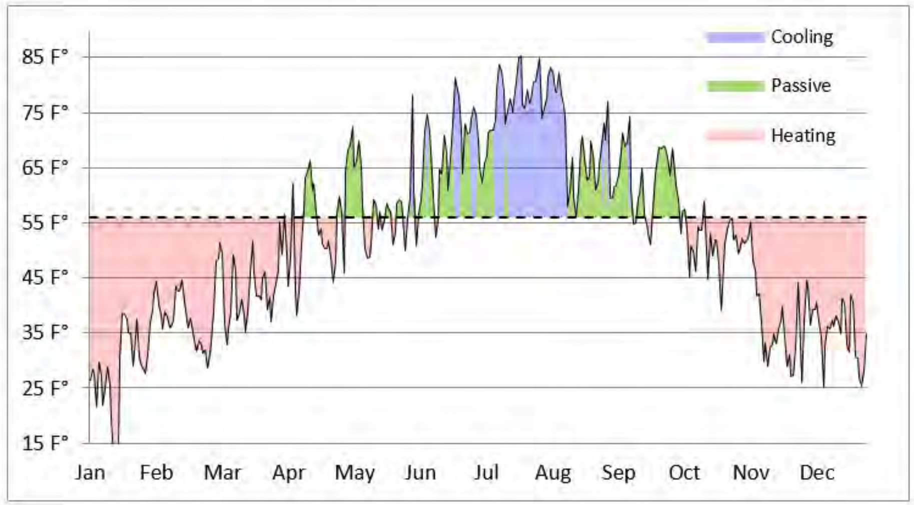
PASSIVE COOLING & NATURAL VENTILATION

Objective: Use natural outdoor air movement and pressure differentials to reduce cooling and ventilation loads.

Benefits: Reduction in fan and cooling energy, longer equipment life, potential equipment downsizing or elimination, greater connection to the outdoors.

Simple Balance Point Feasibility Study

Average Operation (hrs/day):	7.98
Potential HG Rate (Btu/hr):	284,432
Qi (Btu/hr):	94,551
Heat Loss Rate (Btu/hr-°F):	6,699
Balance Point (°F):	55.9



Setpoints

Occupied Cooling Setpoint (°F):	76
Unoccupied Cooling Setback (°F):	82
Temperature difference allowed (°F):	3
Lowest Temp. allowed for open windows (°F):	64

Results

# of Hours with Potential for Passive Strategy:

2,298	26%

# of Hours During Occupied Times:

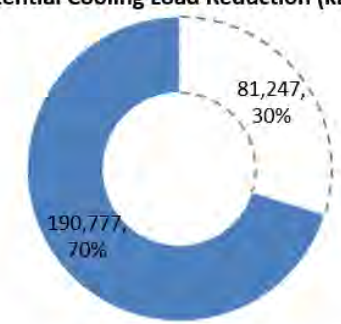
1,240	26%

Sum of Potential Cooling Load Reductions (kBtuh)

81,247	30%

Potential Hours

Potential Cooling Load Reduction (kBtuh)



TEST - Advanced Design Strategies

CROSS VENTILATION

Objective: To passively cool a building by capturing the prevailing winds during the summertime and channeling them through a space

Benefits:

Reduction in fan and cooling energy, longer equipment life, potential equipment downsizing or elimination, greater connection to the outdoors.

Inputs:

Cv Effectiveness Factor: 0.35
Area of openings for analysis (ft2): 150
Effective opening factor: 0.45
Area of operable opening (ft2): 67.5
Wind speed reduction factor: 0.5

Façade	Glazing Area (ft2)
North	840
South	840
East	730
West	730
NW	0
NE	0
SW	0
SE	0

Wind Rose Analysis Period: **All Months**

Results

# of Hours with Potential for Cross Ventilation:

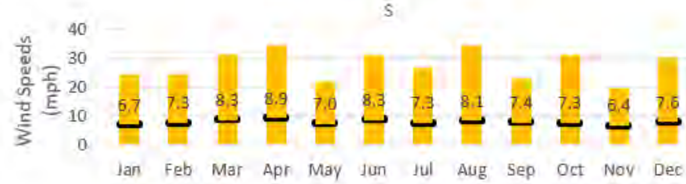
475	5%

# of Hours During Occupied Times:

202	4%

Sum of Potential Cooling Load Reductions (kBtuh)

17,931	7%



TEST - Advanced Design Strategies

STACK VENTILATION

Objective: To passively cool a building. Stack ventilation relies on the buoyancy, pressure differentials, and fluid dynamic properties of air to drive ventilation throughout a building. It useful when site, building, or climate constraints limit the amount of wind and effectiveness of cross ventilation.

Benefits: Reduction in fan and cooling energy, longer equipment life, potential equipment downsizing or elimination, greater connection to the outdoors.

Inputs:

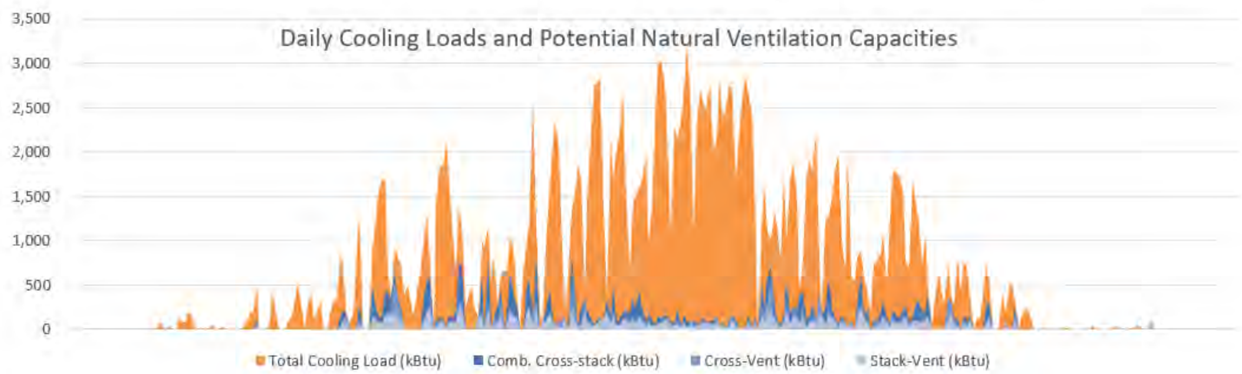
Working area (ft2):	25
Stack height (ft):	16
Discharge coef. for openings:	0.65

Results

# of Hours with Potential for Stack Ventilation:		# of Hours During Occupied Times:		Sum of Potential Cooling Load Reductions (kBtuh)	
942	11%	599	13%	16,862	6%

COMBINED CROSS VENTILATION & STACK VENTILATION

# of Hours with Potential for Combined Vent.:		# of Hours During Occupied Times:		Sum of Potential Cooling Load Reductions (kBtuh)	
942	11%	599	13%	40,515	15%



TEST - Advanced Design Strategies

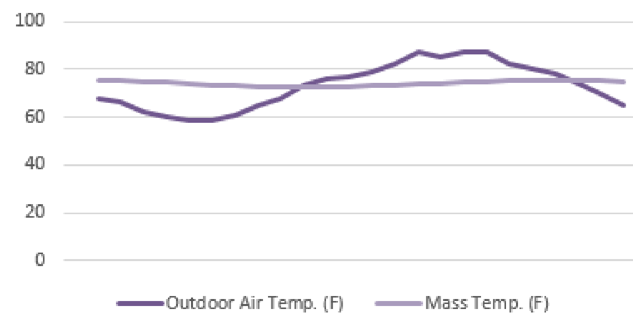
NIGHT FLUSH VENTILATION

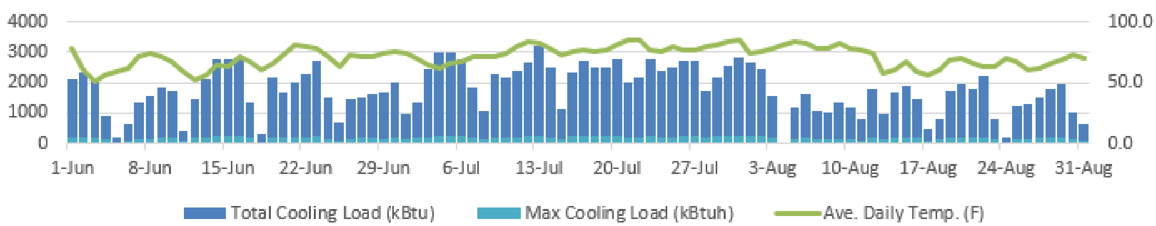
Objective: This strategy involves designing a building with high thermal mass and ventilating during the night. The thermal mass will absorb the heat gained inside a building during the day, effectively acting as a heat sink, and this heat can be removed at night so that the cycle can continue.

Benefits: Reduction in fan and cooling energy, longer equipment life, potential equipment downsizing or elimination, and improved occupant comfort. This strategy addresses the most important component of thermal comfort, seeing as most of our thermal perception as human beings is based off of surface and radiant temperatures.

Inputs:

Floor area (ft2):	5,890
Zone volume (ft3):	235,000
Mass surface area (ft2):	10,000
Mass surface area to floor area ratio:	2
Mass volume (ft3):	10,000
Density of thermal mass (lb/ft3):	140
Specific heat of thermal mass (Btu/lb-°F):	0.21
Mass heat capacity (Btu/°F):	294,000
Mass surface conductance (Btu/hr-ft2-°F):	1





Calculated Results:

Max hourly storage capacity (Btu):	154,384
OSA temp. during largest hour (F):	59.0
Mass temp. during largest hour (F):	73.9
Required flow rate for max (CFH):	41,443
Air changes per hour:	0.18
Night Flush Design Flow Rate (CFM)	**691**

# of Hours with Potential for Night Flush:

565	6%

Sum of Potential Cooling Load Reductions (kBtuh)

25,063	9%

Design Day Results: 15-Jul

Outdoor Air Temp. (F)	Mass Temp. (F)	Mass Storage Capacity (Btu)
68.0	55.6	133,862
66.0	55.2	149,109
62.1	54.9	183,637
60.1	54.7	197,191
59.0	54.6	201,284
59.0	54.5	194,437
61.0	54.5	168,024
64.9	54.6	122,709
68.0	54.8	87,935
73.0	54.9	34,544
75.9	55.2	4,569
77.0	55.6	-6,386
79.0	55.9	-25,969
82.0	56.3	-55,686
87.1	56.7	-104,192
84.9	57.1	-79,048
87.1	57.4	-97,959
87.1	57.5	-94,627
82.0	57.6	-41,009
80.1	57.8	-19,814
78.1	57.8	660
73.9	57.9	42,038
70.0	57.8	80,208
64.9	57.8	127,880

Total Potential Cooling (Btu): **1,728,086**
Sensible Cooling Rate (Btuh): **72,004**

TEST - Advanced Design Strategies

PASSIVE SOLAR

Objective: Passive solar design is perhaps one of the oldes and most popular passive strategies utilized in cotemporary practice today. While there are many types of passive solar systems, i.e. trombe wall, sunspace, roof pond, etc., this tool focuses on direct gaim system coupled with thermal mass.

Benefits: Significant reductions in annual heating energy are possible in our heating-dominated idaho climates.

Inputs:	
Mass Thermal Storage Capacity	Concrete
Mass Thickness (in.)	6
Area of Exposed Thermal Mass (sq. ft.)	350
Ratio of Mass to Glazing Area	0.4
Number of Glazing Panes	2
Night Insulation	No

Annual Heating Energy With Out Passicve Solar	587,384
Overall Heat Loss	1.61
Recommended Overall Heat Loss	

Load reduction is not sufficient and overall passive solar savings and convervation efforts will suffer. Consider tips below before proceeding

Thermal Mass System Designation	Thermal Storage Capacity (Btu/sf-degF)	Mass Thickness (in)	Ratio of Mass to Glazing Area	No. of Glazings	Night Insulation
DG-A1	30	2	6	2	no
DG-A2	30	2	6	3	no
DG-A3	30	2	6	2	yes
DG-B1	45	6	3	2	no
DG-B2	45	6	3	3	no
DG-B3	45	6	3	2	yes
DG-C1	60	4	6	2	no
DG-C2	60	4	6	3	no
DG-C3	60	4	6	2	yes

Choose thermal mass system designation: DG-C1

Area of South vertical windows	840
Area of 45 degree inclined southern glazing	150

Ap 946.1 LCR 39.95

Percent Energy Saved 28.88%

Pre Passive Solar	587,384
Post Passive Solar	417,728
Solar Energy Savings	169,656

2017 Task 8: Daylighting Training

Summary of Efforts and Progress

Idaho Power Company External Year-End Report

September 11, 2017

Prepared for:
Idaho Power Company

Authors:
Elizabeth Cooper

Report Number: 1701_001-08

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Prepared by:
University of Idaho Integrated Design Lab | Boise
306 S 6th St. Boise, ID 83702 USA
www.uidaho.edu/idl

IDL Director:
Elizabeth Cooper

Authors:
Elizabeth Cooper

Prepared for:
Idaho Power Company

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DISCLAIMER

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ACRONYMS AND ABBREVIATIONS

AIA	American Institute of Architects
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
BEQ	Building Energy Quotient
BOMA	Building Owners and Managers Association
EMS	Energy Management System
HID	High Intensity Discharge
IDL	Integrated Design Lab
IPC	Idaho Power Company
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
Op-Ed	Opinion Editorial
TI	Tenant Improvement
UI	University of Idaho

1. Introduction

Idaho Power, in partnership with the University of Idaho's Integrated Design Lab, provided daylight training sessions for local professionals. This training enhanced knowledge of, and appreciation for, daylight, and kept professionals informed of the latest advances in daylighting technologies. The sessions discussed the fundamentals of daylighting design and its implications on visual comfort, thermal comfort, building energy performance and electric lighting control systems.

2. Project Summary

The objective of this task was to continue education and training sessions surrounding the daylighting control systems installed at the IDL and any other approved partner sites to electrical contractors and design professionals on an alternating year basis, as market needs warrant. In 2016, the existing lighting controls in the lab were recommissioned. Lighting controls that were not properly functioning were fixed. All of the new lighting control equipment was commissioned for proper functionality. Manuals for all of the installed lighting control equipment were gathered and all of the installed systems were documented. A market needs assessment was performed in Q3 of 2016 to determine the need for a daylighting class as well as to help develop the curriculum for the class. This survey was sent to a total of 210 individuals of which we received 18 responses. A detailed marketing plan was developed and in accordance with the marketing plan marketing materials were produced. Marketing for the 2017 classes continued into January 2017. The daylighting training was offered as two one-day workshops. The sessions were held March 21-22 (A), April 18-19 (B), and May 9-10 (C).

This scope included education and training for existing technology and any additional installed or updated systems or technologies. A copy of the workshop program can be found in Appendix C.

3. Workshop Results

In the six days of the three sessions there were 27 total attendees with the largest session being the first, with very low attendance for the second session (Figure 1). We speculate that there may have been competing courses offered through other providers around the time of the second session that targeted electrical contractors and that provided CEUs which may have led to fewer attendees. The professions represented at the sessions included; architects, designers, electrical engineers, and electrical contractors (Figure 2). Many of the attendees (30%) indicated ‘other’ as their profession, but we do not have additional information for them. In the future, it is recommended that we provide an opportunity for them to give us their profession if they chose ‘other’. This additional line would help us better know where to market the course in the future and how best to tailor the information to suit the needs of the industry.

Attendees were asked to fill out an evaluation form following the course. A copy of which is provided in Appendix B. The information from the respondents indicates that there is some room for improving the course, although the rating of the instructor’s subject knowledge was excellent, and the opportunity for questions was good. The content of the presentation was rated ‘just right’, but in general the presentations were only rated at just under 4 out of a possible best of 5. One of the open-ended recommendations that was made a few times indicated that some of the information presented may be out-of-date. Should this class be offered in the future, efforts should be made to update any materials related to current available technologies and currently adopted codes. In addition to these comments, some attendees suggested that the instructor could provide a more polished and clear presentation.

In summary, the overall content of the courses was considered just right, and the instructor's knowledge excellent. However, attention should be paid to the appropriate target audiences for marketing efforts, and classes should be scheduled to avoid other lighting courses offered at or near the same time. The course content should be reviewed to assess the relevance to current available technologies and codes.

RESEARCH/SURVEYS

Table 3. 2017 Research/Surveys

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2017 Energy Efficiency Campaign Awareness Survey	Residential	Idaho Power	Idaho Power	Survey
2017 Energy Savings Guide Survey	Residential	Idaho Power	Idaho Power	Survey
2017 Home Energy Audit Program Survey	Residential	Idaho Power	Idaho Power	Survey
2017 Smart Saver Pledge	Residential	Idaho Power	Idaho Power	Survey
Idaho Power Drying Rack Project Post-Survey	Residential	Idaho Power	Idaho Power	Survey
Idaho Power Energy-Saving Kit Program Summary Report 2017 A	Residential	RAP	Idaho Power	Survey
Idaho Power Energy-Saving Kit Program Summary Report 2017 B	Residential	RAP	Idaho Power	Survey
Idaho Power Shade Tree Survey	Residential	Idaho Power	Idaho Power	Survey
WAQC Customer Satisfaction Surveys	Residential	Idaho Power	Idaho Power	Survey
Weatherization Solutions Summary Report	Residential	Idaho Power	Idaho Power	Survey

Idaho Power Weatherization Programs

1. Do you recall seeing any recent ads from Idaho Power on ways to save energy?
(asked of all respondents)

Options	Responses	Percent
Yes	169	49.27%
No	174	50.73%
Answered	343	

2. Where did you see, or hear, a recent Idaho Power advertisement about ways to save energy?
(asked only of respondent who recalled seeing or hearing at least one ad)

Options	Responses	Percent
Television	62	36.69%
Radio	5	2.96%
Newspaper	21	12.43%
Hulu	1	0.59%
Pandora	3	1.78%
Facebook/Instagram	25	14.79%
Weatherbug	0	0.00%
Connections newsletter	115	68.05%
Other	3	1.78%
Answered	169	

3. Which, if any, of the following message topics do you recall from the ad(s) you saw or heard?
(asked only of respondents who said they saw or heard the ad on television or Hulu)

Options	Responses	Percent
You Have the Power to Save	12	18.75%
Energy Savings Made Easy	40	62.50%
Home Energy Audits	18	28.13%
Energy Savings Kits	34	53.13%
Heating and Cooling Tips	29	45.31%
None of these	2	3.13%
Answered	64	

4. Which of the following ads from Pandora or Weatherbug do you recall?
(asked only of respondents who said they heard the ad on Pandora or Weatherbug)

Options	Responses	Percent
Power to Save: EE Bulb	2	66.67%
Power to Save: EE Ductless	1	33.33%
Power to Save: Small Horizontal	0	0.00%
Power to Save: Large Horizontal	0	0.00%
None of these	0	0.00%
Other	0	0.00%
Answered	3	

5. Which of the following ads from Facebook or Instagram do you recall?
(asked only of respondents who said they saw the ad on Facebook or Instagram)

Options	Responses	Percent
Bulbs	11	44.00%
Fan	6	24.00%
Thermostat	10	40.00%
None of these	4	16.00%
Other	2	8.00%
Answered	25	

6. Which of the following newspaper/newsletter ads do you recall?
(asked only of respondents who said they saw the ad in a newspaper or Connections*)*

Options	Responses	Percent
Overall Power to Save	16	13.01%
Home Energy Audit	19	15.45%
Ductless Heat Pump	18	14.63%
None of these	74	60.16%
Other	5	4.07%
Answered	123	

7. Overall, how did you feel about the ad(s) you saw or heard?
(asked only of respondents who said they recalled an energy saving ad)

Options	Responses	Percent
Positive	124	73.37%
Neutral	43	25.44%
Negative	2	1.18%
Answered	169	

8. How likely are you to make energy saving changes in your home after seeing or hearing these ads?
(asked only of respondents who said they recalled an energy saving ad)

Options	Responses	Percent
Very Likely	60	35.50%
Somewhat Likely	76	44.97%
Not Very Likely	28	16.57%
Not Likely at All	5	2.96%
Answered	169	

9. What energy saving changes are you most likely to make after seeing or hearing these ads?
(asked only of respondents who said they recalled an energy saving ad)

Options	Responses	Percent
Ge a Home Energy Audit	34	25.00%
Upgrade Heating and Cooling Equipment	20	14.71%
Order an Energy Savings Kit	62	45.59%
Other	50	36.76%
Answered	136	

10. Below are four examples of ads that were used in newspapers, online, television, and radio during the months of April and May.
    - 1. Energy Savings Made Easy TV Commercial
    - 2. Power to Save
    - 3. Home Energy Audit
    - 4. Ductless Heat Pump

    Now that you have seen them, do you remember seeing or hearing any of these ads recently?
    (asked only of respondents who did not remember seeing or hearing an energy saving ad)

Options	Responses	Percent
Yes	38	21.84%
No	136	78.16%
Answered	174	

11. Based on what you just saw, how did you feel about these ad(s)?
    (asked only of respondents who did not remember seeing or hearing an energy saving ad)

Options	Responses	Percent
Positive	87	50.00%
Neutral	86	49.43%
Negative	1	0.57%
Answered	174	

12. How likely are you to make energy saving changes suggested in the ads in your home?
    (asked only of respondents who did not remember seeing or hearing an energy saving ad)

Options	Responses	Percent
Very Likely	33	18.97%
Somewhat Likely	93	53.45%
Not Very Likely	40	22.99%
Not Likely at All	8	4.60%
Answered	174	

13. What energy saving changes are you most likely to make after seeing these ads?
(asked only of respondents who did not remember seeing or hearing an energy saving ad)

Options	**Responses**	**Percent**
Get a Home Energy Audit	34	26.98%
Upgrade Heating and Cooling Equipment	21	16.67%
Order an Energy Savings Kit	57	45.24%
Other	32	25.40%
Answered	126	

14. How much would you agree, or disagree, that Idaho Power encourages energy efficiency and saving energy with its customers?
(asked of all respondents)

Options	**Responses**	**Percent**
Strongly Agree	228	66.47%
Somewhat Agree	106	30.90%
Strongly Disagree	8	2.33%
Somewhat Disagree	1	0.29%
Answered	343	

Energy Savings Guide Survey Results–July 2017

1. If you received an energy savings guide in the mail that looked similar to this, how likely would you be to open it and see what information is inside?
   Question Total: 412

Options	Percent
Very likely	71%
Somewhat likely	24%
Not very likely	4%
Not likely at all	2%

2. Please indicate which of the following topics you would find useful in helping you save energy. (Check all that apply)
   Question Total: 412

Options	Percent
Rebates and Incentives offered by Idaho Power	93%
Energy Savings Tips on how to save energy and money	83%
Additional Resources to help you save energy and money	67%

3. What information would you expect to see in a section of the energy savings guide labeled Rebates and Incentives? (check all that apply)?
   Question Total:384

Options	Percent
Energy efficiency program descriptions	68%
Explanations of how various energy efficiency programs can help you save energy and money	65%
Dollar amount of rebates and incentives available with energy efficiency programs	90%
Eligibility requirements for energy efficiency programs and rebates and incentives	90%
Links to energy efficiency program pages on idahopower.com	60%
Instructions for how to apply for energy efficiency rebates and incentives	88%
Other (please specify)	6%

This is an example of what one of the Rebates and Incentives pages might look like in the energy savings guide.

4. What is your first impression of this example page?

   Asked only of respondents who said they would find rebates and incentives offered by Idaho Power as a useful topic in the Energy Savings Guide

   Question Total:384

Options	Percent
I like it	80%
It's okay, but I don't love it	18%
I don't like it	2%

Here is another example of what one of the Rebates and Incentives pages might look like in the energy savings guide.

5. What is your first impression of this example page?
   Question Total:384

Options	Percent
I like it	44%
It's okay, but I don't love it	47%
I don't like it	9%

6. What information would you expect to see in a section of the energy savings guide labeled Energy Savings Tips? (check all that apply)
   Question Total: 384

Options	Percent
Cooling energy savings tips	95%
Heating energy savings tips	92%
Kitchen energy savings tips	78%
Laundry energy savings tips	76%
Lighting energy savings tips	88%
Other (please specify)	12%

Here is an example of what one of the Energy Savings Tips pages might look like in the energy savings guide.

7. What is your first impression of this example page?
   Question Total:340

Options	Percent
I like it	62%
It's okay, but I don't love it	32%
I don't like it	5%

8. What information would you expect to see in a section of the energy savings guide labeled Additional Resources? (check all that apply)
   Question Total: 274

Options	Percent
How to access information on My Account at idahopower.com	51%
How, or where, to access more information about other energy savings techniques for your home	90%
How, or where, to access more information about energy efficient appliances and equipment	81%
Other (please specify)	7%

9. What action(s) do you think you would be most likely to take after reviewing an energy savings guide like the one we have proposed here?(check all that apply)
Question Total: 390

Options	Percent
Investigate Idaho Power's energy efficiency programs	67%
Participate in one or more Idaho Power energy efficiency programs	61%
Make other energy savings improvements in your home like changes to your cooling, heating, cooking, or laundry habits	71%
Other (please specify)	7%
Would not take any additional energy savings actions	3%

10. How useful do you think a guide like this would be in helping you save energy and money?
Question Total: 390

Options	Percent
Very useful	52%
Somewhat useful	43%
Not very useful	5%
Not useful at all	0%

11. What do you think would be the best way to make an energy savings guide available to the most people? (check all that apply)
Question Total: 390

Options	Percent
Send a bound book through the mail to customers	61%
Have the information available online at idahopower.com	57%
Have a downloadable PDF available at idahopower.com	47%
Other (please specify)	17%

12. If you received a bound version of the energy savings guide in the mail, how likely would you be to save the guide for future reference?
Question Total: 390

Options	Percent
Very Likely	56%
Somewhat Likely	28%
Not Very Likely	13%
Not Likely at All	3%

2017 Home Energy Audit Program Survey

1. How easy was it for you to apply for the Home Energy Audit program?

Answer Choices	Responses	Percent
Very easy	131	70.05%
Somewhat easy	49	26.20%
Somewhat difficult	6	3.21%
Very Difficult	1	0.53%
Answered	187	

2. If the application process was difficult what was it about that process that made it difficult?
   - 13 answered the question.

3. Please identify the auditor that you used for your home audit.

Answer Choices	Responses	Percent
Brian Bennett, The Energy Auditor	13	8.44%
Chris Callor, Affordable Energy Improvements, LLC	40	25.97%
Dallen Ward, Home Energy Efficiency Technologies (H.E.E.T.)	2	1.30%
Jessie Lumbreras, Energy Zone, LLC	0	0.00%
Robert Johnson, Savings Around Power	0	0.00%
Rod Burk, Home Energy Management	13	8.44%
Tad Duby, On Point, LLC	86	55.84%
Answered	154	

4. Please rate your home auditor on each of the following:

Answer Choices	Responses	Excellent	Good	Fair	Poor
Courteousness	178	89.33%	9.55%	1.12%	0.00%
Professionalism	176	88.64%	9.66%	1.14%	0.57%
Explanation of work/measurements to be performed as part of the audit	177	81.92%	16.38%	0.56%	1.13%
Explanation of recommendations resulting from audit	177	76.84%	18.64%	3.39%	1.13%
Overall experience with auditor (from scheduling an appointment to follow up after the audit)	177	79.10%	17.51%	1.69%	1.69%

5. If you have additional comments you would like to offer about your home auditor, please enter them in the space below.
    - 43 answered the question.

6. How did you receive your Home Energy Audit report?

Answer Choices	Responses	Percent
Accessed report online	66	38.15%
Received paper copy	61	35.26%
Both	46	26.59%
Answered	173	

7. How difficult was it for you to access the report online?

Answer Choices	Responses	Percent
Very easy	70	46.36%
Somewhat easy	35	23.18%
Somewhat difficult	10	6.62%
Very Difficult	8	5.30%
N/A	28	18.54%
Answered	151	

8. How much did the audit influence you to reduce the amount of electricity you consume?

Answer Choices	Responses	Percent
Influenced me a lot	70	39.11%
Influenced me some	79	44.13%
Didn't influence me much	17	9.50%
Didn't influence me at all	13	7.26%
Answered	179	

9. As a result of the Home Energy Audit program, please indicate how strongly you agree or disagree with the following statements.

Answer Choices	Responses	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	N/A
I am more informed about energy usage in my home...	175	65.14%	27.43%	4.57%	2.29%	0.57%
Other members of my household are more informed about our household energy usage	175	37.71%	31.43%	7.43%	2.86%	20.57%
I am more informed about energy efficiency programs that are available to me through Idaho Power...........	174	32.18%	45.40%	12.07%	4.60%	5.75%
I know what no- to low-cost actions I can take	173	52.60%	38.15%	4.62%	3.47%	1.16%
I know what next steps I should take.........................	176	65.91%	28.41%	1.70%	3.41%	0.57%

10. After receiving your audit through the Home Energy Audit program, please indicate if you have taken any of the following actions:

Answer Choices	Responses	Yes	No
Visited the Idaho Power website	153	49.67%	50.33%
Unplugged appliances when not in use	160	52.50%	47.50%
Signed up for myAccount	144	40.97%	59.03%
Shared my energy audit experience with relatives and/or friends	164	74.39%	25.61%
Other	80	47.50%	52.50%
If you selected "other", please specify what other actions you have taken:..	50		
Answered	170		

11. Since receiving your audit through the Home Energy Audit program, please indicate when, or if, you will complete any of the following improvements:

Answer Choices	Responses	Already completed	Plan to in next 6 months	Plan to in 6-12 months	Want to but not sure when	Do not plan to at all	Home does not need
Replace additional incandescent light bulbs with more efficient light bulbs (e.g., CFLs and LEDs)	174	67.82%	16.67%	4.02%	3.45%	2.30%	5.75%
Replace additional showerheads with low-flow models	169	36.09%	13.61%	2.37%	5.33%	23.67%	18.93%
Recycle an extra refrigerator or freezer	171	7.60%	4.09%	4.09%	11.70%	25.73%	46.78%
Replace an older, inefficient appliance with a new ENERGY STAR model	168	15.48%	6.55%	4.17%	26.19%	14.88%	32.74%
Service heating equipment	168	49.40%	16.67%	9.52%	5.36%	4.17%	14.88%
Service cooling equipment	169	39.05%	19.53%	8.88%	5.33%	4.14%	23.08%
Increase attic insulation	172	13.95%	20.35%	11.05%	21.51%	8.72%	24.42%
Increase wall insulation	164	4.27%	8.54%	5.49%	18.29%	25.00%	38.41%
Increase underfloor insulation	162	11.73%	10.49%	8.64%	22.22%	19.75%	27.16%
Seal air leaks	170	25.88%	33.53%	11.76%	12.94%	5.29%	10.59%
Seal duct work	170	17.06%	21.18%	7.65%	20.00%	5.29%	28.82%
Other	43	18.60%	4.65%	9.30%	9.30%	13.95%	44.19%
If you selected "other", please specify what other actions you have taken or plan to take:	24						
Answered	176						

12. For any improvements you indicated you do not plan to do, please tell us why.

- 64 answered the question.

13. What benefits did you experience from the Home Energy Audit program? (Check all that apply)

Answer Choices	Responses	Percent
Cost savings	91	55.83%
Personal satisfaction	107	65.64%
Raised awareness of energy use	119	73.01%
Benefit to the environment	56	34.36%
Home improvement	86	52.76%
Comfort	78	47.85%
Other	13	7.98%
(please specify)	16	
Answered	163	

14. What barriers do you encounter in making energy savings changes in your home? (Check all that apply)

Answer Choices	Responses	Percent
Cost	114	69.94%
Time	70	42.94%
Convenience	37	22.70%
Lack of necessity	20	12.27%
Do not know who to contact	36	22.09%
Other	12	7.36%
Answered	163	

15. The most effective method for Idaho Power to provide information about energy efficiency is to: (Check all that apply)

Answer Choices	Responses	Percent
Offer classes in convenient locations	26	15.48%
Communicate information in local newspapers	24	14.29%
Communicate information on the Idaho Power website	52	30.95%
Communicate information on social media	22	13.10%
Offer a minimal cost home audit service	107	63.69%
Send newsletters or information directly to homeowners	70	41.67%
Send email communications to homeowners	44	26.19%
Send information in monthly Idaho Power bill	111	66.07%
Other (please specify)	6	3.57%
Answered	168	

16. How much do you agree with the following statements:

Answer Choices	Responses	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
My Home Energy Audit report contained valuable information	170	79.41%	14.12%	4.12%	2.35%
I would recommend the Home Energy Audit program to a friend or relative	169	76.92%	15.98%	4.73%	2.37%
I am satisfied with my overall experience with the Home Energy Audit program	171	78.95%	14.62%	4.09%	2.34%

17. If you disagree with any of these statements, please tell us why.

- 12 answered the question.

18. Please identify your age in the ranges below:

Answer Choices	Responses	Percent
Under 25	0	0.00%
26–35	8	4.65%
36–50	32	18.60%
51–65	59	34.30%
Over 65	73	42.44%
Answered	172	

19. What is the highest level of education you completed?

Answer Choices	Responses	Percent
Less than High School	1	0.59%
Some High School	1	0.59%
High School Graduate or Equivalent	16	9.47%
Some College	25	14.79%
Two-Year Associate Degree or Trade/Technical School	17	10.06%
Four-Year College Degree	37	21.89%
Some Graduate Courses	15	8.88%
Advanced Degree	57	33.73%
Answered	169	

20. May we use your name and comments in Idaho Power's communication efforts?

Answer Choices	Responses	Percent
Yes	77	45.29%
No	93	54.71%
Answered	170	

21. Do you have any issues or concerns you would like us to contact you about?

Answer Choices	Responses	Percent
Yes	16	9.82%
No	147	90.18%
Answered	163	

22. Please provide your name and contact information:

Answer Choices	Responses	Percent
Name	97	98.98%
Last Name	3	3.06%
Phone or Email	97	98.98%
Answered	98	

23. Please provide your name:

Answer Choices	Responses	Percent
First Name	8	100.00%
Last Name	8	100.00%
Answered	8	

24. Thank you for taking the time to participate in this survey. We value your opinions and comments. If you have any additional comments, please share your thoughts in the space below.

- 47 answered the question.

2017 Smart-Saver Pledge Follow-Up Survey

1. Thank you for taking the Smart-saver Pledge. We'd love to hear how you did in meeting your pledge as well as find out a bit more about you. Which of the following pledges did you commit to? (Select all that apply)

Answer Choices	Responses	Percent
Clean the condenser coils on my fridge	164	41.21%
Register for myAccount, and review my energy use once a week	85	21.36%
Wash full loads of laundry in cold water	319	80.15%
Use a smart power strip to turn off multiple items at once	154	38.69%
Use the crockpot or BBQ once a week instead of the stove	282	70.85%
Answered	398	

2. Were you able to meet your pledge(s) for the full 21 days?

Answer Choices	Responses	Percent
Yes	376	94.47%
No	22	5.53%
Answered	398	

3. What kept you from meeting the Smart-saver Pledge? (Select all that apply)

Answer Choices	Responses	Percent
Comfort	0	0.00%
Time	6	28.57%
Low priority	2	9.52%
Other individuals in my household were not aligned	2	9.52%
Other (please specify)	15	71.43%
Answered	21	

4. Will you continue with your energy-saving change(s) now that the pledge has ended?

Answer Choices	Responses	Percent
Yes	373	99.47%
No	2	0.53%
Answered	375	

5. What is the primary reason you will continue with the energy-saving change(s)?

Answer Choices	Responses	Percent
Save energy	53	14.21%
Save money	165	44.24%
Help the environment	39	10.46%
It's the right thing to do	94	25.20%
Other (please specify)	22	5.90%
Answered	373	

6. What is the primary reason why you won't continue with the energy-savings change(s)?

Answer Choices	Responses	Percent
Comfort	0	0.00%
Time	0	0.00%
Low priority	0	0.00%
Other individuals in my household are not aligned	0	0.00%
Other (please specify)	2	100.00%
Answered	2	

7. How did taking the Smart-saver Pledge affect your awareness of your energy habits?

Answer Choices	Responses	Percent
Made me much more aware	139	35.10%
Made me somewhat more aware	202	51.01%
Did not affect my awareness	55	13.89%
Answered	396	

8. After taking the Smart-saver Pledge, how likely are you to seek out additional ways to save energy?

Answer Choices	Responses	Percent
Very likely	244	61.62%
Somewhat likely	147	37.12%
Not very likely	4	1.01%
Not likely at all	1	0.25%
Answered	396	

9. What is your level of awareness of other Idaho Power Energy Efficiency programs?

Answer Choices	Responses	Percent
Very aware	68	17.22%
Somewhat aware	250	63.29%
Not very aware	66	16.71%
Not aware at all	11	2.78%
Answered	395	

10. After taking the Smart-saver Pledge, how likely are you to participate in an Idaho Power Energy Efficiency program?

Answer Choices	Responses	Percent
Very likely	170	54.31%
Somewhat likely	139	44.41%
Not very likely	4	1.28%
Not likely at all	0	0.00%
Answered	313	

11. How did you first learn about the Smart-saver Pledge?

Answer Choices	Responses	Percent
Bill insert	263	66.25%
Facebook	30	7.56%
Twitter	0	0.00%
TV	7	1.76%
Idaho Power website	66	16.62%
Idaho Power employee	2	0.50%
Friend, relative or neighbor	19	4.79%
Other (please specify)	10	2.52%
Answered	397	

12. What is the primary fuel used to heat your home?

Answer Choices	Responses	Percent
Electricity	132	33.42%
Natural gas	222	56.20%
Propane	14	3.54%
Wood	20	5.06%
Other	7	1.77%
Answered	395	

13. What is your zip code?

- 304 participants answered the question.

14. What is your gender?

Answer Choices	Responses	Percent
Male	94	24.10%
Female	296	75.90%
Answered	390	

15. Which of the following best describes your age?

Answer Choices	Responses	Percent
Under 25	13	3.31%
26–35	75	19.08%
36–50	103	26.21%
51–65	111	28.24%
Over 65	91	23.16%
Answered	393	

16. What is the highest level of education you completed?

Answer Choices	Responses	Percent
Less than High School	2	0.51%
Some High School	1	0.25%
High School Graduate or Equivalent	53	13.49%
Some College	103	26.21%
Two-Year Associate Degree or Trade/Technical School	76	19.34%
Four-Year College Degree	87	22.14%
Some Graduate Courses	14	3.56%
Advanced Degree	57	14.50%
Answered	393	

17. May we use your name and comments in Idaho Power's communication efforts?

Answer Choices	Responses	Percent
Yes	251	64.36%
No	139	35.64%
Answered	390	

18. Thank you for taking the time to participate in this survey. We value your opinions and comments. If you have any additional comments, please share your thoughts in the space below.

- 77 participants answered the question.

Idaho Power Drying Rack Project Post-Survey

1. Which of the following best describes how you've used your clothes dryer since receiving your Idaho Power drying rack?

Answer Choices	Responses	Percent
Used dryer significantly less	213	27.59%
Used dryer somewhat less	490	63.47%
No change in dryer use	63	8.16%
Used dryer somewhat more	2	0.26%
Used dryer significantly more	4	0.52%
Answered	772	

2. What percent of your laundry do you currently dry in a clothes dryer?

Answer Choices	Responses	Percent
100%—I dry all of my clothes in the dryer	16	2.06%
75–99%	255	32.90%
50–74%	262	33.81%
25–49%	123	15.87%
Less than 25%	100	12.90%
0%—I dry all of my clothes without a clothes dryer	19	2.45%
Answered	775	

3. Rank the following drying rack strategies in order of what you use most often with 1 being your most preferred method. Choose N/A if you do not use the strategy.

Answer Choices	Responses	1	2	3	4	N/A
Dry full loads of laundry on the drying rack	656	21.49%	18.75%	8.23%	20.27%	31.25%
Dry partial loads of laundry on the drying rack	690	55.07%	26.52%	7.97%	1.74%	8.70%
Remove full load from the dryer early to finish drying on the drying rack	673	6.54%	9.96%	23.03%	15.16%	45.32%
Remove partial loads from the dryer early to finish drying on the drying rack	703	17.78%	30.58%	18.21%	6.54%	26.88%
Answered	756					

4. If you're not using your drying rack, please tell us why?

    - 140 answered the question.

5. Since receiving the Idaho Power drying rack, have you adopted any of the following efficient laundry habits?

Answer Choices	Responses	Yes, I adopted this habit	No, I did not adopt this habit	I was already doing this
Use a lower water temperature to wash	761	21.68%	8.02%	70.30%
Use a lower water to rinse	761	16.29%	19.45%	64.26%
Use an extra spin cycle on the washing machine	761	15.90%	61.37%	22.73%
Dry similar materials together	761	23.39%	13.40%	63.21%
Take clothes out of the dryer while still slightly damp	761	30.35%	38.90%	30.75%
Use dryer's moisture sensor	761	13.01%	41.13%	45.86%
Dry multiple loads back-to-back	761	20.37%	27.86%	51.77%
Dry the clothes using the fluff/no-heat cycle	761	12.09%	71.62%	16.29%
Clean the lint screen after every load	761	12.09%	3.94%	83.97%
Other (please specify)	48			
Answered	761			

6. Have you noticed a change in your monthly power bill as a result of changes in your laundry habit?

Answer Choices	Responses	Percent
Yes	154	20.34%
No	241	31.84%
Don’t know	362	47.82%
Answered	757	

7. How satisfied were you with the following aspects of the Idaho Power Drying Rack Project?

Answer Choices	Responses	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very Satisfied
Enrollment process	757	3.17%	0.92%	10.70%	85.20%
Drying rack pick up	757	4.10%	0.00%	7.13%	88.77%
Drying rack quality	757	4.76%	5.02%	18.49%	71.73%
Overall Drying Rack Project	759	3.29%	1.05%	10.94%	84.72%
Answered	760				

8. What did you find satisfying or dissatisfying about the Idaho Power Drying Rack Project?

- 597 answered the question.

9. As a result of your participation in Idaho Power's Drying Rack Project, please indicate how strongly you agree or disagree with the following statements.

Answer Choices	Response	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	N/A
I am more aware of energy use in my home.	755	3.84%	4.24%	49.01%	39.21%	3.71%
Other members of my household are more aware of our household energy use.	756	4.76%	10.45%	43.92%	20.90%	19.97%
I am more aware of energy efficiency programs that are available to me through Idaho Power.	756	4.37%	9.13%	45.24%	37.30%	3.97%
Answered	756					

10. May we use your name and comments in Idaho Power's communication and marketing efforts?

Answer Choices	Responses	Percent
Yes	415	55.26%
No	336	44.74%
Answered	751	

11. May we follow up with you if we have any questions regarding your responses to the survey questions?

Answer Choices	Responses	Percent
Yes	509	68.14%
No	238	31.86%
Answered	747	

12. If yes, please provide your name and contact information:

Answer Choices	Responses	Percent
First Name	496	99.80%
Last Name	496	99.80%
Phone or Email	495	99.60%
Answered	497	

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IDAHO POWER
ENERGY-SAVING KIT PROGRAM SUMMARY REPORT

2017A

SUBMITTED BY:
RESOURCE ACTION PROGRAMS®

Idaho Power Energy-Saving Kit Program Summary Report 2017A

Sponsored by:

IDAHO POWER®

An IDACORP Company

Submitted by:

RESOURCEACTION PROGRAMS

January 2018

"Thanks for the kit, what a great way to put energy saving solutions directly into the hands of Idaho consumers! Great idea of a program!"

– Idaho Power Energy-Saving Kit Program Participant

Table of Contents

"I am very gratified to be a part of this type of conservation. I will be checking out Idahopower.com and seeing for myself the resources that are available. Thank you."

– Idaho Power Energy-Saving Kit Program Participant

Executive Summary

The Idaho Power Energy-Saving Kit Program was designed and implemented to provide Idaho Power's residential households with energy-efficiency education, measures to reduce their energy costs, and help them develop energy-efficient behaviors consistent with Idaho Power. This report summarizes the 2017A Energy-Saving Kit program, which was implemented by twenty-eight thousand, nine-hundred twenty-two (28,922) Idaho households and one thousand, three-hundred eighty-one (1,381) Oregon households. Funding was provided by Idaho Power.

The program achieved or exceeded expectations and the results are listed below.

PROGRAM ACHIEVEMENTS

1. Provided residential energy-saving measures and energy-efficiency education to 28,922 Idaho and 1,381 Oregon households.

- Affected all five regions of the Idaho Power service territory
- Affected 113 cities & towns in Idaho
- Affected 18 cities & towns in Oregon

Regions	Households	Electric Kit	Non-Electric Kit
Canyon	4,735	2,690	2,045
Capital	12,070	4,835	7,235
Eastern	4,475	2,973	1,502
Southern	4,507	3,210	1,297
Western	4,516	3,676	840
Total	**30,303**	**17,384**	**12,919**
		30,303	

2. Generated residential energy and water savings. Projected annual savings:
- 192,824,444 gallons of water saved
- 14,007,649 kWh of electricity saved
- 70,107 therms of gas saved

(continued)

3. Supported Idaho Power with their diverse outreach and distribution methods.
   - Idaho Power website
   - Idaho Power employee
   - Information in bills
   - Social Media
   - Family & friends
   - News
   - Direct mailing
4. Designed and provided complementary educational materials and incentives to maximize installation of targeted efficiency measures (Installation rates ranged from 51–91 percent).
5. Maintained data collection and management services to collect and process audit ready data from participating households.
6. Maintained tracking and reporting to summarize the Program participation.

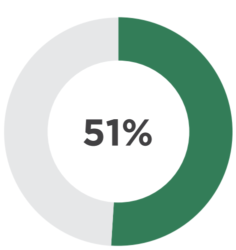
OPTING-IN METHODS	HOUSEHOLDS	%
Website	20,272	66.9%
Phone	3,889	12.8%
Postcards	6,142	20.3%

Program design and customization approved in 2016 resulted in the full implementation starting in January 2017. Direct mailing in April and July resulted in immediate positive response from Idaho Power customers. Program content on the Idaho Power website and enclosed information in the customer bills combined with community events generated steady demand for this energy-saving kit. The program served a total of 30,303 households in both Idaho and Oregon.

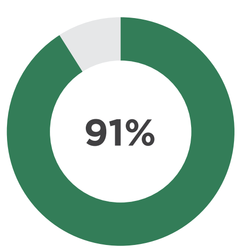
The Program provided customized Direct-to-Customer Program modules, which included educational materials and energy-saving products. A participant survey was included with the program materials. The purpose of the survey was to increase educational retention and impact while serving as a data collection tool.

Survey responses indicated high participant satisfaction and participation in product retrofits and adoption of new energy saving behaviors. Total 5,343 households returned completed surveys and the responses were overwhelmingly positive. Highlights include:

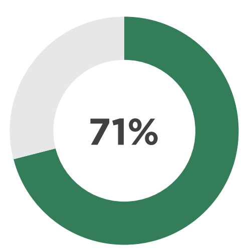
A summary of responses can be found in Appendix B.



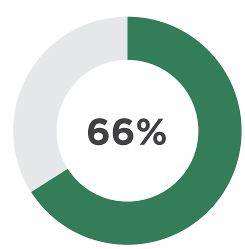
Reported households with ALL 9 LED light bulbs installed.



Reported households with the LED Night Light installed.*



Reported households with the High-Efficiency Showerhead installed.*



Reported households who used the Shower Timer.*

**Installation rates assume 50% of households who responded "Not yet, but will" actually completed the installation.*

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Projected energy savings from this program are significant. Based on the reported actions, annual and lifetime resource savings are as follows:

PROJECTED ANNUAL SAVINGS	
192,824,444	gallons of water saved
14,007,649	kWh of electricity saved
70,107	therms of gas saved

PROJECTED LIFETIME SAVINGS	
1,724,992,412	gallons of water saved
130,307,859	kWh of electricity saved
140,213	therms of gas saved

PROJECTED ANNUAL SAVINGS PER HOME	
11,091	gallons of water saved
462	kWh of electricity saved
2	therms of gas saved

PROJECTED LIFETIME SAVINGS PER HOME	
99,217	gallons of water saved
4,300	kWh of electricity saved
5	therms of gas saved

"Excellent program! Easy to understand and implement. Thanks!"

– Idaho Power Energy-Saving Kit Program Participant

RAP Direct-to-Customer Programs

For more than 25 years, Resource Action Programs® (RAP) has designed and implemented resource efficiency and education programs, changing household energy and water use while delivering significant, measurable resource savings for program sponsors. All RAP programs feature a proven blend of innovative education and comprehensive implementation services.

RAP Programs serve more than 550,000 households each year through school and adult delivered Measure Based Education Programs. Our forty-person staff manages the implementation process and program oversight for nearly 300 individual programs annually. Recognized nationally as a leader in energy and water efficiency education and program design, RAP has a strong reputation for providing the highest level of service to program sponsors as part of a wide range of conservation and resource efficiency solutions for municipalities, utilities, states, community agencies, and corporations.

All aspects of program design and implementation are completed at the Program Center in Sparks, Nevada. These include: graphic and web design, print production, procurement, warehousing, logistics, module production, marketing, program tracking, data tabulation and reporting.

The Direct-to-Customer Program represents the leading edge of community energy efficiency education program design and implementation. The Program uses a client-directed Measure Based Education model to generate lasting residential energy savings from both retrofits and new behaviors. Initially, participants choose their personal savings target. Then they select retrofits using provided measures and energy-saving behaviors to reach their goal. The Direct-to-Customer Program is tremendously versatile, and can easily be introduced and distributed via a wide range of delivery channels, including Opt-in Direct Mail, CBO/CAA distribution, workshops, community events, affinity groups (volunteers, CAAs, CBOs, churches) or public events.

Cost-effective energy savings from the measure installations will justify program investments on their own, but the Program delivers several other important benefits as well. The educational component is designed to include each household member in order to manage household energy use. Measures, immediate savings actions and additional savings ideas for all areas of residential energy use are grouped by areas of the home and provided to participants as options to help them reach their personal savings targets. Additional rebates and program opportunities can be introduced through the Program or offered as incentives for program performance.

Participation in the Direct-to-Customer Program provides a strong, personalized pathway for participants to realize both initial and ongoing savings from new products and behavior choices in their homes.

"Our favorite was the shower timer. It helps teach kids to take more efficient showers! Thanks a ton. Good customer engagement idea. I heard about the kit through word of mouth at a dance practice for my kid."

– Idaho Power Energy-Saving Kit Program Participant

Idaho Power Energy-Saving Kit Program Overview

The overarching goal of this measure based program was to assist Idaho Power in providing their residential households with energy-efficiency education and reduced energy costs as well as developing energy efficiency behaviors consistent with Idaho Power's energy efficiency objectives. The energy-savings Kits empowered the Idaho and Oregon households to save energy and money.

The program created and distributed a custom educational savings module consisting of efficiency measures, educational materials, and household surveys. Educational materials included a Quick Start Guide, Survey, Installation Instructions, Mini-Home Assessment (Idaho Power provided) and other tools such as stickers and magnets as reminders for new energy-efficient conservation behaviors. All elements were customized to meet Idaho Power priorities, regional conditions and regulatory requirements.

HEARD ABOUT PROGRAM	HOUSEHOLDS	%
Direct Mail	7,281	24.0%
Idaho Power employee	1,569	5.2%
Idaho Power website	1,635	5.4%
Info in bill	5,973	19.7%
Social Media	2,445	8.1%
Other: Family & Friends	4,994	16.5%
Other: News	3,467	11.4%
Other: Organizations	1,906	6.3%
Other	772	2.5%
Blank	261	0.9%

The program was offered to eligible Idaho Power residential households as defined by Idaho Power. Those in participating households cited the categories shown in the table (at right) when asked how they heard of the program.

OPTING-IN METHODS	HOUSEHOLDS	%
Website	20,272	66.9%
Phone	3,889	12.8%
Postcards	6,142	20.3%

Those in eligible households opting-in to receive the energy-saving kit utilized one of three primary methods:

1) RAP developed and maintained a program website to process energy-saving kit orders as well as to provide program information, including product installation videos and instructions. 2) RAP maintained a toll-free phone number to process the called-in kit orders and address any inquiries and issues. 3) Custom-designed direct mailers were sent to households with program information and instructions on ordering a kit.

Follow-up installation surveys were received from 5,343 participated households, representing a response rate of 17.6% of the 30,289 energy-saving kits distributed. A monthly drawing for a $100 gift card provided an incentive for returning the household installation surveys.

Idaho Power Energy-Saving Kit Program Materials

Each participating household received an energy-saving kit containing efficiency measures for their homes and a Quick Start Guide with energy efficiency information and behavioral tips. The materials were customized for Idaho Power. Households with electric water heating received an electric kit (including water-saving measures). Households with other water heating options received a non-electric kit (not including water-saving measures).

Included Educational Materials

Quick Start Guide

Survey

Survey Envelope (postage prepaid)

Sticker and Magnet Reminder

Mini-Home Assessment (Idaho Power provided)

Installation Instructions

Included Efficiency Measures

Six 9-Watt LEDs (800 Lumens)

Three 7.5-Watt LEDs (480 Lumens)

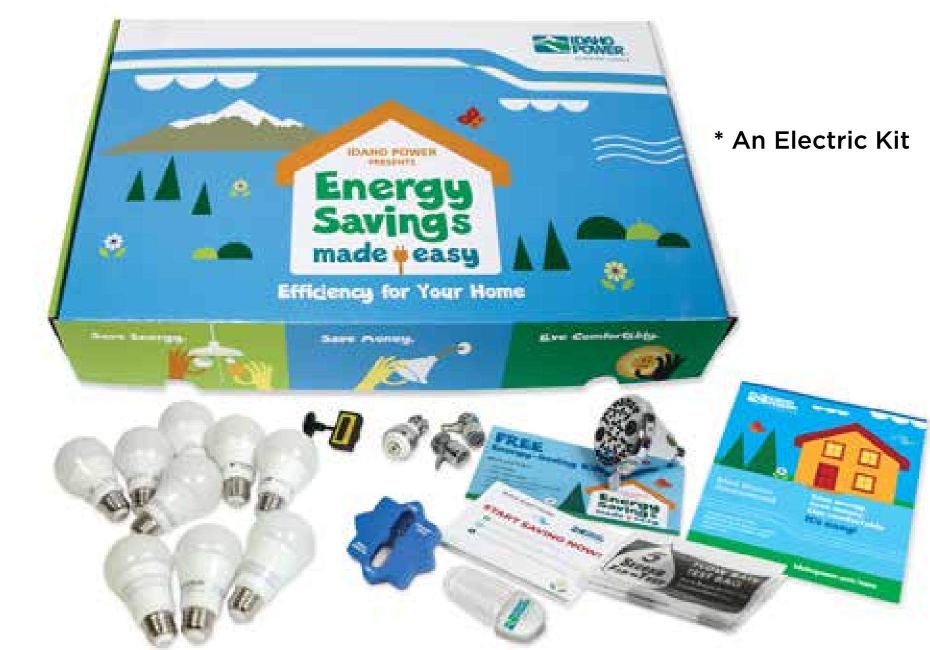
IPC branded LED Night Light

High Efficiency Showerhead

Kitchen and Bathroom Faucet Aerators

Shower Timer

Digital Thermometer



* An Electric Kit

116219
INSTALLATION SURVEY
(Español en el otro lado)
Complete this survey for a chance to win a
$100* Gift Card
All you have to do is...
1. Install the energy-efficient products in your kit.
2. Follow the energy-saving tips
quick start guide.
3. Return this survey for a cha
gift card!
(Postage-paid envelope included
Fill in each bubble comp
Use a black pen to fill in
next to the correct answ
*For contest details visit Idahopower.com/sa
15038 A0080 Idaho Power DTC
0000000
1. What type of home do you live in?
Single family home - Detached
Apartment, Condo, Townhouse, or Multi-family with 2-3 units
Apartment, Condo, Townhouse, or Multi-family with 4 or more units
Mobile/Manufactured home
2. How many people live in your home?
5 or more
4
3
2
1
3. How many of the LEDs did you install?
All of them
7-8
5-6
3-4
1-2
None
4. If you did not install all of the LEDs, what did you do with the remainder?
Plan to install, just haven't yet
Stored for later use
Gave them to someone else
Other
Have you installed the
5. High-Efficiency Showerhead?
6. Kitchen Faucet Aerator?
7. Bathroom Faucet Aerator #1?
8. Bathroom Faucet Aerator #2?
Yes
Not yet, but will
No, won't use
Have you used the
9. LED Night Light?
10. Shower Timer?
11. Flow-Rate Test Bag to test the flow rate of your shower or faucets?
Yes
Not yet, but will
No, won't use
12. If you used the Digital Thermometer to check the temperature of your water, what was the temperature?
> 140° F
131° F to 140° F
120° F to 130° F
< 120° F
Did not check water temperature
Did you adjust the temperature of your
13. Electric water heater?
14. Refrigerator?
15. Freezer?
Yes I lowered it
Yes I raised it
No I did not adjust
16. How satisfied were you with the kit ordering process?
Very satisfied
Somewhat satisfied
Somewhat dissatisfied
Very dissatisfied
17. Did you receive your kit within 3 weeks?
Yes
No
18. How likely would you be to tell a friend or family member to order a kit?
Very likely
Somewhat likely
Somewhat unlikely
Very unlikely
19. Prior to hearing about the Energy-Saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?
Yes
No
20. Have you ever gone to Idaho Power's website to look for information about energy efficiency programs or to find ways to save?
Yes
No
21. How likely are you to participate in another energy efficiency program?
Very likely
Somewhat likely
Somewhat unlikely
Very unlikely
22. If you did not install some of the kit items, please tell us why.
Return this survey in the postage-paid envelope included in your kit.
You will be entered into our monthly drawing for a chance to win a $100 gift card.

Idaho Power Energy-Saving Kit Program Implementation

An introductory marketing direct mailer, supported by the information on the Idaho Power website, merited positive results. Many shared their positive program experience with their family and friends though social media, word of mouth, and emails. Additional exposure through bill inserts and community events resulted in a steady demand for the program.

Participation was processed and tracked at the RAP Program Center, which has the capacity to handle in excess of 100,000 requests per month. The program website, a toll-free phone number, and the business reply postcards provided convenient methods for interested households to order a kit and participate in the program.

Orders were tracked and managed daily from all outreach and enrollment sources. Program materials and products were packaged and addressed for individual home delivery. All Program modules received a unique ID number to improve the accuracy of data tracking and reduce the amount of information required from respondents.

All enrollments, shipping, and survey data were managed by RAP's proprietary Program Database. In addition, all returned surveys were tabulated and included in the program database. This procedure allows for reporting, which is an important element for tracking the measurements and goals of this program.

“I installed everything — called the gas company to find out about their programs. Thank you for the Energy Savings Kit, I’m telling everyone about it!!”

– Idaho Power Energy-Saving Kit Program Participant

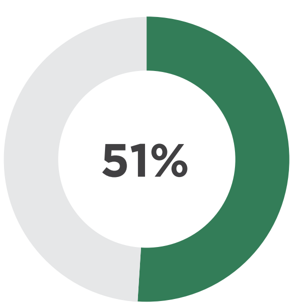
Idaho Power Energy-Saving Kit Program Impact

The program impacted 113 cities and towns throughout Idaho and 18 cities and towns in Oregon. As illustrated below, the program successfully educated those in participating households about energy and water efficiency while generating resource savings through the installation of efficiency measures in their homes. Home survey and installation information was collected to track savings and gather household consumption and demographic data. The three program elements, described on the next few pages, were used to collect this data.

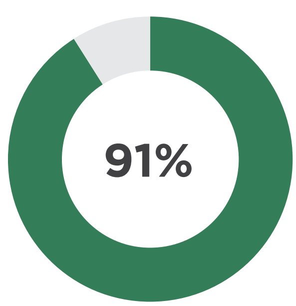
A. Home Survey and Retrofit Data

Upon completion of the program, participating households were asked to complete a home survey to assess their resource use, verify product installation, provide demographic information, and measure participation rates. Sample questions appear below and a complete summary of all responses is included in Appendix B.

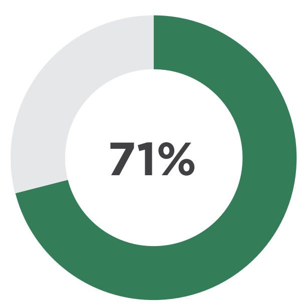
Did you install ALL 9 LED Light Bulbs?	**Yes - 51%**
Did you install the LED Night Light?	**Yes - 91%**
Did you install the High-Efficiency Showerhead?	**Yes - 71%**
Did you use the Shower Timer?	**Yes - 66%**



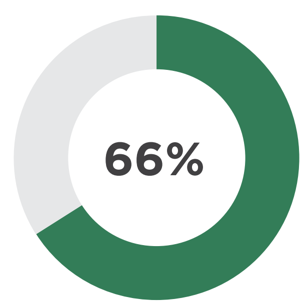
Reported households with ALL 9 LED Light Bulbs installed.



Reported households with the LED Night Light installed.*



Reported households with the High-Efficiency Showerhead installed.*



Reported households who used the Shower Timer.*

**Installation rates assume 50% of households who responded "Not yet, but will" actually completed the installation.*

B. Water and Energy Savings Summary

As part of the program, participants installed retrofit efficiency measures in their homes. Using the family habits collected from the home survey as the basis for this calculation, 30,289 households are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

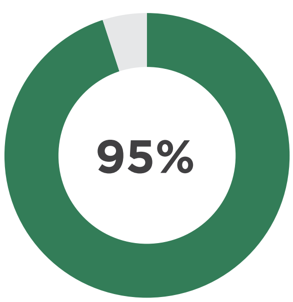
Total Number of Participants:	**30,303**		
Number of Electric Only Participants:	**17,386**		
Number of Non-Electric Participants:	**12,917**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	**96,701,129**	**967,011,287**	gallons
Measure Life: **10 years**	**3,112,094**	**31,120,940**	kWh
Projected reduction from Shower Timer installation:	**25,406,503**	**50,813,007**	gallons
Product Life: **2 years**	**1,902,896**	**3,805,793**	kWh
	70,107	**140,213**	therms
Projected reduction from Kitchen Faucet Aerator retrofit:	**41,114,425**	**411,144,255**	gallons
Measure Life: **10 years**	**1,842,916**	**18,429,160**	kWh
Projected reduction from Bathroom Faucet Aerator retrofit:	**29,602,386**	**296,023,863**	gallons
Measure Life: **10 years**	**3,685,832**	**36,858,320**	kWh
Projected reduction from **9**-watt LED Light Bulbs:	**1,818,180**	**21,818,160**	kWh
Measure Life: **12 years**			
Projected reduction from **7.5**-watt LED Light Bulbs:	**909,090**	**10,909,080**	kWh
Measure Life: **12 years**			
Projected reduction from LED Night Light:	**736,641**	**7,366,406**	kWh
Measure Life: **10 years**			
TOTAL PROJECTED PROGRAM SAVINGS:	**192,824,444**	**1,724,992,412**	gallons
	14,007,649	**130,307,859**	kWh
	70,107	**140,213**	therms
TOTAL PROJECTED PROGRAM SAVINGS PER HOUSEHOLD:	**11,091**	**99,217**	gallons
	462	**4,300**	kWh
	2	**5**	therms

C. Participant Response

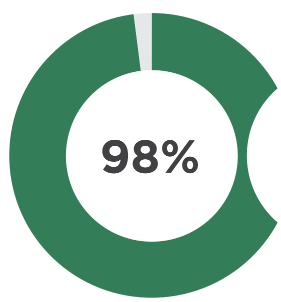
Participant response to Idaho Power's various outreach methods combined with social media and interpersonal communication resulted in an overwhelming demand for the program. Idaho Power increased the budget and the kit availability for this program in order to fulfill all residential customer orders. The participants utilized the Quick Start Guide to choose which measures and actions to take. Installation videos and text instructions made retrofit projects easy to complete. The installation rate data and the participant satisfaction data presented in this report were provided by kit surveys.

SURVEY TYPE	KITS SHIPPED	SURVEYS RECEIVED	SURVEY %
Electric	17,386	2,794	16.1%
Non-electric	12,917	2,549	19.7%
TOTAL	**30,303**	**5,343**	**17.6%**

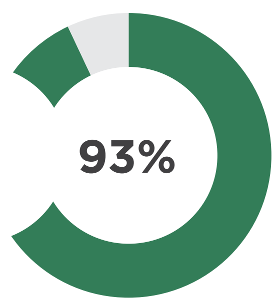
How satisfied were you with the kit ordering process? **Very Satisfied - 95%**
Did you receive your kit within 3 weeks? **Yes - 98%**
How likely would you be to tell a friend or family member to order a kit? **Very Likely - 93%**
How likely are you to participate in another energy efficiency program? **Very Likely - 81%**



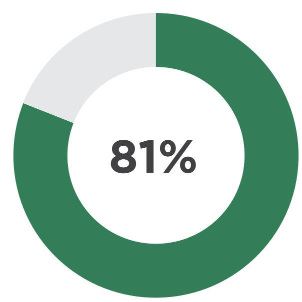
Reported households that were very satisfied with the ordering process.



Reported households that received their kits within 3 weeks.



Reported households that were very likely to tell a friend or family member to order a kit.



Reported households that were very likely to participate in another energy efficiency program.

Participant Responses

Thanks for the kit, what a great way to put energy saving solutions directly into the hands of Idaho consumers! Great idea of a program!

I am very gratified to be a part of this type of conservation. I will be checking out Idahopower.com and seeing for myself the resources that are available. Thank you.

Excellent program! Easy to understand and implement. Thanks !

Our favorite was the shower timer. It helps teach kids to take more efficient showers! Thanks a ton. Good customer engagement idea. I heard about the kit through word of mouth at a dance practice for my kid.

I installed everything — called the gas company to find out about their programs. Thank you for the Energy Savings Kit, I'm telling everyone about it!!

Very helpful and useful kit that was sent. Would highly recommend it to all. Thank you.

I used everything in the kit. Instructions were easy to use follow and I liked the suggestions provided too.

We believe in saving power and one day installing solar panels to save more on power. Going green is a dream of me and my family. I installed all the lights and thank, "Idaho Power" for giving them to us! Also, we read all the info in the monthly statements. I donated my bulbs to the elderly who cannot afford new ones... we love ID Power and all you provide to make our lives better.

I love the magnet stickers to reminder my husband to use cold water and the stickers about turning off lights. I think the LED night light is very useful. My daughters love having light during the night.

I was somewhat apprehensive about the showerhead, but I installed it in my son's shower. He is a teenager and between the showerhead and timer, I see him trying harder to be more conservative on water/energy. Thank you for offering this program, it has helped a lot. I even purchased more LED light bulbs to finish my entire house.

I am a renter and the landlord does agree with replacing things. I did what I can and learned all the information for another time.

I love the night light. I love your website, too. Great information and helpful.

Thank you, thank you, thank you. It was the greatest birthday present ever!

We are using all of the kit. Very much appreciate the products to help make our electric bill more efficient and hope to lower our bill. Thank you so much for everything.

The bathroom high efficiency showerhead is WONDERFUL. We love the LED night light! Thank you for this kit! I love that you do this! I'm telling everyone!

Participant Responses *(continued)*

Outstanding kit! I've told others to make sure they get theirs.

Awesome kit! I've told all of my friends about it and would like one for my other property in garden valley.

I am 89 years old and very slow. I will get things done eventually. I think this kit is a wonderful idea.

I'm 84 years old, did the best I could — it is great idea. Thank you for saving me money.

Thank you Idaho Power for my energy savings kit. I am thrilled and I immediately installed every light bulb.

We used everything! Especially love the night light! Thanks!

I think we used everything except the flow rate test bag. I'd have to read up on what to do with this. I thought the energy quiz was helpful too, to pinpoint where we could do better.

Thank you. It is awesome that you would help us!

This is a great program in offering the kit.

* An Electric Kit

Appendices

Appendix A

Appendix B

Appendix C

Appendix A

Projected Savings from 9-Watt LED Retrofit

9-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per participant:	**6**	
Number of participants:	**30,303**	
Deemed savings per lamp (kWh):	**10**	kWh[1]
Measure life:	**12**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**1,818,180**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**21,818,160**	kWh[3]

1 Regional Technical Forum. ResLightingCFLandLEDLamps_v3_3.xslm. Mail by request. LED general purpose and Dimmable. 665 to 1439 lumens.

2 LED kWh savings formula (Deemed savings per lamp x Number of participants x Lamps per participant).

3 LED kWh lifetime savings formula (Annual savings x Measure Life).

Projected Savings from 7.5-Watt LED Retrofit

7.5-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per participant:	**3**	
Number of participants:	**30,303**	
Deemed savings per lamp (kWh):	**10**	kWh[1]
Measure life:	**12**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**909,090**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**10,909,080**	kWh[3]

1 Regional Technical Forum. ResLightingCFLandLEDLamps_v3_3.xslm. Mail by request. LED general purpose and Dimmable. 250 to 664 lumens.

2 LED kWh savings formula (Deemed savings per lamp x Number of participants x Lamps per participant).

3 LED kWh lifetime savings formula (Annual savings x Measure Life).

Projected Savings from Showerhead Retrofit

Showerhead retrofit inputs and assumptions:		
Showerheads per electric DHW kit:	**1**	
Number of electric DHW participants:	**17,386**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Deemed Savings:	**179**	[2]
Length of average shower:	**7.84**	minutes[3]
Showerhead (baseline):	**2.50**	gpm[3]
Showerhead new (retrofit):	**1.75**	gpm
Measure life:	**10.00**	years[2]
Projected Water Savings:		
Showerhead retrofit projects an **annual** reduction of:	**96,701,129**	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	**967,011,287**	gallons[4]
Projected Electricity Savings:		
Showerhead retrofit projects an **annual** reduction of:	**3,122,094**	kWh[5]
Showerhead retrofit projects a **lifetime** reduction of:	**31,120,940**	kWh[5]

1 *Data Reported by Program Participants.*

2 *Regional Technical Forum - ResShowerheads_v2_1 xlsm. Mail by request. 1.75 gpm Any shower Electric water heating.*

3 *(March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.*

4 *Showerhead Gallons Formula (Number of participants x (Showerhead baseline - Showerhead new) x Length of average shower x Days per year x People per household).*

5 *Showerhead kWh formula (Number of Participants x Deemed Savings).*

Appendix A

Projected Savings from Kitchen Faucet Aerator Retrofit

Kitchen Faucet Aerator retrofit inputs and assumptions:		
Kitchen Faucet Aerator per electric DHW kit:	**1**	
Number of electric DHW participants:	**17,386**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Savings:	**106**	kWh[2]
Average daily use:	**2.50**	minutes [3]
Kitchen Faucet Aerator (baseline):	**2.50**	gpm[3]
Kitchen Faucet Aerator (retrofit):	**1.50**	gpm
Measure life:	**10.00**	years[3]

Projected Water Savings:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**41,114,425**	gallons[4]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**411,144,255**	gallons[4]

Projected Electricity Savings:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**1,842,916**	kWh[5]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**18,429,160**	kWh[6]

1 Data Reported by Program Participants.

2 Applied Energy Group. Idaho Power Energy Efficiency Potential Study, 2012.

3 (March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.

4 Kitchen Aerators gallons formula (Number of Participants x (Kitchen aerator baseline - Kitchen aerator retrofit) x Average Daily Use x Days per year x People per household).

5 Kitchen Aerators kWh formula (Number of Participants x Savings).

6 Kitchen Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).

Projected Savings from Bathroom Faucet Aerator Retrofit

Bathroom Faucet Aerator retrofit inputs and assumptions:

Bathroom Faucet Aerator per electric DHW kit:	**2**	
Number of electric DHW participants:	**17,386**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Savings:	**106**	kWh[2]
Average daily use:	**1.50**	minutes [3]
Bathroom Faucet Aerator (baseline):	**2.20**	gpm[3]
Bathroom Faucet Aerator (retrofit):	**1.00**	gpm
Measure life:	**10.00**	years[3]

Projected Water Savings:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**29,602,386**	gallons[4]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**296,023,863**	gallons[4]

Projected Electricity Savings:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**3,685,832**	kWh[5]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**36,858,320**	kWh[6]

1 Data Reported by Program Participants.

2 Applied Energy Group. Idaho Power Energy Efficiency Potential Study, 2012.

3 (March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.

4 Bathroom Faucet Aerator gallons formula ((People per Household x Average daily use) x (Bathroom faucet baseline - Bathroom faucet retrofit) x Days per year x Number of Participants).

5 Bathroom Faucet Aerator kWh formula (Number of participants x savings x Bathroom Faucet Aerators per electric DHW kit).

6 Bathroom Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).

Projected Savings from LED Night Light Installation

Energy Efficient Night Light Retrofit Inputs and Assumptions:

Average length of use:	**4,380**	hours per year[1]
Average night light uses:	**7**	watts
Retrofit night light uses:	**0.5**	watts
Measure life:	**10**	years[2]
Energy saved per year:	**28**	kWh per year
Energy saved over life expectancy:	**285**	kWh
Installation / participation rate of:	**85.39%**	[3]
Number of participants:	**30,303**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**736,641**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**7,366,406**	kWh[5]

1 Assumption (12 hours per day)

2 Product life provided by manufacturer

3 Data reported by program participants

4 Energy Efficient Night Light kWh savings formula (Energy saved per year x Number of participants x Installation rate)

5 Energy Efficient Night Light kWh lifetime savings formula (Energy saved over life expectancy x Number of participants x Installation rate)

Projected Savings from Shower Timer Installation

Shower TImer inputs and assumptions:		
% of water heated by gas:	**42.00%**	[1]
% of water heated by electricity:	**57.00%**	[1]
Installation / participation rate of Shower Timer:	**50.42%**	[1]
Average showerhead has a flow rate of:	**2.50**	gallons per minute[1]
Retrofit showerhead has flow rate of:	**1.75**	gallons per minute[1]
Number of participants:	**30,303**	[1]
Average of baseline and retrofit showerhead flow rate:	**2.13**	gallons per minute[2]
Shower duration:	**8.20**	minutes per day[3]
Shower Timer duration:	**5.00**	minutes per day[4]
Showers per capita per day (SPCD):	**0.67**	showers per day[3]
Percent of water that is hot water:	**73%**	[5]
Days per year:	**365.00**	days
Product life:	**2.00**	years[5]
Projected Water Savings:		
Shower Timer installation projects an **annual** reduction of:	**25,406,503**	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	**50,813,007**	gallons[7]
Projected Electricity Savings:		
Shower Timer installation projects an **annual** reduction of:	**1,902,896**	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	**3,805,793**	kWh[9]
Projected Natural Gas Savings:		
Shower Timer installation projects an **annual** reduction of:	**70,107**	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	**140,213**	therms[11]

1 Data Reported by Program Participants.

2 Average of the baseline GPM and the retrofit GPM

3 (March 4, 2010). EPA WaterSense® Specification for Showerheads Supporting Statement. Retrieved from http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf

4 Provided by manufacturer.

5 Navigant EM&V Report for Super Savers Program in Illinois PY7

6 Annual water savings = Water Flow (Average of baseline and retrofit flow) × (Baseline Shower duration - Shower Timer duration) × Participants × Days per year × SPCD × Installation Rate of Shower Timer

7 Projected Annual Water Savings x Product Life

8 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Participants

9 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Product Life x Participants

10 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Participants

11 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Product Life x Participants

Enrollment Survey Response Summary

1 How is the water heated in your home?	
Electricity	57%
Gas	42%
Other	1%
2 Do you own or rent your home?	
Own	86%
Rent	14%
3 What is the primary method of heating your home?	
Gas forced air	54%
Heat pump	10%
Electric forced air	20%
Baseboard or ceiling cable	7%
Other	9%
4 What is the primary method of cooling your home?	
Central A/C	63%
Window A/C	15%
Heat pump	10%
None	9%
Other	3%
5 What, if any, energy-saving improvements are you planning to make in the next two years?	
Windows	30%
Furnace or A/C	14%
Insulation	13%
Appliances	17%
Smart thermostat	9%
Other	17%
6 How did you hear about this kit offering?	
Direct mail	24%
Info in bill	20%
Social media	8%
Idaho Power website	5%
Idaho Power employee	5%
Other	38%

Due to rounding of numbers, percentages may not add up to 100%

Kit Survey Response Summary

1 What type of home do you live in?	
Single family home - detached	85%
Apartment, Condo, Townhouses, or Multi-family with 2-3 units	4%
Apartment, Condo, Townhouses, or Multi-family with 4 or more units	3%
Mobile/Manufactured home	7%
2 How many people live in your home?	
5 or more	7%
4	9%
3	12%
2	51%
1	21%
3 How many of the LEDs did you install?	
All of them	51%
7-8	6%
5-6	16%
3-4	15%
1-2	7%
None	5%
4 If you did not install all of the LEDs, what did you do with the remainer?	
Plan to install, just haven't yet	30%
Stored for later use	63%
Gave them to someone else	1%
Other __________	5%
5 Have you installed the High-Efficiency Showerhead?	
Yes	53%
Not yet, but will	36%
No, won't use	11%
6 Have you installed the Kitchen Faucet Aerator?	
Yes	50%
Not yet, but will	28%
No, won't use	22%
7 Have you installed the Bathroom Faucet Aerator #1?	
Yes	54%
Not yet, but will	33%
No, won't use	13%
8 Have you installed the Bathroom Faucet Aerator #2?	
Yes	37%
Not yet, but will	38%
No, won't use	25%

Due to rounding of numbers, percentages may not add up to 100%

Kit Survey Response Summary *(continued)*

9 Have you used the LED Night Light?

Yes	85%
Not yet, but will	13%
No, won't use	2%

10 Have you used the Shower Timer?

Yes	50%
Not yet, but will	32%
No, won't use	17%

11 Have you used the Flow-Rate Test Bag to test the flow rate of your shower or faucets?

Yes	22%
Not yet, but will	56%
No, won't use	22%

12 If you used the Digital Thermometer to check the temperature of your water, what was the temperature?

> 140 F	2%
131 F to 140 F	8%
121 F - 130 F	24%
< 120 F	31%
Did not check water temperature	35%

13 Did you adjust the temperature of your electric water heater?

Yes, I lowered it	19%
Yes, I raised it	2%
No, I did not adjust	80%

14 Did you adjust the temperature of your refrigerator?

Yes, I lowered it	23%
Yes, I raised it	11%
No, I did not adjust	66%

15 Did you adjust the temperature of your freezer?

Yes, I lowered it	19%
Yes, I raised it	9%
No, I did not adjust	72%

16 How satisfied were you with the kit ordering process?

Very satisfied	95%
Somewhat satisfied	3%
Somewhat dissatisfied	0%
Very dissatisfied	1%

17 Did you receive your kit within 3 weeks?

Yes	98%
No	2%

Due to rounding of numbers, percentages may not add up to 100%

Kit Survey Response Summary *(continued)*

18 How likely would you be to tell a friend or family member to order a kit?

Very likely	93%
Somewhat likely	6%
Somewhat unlikely	0%
Very unlikely	1%

19 Prior to hearing about the Energy-Saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?

Yes	55%
No	45%

20 Have you ever gone to Idaho Power's website to look for information about energy efficiency programs and incentives?

Yes	37%
No	63%

21 How likely are you to participate in another energy efficiency program?

Very likely	81%
Somewhat likely	17%
Somewhat unlikely	1%
Very unlikely	0%

22 If you did not install some of the kit items, please tell us why.

Due to rounding of numbers, percentages may not add up to 100%

Idaho Cities & Towns Affected

IDAHO CITIES & TOWNS AFFECTED		
ABERDEEN	GREENLEAF	NEW MEADOWS
AMERICAN FALLS	HAGERMAN	NEW PLYMOUTH
ARBON	HAILEY	NORTH FORK
BANKS	HAMMETT	NOTUS
BELLEVUE	HANSEN	OAKLEY
BLACKFOOT	HAZELTON	OLA
BLISS	HEYBURN	OREANA
BOISE	HILL CITY	PARMA
BRUNEAU	HOLLISTER	PAUL
BUHL	HOMEDALE	PAYETTE
BURLEY	HORSESHOE BEND	PICABO
CALDWELL	IDAHO CITY	PINE
CAMBRIDGE	INDIAN VALLEY	PINGREE
CAREY	INKOM	PLACERVILLE
CARMEN	JACKSON	POCATELLO
CASCADE	JEROME	POLLOCK
CASTLEFORD	KETCHUM	PRAIRIE
CENTERVILLE	KIMBERLY	RICHFIELD
CHUBBUCK	KING HILL	RIGGINS
CORRAL	KUNA	ROBIE CREEK
COUNCIL	LAKE FORK	ROCKLAND
DIETRICH	LEADORE	ROGERSON
DONNELLY	LEMHI	RUPERT
EAGLE	LETHA	SALMON
EDEN	LOWMAN	SHOSHONE
EMMETT	MALTA	SPRINGFIELD
FAIRFIELD	MARSING	STAR
FEATHERVILLE	MCCALL	STERLING
FILER	MELBA	SUN VALLEY
FORT HALL	MERIDIAN	SWEET
FRUITLAND	MESA	TENDOY
FRUITVALE	MIDDLETON	TWIN FALLS
GARDEN CITY	MIDVALE	WEISER
GARDEN VALLEY	MONTOUR	WENDELL
GIBBONSVILLE	MOUNTAIN HOME	WEST MAGIC
GLENNS FERRY	MURPHY	WILDER
GOODING	MURTAUGH	YELLOW PINE
GRAND VIEW	NAMPA	
TOTAL NUMBER OF CITIES & TOWNS AFFECTED:		113
TOTAL NUMBER OF HOUSEHOLDS AFFECTED:		28,922

Oregon Cities & Towns Affected

OREGON CITIES & TOWNS AFFECTED		
ADRIAN	HUNTINGTON	RICHLAND
BROGAN	IRONSIDE	UNITY
DREWSEY	JAMIESON	VALE
DURKEE	JORDAN VALLEY	WESTFALL
HALFWAY	NYSSA	
HARPER	ONTARIO	
HEREFORD	OXBOW	

TOTAL NUMBER OF CITIES & TOWNS AFFECTED:	18
TOTAL NUMBER OF HOUSEHOLDS AFFECTED:	1,381

Idaho Power Regions Affected

REGIONS (IDAHO)	ELECTRIC	NON-ELECTRIC
CANYON	2,676	2,043
CAPITAL	4,835	7,235
EASTERN	2,973	1,502
SOUTHERN	3,210	1,297
WESTERN	2,489	662
NUMBER OF HOUSEHOLDS IMPACTED:	16,183	12,739
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	28,922	

REGIONS (OREGON)	ELECTRIC	NON-ELECTRIC
CANYON	14	2
WESTERN	1,187	178
NUMBER OF HOUSEHOLDS IMPACTED:	1,201	180
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	1,381	

REGIONS (COMBO)	ELECTRIC	NON-ELECTRIC
NUMBER OF HOUSEHOLDS IMPACTED:	17,384	12,919
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	30,303	

RESOURCEACTION PROGRAMS

A FRANKLIN ENERGY COMPANY

976 United Circle • Sparks, NV 89431

www.resourceaction.com • (888) 438-9473

N30000

An IDACORP Company

IDAHO POWER
ENERGY-SAVING KIT
PROGRAM SUMMARY REPORT

2017B

SUBMITTED BY:
RESOURCE ACTION PROGRAMS®

Idaho Power Energy-Saving Kit Program Summary Report 2017B

Sponsored by:

IDAHO POWER®

An IDACORP Company

Submitted by:

RESOURCEACTION PROGRAMS

January 2018

“Appreciated very much receiving all the products. Great way to illustrate and teach the importance of energy efficiency. Thank you! :)”

– Idaho Power Energy-Saving Kit Program Participant

Table of Contents

“It was all very helpful and I like the energy package. Thank you for the energy program. I will spread the word to my friends and family.”

– Idaho Power Energy-Saving Kit Program Participant

Executive Summary

The Idaho Power Energy-Saving Kit Program was designed and implemented to provide Idaho Power's residential households with energy-efficiency education, measures to reduce their energy costs, and help them develop energy-efficient behaviors consistent with Idaho Power. This report summarizes the 2017B Energy-Saving Kit program, which was implemented by nineteen thousand, six-hundred seven (19,607) Idaho households and seven-hundred ten (710) Oregon households. Funding was provided by Idaho Power.

The program achieved or exceeded expectations and the results are listed below.

PROGRAM ACHIEVEMENTS

1. Provided residential energy-saving measures and energy-efficiency education to 19,607 Idaho and 710 Oregon households.

- Affected all five regions of the Idaho Power service territory
- Affected 113 cities & towns in Idaho
- Affected 18 cities & towns in Oregon

Regions	Households	Electric Kit	Non-Electric Kit
Canyon	3,703	1,750	1,953
Capital	4,650	1,506	3,144
Eastern	4,075	2,055	2,020
Southern	4,682	2,568	2,114
Western	3,207	2,112	1,095
Total	20,317	9,991	10,326
		20,317	

2. Generated residential energy and water savings. Projected annual savings:

- 113,242,107 gallons of water saved
- 9,173,216 kWh of electricity saved
- 47,004 therms of gas saved

(continued)

3. Supported Idaho Power with their diverse outreach and distribution methods.
   - Idaho Power website
   - Idaho Power employee
   - Information in bills
   - Facebook/Twitter
   - Friend or family
   - Other
   - Direct mail
4. Designed and provided complementary educational materials and incentives to maximize installation of targeted efficiency measures (Installation rates ranged from 58–93 percent).
5. Maintained data collection and management services to collect and process audit ready data from participating households.
6. Maintained tracking and reporting to summarize the Program participation.

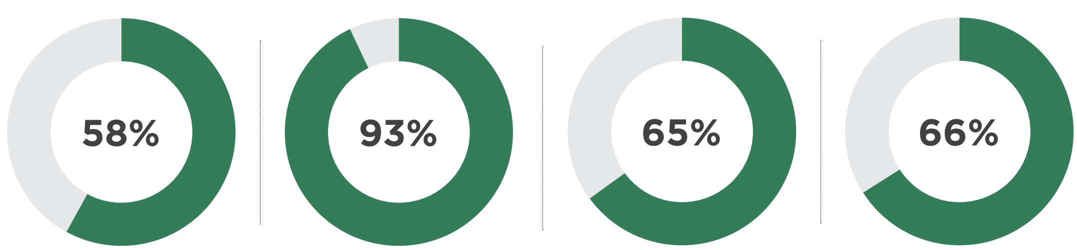
OPTING-IN METHODS	HOUSEHOLDS	%
Website	5,633	27.7%
Phone	1,004	4.9%
Postcards	13,680	67.3%

The program with a new electric kit configuration was launched in mid-August. Direct mailing in September and November resulted in immediate positive response from Idaho Power customers. Program content on the Idaho Power website and enclosed information in the customer bills combined with community events generated steady demand for this energy-saving kit. The program served a total of 20,317 households in both Idaho and Oregon.

The Program provided customized Direct-to-Customer Program modules, which included educational materials and energy-saving products. A participant survey was included with the program materials. The purpose of the survey was to increase educational retention and impact while serving as a data collection tool.

Survey responses indicated high participant satisfaction and participation in product retrofits and adoption of new energy saving behaviors. Total 2,908 households returned completed surveys and the responses were overwhelmingly positive. Highlights include:

A summary of responses can be found in Appendix B.



Reported households with ALL 9 LED light bulbs installed.

Reported households with the LED Night Light installed.*

Reported households with the Evolve TSV & Showerhead installed.*

Reported households who used the Shower Timer.*

**Installation rates assume 50% of households who responded "Not yet, but will" actually completed the installation.*

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Projected energy savings from this program are significant. Based on the reported actions, annual and lifetime resource savings are as follows:

PROJECTED ANNUAL SAVINGS	
113,242,107	gallons of water saved
9,173,216	kWh of electricity saved
47,004	therms of gas saved

PROJECTED LIFETIME SAVINGS	
996,148,378	gallons of water saved
85,182,671	kWh of electricity saved
94,008	therms of gas saved

PROJECTED ANNUAL SAVINGS PER HOME	
11,334	gallons of water saved
452	kWh of electricity saved
2	therms of gas saved

PROJECTED LIFETIME SAVINGS PER HOME	
99,705	gallons of water saved
4,193	kWh of electricity saved
5	therms of gas saved

"I have installed and used everything that was sent. I even bought more LED bulbs for the rest of the house."

– Idaho Power Energy-Saving Kit Program Participant

RAP Direct-to-Customer Programs

For more than 25 years, Resource Action Programs® (RAP) has designed and implemented resource efficiency and education programs, changing household energy and water use while delivering significant, measurable resource savings for program sponsors. All RAP programs feature a proven blend of innovative education and comprehensive implementation services.

RAP Programs serve more than 550,000 households each year through school and adult delivered Measure Based Education Programs. Our forty-person staff manages the implementation process and program oversight for nearly 300 individual programs annually. Recognized nationally as a leader in energy and water efficiency education and program design, RAP has a strong reputation for providing the highest level of service to program sponsors as part of a wide range of conservation and resource efficiency solutions for municipalities, utilities, states, community agencies, and corporations.

All aspects of program design and implementation are completed at the Program Center in Sparks, Nevada. These include: graphic and web design, print production, procurement, warehousing, logistics, module production, marketing, program tracking, data tabulation and reporting.

The Direct-to-Customer Program represents the leading edge of community energy efficiency education program design and implementation. The Program uses a client-directed Measure Based Education model to generate lasting residential energy savings from both retrofits and new behaviors. Initially, participants choose their personal savings target. Then they select retrofits using provided measures and energy-saving behaviors to reach their goal. The Direct-to-Customer Program is tremendously versatile, and can easily be introduced and distributed via a wide range of delivery channels, including Opt-in Direct Mail, CBO/CAA distribution, workshops, community events, affinity groups (volunteers, CAAs, CBOs, churches) or public events.

Cost-effective energy savings from the measure installations will justify program investments on their own, but the Program delivers several other important benefits as well. The educational component is designed to include each household member in order to manage household energy use. Measures, immediate savings actions and additional savings ideas for all areas of residential energy use are grouped by areas of the home and provided to participants as options to help them reach their personal savings targets. Additional rebates and program opportunities can be introduced through the Program or offered as incentives for program performance.

Participation in the Direct-to-Customer Program provides a strong, personalized pathway for participants to realize both initial and ongoing savings from new products and behavior choices in their homes.

“I have or will use the whole kit, it was awesome!! Came much sooner than I thought it would.”

– Idaho Power Energy-Saving Kit Program Participant

Idaho Power Energy-Saving Kit Program Overview

The overarching goal of this measure based program was to assist Idaho Power in providing their residential households with energy-efficiency education and reduced energy costs as well as developing energy efficiency behaviors consistent with Idaho Power's energy efficiency objectives. The energy-savings Kits empowered the Idaho and Oregon households to save energy and money.

The program created and distributed a custom educational savings module consisting of efficiency measures, educational materials, and household surveys. Educational materials included a Quick Start Guide, Survey, Installation Instructions, Mini-Home Assessment (Idaho Power provided) and other tools such as stickers and magnets as reminders for new energy-efficient conservation behaviors. All elements were customized to meet Idaho Power priorities, regional conditions and regulatory requirements.

HEARD ABOUT PROGRAM	HOUSEHOLDS	%
Direct Mail	14,817	72.9%
Idaho Power employee	648	3.2%
Idaho Power website	578	2.8%
Info in bill	978	4.8%
Facebook/Twitter	458	2.3%
Friend or family	1,918	9.4%
Other: News	73	0.4%
Other: Organizations	447	2.2%
Other	220	1.1%
Blank	180	0.9%

The program was offered to eligible Idaho Power residential households as defined by Idaho Power. Those in participating households cited the categories shown in the table (at right) when asked how they heard of the program.

Those in eligible households opting-in to receive the energy-saving kit utilized one of three primary methods:

OPTING-IN METHODS	HOUSEHOLDS	%
Website	5,633	27.7%
Phone	1,004	4.9%
Postcards	13,680	67.3%

1) RAP developed and maintained a program website to process energy-saving kit orders as well as to provide program information, including product installation videos and instructions. 2) RAP maintained a toll-free phone number to process the called-in kit orders and address any inquiries and issues. 3) Custom-designed direct mailers were sent to households with program information and instructions on ordering a kit.

Kit installation surveys were received from 2,908 participated households, representing a response rate of 14.3% of the 20,317 energy-saving kits distributed. A monthly drawing for a $100 gift card provided an incentive for returning the household installation surveys.


QUICK START GUIDE
Español en el otro lado
START SAVING NOW!
1 Install the energy-efficient products in your kit.
2 Follow the energy-saving tips provided in this Quick Start Guide.
3 For additional ways to save, visit idahopower.com/save2day.
117419

Idaho Power Energy-Saving Kit Program Materials

Each participating household received an energy-saving kit containing efficiency measures for their homes and a Quick Start Guide with energy efficiency information and behavioral tips. The materials were customized for Idaho Power. Households with electric water heating received an electric kit (including water-saving measures). Households with other water heating options received a non-electric kit (not including water-saving measures).

Included Educational Materials

Quick Start Guide

Survey

Survey Envelope (postage prepaid)

Sticker and Magnet Reminder

Mini-Home Assessment (Idaho Power provided)

Installation Instructions

Included Efficiency Measures

Six 9-Watt LEDs (800 Lumens)

Three 6-Watt LEDs (480 Lumens)

IPC branded LED Night Light

Evolve TSV & Showerhead

Kitchen and Bathroom Faucet Aerators

Shower Timer

Digital Thermometer

* An Electric Kit


117429
INSTALLATION SURVEY
(Español en el otro lado)
Complete this survey for a chance to win a
$100* Gift Card
All you have to do is...
1. Install the energy-efficient products in your kit.
2. Follow the energy-saving tips
quick start guide.
3. Return this survey for a cha
gift card!
(Postage-paid envelope included
Fill in each bubble comp
Use a black pen to fill in
next to the correct answ
*For contest details visit Idahopower.com/sa
15039 A0092 Idaho Power DTC
0000000
1. What type of home do you live in?
Single family home - Detached
Apartment, Condo, Townhouse, or Multi-family with 2-3 units
Apartment, Condo, Townhouse, or Multi-family with 4 or more units
Mobile/Manufactured home
2. How many people live in your home?
5 or more
4
3
2
1
3. How many of the LEDs did you install?
All of them
7-8
5-6
3-4
1-2
None
4. If you did not install all of the LEDs, what did you do with the remainder?
Plan to install, just haven't yet
Stored for later use
Gave them to someone else
Other
Have you used the
5. LED Night Light?
6. Shower Timer?
7. Flow-Rate Test Bag to test the flow rate of your shower or faucets?
Yes
Not yet, but will
No, won't use
8. If you used the Digital Thermometer to check the temperature of your water, what was the temperature?
> 140° F
131° F to 140° F
120° F to 130° F
< 120° F
Did not check water temperature
Did you adjust the temperature of your
9. Electric water heater?
10. Refrigerator?
11. Freezer?
Yes I lowered it
Yes I raised it
No I did not adjust
12. How satisfied were you with the kit ordering process?
Very satisfied
Somewhat satisfied
Somewhat dissatisfied
Very dissatisfied
13. Did you receive your kit within 3 weeks?
Yes
No
14. How likely would you be to tell a friend or family member to order a kit?
Very likely
Somewhat likely
Somewhat unlikely
Very unlikely
15. Prior to hearing about the Energy-Saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?
Yes
No
16. Have you ever gone to Idaho Power's website to look for information about energy efficiency programs or to find ways to save?
Yes
No
17. How likely are you to participate in another energy efficiency program?
Very likely
Somewhat likely
Somewhat unlikely
Very unlikely
18. If you did not install some of the kit items, please tell us why.
Return this survey in the postage-paid envelope included in your kit.
You will be entered into our monthly drawing for a chance to win a $100 gift card.

Idaho Power Energy-Saving Kit Program Implementation

An introductory marketing direct mailer, supported by the information on the Idaho Power website, merited positive results. Many shared their positive program experience with their family and friends though social media, word of mouth, and emails. Additional exposure through bill inserts and community events resulted in a steady demand for the program.

Participation was processed and tracked at the RAP Program Center, which has the capacity to handle in excess of 100,000 requests per month. The program website, a toll-free phone number, and the business reply postcards provided convenient methods for interested households to order a kit and participate in the program.

Orders were tracked and managed daily from all outreach and enrollment sources. Program materials and products were packaged and addressed for individual home delivery. All Program modules received a unique ID number to improve the accuracy of data tracking and reduce the amount of information required from respondents.

All enrollments, shipping, and survey data were managed by RAP's proprietary Program Database. In addition, all returned surveys were tabulated and included in the program database. This procedure allows for reporting, which is an important element for tracking the measurements and goals of this program.

"Thank you for the light bulbs. I've replaced all of my home lights with LED except in my shop but will do them too. Replaced my kitchen lights with LED strip lights fixtures. It was way brighter, wife is happy!"

– Idaho Power Energy-Saving Kit Program Participant

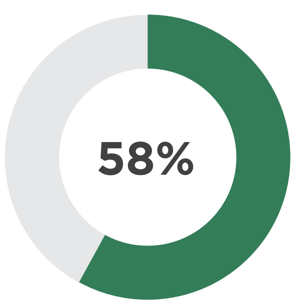
Idaho Power Energy-Saving Kit Program Impact

The program impacted 115 cities and towns throughout Idaho and 18 cities and towns in Oregon. As illustrated below, the program successfully educated those in participating households about energy and water efficiency while generating resource savings through the installation of efficiency measures in their homes. Home survey and installation information was collected to track savings and gather household consumption and demographic data. The three program elements, described on the next few pages, were used to collect this data.

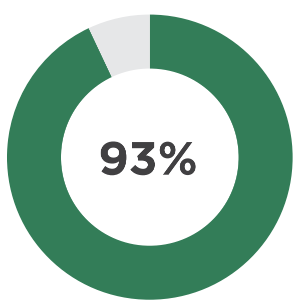
A. Home Survey and Retrofit Data

Upon completion of the program, participating households were asked to complete a home survey to assess their resource use, verify product installation, provide demographic information, and measure participation rates. Sample questions appear below and a complete summary of all responses is included in Appendix B.

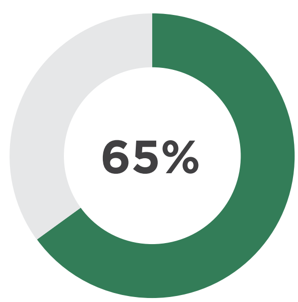
Did you install ALL 9 LED Light Bulbs?	**Yes - 58%**
Did you install the LED Night Light?	**Yes - 93%**
Did you install the Evolve TSV & Showerhead?	**Yes - 65%**
Did you use the Shower Timer?	**Yes - 66%**



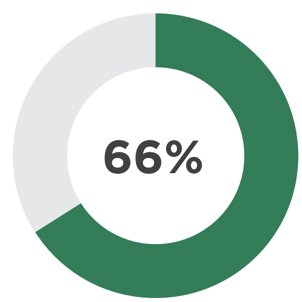
Reported households with ALL 9 LED Light Bulbs installed.



Reported households with the LED Night Light installed.*



Reported households with the Evolve TSV & Showerhead installed.*



Reported households who used the Shower Timer.*

**Installation rates assume 50% of households who responded "Not yet, but will" actually completed the installation.*

B. Water and Energy Savings Summary

As part of the program, participants installed retrofit efficiency measures in their homes. Using the family habits collected from the home survey as the basis for this calculation, 20,317 households are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

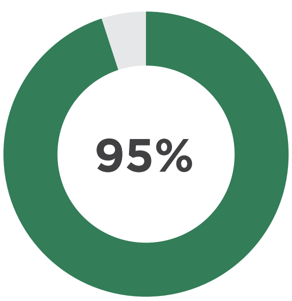
Total Number of Participants:	**20,317**		
Number of Electric Only Participants:	**9,991**		
Number of Non-Electric Participants:	**10,326**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	**55,570,055**	**555,700,550**	gallons
Measure Life: **10 years**	**2,397,840**	**23,978,400**	kWh
Projected reduction from Shower Timer installation:	**17,034,087**	**34,068,174**	gallons
Product Life: **2 years**	**1,275,819**	**2,551,638**	kWh
	47,004	**94,008**	therms
Projected reduction from Kitchen Faucet Aerator retrofit:	**23,626,724**	**236,267,241**	gallons
Measure Life: **10 years**	**1,059,046**	**10,590,460**	kWh
Projected reduction from Bathroom Faucet Aerator retrofit:	**17,011,241**	**170,112,413**	gallons
Measure Life: **10 years**	**2,118,092**	**21,180,920**	kWh
Projected reduction from **9**-watt LED Light Bulbs:	**1,219,020**	**14,628,240**	kWh
Measure Life: **12 years**			
Projected reduction from **6**-watt LED Light Bulbs:	**609,510**	**7,314,120**	kWh
Measure Life: **12 years**			
Projected reduction from LED Night Light:	**493,889**	**4,938,893**	kWh
Measure Life: **10 years**			
TOTAL PROJECTED PROGRAM SAVINGS:	**113,242,107**	**996,148,378**	gallons
	9,173,216	**85,182,671**	kWh
	47,004	**94,008**	therms
TOTAL PROJECTED PROGRAM SAVINGS PER HOUSEHOLD:	**11,334**	**99,705**	gallons
	452	**4,193**	kWh
	2	**5**	therms

C. Participant Response

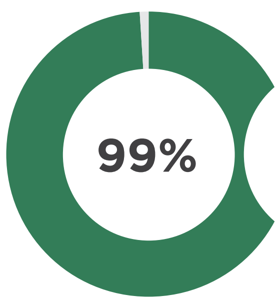
Participant response to Idaho Power's various outreach methods combined with social media and interpersonal communication resulted in an overwhelming demand for the program. Idaho Power increased the budget and the kit availability for this program in order to fulfill all residential customer orders. The participants utilized the Quick Start Guide to choose which measures and actions to take. Installation videos and text instructions made retrofit projects easy to complete. The installation rate data and the participant satisfaction data presented in this report were provided by kit surveys.

SURVEY TYPE	KITS SHIPPED	SURVEYS RECEIVED	SURVEY %
Electric	9,991	1,213	12.1%
Non-electric	10,326	1,695	16.4%
TOTAL	20,317	2,908	14.3%

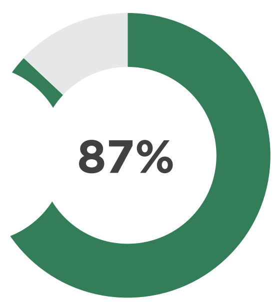
How satisfied were you with the kit ordering process? **Very Satisfied - 95%**
Did you receive your kit within 3 weeks? **Yes - 99%**
How likely would you be to tell a friend or family member to order a kit? **Very Likely - 87%**
How likely are you to participate in another energy efficiency program? **Very Likely - 80%**



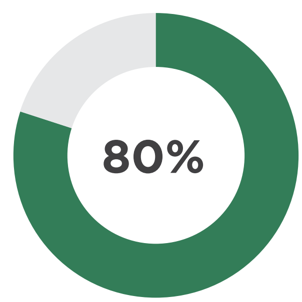
Reported households that were very satisfied with the ordering process.



Reported households that received their kits within 3 weeks.



Reported households that were very likely to tell a friend or family member to order a kit.



Reported households that were very likely to participate in another energy efficiency program.

Participant Responses

Appreciated very much receiving all the products. Great way to illustrate and teach the importance of energy efficiency. Thank you! :)

It was all very helpful and I like the energy package. Thank you for the energy program. I will spread the word to my friends and family.

I have installed and used everything that was sent. I even bought more LED bulbs for the rest of the house.

I have or will use the whole kit, it was awesome!! Came much sooner than I thought it would.

Thank you for the light bulbs. I've replaced all of my home lights with LED except in my shop but will do them too. Replaced my kitchen lights with LED strip lights fixtures. It was way brighter, wife is happy!

I was very impressed with the kit, makes you aware of energy efficiency.

The bulbs were AMAZING - we purchased more to change out all of our bulbs! The shower timer will be great for our son. Amount of ways to temp with thermometer, helped with fridge and both freezers.

Thank you for providing this education tool and energy-saving tools.

Thank you :) this energy savings kit is a great idea.

Thanks! What an awesome kit and interesting activities.

I have told everyone that comes to our home about the gift package. Loved it.

Thank you - I try to be energy aware - this was a nice way to check the light bulbs are great and the night light we didn't even know we needed until now!

Used all the lights, very easy to install. Have used the digital thermometer in a number of avenues and like it very much. Some of the other tools I will get around to using, just need to find the time to get it done. I also participate in the A/C power shut off program in the summer.

Great program, loved the kit, great energy items. Thank you

Almost everything was installed as used. Will use everything as time permits.

I'm 80 years old and love the night light, foster girls take 25 min showers.

Had some LED lights already but will use them when needed. Good program. I take more baths for shower timer, we'll use when grandkids come. Us older people, always need night lights in hallways. Thank you!

I loved the kit, very helpful! Thank you!

Participant Responses *(continued)*

Loved night light & light bulbs (as they are) more efficient. Thank you. I'll pay it forward.

I was very pleased with my kit. I am 81 so I appreciate all I get. Thank you.

Awesome kit! Very well put together. We were impressed with it! Great job.

Thank you. Best program ever! I have told friends!

The shower timer is very helpful with the kids. I've noticed the teenagers taking shorter showers. Thanks for making that battle easier!

Pleasantly surprised with kit, more than I expected.

I loved the kit, very helpful! Thank you!

All items useful and informative. Thanks a lot.

Idaho power is a fine company. I hope to be a long time customer. Keep up the good work!

* An Electric Kit

Appendices

Appendix A

Appendix B

Appendix C

Projected Savings from 9-Watt LED Retrofit

9-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per participant:	**6**	
Number of participants:	**20,317**	
Deemed savings per lamp (kWh):	**10**	kWh[1]
Measure life:	**12**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**1,219,020**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**14,628,240**	kWh[3]

1 Regional Technical Forum. ResLightingCFLandLEDLamps_v3_3.xslm. Mail by request. LED general purpose and Dimmable. 665 to 1439 lumens.

2 LED kWh savings formula (Deemed savings per lamp x Number of participants x Lamps per participant).

3 LED kWh lifetime savings formula (Annual savings x Measure Life).

Projected Savings from 6-Watt LED Retrofit

7.5-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per participant:	**3**	
Number of participants:	**20,317**	
Deemed savings per lamp (kWh):	**10**	kWh[1]
Measure life:	**12**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**609,510**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**7,314,12**	kWh[3]

1 Regional Technical Forum. ResLightingCFLandLEDLamps_v3_3.xslm. Mail by request. LED general purpose and Dimmable. 250 to 664 lumens.

2 LED kWh savings formula (Deemed savings per lamp x Number of participants x Lamps per participant).

3 LED kWh lifetime savings formula (Annual savings x Measure Life).

Projected Savings from Showerhead Retrofit

Showerhead retrofit inputs and assumptions:		
Showerheads per electric DHW kit:	**1**	
Number of electric DHW participants:	**9,991**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Deemed Savings:	**240**	[2]
Length of average shower:	**7.84**	minutes[3]
Showerhead (baseline):	**2.50**	gpm[3]
Showerhead new (retrofit):	**1.75**	gpm
Measure life:	**10.00**	years[2]
Projected Water Savings:		
Showerhead retrofit projects an **annual** reduction of:	**55,570,055**	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	**555,700,550**	gallons[4]
Projected Electricity Savings:		
Showerhead retrofit projects an **annual** reduction of:	**2,397,840**	kWh[5]
Showerhead retrofit projects a **lifetime** reduction of:	**23,978,400**	kWh[5]

1 *Data Reported by Program Participants.*

2 *Regional Technical Forum - ResShowerheads_v2_1 xlsm. Mail by request. 1.75 gpm Any shower Electric water heating.*

3 *(March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.*

4 *Showerhead Gallons Formula (Number of participants x (Showerhead baseline - Showerhead new) x Length of average shower x Days per year x People per household).*

5 *Showerhead kWh formula (Number of Participants x Deemed Savings).*

Appendix A

Projected Savings from Kitchen Faucet Aerator Retrofit

Kitchen Faucet Aerator retrofit inputs and assumptions:		
Kitchen Faucet Aerator per electric DHW kit:	**1**	
Number of electric DHW participants:	**9,991**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Savings:	**106**	kWh[2]
Average daily use:	**2.50**	minutes [3]
Kitchen Faucet Aerator (baseline):	**2.50**	gpm[3]
Kitchen Faucet Aerator (retrofit):	**1.50**	gpm
Measure life:	**10.00**	years[3]
Projected Water Savings:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**23,626,724**	gallons[4]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**236,267,241**	gallons[4]
Projected Electricity Savings:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**1,059,046**	kWh[5]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**10,590,460**	kWh[6]

1 Data Reported by Program Participants.

2 Applied Energy Group. Idaho Power Energy Efficiency Potential Study, 2012.

3 (March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.

4 Kitchen Aerators gallons formula (Number of Participants x (Kitchen aerator baseline - Kitchen aerator retrofit) x Average Daily Use x Days per year x People per household).

5 Kitchen Aerators kWh formula (Number of Participants x Savings).

6 Kitchen Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).

Projected Savings from Bathroom Faucet Aerator Retrofit

Bathroom Faucet Aerator retrofit inputs and assumptions:

Bathroom Faucet Aerator per electric DHW kit:	**2**	
Number of electric DHW participants:	**9,991**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Savings:	**106**	kWh[2]
Average daily use:	**1.50**	minutes [3]
Bathroom Faucet Aerator (baseline):	**2.20**	gpm[3]
Bathroom Faucet Aerator (retrofit):	**1.00**	gpm
Measure life:	**10.00**	years[3]

Projected Water Savings:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**17,011,241**	gallons[4]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**170,112,413**	gallons[4]

Projected Electricity Savings:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**2,118,092**	kWh[5]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**21,180,920**	kWh[6]

1 Data Reported by Program Participants.

2 Applied Energy Group. Idaho Power Energy Efficiency Potential Study, 2012.

3 (March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.

4 Bathroom Faucet Aerator gallons formula ((People per Household x Average daily use) x (Bathroom faucet baseline - Bathroom faucet retrofit) x Days per year x Number of Participants).

5 Bathroom Faucet Aerator kWh formula (Number of participants x savings x Bathroom Faucet Aerators per electric DHW kit).

6 Bathroom Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).

Appendix A

Projected Savings from LED Night Light Installation

Energy Efficient Night Light Retrofit Inputs and Assumptions:

Average length of use:	**4,380**	hours per year[1]
Average night light uses:	**7**	watts
Retrofit night light uses:	**0.5**	watts
Measure life:	**10**	years[2]
Energy saved per year:	**28**	kWh per year
Energy saved over life expectancy:	**285**	kWh
Installation / participation rate of:	**85.39%**	[3]
Number of participants:	**20,317**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**493,889**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**4,938,893**	kWh[5]

1 Assumption (12 hours per day)

2 Product life provided by manufacturer

3 Data reported by program participants

4 Energy Efficient Night Light kWh savings formula (Energy saved per year x Number of participants x Installation rate)

5 Energy Efficient Night Light kWh lifetime savings formula (Energy saved over life expectancy x Number of participants x Installation rate)

Projected Savings from Shower Timer Installation

Shower TImer inputs and assumptions:		
% of water heated by gas:	**42.00%**	[1]
% of water heated by electricity:	**57.00%**	[1]
Installation / participation rate of Shower Timer:	**50.42%**	[1]
Average showerhead has a flow rate of:	**2.50**	gallons per minute[1]
Retrofit showerhead has flow rate of:	**1.75**	gallons per minute[1]
Number of participants:	**20,317**	[1]
Average of baseline and retrofit showerhead flow rate:	**2.13**	gallons per minute[2]
Shower duration:	**8.20**	minutes per day[3]
Shower Timer duration:	**5.00**	minutes per day[4]
Showers per capita per day (SPCD):	**0.67**	showers per day[3]
Percent of water that is hot water:	**73%**	[5]
Days per year:	**365.00**	days
Product life:	**2.00**	years[5]
Projected Water Savings:		
Shower Timer installation projects an **annual** reduction of:	**17,034,087**	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	**34,068,174**	gallons[7]
Projected Electricity Savings:		
Shower Timer installation projects an **annual** reduction of:	**1,275,819**	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	**2,551,638**	kWh[9]
Projected Natural Gas Savings:		
Shower Timer installation projects an **annual** reduction of:	**47,004**	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	**94,008**	therms[11]

1 Data Reported by Program Participants.

2 Average of the baseline GPM and the retrofit GPM

3 (March 4, 2010). EPA WaterSense® Specification for Showerheads Supporting Statement. Retrieved from http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf

4 Provided by manufacturer.

5 Navigant EM&V Report for Super Savers Program in Illinois PY7

6 Annual water savings = Water Flow (Average of baseline and retrofit flow) × (Baseline Shower duration - Shower Timer duration) × Participants × Days per year × SPCD × Installation Rate of Shower Timer

7 Projected Annual Water Savings x Product Life

8 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Participants

9 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Product Life x Participants

10 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Participants

11 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Product Life x Participants

Enrollment Survey Response Summary

1 How is the water heated in your home?	
Electricity	48%
Gas	50%
Other	1%
2 Do you own or rent your home?	
Own	90%
Rent	10%
3 What is the primary method of heating your home?	
Gas forced air	60%
Heat pump	9%
Electric forced air	16%
Baseboard or ceiling cable	6%
Other	9%
4 What is the primary method of cooling your home?	
Central A/C	65%
Window A/C	16%
Heat pump	8%
None	8%
Other	4%
5 What, if any, energy-saving improvements are you planning to make in the next two years?	
Windows	30%
Furnace or A/C	14%
Insulation	12%
Appliances	19%
Smart thermostat	11%
Other	14%
6 How did you hear about this kit offering?	
Direct mail	73%
Idaho Power employee	3%
Idaho Power website	3%
Info in bill	5%
Facebook/Twitter	2%
Friend or Family	7%
Other	7%
Blank	1%

Due to rounding of numbers, percentages may not add up to 100%

Kit Survey Response Summary

1 What type of home do you live in?	
Single family home - detached	92%
Apartment, Condo, Townhouses, or Multi-family with 2-3 units	2%
Apartment, Condo, Townhouses, or Multi-family with 4 or more units	1%
Mobile/Manufactured home	4%
2 How many people live in your home?	
5 or more	10%
4	11%
3	14%
2	48%
1	17%
3 How many of the LEDs did you install?	
All of them	58%
7-8	6%
5-6	11%
3-4	11%
1-2	8%
None	6%
4 If you did not install all of the LEDs, what did you do with the remainer?	
Plan to install, just haven't yet	28%
Stored for later use	64%
Gave them to someone else	2%
Other _________	6%
5 Have you installed the Evolve Showerhead?	
Yes	44%
Not yet, but will	42%
No, won't use	14%
6 Have you installed the Kitchen Faucet Aerator?	
Yes	48%
Not yet, but will	31%
No, won't use	21%
7 Have you installed the Bathroom Faucet Aerator #1?	
Yes	57%
Not yet, but will	33%
No, won't use	10%
8 Have you installed the Bathroom Faucet Aerator #2?	
Yes	42%
Not yet, but will	37%
No, won't use	22%

Due to rounding of numbers, percentages may not add up to 100%

Kit Survey Response Summary *(continued)*

9 Have you used the LED Night Light?	
Yes	88%
Not yet, but will	11%
No, won't use	1%
10 Have you used the Shower Timer?	
Yes	49%
Not yet, but will	34%
No, won't use	17%
11 Have you used the Flow-Rate Test Bag to test the flow rate of your shower or faucets?	
Yes	24%
Not yet, but will	55%
No, won't use	20%
12 If you used the Digital Thermometer to check the temperature of your water, what was the temperature?	
> 140 F	2%
131 F to 140 F	8%
121 F - 130 F	26%
< 121 F	26%
Did not check water temperature	37%
13 Did you adjust the temperature of your electric water heater?	
Yes, I lowered it	19%
Yes, I raised it	2%
No, I did not adjust	79%
14 Did you adjust the temperature of your refrigerator?	
Yes, I lowered it	25%
Yes, I raised it	12%
No, I did not adjust	63%
15 Did you adjust the temperature of your freezer?	
Yes, I lowered it	20%
Yes, I raised it	9%
No, I did not adjust	71%
16 How satisfied were you with the kit ordering process?	
Very satisfied	95%
Somewhat satisfied	4%
Somewhat dissatisfied	0%
Very dissatisfied	1%
17 Did you receive your kit within 3 weeks?	
Yes	99%
No	1%

Due to rounding of numbers, percentages may not add up to 100%

Kit Survey Response Summary *(continued)*

18 How likely would you be to tell a friend or family member to order a kit?

Very likely	87%
Somewhat likely	10%
Somewhat unlikely	1%
Very unlikely	1%

19 Prior to hearing about the Energy-Saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?

Yes	53%
No	47%

20 Have you ever gone to Idaho Power's website to look for information about energy efficiency programs and incentives?

Yes	26%
No	74%

21 How likely are you to participate in another energy efficiency program?

Very likely	80%
Somewhat likely	19%
Somewhat unlikely	1%
Very unlikely	1%

22 If you did not install some of the kit items, please tell us why.

Due to rounding of numbers, percentages may not add up to 100%

Idaho Cities & Towns Affected

IDAHO CITIES & TOWNS AFFECTED		
ABERDEEN	GREENLEAF	NEW MEADOWS
AMERICAN FALLS	HAGERMAN	NEW PLYMOUTH
ARBON	HAILEY	NORTH FORK
BANKS	HAMMETT	NOTUS
BELLEVUE	HANSEN	OAKLEY
BLACKFOOT	HAZELTON	OLA
BLISS	HEYBURN	OREANA
BOISE	HILL CITY	PARMA
BRUNEAU	HOLLISTER	PAUL
BUHL	HOMEDALE	PAYETTE
BURLEY	HORSESHOE BEND	PICABO
CALDWELL	IDAHO CITY	PINE
CAMBRIDGE	INDIAN VALLEY	PINGREE
CAREY	INKOM	PLACERVILLE
CARMEN	JACKSON	POCATELLO
CASCADE	JEROME	POLLOCK
CASTLEFORD	KETCHUM	PRAIRIE
CENTERVILLE	KIMBERLY	RICHFIELD
CHUBBUCK	KING HILL	RIGGINS
CORRAL	KUNA	ROBIE CREEK
COUNCIL	LAKE FORK	ROCKLAND
DIETRICH	LEADORE	ROGERSON
DONNELLY	LEMHI	RUPERT
EAGLE	LETHA	SALMON
EDEN	LOWMAN	SHOSHONE
EMMETT	MALTA	SPRINGFIELD
FAIRFIELD	MARSING	STAR
FEATHERVILLE	MCCALL	STERLING
FILER	MELBA	SUN VALLEY
FORT HALL	MERIDIAN	SWEET
FRUITLAND	MESA	TENDOY
FRUITVALE	MIDDLETON	TWIN FALLS
GARDEN CITY	MIDVALE	WEISER
GARDEN VALLEY	MONTOUR	WENDELL
GIBBONSVILLE	MOUNTAIN HOME	WEST MAGIC
GLENNS FERRY	MURPHY	WILDER
GOODING	MURTAUGH	YELLOW PINE
GRAND VIEW	NAMPA	
	TOTAL NUMBER OF CITIES & TOWNS AFFECTED:	113
	TOTAL NUMBER OF HOUSEHOLDS AFFECTED:	19,607

Oregon Cities & Towns Affected

OREGON CITIES & TOWNS AFFECTED		
ADRIAN	HUNTINGTON	OXBOW
BROGAN	IRONSIDE	RICHLAND
DREWSEY	JAMIESON	UNITY
DURKEE	JORDAN VALLEY	VALE
HALFWAY	JUNTURA	
HARPER	NYSSA	
HEREFORD	ONTARIO	

TOTAL NUMBER OF CITIES & TOWNS AFFECTED:	18
TOTAL NUMBER OF HOUSEHOLDS AFFECTED:	710

Idaho Power Regions Affected

REGIONS (IDAHO)	ELECTRIC	NON-ELECTRIC
CANYON	1,731	1,952
CAPITAL	1,506	3,144
EASTERN	2,055	2,020
SOUTHERN	2,568	2,114
WESTERN	1,630	887
NUMBER OF HOUSEHOLDS IMPACTED:	9,490	10,117
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	19,607	

REGIONS (OREGON)	ELECTRIC	NON-ELECTRIC
CANYON	19	1
WESTERN	482	208
NUMBER OF HOUSEHOLDS IMPACTED:	501	209
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	710	

REGIONS (IDAHO POWER)	ELECTRIC	NON-ELECTRIC
NUMBER OF HOUSEHOLDS IMPACTED:	9,991	10,326
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	20,317	

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Idaho Power Shade Tree Survey

1. How did you hear about Idaho Power's Shade Tree Project? (Check all that apply)

Answer Choices	Responses	Percent
Letter from Idaho Power	413	46.35%
Friend or relative	248	27.83%
Neighbor	62	6.96%
Idaho Power employee	24	2.69%
Other (please specify)	174	19.53%
Answered	891	

2. What was the primary reason you participated in the program? (Mark one)

Answer Choices	Responses	Percent
Tree was free	167	18.72%
Home too warm in the summer	143	16.03%
Reduce energy bill	179	20.07%
Improve landscape/property value	131	14.69%
Wanted a tree	158	17.71%
Help the environment	69	7.74%
Other (please specify)	45	5.04%
Answered	892	

3. What kept you from planting a tree prior to the Shade Tree Project? (Mark one).

Answer Choices	Responses	Percent
Lack of knowledge	146	16.44%
Cost	453	51.01%
Time	112	12.61%
Other (please specify)	177	19.93%
Answered	888	

4. Where would you typically purchase a new tree? (Mark one)

Answer Choices	Responses	Percent
Garden section of a do-it-yourself/home improvement store	308	35.20%
Nursery/garden store	539	61.60%
Other (please specify)	28	3.20%
Answered	875	

5. How long did you spend on the online enrollment tool? (Mark one)

Answer Choices	Responses	Percent
10 minutes or less	582	65.54%
11–20 minutes	223	25.11%
21-30 minutes	53	5.97%
31 minutes or more	18	2.03%
N/A	12	1.35%
Answered	888	

6. Overall, how easy was it for you to use the online enrollment tool?

Answer Choices	Responses	Percent
Very easy	652	73.59%
Somewhat easy	197	22.23%
Somewhat difficult	22	2.48%
Very Difficult	4	0.45%
N/A	11	1.24%
Answered	886	

7. How many trees did you pick up at the Shade Tree event?

Answer Choices	Responses	Percent
One	268	30.15%
Two	621	69.85%
Answered	889	

8. When did you plant your shade tree?

Answer Choices	Responses	Percent
Same day as the tree pickup	84	31.23%
1–3 days after the tree pickup	117	43.49%
4–7 days after the tree pickup	43	15.99%
More than 1 week after the tree pickup	22	8.18%
Did not plant the tree	3	1.12%
Answered	269	

9. On which side of your home did you plant your shade tree?

Answer Choices	Responses	Percent
North	11	4.20%
Northeast	13	4.96%
East	30	11.45%
Southeast	18	6.87%
South	23	8.78%
Southwest	36	13.74%
West	107	40.84%
Northwest	24	9.16%
Answered	262	

10. How far from the home did you plant your shade tree?

Answer Choices	Responses	Percent
20 feet or less	106	40.15%
21–40 feet	133	50.38%
41–60 feet	22	8.33%
More than 60 feet	3	1.14%
Answered	264	

11. How many shade trees did you plant?

Answer Choices	Responses	Percent
One tree	13	2.09%
Both trees	598	96.30%
Did not plan trees	10	1.61%
Answered	621	

12. When did you plant your shade tree?

Answer Choices	Responses	Percent
Same day as the tree pickup	3	23.08%
1–3 days after the tree pickup	5	38.46%
4–7 days after the tree pickup	3	23.08%
More than 1 week after the tree pickup	2	15.38%
Answered	13	

13. On which side of your home did you plant your shade tree?

Answer Choices	Responses	Percent
North	0	0.00%
Northeast	3	23.08%
East	3	23.08%
Southeast	0	0.00%
South	1	7.69%
Southwest	2	15.38%
West	4	30.77%
Northwest	0	0.00%
Answered	13	

14. How far from the home did you plant your shade tree?

Answer Choices	Responses	Percent
20 feet or less	2	15.38%
21–40 feet	10	76.92%
41–60 feet	0	0.00%
More than 60 feet	1	7.69%
Answered	13	

15. When did you plant your shade trees?

Answer Choices	Responses	Same day as the tree pickup	1–3 days after the tree pickup	4–7 days after the tree pickup	More than 1 week after the tree pickup
Tree 1	593	18.89%	49.92%	18.72%	12.48%
Tree 2	550	17.27%	49.09%	18.91%	14.73%
Answered	595				

16. On which side of your home did you plant your shade trees?

Answer Choices	Responses	North	Northeast	East	Southeast	South	Southwest	West	Northwest
Tree 1	568	6.34%	7.92%	13.56%	10.56%	8.80%	15.67%	29.58%	7.57%
Tree 2	563	6.75%	6.39%	11.37%	7.28%	10.12%	19.01%	29.13%	9.95%
Answered	568								

17. How far from the home did you plant your shade trees?

Answer Choices	Responses	20 feet or less	21–40 feet	41–60 feet	More than 60 Feet
Tree 1	572	34.27%	48.60%	13.64%	3.50%
Tree 2	552	28.99%	49.09%	16.30%	5.62%
Answered	572				

18. How satisfied are you with the information you received on the planting and care of your shade tree?

Answer Choices	Responses	Percent
Very satisfied	764	88.32%
Somewhat satisfied	83	9.60%
Somewhat dissatisfied	6	0.69%
Very dissatisfied	3	0.35%
Not applicable	9	1.04%
Answered	865	

19. What information did you find most valuable?

Answer Choices	Responses	Percent
Planting depth	479	55.44%
Circling roots	113	13.08%
Staking	77	8.91%
Watering	68	7.87%
Not applicable	62	7.18%
Other (please specify)	65	7.52%
Answered	864	

20. How much do you agree with the following statements:

Answer Choices	Responses	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	Not applicable
I am satisfied with the Shade Tree Project pick up event	864	91.55%	7.18%	0.69%	0.23%	0.35%
It was easy to plant my shade tree	861	88.27%	10.10%	0.23%	0.35%	1.05%
I would recommend the Shade Tree Project to a friend or relative	863	97.10%	2.43%	0.23%	0.23%	0.00%
I am satisfied with my overall experience with the Shade Tree Project	863	94.32%	4.40%	1.04%	0.23%	0.00%
Answered	865					

21. If you have additional comments you would like to offer about the Shade Tree Project, please enter them in the space below.

- 261 participants answered the question.

22. If you disagree with any of these statements, please tell us why.

Answer Choices	Responses	Percent
Yes	487	57.23%
No	364	42.77%
Answered	851	

23. May we follow up with you if we have any questions regarding your responses to the survey questions?

Answer Choices	Responses	Percent
Yes	476	56.00%
No	374	44.00%
Answered	850	

24. When was this residence originally built? (Select when the building was originally constructed, not when it was remodeled, added to, or converted.)

Answer Choices	Responses	Percent
Before 1950	54	6.46%
1950–1959	24	2.87%
1960–1969	31	3.71%
1970–1979	84	10.05%
1980–1989	38	4.55%
1990–1999	113	13.52%
2000–2006	204	24.40%
2007–2015	271	32.42%
Don’t know	17	2.03%
Answered	836	

25. What one fuel is most often used to heat this residence? (Mark one)

Answer Choices	Responses	Percent
Electricity	228	26.89%
Natural gas	522	61.56%
Propane	34	4.01%
Fuel Oil	8	0.94%
Wood	35	4.13%
Other (please specify)	21	2.48%
Answered	848	

26. What type of air conditioning system is used at this residence?

Answer Choices	Responses	Percent
None	10	1.18%
Central air conditioner	732	86.42%
Heat pump	77	9.09%
Individual room or window air conditioner	41	4.84%
Evaporative/swamp cooler	18	2.13%
Other (please specify)	7	0.83%
Answered	847	

27. What is your gender?

Answer Choices	Responses	Percent
Female	517	62.14%
Male	315	37.86%
Answered	832	

28. Which of the following best describes your age?

Answer Choices	Responses	Percent
Under 18	0	0.00%
18–24	6	0.72%
25–34	186	22.17%
35–44	264	31.47%
45–60	260	30.99%
Over 65	123	14.66%
Answered	839	

29. What is the highest level of education you completed?

Answer Choices	Responses	Percent
Less than High School	2	0.24%
High School or Equivalent	92	10.97%
Some College/Technical School	347	41.36%
Four-Year College Degree	219	26.10%
Some Graduate Courses	53	6.32%
Graduate Degree	126	15.02%
Answered	839	

2017 WAQC

1. Agency/Contractor Name:

Answer Choices	Responses	Percent
Metro Community Services	23	13.61%
Eastern Idaho Community Action Partnership	4	2.37%
El Ada Community Action Partnership	91	53.85%
South Central Community Action Partnership	20	11.83%
Southeastern Idaho Community Action Agency	27	15.98%
Community in Action	4	2.37%
Answered	169	

2. How did you learn about the weatherization program(s)?

Answer Choices	Responses	Percent
Agency/Contractor flyer	35	21.47%
Idaho Power employee	6	3.68%
Idaho Power website	5	3.07%
Friend or relative	70	42.94%
Letter in mail	15	9.20%
Other (please specify)	32	19.63%
Answered	163	

3. What was your primary reason for participating in the weatherization program?

Answer Choices	Responses	Percent
Reduce utility bills	128	77.58%
Improve comfort of home	63	38.18%
Furnace concerns	45	27.27%
Water heater concerns	20	12.12%
Improve insulation	39	23.64%
Other (please specify)	12	7.27%
Answered	165	

4. If you received any energy efficiency equipment upgrade as part of the weatherization, how well was the equipment's operation explained to you?

Answer Choices	Responses	Percent
Completely	142	88.75%
Somewhat	15	9.38%
Not at all	3	1.88%
Answered	160	

5. Which of the following did you learn about from the auditor or crew during the weatherization process? (Check all that apply)

Answer Choices	Responses	Percent
How air leaks affect energy usage.	130	81.25%
How insulation affects energy usage.	101	63.13%
How to program the new thermostat.	82	51.25%
How to reduce the amount of hot water used.	54	33.75%
How to use energy wisely.	89	55.63%
How to understand what uses the most energy in my home.	75	46.88%
Other (please specify)	6	3.75%
Answered	160	

6. Based on the information you received from the agency/contractor about energy use, how likely are you to change your habits to save energy?

Answer Choices	Responses	Percent
Very likely	129	80.12%
Somewhat likely	27	16.77%
Not very likely	1	0.62%
Not likely at all	4	2.48%
Answered	161	

7. How much of the information about energy use have you shared with other members of your household?

Answer Choices	Responses	Percent
All of it	117	72.67%
Some of it	21	13.04%
None of it	4	2.48%
N/A	19	11.80%
Answered	161	

8. If you shared the energy use information with other members of your household, how likely do you think household members will change habits to save energy?

Answer Choices	Responses	Percent
Very likely	82	51.57%
Somewhat likely	49	30.82%
Somewhat unlikely	4	2.52%
Very unlikely	2	1.26%
N/A	22	13.84%
Answered	159	

9. What habits are you and other members of your household most likely to change to save energy? (check all that apply)

Answer Choices	Responses	Percent
Washing full loads of clothes	110	69.62%
Washing full loads of dishes	85	53.80%
Turning off lights when not in use	133	84.18%
Unplugging electrical equipment when not in use	89	56.33%
Turning the thermostat up in the summer	90	56.96%
Turning the thermostat down in the winter	99	62.66%
Other (please specify)	7	
Answered	158	

10. How much do you think the weatherization you received will affect the comfort of your home?

Answer Choices	Responses	Percent
Significantly	153	93.29%
Somewhat	9	5.49%
Very little	0	0.00%
Not at all	2	1.22%
Answered	164	

11. Rate the agency/contractor based on your interactions with them.

Answer Choices	Answered	Excellent	Good	Fair	Poor
Courteousness	165	95.15%	4.85%	0.00%	0.00%
Professionalism	161	93.79%	5.59%	0.62%	0.00%
Explanation of work to be performed on your home	161	95.03%	4.97%	0.00%	0.00%
Overall experience with agency/contractor	160	94.38%	5.00%	0.63%	0.00%

12. Were you aware of Idaho Power's role in the weatherization of you home?

Answer Choices	Responses	Percent
Yes	121	75.63%
No	39	24.38%
Answered	160	

13. Overall how satisfied are you with the weatherization program you participated in?

Answer Choices	Responses	Percent
Very satisfied	160	96.97%
Somewhat satisfied	4	2.42%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	1	0.61%
Answered	165	

14. How has your opinion of Idaho Power changed as a result of its role in the weatherization program?

Answer Choices	Responses	Percent
Improved	149	91.98%
Stayed the same	13	8.02%
Decreased	0	0.00%
Answered	162	

15. How many people beside yourself live in your home year-round?

Answer Choices	Responses	Percent
0	46	28.22%
1	46	28.22%
2	21	12.88%
3	21	12.88%
4	14	8.59%
5	2	1.23%
6 or more	13	7.98%
Answered	163	

16. How long have you been an Idaho Power customer?

Answer Choices	Responses	Percent
Less than 1 year	5	3.07%
1–10 years	41	25.15%
11–25 years	46	28.22%
26 years or more	71	43.56%
Answered	163	

17. Please select the category below that best describes your age:

Answer Choices	Responses	Percent
Under 25	1	0.61%
25–34	18	11.04%
35–44	25	15.34%
45–54	20	12.27%
55–64	36	22.09%
65–74	40	24.54%
75 or older	23	14.11%
Answered	163	

18. Select the response below that best describes the highest level of education you have attained:

Answer Choices	Responses	Percent
Less than High School	33	20.37%
High School graduate or GED	58	35.80%
Some College or Technical School	51	31.48%
Associate Degree	9	5.56%
College Degree (including any graduate school or graduate degree	11	6.79%
Answered	162	

2017 Weatherization Solutions for Eligible Customers

1. Agency/Contractor Name:

Answer Choices	Responses	Percent
Metro Contractor Services	56	40.29%
Home Energy Management	50	35.97%
Savings Around Power	15	10.79%
Power Savers	18	12.95%
Answered	139	

2. How did you learn about the weatherization program(s)?

Answer Choices	Responses	Percent
Agency/Contractor flyer	15	10.87%
Idaho Power employee	10	7.25%
Idaho Power website	22	15.94%
Friend or relative	24	17.39%
Letter in mail	30	21.74%
Other (please specify)	37	26.81%
Answered	138	

3. What was your primary reason for participating in the weatherization program?

Answer Choices	Responses	Percent
Reduce utility bills	110	79.71%
Improve comfort of home	54	39.13%
Furnace concerns	22	15.94%
Water heater concerns	7	5.07%
Improve insulation	31	22.46%
Other (please specify)	12	8.70%
Answered	138	

4. If you received any energy efficiency equipment upgrade as part of the weatherization, how well was the equipment's operation explained to you?

Answer Choices	Responses	Percent
Completely	95	83.33%
Somewhat	10	8.77%
Not at all	9	7.89%
Answered	114	

5. Which of the following did you learn about from the auditor or crew during the weatherization process? (Check all that apply)

Answer Choices	Responses	Percent
How air leaks affect energy usage.	108	80.60%
How insulation affects energy usage.	83	61.94%
How to program the new thermostat.	52	38.81%
How to reduce the amount of hot water used.	58	43.28%
How to use energy wisely.	84	62.69%
How to understand what uses the most energy in my home.	73	54.48%
Other (please specify)	9	6.72%
Answered	134	

6. Based on the information you received from the agency/contractor about energy use, how likely are you to change your habits to save energy?

Answer Choices	Responses	Percent
Very likely	104	78.79%
Somewhat likely	25	18.94%
Not very likely	2	1.52%
Not likely at all	1	0.76%
Answered	132	

7. How much of the information about energy use have you shared with other members of your household?

Answer Choices	Responses	Percent
All of it	89	66.92%
Some of it	16	12.03%
None of it	3	2.26%
N/A	25	18.80%
Answered	133	

8. If you shared the energy use information with other members of your household, how likely do you think household members will change habits to save energy?

Answer Choices	Responses	Percent
Very likely	66	49.25%
Somewhat likely	37	27.61%
Somewhat unlikely	1	0.75%
Very unlikely	0	0.00%
N/A	30	22.39%
Answered	134	

9. What habits are you and other members of your household most likely to change to save energy? (check all that apply)

Answer Choices	Responses	Percent
Washing full loads of clothes	67	53.17%
Washing full loads of dishes	53	42.06%
Turning off lights when not in use	103	81.75%
Unplugging electrical equipment when not in use	79	62.70%
Turning the thermostat up in the summer	80	63.49%
Turning the thermostat down in the winter	82	65.08%
Other (please specify)	14	
Answered	126	

10. How much do you think the weatherization you received will affect the comfort of your home?

Answer Choices	Responses	Percent
Significantly	107	79.26%
Somewhat	25	18.52%
Very little	2	1.48%
Not at all	1	0.74%
Answered	135	

11. Rate the agency/contractor based on your interactions with them?

Answer Choices	Answered	Excellent	Good	Fair	Poor
Courteousness	134	94.78%	5.22%	0.00%	0.00%
Professionalism	134	94.03%	5.97%	0.00%	0.00%
Explanation of work to be performed on your home	134	88.81%	10.45%	0.75%	0.00%
Overall experience with agency/contractor	134	93.28%	5.97%	0.00%	0.75%

12. Were you aware of Idaho Power's role in the weatherization of you home?

Answer Choices	Responses	Percent
Yes	114	85.07%
No	20	14.93%
Answered	134	

13. Overall how satisfied are you with the weatherization program you participated in?

Answer Choices	Responses	Percent
Very satisfied	125	92.59%
Somewhat satisfied	9	6.67%
Somewhat dissatisfied	1	0.74%
Very dissatisfied	0	0.00%
Answered	135	

14. How has your opinion of Idaho Power changed as a result of its role in the weatherization program?

Answer Choices	Responses	Percent
Improved	109	81.34%
Stayed the same	25	18.66%
Decreased	0	0.00%
Answered	134	

15. How many people beside yourself live in your home year-round?

Answer Choices	Responses	Percent
0	42	30.66%
1	47	34.31%
2	13	9.49%
3	13	9.49%
4	11	8.03%
5	4	2.92%
6 or more	7	5.11%
Answered	137	

16. How long have you been an Idaho Power customer?

Answer Choices	Responses	Percent
Less than 1 year	2	1.50%
1–10 years	35	26.32%
11–25 years	28	21.05%
26 years or more	68	51.13%
Answered	133	

17. Please select the category below that best describes your age:

Answer Choices	Responses	Percent
Under 25	3	2.19%
25–34	10	7.30%
35–44	18	13.14%
45–54	14	10.22%
55–64	28	20.44%
65–74	41	29.93%
75 or older	23	16.79%
Answered	137	

18. Select the response below that best describes the highest level of education you have attained:

Answer Choices	Responses	Percent
Less than High School	7	5.22%
High School graduate or GED	36	26.87%
Some College or Technical School	57	42.54%
Associate Degree	14	10.45%
College Degree (including any graduate school or graduate degree	20	14.93%
Answered	134	

EVALUATIONS

Table 4. 2017 Evaluations

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
Idaho Power Commercial and Industrial Energy Efficiency Program Evaluation	C/I	DNV-GL	Idaho Power	Process evaluation
Idaho Power Residential Heating and Cooling Program Evaluation	Residential	DNV-GL	Idaho Power	Process and impact evaluation
Idaho Power Residential Home Energy Audit Impact Evaluation	Residential	DNV-GL	Idaho Power	Impact evaluation

Idaho Power Commercial and Industrial Energy Efficiency Program Evaluation

1 EXECUTIVE SUMMARY

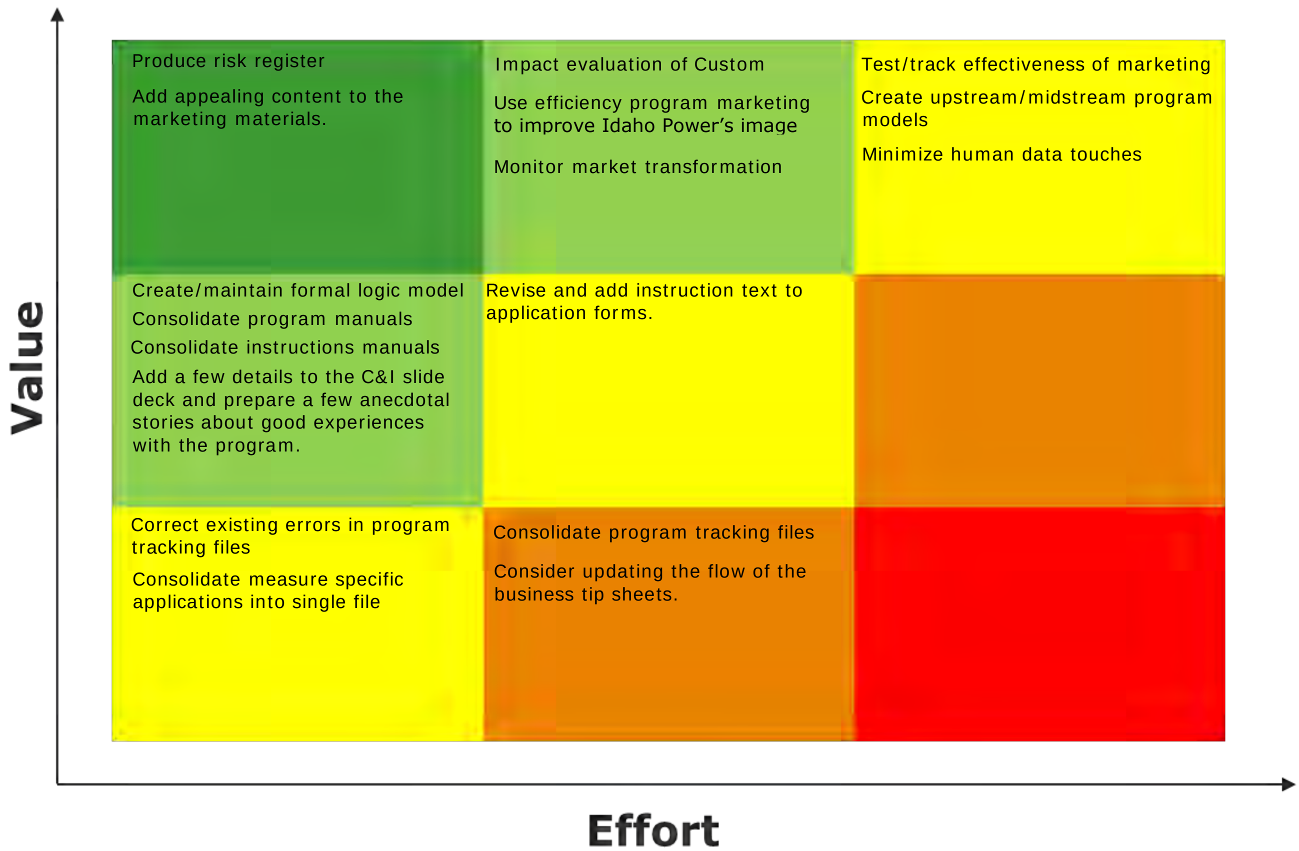
Idaho Power's Commercial and Industrial (C&I) program consists of the combination of 3 programs that were previously separate: New Construction, Retrofits, and Custom Projects. Idaho Power engaged DNV GL to complete a process evaluation of the C&I program; this report documents that process evaluation. DNV GL's evaluation included interviews with program staff from each of the subprograms, review of program tracking data and project files, and review of program documentation.

Overall, the C&I program is well-run. DNV GL obtained the following key findings:

1. Program staff maintain good awareness of program goals and operations.
2. No formal program logic model exists in the documentation reviewed by DNV GL.
3. Program manuals and instructions are generally well-written and thorough. They could benefit from some key additions (logic model, risk register, charts/tables) and from consolidation.
4. Program tracking data is comprehensive and generally accurate. It could benefit from a few additions (e.g., further data fields) and from the correction of a few minor errors/inconsistencies.
5. Program application forms are thorough, well-produced, and contain several labor-saving features. They could benefit from some additional instructional text.
6. Program marketing materials are appealing and of high quality. Features available through websites (e.g., embedded videos) could be leveraged as well.

While DNV GL offers several recommendations, we discovered no fundamental shortcomings or major red flags in the way the program is run. We have organized our recommendations by the estimated amount of effort they require and the value that Idaho Power would derive from them (Figure 1). Additional details about these recommendations are provided in Section 5.

Figure 1. Recommendation effort/value diagram



2 INTRODUCTION

2.1 Program overview

The C&I program consists of the combination of 3 programs that were previously separate. The 3 programs were:

New Construction (previously the Building Efficiency program) enables customers to apply energy-efficient design features and technologies in new C&I construction, expansion, or major remodeling projects. The program offers a menu of measures and incentives for lighting, cooling, building shell, controls, appliances, and refrigeration efficiency. Program ex-ante savings are based on a technical reference manual (TRM) provided by a third-party engineering and evaluation firm and in-house calculations.

Retrofits (previously the Easy Upgrades program) is a prescriptive measure program for the C&I retrofit market. The program encourages customers to implement energy efficiency retrofits by offering specific incentives on a defined list of measures. Customers can also apply for incentives for non-standard lighting measures. Eligible measures cover a variety of energy saving opportunities in lighting, heating ventilation and air conditioning (HVAC), building shell, variable frequency drives (VFDs), food service equipment, and other commercial measures. Program ex-ante savings are determined by lighting calculator and a TRM provided by a third-party engineering and evaluation firms.

Custom Projects (previously the Custom Efficiency program) targets energy savings by implementing customized energy efficiency projects at customer locations. Program offerings include energy efficiency training and education, energy auditing services, and financial incentives. Idaho Power engineers work with customers and vendors to gather sufficient information to support their energy savings calculations. In some cases, large, complex projects may take up to 2 years or more to complete. Most projects receive an onsite verification by Idaho Power staff or an Idaho Power contractor.

Idaho Power engaged DNV GL to complete a process evaluation of this program; this report documents that process evaluation.

2.2 Evaluation overview

The key objectives of the process evaluation include:

- Evaluate program design, including program mission, logic, and use of industry best practices
- Evaluate program implementation, including quality control, operational practice, and outreach
- Evaluate program administration, including program oversight, staffing, management, training, documentation and reporting
- Report findings, observations, and recommendations to enhance program effectiveness

To achieve these objectives, DNV GL executed the following activities:

- Semi-structured interviews with program staff
- Tracking system review
- Program file review

- Program materials review
- Program logic review
- QA/QC review

2.3 Layout of report

The remainder of the report is organized into the following sections:

Section 3. Methods – Describes the evaluation activities in detail

Section 4. Process findings – Reports findings relevant to program processes and materials

Section 5. Conclusions and recommendations – Lays out conclusions and provides recommendations for program improvement

3 METHODS

This section provides detailed descriptions of the methods DNV GL used to evaluate the program. The findings from our analysis are included in Section 4.

3.1 Program staff interviews

The objective of the in-depth interviews was to understand:

- The program history
- How the program is delivered
- The logic and objectives of the program
- The perceived strengths and weaknesses of the program
- What the program staff wants or needs from the evaluation

DNV GL developed instruments to guide the interviews (Appendix A). Senior DNV GL staff conducted the interviews in person with Idaho Power program staff from each of the previously separate programs in June 2017; each interview lasted approximately one hour.

3.2 Tracking system review

DNV GL reviewed the program's database, its fields and their uses, and the accuracy of the data. We assessed the accuracy of the data entry and individual measure savings values, and conducted a broader assessment of the various ways the tracking information is used to ensure that the data can support program administration and oversight, program evaluation, and regulatory reporting.

DNV GL assessed the program database in these 4 major areas:

- Structure: Does the database contain all fields needed to track programs, perform evaluations, and calculate savings?
- Completeness: Are required fields populated with usable data?

- Quality: Are the data in a format that enables analysis and reporting? Do they have consistent, identified units and mutually exclusive categories?
- Accuracy: Does the database accurately calculate program savings consistent with deemed measure algorithms?

The evaluation team performed the following actions with the tracking data:

- Compared database savings to match program reporting: We compared the reported savings in the program reports to those listed in the tracking database.
- Checked data quality: We checked that the database tracks all the relevant fields, including checking for fields with significant missing data or placeholder data.
- Compared line-by-line records to deemed measure assumptions: We inspected the savings for each deemed measure for the correct calculation approach.

In addition to reviewing the data contained in the tracking systems, DNV GL reviewed whether the databases are set up and managed to their fullest potential. Specifically, we:

- Assessed data quality control: We reviewed Idaho Power's data quality control procedures, including checking how well the program files and the database match.
- Reviewed **data's ability to support program administration:** We verified that the tracking systems can be leveraged for effective program management. This included:
    - Checking to see if costs, number of units, and savings are properly tracked
    - Noting whether completed project field verifications are recorded in the tracking system as having passed the site inspection or not
    - Examining the database to see how well it can support evaluation, measurement, and verification (EM&V) activities and measure installation verification practices

3.3 File review

DNV GL reviewed samples of the project files, including original energy analysis and any follow-up documents adjusting savings estimates. For each measure, we attempted to determine the key engineering assumptions involved and the extent to which they were documented. Specifically, we:

- Verified the accuracy of data entry, by comparing the application, the invoice, and the database for key elements like customer information, incentives, savings, and measures implemented
- Reviewed the project files for all the documents listed in the final application checklist and verified that these were appropriately accounted for

DNV GL requested a sample of project files for the Retrofits, Custom Projects, and New Construction programs. For the Custom Projects and New Construction program, the basis for sampling was to cover all the measure types in the respective programs. At the time of developing the sample, DNV GL did not have access to measure data for the Retrofits program, so we selected the project with the maximum savings plus another 5 randomly determined projects.

3.4 Program materials review

The primary purpose of the program materials review was to provide an objective opinion of the clarity and effectiveness of program-related documents. Program documentation is a critical aspect of program planning, project management, and communication with stakeholders and trade allies. Table 1 lists the program materials we reviewed and the core questions associated with each one.

Table 1. Materials reviewed and core issues considered

Program material	Core questions
Program plan	Is program theory clearly articulated? Are program objectives articulated? Are program goals recorded and SMART?[1] Are program roles and responsibilities clearly recorded? Are risks and contingencies recorded?
Marketing materials	Are materials visually appealing? Do they effectively convey the intended information? Are they easy to understand? Do they have utility logos or branding? Do they provide a follow-up activity and means to accomplish it? Do they utilize any psychological/motivational theories, and how effective are they at doing so?
Trade ally/ subcontractor contracts, instructions, tools/worksheets	Are goals clearly articulated and SMART? Are program measures and operations clearly articulated? Are the standards/terms by which the trade allies/subcontractors will be evaluated clearly articulated? Are tools/worksheets consistent across subcontractors? Is a communication plan clearly articulated? Is there a paper trail for information that comes from trade allies and subcontractors to the utility?
Application forms	Do they cover the necessary information? Are instructions available and clear? Are they easy to follow and to fill out? Do they use jargon or require technical knowledge?
Websites	Are they visually appealing? Are they easy to navigate/laid out intuitively? Are links broken? Are they accurate? Do they convey the necessary information? Do they take advantage of the unique capabilities of the medium?

3.5 Program logic review

Based on the program staff interviews and the review of the program materials, DNV GL developed a single logic model for the new, combined program.

[1] Specific, Measurable, Attainable, Realistic, Time-delineated

3.6 QA/QC review

DNV GL assessed the adequacy of Idaho Power's savings verification processes, controls, and procedures. The goal of the assessment was to ensure that an appropriate level of resources is placed on quality control and quality assurance, that the most effective policies are in place, and that those policies are put into action via effective and efficient procedures that are continually followed and routinely reviewed.

The evaluation team reviewed each program's procedural documents and example project files, focusing on situations where savings are verified. We reviewed the quality of the verification documentation. After identifying Idaho Power's verification practices, we compared them with industry best practices based on our reviews of comparable efficiency programs nationwide.

4 FINDINGS AND TARGETED RECOMMENDATIONS

This section provides detailed findings on program operations and materials. The section summarizes information about each program obtained during in-depth interviews with program staff; provides a basic logic model for the program; describes findings from our review of program materials such as manuals, instruction sheets, and the tracking databases; and reviews program marketing materials. In this section, we also offer targeted recommendations for improving individual materials.

Key findings

1. Program staff maintain good awareness of program goals and operations.
2. No formal program logic model exists in the documentation reviewed by DNV GL.
3. Program manuals and instructions are generally well-written and thorough. They could benefit from some key additions (logic model, risk register, charts/tables) and consolidation.
4. Program tracking data is thorough and generally accurate. It could benefit from a few additions (e.g., additional data fields) and the correction of a few minor errors/inconsistencies.
5. Program application forms are thorough, well-produced, and contain several labor-saving features. They could benefit from some additional instructional text.
6. Program marketing materials are appealing and of high quality. Features available through websites (e.g., embedded videos) could be leveraged as well.

4.1.1 Program operations

4.1.1.1 New construction

Staff interviews provided DNV GL with an overview of the program design and operations. Program goals are based on total energy savings. The goals are further broken down by number of projects and energy savings on a regional basis. The program staff proactively monitors performance and makes sure the program stays on goal.

Program staff continuously work on building relationships with customers, architect and design firms, and leverage Idaho Power's customer representatives for larger accounts. The Program allocates a portion of the budget every year to facilitate personal interaction with these stakeholders, and tries to focus on 2 regions every year.

The program utilizes third-party engineering firms to determine savings and incentives values. Internal program staff monitors cost effectiveness. The program also leverages a TRM that is updated every 2 or 3 years to keep up with building code.

The program markets to customers and to architect and design firms. It tries to get customers to select from a "menu" of approximately 24 prescriptive measures first, then funds any additional energy saving measures through the custom projects program.

4.1.1.2 Retrofits

Staff interviews provided DNV GL with an overview of the program design and operations. The majority (~95% in 2016) of retrofit savings comes from lighting projects. These lighting projects are submitted to the program via the "lighting tool," which is an Excel worksheet that guides customers or trade allies through data entry of the information needed for the application. Program staff decide whether to conduct an inspection of the facility, based on the magnitude of the project and the history of the contractor involved. Approximately 30% of sites received an inspection.

The lighting tool calculates lighting savings based on wattage reduction and hours of operation (with the exception of refrigerated case lighting). Non-lighting savings are based on Regional Technical Forum (RTF) and TRM deemed and prescriptive values.

The program has annual savings and unit goals per each Idaho Power region that are tracked on a spreadsheet and reviewed monthly. The program staff proactively monitors performance and makes sure the program stays on goal.

Trade allies are valuable contributors to the marketing and implementation of the program. The program's trade ally outreach specialist visits lighting trade allies for the purposes of strengthening relationships, keeping the program uppermost in their mind, informing them of program adjustments, and helping them identify and submit projects to the program. The program also provides credited technical lighting training opportunities for trade allies to increase their knowledge of the latest in energy efficient lighting options.

4.1.1.3 Custom Projects

DNV GL obtained an overview of the program design and operations through staff interviews. The program is designed to cover any cost-effective measures that are not part of the Retrofit or New Construction subprograms. Engineers review applications to confirm savings calculations before approval and verify projects after installation. The program relies on customer service representatives, particularly for the largest Idaho Power customers, to market the program and identify opportunities. The program sponsors scoping audits at no cost to high-demand customers to identify opportunities. The program also offers detailed audits through a shared-cost mechanism. The program staff proactively monitors performance and makes sure the program stays on goal. Most years, the program exceeds goals. Program Staff spend a substantial amount of time on customer relations, particularly with the largest customers, and on educating and training trade allies and customer representatives.

4.1.2 Program logic review

New Construction has an operations manual that partially lays out program logic, but does not contain a formal logic model. DNV GL obtained additional information about each subprogram from the program staff interviews. We generated a basic, formal logic model based on these sources of information (Figure 2).

Figure 2. C&I logic model

Assumptions

Prescriptive measures provide broad coverage and custom covers everything else

External Factors

Use TRM and RTF values

Customer service reps help identify custom opportunities

Latest Evaluations

Process: 2017

Impact: 2016 (NC, Retrofits); 2014 (Custom Projects)

Inputs	Outputs: Activities	Outputs: Participation	Outcomes – Impact: Short	Outcomes – Impact: Medium	Outcomes – Impact: Long
Idaho Power invests: Staff time; Incentives; Purchase data from various sources; No cost scoping audits; Detailed audits jointly funded with customers	**Idaho Power does:** Customer outreach; Educate and engage customers, trade allies, customer service reps; Review and approve applications; Inspect installations; Work with customers to identify additional projects	**Idaho Power reaches:** Customers; Self-directed customers; Trade allies; Architects and design firms; Customer service reps	Offset portion of additional capital expenses for more efficient measures; Fund cost-effective projects not covered by the prescriptive programs; Implement a number of projects by region	Energy savings; Demand savings (tracked but not reported); Move commonly occurring custom measures to prescriptive; Teach customers how to save with low/no cost behavioral measures	Keep rates low; Minimize environmental impact; Improve customer satisfaction; Avoid/defer building new generation

4.1.3 Program manual and instruction documents

Idaho Power provided many program documents for review.

C&I Procedures Manual.pdf **–** This is the customer-facing procedures manual available on each of the sub-program areas of the Idaho Power website. This document contains all the information a customer needs to start participating in the program. The formatting is visually appealing. It is logically organized and easy to follow. It makes use of hyperlinks within the document to facilitate navigation. It gives customers clear instructions about what to do and expect about the program, lists high-level terms and conditions, and provides program staff contact information. It also includes a revision history section at the end.

New Construction Program Handbook **–** *2017 Update* – Overall, this is a solid document with a strong, high-level description of the subprogram. This document states program goals in terms of dollars and kWh savings as well as high-level program objectives. Program logic is partially recorded in an informal manner. Risks and contingencies are not identified. The handbook describes the key personnel in the New Construction sector, high level tasks, and step-by-step instructions for several tasks. It appears to be usable by people working with the program, although it does rely some on institutional knowledge. There is not enough detail in this document for someone to be able to use it in isolation to administer the program.

2017 Retrofit Procedures.docx manual – This document appears to be the core manual for the Retrofits subprogram. It is thorough and provides step-by-step instructions for common tasks. While these instructions are detailed, they are probably not sufficiently detailed to serve as a stand-alone document. Someone using these instructions would need to have additional institutional knowledge or access to someone who does to fully conduct the tasks.

Custom Projects Program Manual – This is the core document for the Custom Projects subprogram. It contains details about the program design and procedures, including defining custom projects, the incentive structure, customer benefits, contact information, measures covered, a process flow diagram and step-by-step instructions for key program processes, cost effectiveness analyses, baseline information, and summaries and links to evaluations.

Directions to Upload Applications.docx – This document contains instructions for entering applications into CLRIS. It is a well-written document that makes excellent use of shapes drawn on top of screenshots, to clearly connect instructional text to images to help a user know what to click and when.

Recommendation: Other instructions that include screenshots should emulate this document, not only in the use of screenshots and shapes, but also in the use of the labels on those shapes to clearly refer to the instructional text.

Processing Non-lighting Pre-approval Applications – This document provides detailed instructions that include screenshots and shapes. While these are good, they could be improved by more clearly tying the shapes over the screenshots to the instructional text the way Directions to Upload Applications.docx does (see above).

2016 Lighting Inspection Guidelines.docx – This document has thorough, well-written instructions with a good checklist.

Non Lighting Inspection.docx – This document provides very high-level instructions for how to do an inspection on non-lighting measures. In its current form, it does not provide much guidance or standardization for inspections.

Recommendation: This document should provide the same level of detail found in the lighting inspection checklist.

Add Trade Ally.docx – This is a small document that contains instructions for how to conduct one specific task. It could be consolidated into a larger procedures manual.

Recommendation: The instructions in these documents (including the program procedures manuals) are very similar to each other, which is unsurprising considering they involve the same systems. This similarity provides an opportunity to consolidate the different instruction documents that are maintained separately across the 3 subprograms into a single C&I manual and procedures document. The customer-facing program manual available on the website (C&I Procedures Manual.pdf) is a good example of a combined document. We recommend Idaho Power create a similar, internal-facing document. This combined document should take collectively less time to maintain and would be easier for staff to find than separate documents. It could contain appendices or sidebars for instructions that are idiosyncratic to one of the subprograms. The consolidated document would benefit from the following additional characteristics:

- Include a table at the beginning or end that lists the revision history of the document.
- Emulate the combination of shapes superimposed over screenshots such as those used in "Directions to upload applications.docx." All the instruction documents had screenshots, but this one did the best job of clearly labeling the different areas on the screen in a way that intuitively tied back to the instructional text (and vice versa).

- Adding graphics that show a program logic model, organizational chart, and process flow would improve the intuitiveness of the document.
- Include a list of major risks to accomplishing the program's goals and contingencies for dealing with those situations if they occur.

4.1.4 Tracking systems

DNVGL reviewed the tracking database for all the programs. DNV GL also verified that the reported savings in the program reports (2016 Supplement 1: Cost Effectiveness) can be duplicated from the tracking database.

4.1.4.1 New construction

The findings from the new construction subprogram tracking database are as follows:

- The database is complete and well-organized. It has the incentives and energy savings information filled in for all the projects.
- There are some missing entries in column AP (Proj Name), column AM (Project App Name), and column AQ (Proj Description).

DNV GL received 8 project files for the new construction program to verify the savings reported in the project files match the tracking database entries. For all 8 projects, the measure information, including which measure was implemented for each project, respective savings, and incentives match the entries in the tracking database.

The total incentives and 2016 gross annual energy savings reported in the tracking database match the values reported in the 2016 cost effectiveness report.

4.1.4.2 Retrofits

Per the program staff interview, a macro moves data from the lighting tool into CLRIS. However, non-lighting information is manually entered by an internal administrator. The tracking database is complete and well-organized, and all the fields are filled with relevant information. It has the incentives, project costs, and energy savings information filled in for all projects.

DNV GL received 6 project files for the retrofits program to verify the savings reported in the project files match the tracking database entries. Out of the 6 projects, only one had an inconsistency between the database and project files. ID 160030 had pre-approval applications only, and the savings estimate, incentives and project costs in the tracking database differed slightly from the pre-approval applications. According to follow-up with Idaho Power, it is common for changes to occur during the review process to adjust for a variety of factors such as hours of operation and wattage.

The total incentives and 2016 gross annual energy savings reported in the tracking database match the values reported in the 2016 cost effectiveness report.

4.1.4.3 Custom Projects

The findings from the custom projects program tracking database are as follows:

- The database is mostly complete and well-organized. It has the incentives, project costs, and energy savings information filled in for all projects.

- Column BH (Final Tot kWh svgs) always matches [kWh before] minus [kWh after] (Column CP-CQ). However, for some projects the [kWh after] is filled in as "0." DNV GL raised this question to Idaho Power and it was clarified that where 0 shows up in the [kWh/yr after], it is likely a situation where the [kWh/yr before] may not be clear but the energy savings number is. In those situations, the energy savings is entered as the [kWh/yr before] and 0 entered as kWh/yr after. It also seems that on some lighting projects, the transition from an Easy Upgrades (Retrofits) project number to a Custom Projects project number will enter savings the same way with the [kWh/yr before] indicating the kWh/yr saved.

  Recommendation: DNV GL recommends using each variable/field for a single purpose, create new fields as necessary to hold a different type of data, and use a delineated value to represent missing data. The missing data value should be something that could never be confused for a real value, and it should be filled in as completely as possible to minimize the number of blank cells.

- Column AP (description) has 56 missing entries out of the 196 records. These missing 56 records have Column BO (Pre-Measure [2], which seems to represent measure category) populated.
- Some columns have the same titles; this can lead to confusion if using an automated scripting language to pull data for analysis.
- There are columns for pre-measure descriptions and final-measure descriptions. In some cases, pre-measure (1), which seems to represent the first measure considered, is blank and the pre-measure (2) is filled in.

  Recommendation: For consistency, we recommend filling in the measure data in chronological order.

DNV GL received 15 project files for the Custom Projects program to verify that the savings reported in the project files match the tracking database entries. For each of the 15 projects, the measure information, including which measure was implemented, the respective final savings, and the incentives, matches the entries in the tracking database. Overall the database matches almost perfectly with the sampled project files. For one of the project files (id 1495), the project name did not match the application, and the invoice documents the size of the motor on which the variable frequency drive was installed as 35 hp compared to 25 hp in the application.

The 2016 gross annual energy savings reported in the tracking database matches the value reported in the 2016 cost effectiveness report. However, the total incentives in the report are slightly different from the tracking database. The 2016 cost effectiveness reports $6,114,243 of incentives, while the value in the tracking database is $6,103,533. The discrepancy could be due to the Green Motors program. That program is listed in the cost effectiveness report, but no dollars are listed for it. Alternatively, the amount of discrepancy suggests 2016 cost effectiveness report included one or two projects that were not reflected in the 2016 tracking database submitted to the evaluators. This could have occurred if some late-2015 projects happened to be paid out in 2016, thus getting included in the cost effectiveness report, but not in the data pull that was limited to 2016 projects.

4.1.5 Application forms

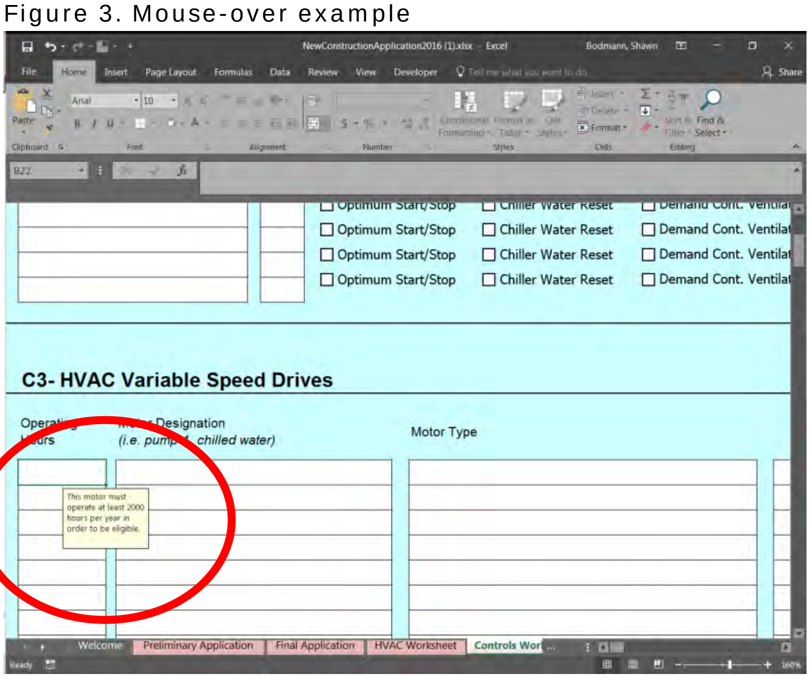
DNV GL reviewed the application forms available on Idaho Power's website as of October 3, 2017.

New Construction – This application form appears to be complete, well-organized, and mostly easy to follow. It does use some technical jargon, but that is unavoidable with the level of detail required for these applications. The Excel sheet is formatted in a visually appealing way and the use of worksheets and formulas is well-done. There are several positive features included in this application:

- Auto-filling fields (e.g., customer name) after they are entered in one worksheet to other worksheets
- Use of data validation pulldown menus to enforce the use of specific measure types
- Use of formulas that automatically update incentive amounts based on measure specifications
- Links to Idaho Power websites with the specific program requirements and terms and conditions
- Automatically updating cells that need to be filled in as other cells are filled in

Recommendation: The form could benefit from more specific instructions in the areas where applicants need to input measure specifications to calculate incentives. Choosing the right values to fill in everywhere is not entirely intuitive. At one point during a trial run through the application, an incentive calculation came up as "chk box," but it was not clear what that meant. It took several frustrating minutes to figure out what the form required. A mouse-over box like the one provided for the operating hours on the variable speed drives on the Controls Worksheet (Figure 3) would be a good way to provide instructions and explanations for what applicants need to enter, and for explaining outcomes like "chk box."

Figure 3. Mouse-over example



Retrofits Lighting – Considering that 90% of program savings come from lighting projects, most Retrofits participants will use the lighting tool for program application. Like the New Construction application workbook, this workbook is well-organized and very usable. Positive characteristics include:

- Automatically updating the list of missing information on the Welcome worksheet
- Use of drop down lists (data validation) to enforce standardized data entry

- Auto-fill of cells in the Pre-approval Application and Payment Application worksheets from data entered in the Data Entry worksheet
- Maintaining all these details in a single file

Recommendations: DNV GL has several recommendations for improvements to the workbook. Mouse-over instructions such as those illustrated in the New Construction section would be a good way to implement these recommendations:

- Provide instructions that applicants should not try to type in the light blue cells.
- Provide additional instructions about what to enter in the QPL column of the Product Type worksheet.
- Define acronyms such as QPL, LCL, and DLC.
- Provide additional instructions about what to put in for "hours of operation" on the Data Entry worksheet. Should the applicant fill in total hours per day (e.g., 12) or the hour of opening and of closing (e.g., 8:00 a.m. to 8:00 p.m.)?

Retrofits Nonlighting – The pdf worksheets used for non-lighting applications are easy to understand and use. The use of deemed incentive values helps simplify these worksheets.

Recommendation: Auto-fill the incentive per ton on the HVAC worksheet based on what the customer enters in the first column of that table for measure number. The sheet already has a pulldown list for the values that go into the measure number column, so it should also be able to apply a value to the incentive in the second column rather than requiring the applicant to type that information in.

Custom Projects - The custom projects application is simple and straightforward. It contains several helpful features such as auto-filling the customer information cells in the Pay App worksheet from the information entered into the Pre-App worksheet; using pulldown menus to enforce standardized data entry; and automatically calculating savings, incentives, and payback periods.

Recommendations:

- While the workbook is mostly intuitive, it does not contain much instructional text and it uses several acronyms. For example, what should an applicant do if they have more than 3 measures?
- Additionally, while the inclusion of the payback period is a nice touch, it might inadvertently be hurting the program because it is only factoring in energy-related savings. Many measures have additional, non-energy benefits that are often substantial but also difficult to measure. For example, LED lighting results in substantial savings in operations and maintenance labor costs because the lamps last so long.

Custom Projects self-audit workbook – The self-audit workbook has a similar look and feel to the other application forms, and it has pull-down menus to enforce standardized data entry. Lighting and HVAC are notably absent from the form, and those are likely to make up the bulk of most facilities' energy use. Even if the lighting and HVAC are less likely to receive incentives through the Custom Projects approach, the tool could still be used to identify those opportunities. There are also some cosmetic oddities. For example, there is an arrow near the hours of operation that points outside the margins of the form.

Recommendation: The copyright mark on this form says 2013; if this form hasn't been updated in 4 years, it would probably benefit from review to make sure it still aligns with current program design and offerings.

4.1.6 QA/QC review

New Construction - Per the program handbook, the Integrated Design Lab performs measure verification. Approximately 10% of projects receive inspection. Per the in-depth interview, program staff have several checklists to help ensure that applications are complete. DNV GL reviewed one post-inspection form available in project files, and it appears to be thorough and very detailed.

Retrofits/Custom Projects - The program procedures document contains instructions for scheduling and conducting lighting inspections. The instructions include a list of information to cover during the scheduling call and an email template for courtesy notifications to customer representatives. These are good practices.

This document lists inspection criteria, which are all reasonable. Per the Retrofits program staff interview, approximately 34% of projects receive a pre-inspection and 23% receive post-installation inspections. DNV GL typically sees inspection rates closer to 10% for deemed measures in mature programs and inspection rates in the same range as Idaho Power for large, custom projects.

Recommendation: If the current inspections are finding few problems and trade allies are being retained by the program, Idaho Power could probably reduce the proportion of inspections without adverse effect.

The instructions for how to conduct the inspection are very thorough and contain instructions for activities that are easily overlooked, such as telling inspectors they should not try to answer program-related questions, recording the first and last names of all walkthrough attendees, and wearing appropriate footwear. These are excellent instructions.

Recommendation: The only recommendation DNV GL can make on these instructions is to consider implementing a tablet-based electronic data entry form that lets inspectors directly enter information as they walk through the facility.

4.1.7 Program marketing

DNV GL reviewed the program website, marketing materials, application forms, staff and trade ally tools, and past evaluations and research (i.e., the Burke Report). Overall, DNV GL found these documents to be very well done.

Website

The websites for the commercial programs are in good condition. They are clean, they contain the information needed by potential participants, and they are easy to navigate. DNV GL did not find any broken links. The program pages do not take full advantage of the web medium.

Recommendation: There could be more pictures, such as those of smiling people used in the New Construction brochures. The website could also benefit from links to more stories or testimonials of satisfied customers. In particular, Idaho Power should make the YouTube videos about the New Construction program available in these web pages. The FAQs should include contact information in case the FAQ section is not sufficient. Note: The entire idahopower.com website was redesigned and relaunched in November 2017. The new site has more visual elements.

Marketing materials

Like the websites, the marketing materials reviewed by DNV GL are of high quality. We reviewed several brochures, airport signage, vendor fliers, bill inserts, and the PowerPoint presentation used by C&I program staff during outreach and lunch-and-learns. These materials all have the essential characteristics that DNV GL looks for: they are visually appealing, they convey the intended information, they are easy to understand, they have utility logos and branding, they all provide follow-up activities and contact information (including both web and phone for the paper collateral).

The *New Construction brochures* were especially well-done. They featured pictures of smiling people who have participated in the program. There is a special area in human brains for facial recognition, so smiling people are an especially effective type of graphic to include in marketing materials. It adds further value that these people are also members of the community and are essentially offering a testimonial.

The *business tips sheets* were also very well done, and could serve as an industry example of how to produce these types of documents. The education sheet was particularly good, and included some non-energy benefits that are relevant to schools such as learning outcomes.

Recommendations: One potential improvement to these sheets would be to start with the energy use breakdowns for the facility types, to contextualize the 2 or 3 systems that the sheets focus on. This reordering would allow the sheet to tell the reader which systems tend to use the most energy, then explain what to do to make those most energy-intensive systems more efficient. Related to this concept, the sheets should focus on the most energy-intensive systems. Generally, this is the case, but the hospitality sheet does not address the "other" category, which is the most intensive system for that sector. Laundry and hot water are most likely major components of that "other" category, and have efficient equipment options. Finally, all the sheets should try to mention additional non-energy benefits like the education sheet does. For example, in convenience stores, improved refrigeration could result in less product spoilage, and improved lighting could increase worker and customer safety.

The *slide deck used during in-person presentations* was also well-written overall.

Recommendations: DNV GL's recommendations are minor: on slide 11, provide a link to the lighting tool; on slide 12, provide an example of a typical building or office space priced out to the full incentive, rather than just showing dollars per kWh. For example, something like the following:

> "The typical floor of an office building has 400 lighting fixtures. Replacing these fixtures with LED technology would result in a savings of 16,000 kWh per year ($1,600 on your electricity bill) and receive an incentive of $2,400."[2]

On slide 14, eliminate the redundancy between the last 2 bullets and the previous 2 bullets. We further recommend that presenters have a story or two they can tell about how participants or trade allies benefited from their participation in the program. Anecdotal examples will lend credibility to the presentation. These stories do not need special slides.

Past studies

[2] The numbers in this example are completely arbitrary and do not necessarily reflect realistic values.

DNV GL reviewed the Burke Report, which covered market research and customer satisfaction with Idaho Power generally, rather than focusing only on the C&I program. The major themes of the Burke Report were that customers are concerned about rates, outages, and the image of Idaho Power as a partner or pro-social company.

The Burke Report does not point to any specific deficiencies in the efficiency programs. Efficiency programs are a rare opportunity for utilities to have a positive interaction with customers instead of the much more common, negative interactions involving bill payments and outages. Participation rates in efficiency programs are low for most utilities, and the marketing for the efficiency programs reaches a much wider portion of Idaho Power's customer base. This marketing can help address all the themes highlighted in the Burke Report.

Recommendations: Some specific approaches Idaho Power could use include:

- Continue to funnel customers to efficiency programs when they call in with high bill complaints.
- Marketing materials for efficiency programs should include the message that Idaho Power offers these programs to help customers pay their bills and keep the price of electricity down. This can be used to convey an "Idaho Power cares" message. Pictures of smiling customers would help drive this message home.
- Marketing materials can also mention that efficiency programs help with grid stability by reducing peak demand.
- Try to include non-energy benefits in marketing materials.
- If possible, get more visibility on the Customer Connections newsletter and its content. This newsletter contains testimonials and content that show that Idaho Power cares about its customers. The map comparing Idaho Power's rates to other states' rates was a good answer to one of the major concerns expressed in the Burke Survey. The article about not being a victim of scams helps show that Idaho Power has concern for its customers.
- Participate in community events as much as possible. Booths that give out brochures about the efficiency programs and possibly also give away free LEDs or showerheads are good ways to get visibility in the community.

5 CONCLUSIONS AND RECOMMENDATIONS

Overall, the C&I program is well-run. Program staff know their goals and manage toward them proactively. There is well-written documentation for many of the administrative tasks. Application forms are easy to navigate and contain features that reduce applicant burden. The marketing materials are visually appealing and follow industry best practices. Tracking databases contain all necessary information, and are consistent with project files except in a few minor instances. QA/QC procedures are well-documented, and the inspection reports are detailed and thorough. While DNV GL provides several recommendations, we discovered no fundamental shortcomings or major red flags in the way the program is run.

5.1 General recommendations and best practices

Create and maintain a formal, written logic model. The rationale as to how program activities produce desired results exists whether or not the program codifies it in a formal, written logic model. The advantage of writing it down is that the rationale and any assumptions become transparent, which can help current and future program staff verify whether the program is still operating as intended, or whether some assumptions need to be revisited. This logic model should be included in a consolidated program manual.

Identify and record major risks to program goal achievement along with mitigation strategies. Even well-run programs face risks. One example many utilities will soon face is what will happen to lighting savings as the market more fully embraces LED technology and federal EISA regulations take full effect. It is better to anticipate these risks and have plans in place for dealing with adversity when it occurs than to have to scramble at a difficult moment. A well-written risk register will position the program to more effectively and adroitly deal with adversity as it arises. The risk register should include a list of the program's potential unintended consequences. Risks should be ranked based on the likelihood of occurring multiplied by the impact on the program if they do occur. Generally, each of these dimensions is scored on a 5-point scale, so risks can have a value of 1 to 25. This risk register should be included in the program manual. Table 2 provides an example basic layout of a risk register.

Table 2. Example risk register

Description	Likelihood (1 to 5)	Impact (1 to 5)	Total score (likelihood * impact)	Mitigation
Risk 1	5	5	25	<person/position/department> will do <activity>
Risk 2	4	5	20	<person/position/department> will do <activity>

If practical and allowed by regulations, test or track the effectiveness of marketing methods/campaigns. While marketing materials follow industry best practices, that alone does not guarantee their effectiveness. Testing the effectiveness of marketing materials and campaigns will help Idaho Power spend finite marketing dollars on the most effective means of outreach. If possible, Idaho Power should consider setting up a way to test or at least track the effectiveness of various marketing approaches. There are several methods for collecting this information (ordered here in terms of least to most effort/cost to implement and least to most reliability):

- Use surveys to ask participants where they first heard of the program
- Ask about sources of information on the application forms
- Put "coupon codes" on marketing materials that customers can enter to get a slightly better incentive or a small bonus. These codes would be entered on the application and should be unique to each marketing channel or campaign so that applications can be easily associated with each type of outreach.

- Set up randomized experiments where some customers receive one type of marketing and other customers receive another type. This approach could leverage a coupon code or similar means of linking applications back to specific marketing approaches.

Consider moving some measures to an upstream or midstream incentive model. As programs mature, they tend to evolve from custom models to deemed models to upstream models. Measures with deemed savings are the best candidates for upstream incentives, and lighting is typically the first end use that moves upstream. Some programs implemented by other utilities evaluated by DNV GL have also recently moved HVAC (rooftop units) and water heating measures (domestic and instant water heaters) upstream. An advantage of upstream programs is administrative simplicity for the program. A disadvantage is that upstream programs are less visible to participants, which means that Idaho Power might not generate as much customer satisfaction from them. Upstream programs are also more difficult to evaluate. While some measures will eventually be able to move upstream, some measures and projects will always require a custom approach.

Monitor market transformation towards adoption of efficient technologies as standard practice. This will help Idaho Power prioritize which measures to incentivize and at what level.

Minimize the number of times humans touch the data. Every instance of a human modifying data introduces a chance for error. Ideally, the only time a human would touch data would be the initial data entry, and all other data transfers from one system to another would occur automatically. Per the program staff interview, a macro moves data from the lighting tool into CLRIS. However, non-lighting information is manually entered by an internal administrator. If possible, this and all other cases of manual entry should be automated the way the lighting tool is.

5.2 Program-specific recommendations

Correct the errors that exist in the tracking system. While these errors are minor, the tracking system will be most useful to program staff and easier for evaluators to use for impact evaluations when it is as free of errors as possible.

New Construction – Make sure all cells have a legal value. If necessary, specify a value to represent missing data that can be used to eliminate any empty cells.

Retrofits – No recommendations.

Custom Projects –

- Only store one type of information in each column/variable. Create new variables as necessary to follow this rule.
- Make sure that each column/variable has a unique title.
- Fill in the measure data consistently in chronological order to avoid having missing data in lower ordered measure variables.

Create a consolidated internal program manual. A consolidated internal program manual would keep related program information in a single location and help condense the formerly three separate programs into one. In addition to the information currently contained in the program manuals, the single program manual should contain:

- A table at the beginning or end that lists the revision history of the document
- Graphics that show a program logic model, organizational chart, and process flows
- A risk register

Consolidate and standardize program operations instructions. Two programs provide high-level program manuals that described program goals, personnel, and tasks. Several additional documents contain detailed, step-by-step instructions for executing common program administration activities such as entering a new application into CLRIS. These documents are very similar across all 3 subprograms. Maintaining 3 separate manuals and sets of instructions is not only redundant, but could cause confusion among program staff as to which instructions they should use for any specific task. A single document containing all the instructions would help align the 3 subprograms while reducing redundancy and confusion. DNV GL recommends the following additional content for the document:

- Include a table at the beginning or end that lists the document's revision history.
- Emulate the combination of shapes superimposed over screenshots used in "Directions to upload applications.docx." All the instruction documents have screenshots, but this one does the best job of clearly labeling the different areas on the screen in a way that intuitively ties back to the instructional text (and vice versa).

Consider consolidating the program tracking files. This would further advance the management of the formerly 3 separate programs as a single program.

Revise and add instruction text to application forms. These will make the forms more intuitive and usable by participants. Mouse-over text is a good way to add instructions to specific areas of the application forms. Areas of the application forms that could benefit from additional instructions include:

- Error text for cells that calculate formulas such as "chk box" in the new construction application
- Areas where applicants should not type
- What to enter in columns that request specific information in specific formats
- Define acronyms such as QPL, LCL, and DLC

Consolidate all measure-specific applications into a single file or make sure that each individual file has a unique identifier that can be used to keep the set together. This will facilitate the tracking of customers who install multiple measures and will make data entry easier and more consistent.

Add appealing content to the marketing materials. This will help get people to pay attention to the marketing materials, and the anecdotal evidence is another way to convince customers of the value of energy efficiency. There could be more pictures, such as those of smiling people used in the New Construction brochures. The website could also benefit from links to more stories or testimonials of satisfied customers. Make the YouTube videos about the New Construction program available in these web pages.

Consider updating the flow of the business tip sheets. This will help customers focus on the areas that will impact them the most. Start with the energy use breakdowns for the facility types, to contextualize the 2 or 3 systems that the sheets focus on. Focus on the most energy intense systems and explain how to make those systems more efficient. Try to mention additional non-energy benefits.

Add a few details to the C&I slide deck and prepare a few anecdotal stories about good experiences with the program. These details will make the slide deck a little more informative for observers, and the anecdotes will help motivate participation.

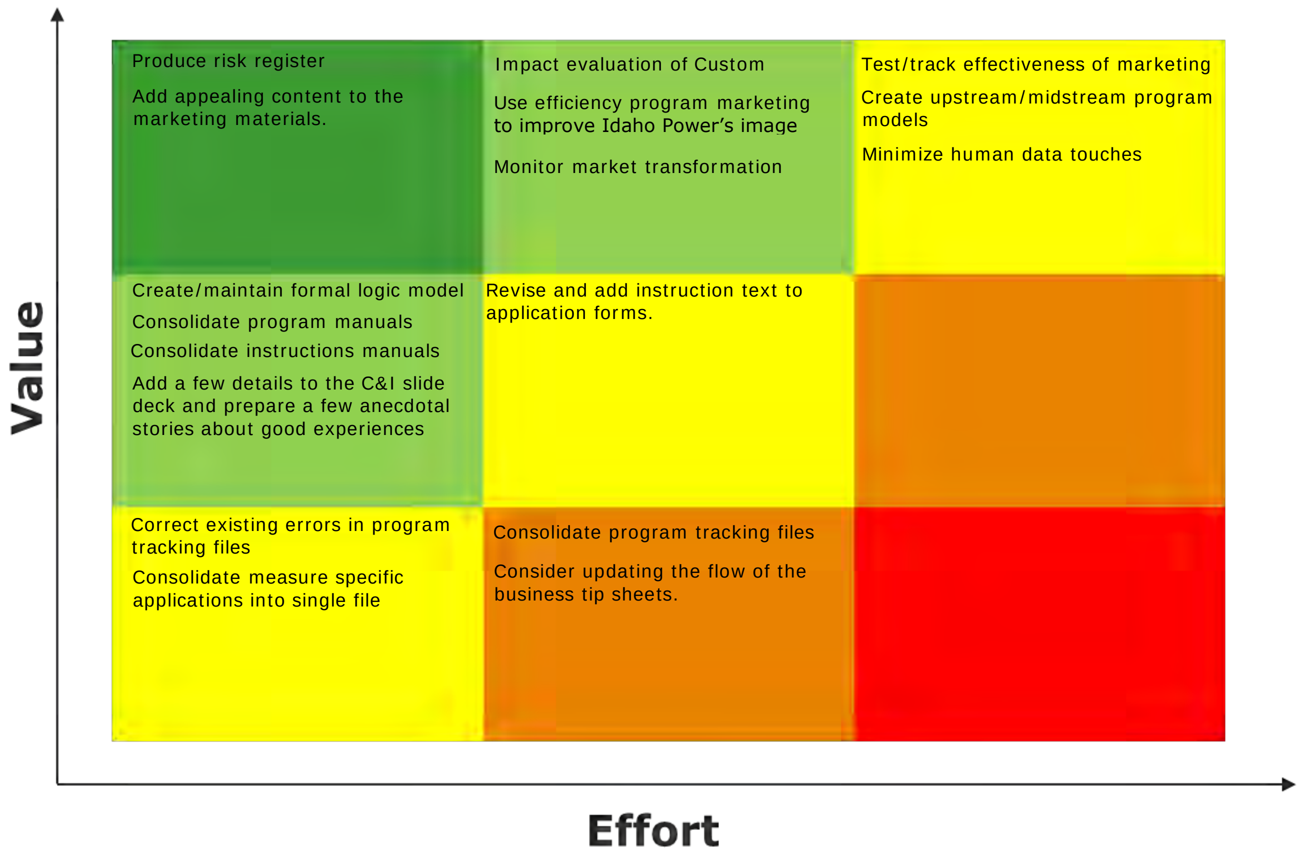
Use efficiency program marketing activities to enhance Idaho Power's image. Idaho Power is providing efficiency programs for the right reasons, and those programs are an opportunity for a positive interaction with customers. Idaho Power is already investing in marketing the efficiency programs, and that marketing can be used to address some of the themes highlighted in the Burke Report. Other steps Idaho Power can take to address the Burke Report's concerns include:

- Funnel customers to efficiency programs when they call in with high bill complaints.
- Marketing materials for efficiency programs should note that Idaho Power does this to help customers pay their bills and keep the price of electricity down. This can be used to convey an "Idaho Power cares" message. Pictures of smiling customers would help drive home this message.
- Marketing materials can also mention that efficiency programs help with grid stability by reducing peak demand.
- Try to include non-energy benefits in marketing materials.
- If possible, get more visibility on the Customer Connections newsletter and its content. This letter contains testimonials and content that shows that Idaho Power cares about its customers. The map comparing Idaho Power's rates to other states' rates was a good answer to one of the major concerns expressed in the Burke Survey. The article about not being a victim of scams helps show that Idaho Power has concern for its customers. If content like this is not already posted to Idaho Power's social media, that would be a way to increase its exposure.
- Participate in community events as much as possible. Booths that give out brochures about the efficiency programs and possibly also give away free LEDs or showerheads are good ways to get visibility in the community.

Conduct an impact evaluation on the custom projects subprogram in 2018 or 2019 at the latest. Of all the subprograms, Custom Projects is probably the one that can benefit the most from an impact evaluation because each project involved unique energy savings calculations performed by Idaho Power or a subcontractor rather than drawing on vetted external sources such as RTF for deemed savings values. The last impact evaluation was in 2014. Best practices suggest a 2-year or 3-year schedule for impact evaluations of a custom projects program.

DNV GL organized these recommendations by to the estimated amount of effort they require, and the value that Idaho Power would derive from them (Figure 4).

Figure 4. Recommendation effort/value diagram



APPENDIX A. PROGRAM STAFF INTERVIEW GUIDE

The Program Staff interview guide is appended below as a PDF object. Double-click the image to open a PDF viewer to review the entire guide.

Idaho Power PM Interview Guide

1 GOALS OF INTERVIEW

Program	Info to support impact eval	Program design	Program implementation	Program admin and oversight
C&I		✓	✓	✓
Res Heating and Cooling	✓	✓	✓	✓
Res Home Audits	✓			

Program	
Interviewee	
Interviewer	
Completion Date	
Interview Length	

This interview guide is a guide rather than a script. It is intended to remind the interviewer of the topics to cover and provide a guideline for the flow of the interview. It is not a script. The interview guide assumes that the interviewer will be familiar with how similar programs are implemented in the industry and how Idaho Power specifically implements its programs. Furthermore, the interviewer is expected to be an experienced interviewer who knows when and how to ask follow up questions and probe, even if those specific probes are not listed on the interview guide. Thus, the expectation is that the interview will proceed as a conversation and go where the conversation leads, within the bounds of the interviewer covering the topics needed as listed in this guide.

Idaho Power Residential Heating and Cooling Program Evaluation

1 EXECUTIVE SUMMARY

DNV GL conducted a process and impact evaluation on Idaho Power's residential Heating and Cooling Efficiency program. Evaluation activities included:

- Semi-structured interviews with program staff
- Review of program tracking systems
- Review of program logic, files, and materials
- Review of savings algorithms
- Computation of verified savings and realization rates
- Review of QA/QC procedures

DNV GL's key findings included:

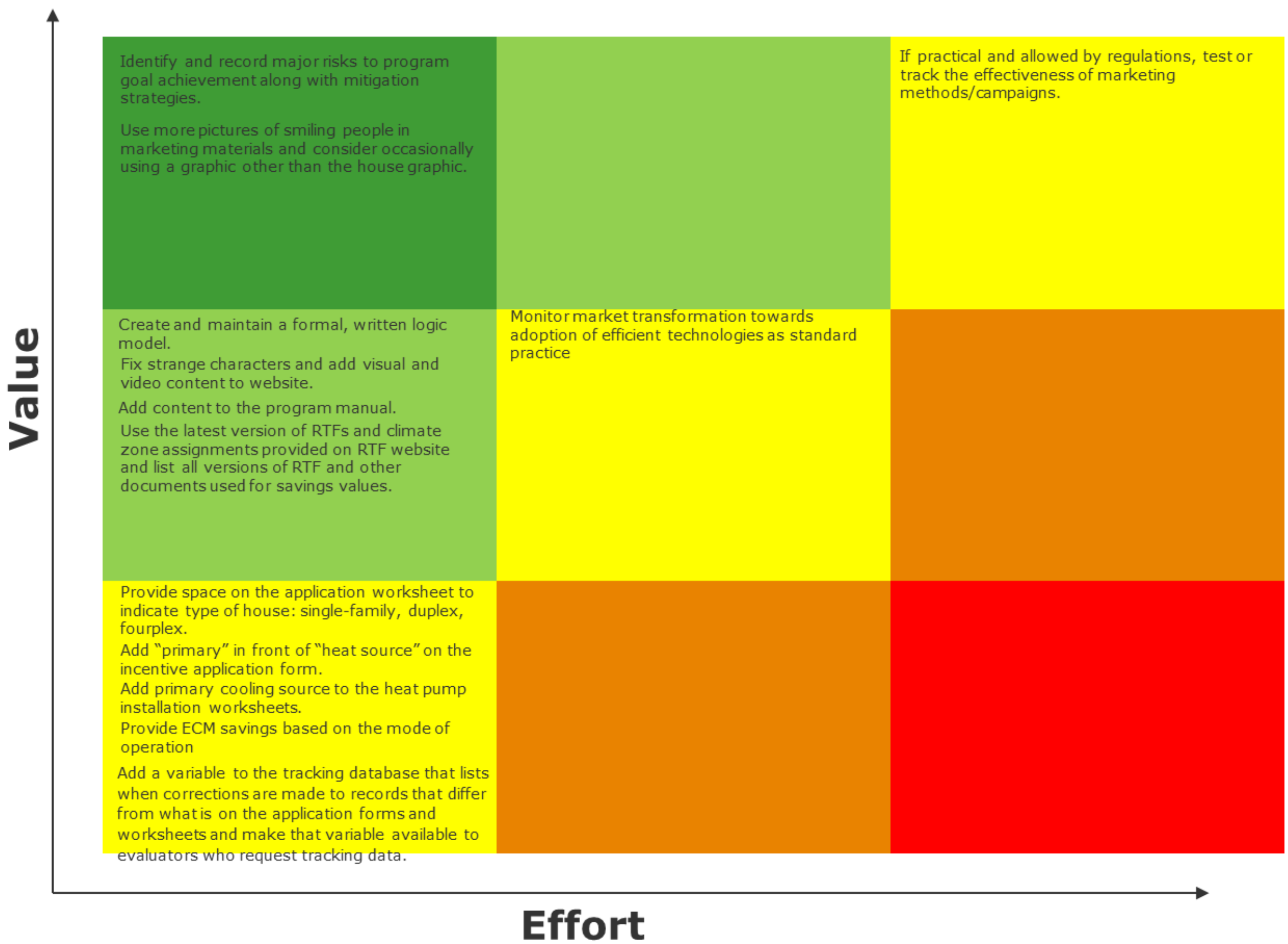
1. The total reported savings for the program were 1,113,574 kWh with total verified savings of 1,126,591 kWh, for a realization rate of 1.01.
2. Ex-ante savings calculations for 12 out of 14 measures were verified accurate.
   a. "Air-Source Heat Pump to Open Loop Water Source Heat Pump" used an incorrect baseline.
   b. Evaporative coolers used different climate zones for single-family and manufactured homes.
3. Differences in savings for specific reviewed files occurred because of climate zone changes.
4. There were some anomalies on the application forms, but tracking data contained the correct values.
5. Trade allies are a key means of implementing the program.
6. Program documentation was good, and could be improved with several changes:
   a. Formatting for improved readability
   b. Including program logic model and risk register
   c. Adding several fields to applications
7. Print collateral was well done.

The program is operating well and meeting its goals, supported by a savings realization rate just over 100%. The program specialist is aware of program operations, and program processes are in good working order.

DNV GL Headquarters, Veritasveien 1, P.O.Box 300, 1322 Høvik, Norway. Tel: +47 67 57 99 00. www.dnvgl.com

While DNV GL makes several recommendations (Figure 1), we discovered no major red flags during the evaluation.

Figure 1. Recommendation value * effort map



2 INTRODUCTION

2.1 Program overview

The Heating and Cooling Efficiency (H&C) program provides incentives to residential customers in Idaho Power's Idaho and Oregon service areas for the purchase and proper installation of qualified heating and cooling equipment and services.

The program was initiated in 2007. Its objective is to acquire energy savings by providing customers with energy efficient options for electric space heating and cooling. The available measures in 2016 included ducted air source heat pumps, ducted open loop water source heat pumps, ductless air source heat pumps, duct-sealing, whole-house fans, electronically commutated motors, evaporative coolers, and smart thermostats.

Idaho Power requires licensed contractors to perform the installation services related to these measures, except for evaporative coolers that can be self-installed. For the ducted air source heat pump, ducted open-loop water source heat pump, ductless air source heat pump, and duct-sealing measures, the licensed contractor must also be an Idaho Power participating contractor.

2.2 Evaluation overview

DNV GL conducted an impact and process evaluation. The key objectives of the impact evaluation included:

- Determine and verify the energy (kWh) impacts attributable to the 2016 program. Ex-ante savings estimates are determined using various sources including the Regional Technical Forum (RTF) deemed savings, and internal/external engineering.
- Provide credible and reliable program energy impact estimates and ex-post realization rates for the 2016 program year.
- Report findings and observations, and provide recommendations that enhance the effectiveness of future ex-ante savings analysis and the accurate and transparent reporting of program savings.

The key objectives of the process evaluation included:

- Evaluate program design including program mission, logic, and use of industry best practices.
- Evaluate program implementation including quality control, operational practice, and outreach.
- Evaluate program administration including program oversight, staffing, management, training, documentation and reporting.
- Report findings and observations and recommendations to enhance program effectiveness.

To achieve these objectives, DNV GL conducted:

- Semi-structured interviews with program staff
- Tracking system review
- Program file review

- Program materials review
- Review of savings algorithms
- Program logic review
- QA/QC review

2.3 Layout of report

The remainder of this report is organized into the following sections:

Section 3. Methods – describes the evaluation activities in detail

Section 4. Impact findings – reports findings relevant to verification of program savings

Section 5. Process findings – reports findings relevant to program processes and materials

Section 6. Conclusions and recommendations – lays out the key findings and provides recommendations for program improvement

3 METHODS

This section provides detailed descriptions of the methods DNV GL used to evaluate the program.

3.1 Program staff interviews

DNV GL conducted in-depth interviews (IDIs) with Idaho Power program staff, to understand:

- Program history
- How the program is delivered
- Program logic and objectives
- The perceived strengths and weaknesses of the program
- What the program staff wants or needs from the evaluation

DNV GL developed instruments to guide the IDIs (Appendix A). Senior DNV GL staff conducted the IDIs in person in June 2017.

3.2 Tracking system review

Our tracking system review informed both the impact and the process evaluations. In the review, DNV GL assessed the program's database, its fields, their use, and the accuracy of the data. To ensure that the data can support program administration and oversight, program evaluation, and regulatory reporting, we assessed the accuracy of the data entry and individual measure savings values, and conducted a broader assessment of the various ways the tracking information is used.

DNV GL assessed the program database along four major areas, asking the following questions:

- Structure: Does the database contain all needed fields to track programs, perform evaluations, and calculate savings?

- Completeness: Are required fields populated with usable data?
- Quality: Are the data in a format that enables analysis and reporting? Do they have consistent, identified units and mutually exclusive categories?
- Accuracy: Does the database accurately calculate program savings that are consistent with deemed measure algorithms? DNV GL reviewed the sampled projects to determine this.

3.3 File review

DNV GL reviewed a sample of the project files, including original energy analysis and any follow-up documents adjusting savings estimates. We verified the accuracy of data entry by comparing the application, the invoice, and the database for key elements of the savings calculation such as quantity, size, efficiency level, and units of measure.

For each measure, we attempted to determine the key engineering assumptions involved and the extent to which they were documented. Specifically, we:

- Reviewed calculations for accuracy, appropriateness of methods and use of inputs and assumptions
- Identified areas of concern
- Assessed the appropriateness of baseline equipment/efficiency levels
- Identified whether climate zone assignments are likely to affect the energy savings, and verified that these were appropriately accounted for

DNV GL requested a sample of project files designed to meet a 90/10 precision requirement (a relative error of no more than 10%, with 90% confidence) with reasonable assumptions. The sample was designed to include all the measure types in the program, with preference given to measures that had greater and more variable savings levels. The final sample included 26 projects (Table 1).

Table 1. Heating and cooling sample plan

Measures	Group	Stratum	Stratum definition	Population count	Weight	Sample size
Heat pump	A	1	< 4,000 kWh	92	0.1905	4
	A	2	4,001 - 6,999 kWh	73	0.1511	5
	A	3	>= 7,000 kWh	1	0.0021	1
OL	B	1	< 10,000 kWh	16	0.0331	2
	B	2	>= 10,000 kWh	1	0.0021	1
Ductless heat pump	C	1	< 2,200 kWh	24	0.0497	2
	C	2	>= 2,200 kWh	125	0.2588	2
Smart Thermostat	D	1	All thermostats	57	0.1180	3
Evaporative cooler	E	1	Single-family	13	0.0269	1
	E	2	Multi-family	9	0.0186	1
Duct sealing	E	3	All duct sealing	3	0.0062	1
WH fan	E	4	All	19	0.0393	1
ECM	E	5	All	50	0.1035	2
Total				483		26

This sample plan was formed using the following assumptions:

- Group A – pulled one largest out as census, and split remainder into 2 strata
- Group B – pulled largest out as census
- Group C – split into 2 strata
- Group D – no stratification
- Measures in group E all had constant savings. The sample was set to size 1, except for ECM, which was set to 2 due to the large number of projects. Because there is no variability for these measures, the assumption is that any discrepancies found would be consistent for all project files of the same measure type.
- Ratio near 1 and a correlation of at least 0.5.

Using these assumptions, the sample achieved better than 90/10 precision.

3.4 Program materials review

The primary purpose of a program materials review is to provide an objective opinion of the clarity and effectiveness of those documents. Program documentation is a critical aspect of program planning, project management, and communication with stakeholders and trade allies. Table 2 lists the program materials we reviewed and the core issues associated with each.

Table 2. Materials reviewed and core issues considered

Program material	Core issues
Program plan	Is program theory clearly articulated? Are program objectives articulated? Are program goals recorded and SMART[1]? Are program roles and responsibilities clearly recorded? Are risks and contingencies recorded?
Marketing materials	Are materials visually appealing? Do they effectively convey the intended information? Are they easy to understand? Do they have utility logos or branding? Do they provide a follow-up activity and means to do it? Do they utilize any psychological/motivational theories and how effective are they at doing so?
Application forms	Do they cover the minimal information necessary? Are instructions available and clear? Are they easy to follow and fill out? Do they use jargon or require technical knowledge?
Websites	Are they visually appealing? Are they easy to navigate / laid out in an intuitive manner? Are links broken? Are they accurate? Do they convey necessary information? Do they take advantage of the unique capabilities of the medium?

3.5 Review of savings algorithms

DNV GL reviewed the savings algorithms used by Idaho Power to ensure that the savings claimed by each measure is appropriate. We examined each measure's savings algorithm to verify the following:

- Baseline efficiency levels are consistent with current codes and standards, and/or industry standard practices
- Efficiency levels are consistent with program requirements
- Hours of use and run time values are consistent with ASHRAE or other established references
- Appropriate adjustments are made for climate zone and interactivity
- Standard engineering practices have been followed
- All calculations are consistent with RTF requirements

DNV GL recalculated energy savings using the applicable savings algorithms to verify that the equations were properly documented and to quantify the impact of changes in input assumptions.

3.6 Program logic review

Based on the program specialist interviews and the review of the program materials, DNV GL developed program theory and logic models for the program.

[1] Specific, Measurable, Attainable, Realistic, Time-delineated

3.7 QA/QC review

DNV GL assessed the adequacy of Idaho Power's savings verification processes, controls, and procedures. The goal of the assessment was to ensure that adequate resources are dedicated to quality assurance and quality control, that the most effective policies are in place, and that those policies are enacted through appropriate, efficient procedures that are routinely reviewed.

The evaluation team reviewed the program's procedural documents and example project files, focusing on situations where savings are verified. We reviewed the quality and adequacy of the verification documentation, including invoices, manufacturer's cut sheets, and inspection reports.

4 IMPACT FINDINGS

This section provides detailed findings on program savings. The impact evaluation consisted of three primary activities: reviewing the program tracking system for accuracy and completeness, reviewing savings algorithms for program measures, and reviewing a sample of project files to verify that calculations and assumptions are accurate.

4.1.1 Tracking system review

The tracking system savings matched the reported savings[2] of 1,113,574 kWh.

We assessed the tracking data for whether it contained the necessary data to determine if the appropriate savings were applied across all measures. We found the database to be mostly complete and well-organized, with project costs, measure description, and energy savings information filled in for all projects. The incentive information is available for all projects except those that had a connected thermostat measure (for which no project listed incentives).

4.1.2 Tracking data review

There are 15 measure types in the H&C program database. The savings basis for each measure is listed in Table 3.

Key impact findings

1. *The total reported savings for the program were 1,113,574 kWh with total verified savings of 1,126,591 kWh, for a realization rate of 1.01.*
2. *Ex-ante savings calculations for 12 out of 14 measures were verified accurate.*
    a. *"Air-Source Heat Pump to Open Loop Water Source Heat Pump" used an incorrect baseline.*
    b. *Evaporative coolers used different climate zones for single-family and manufactured homes.*
3. *Differences in savings for specific reviewed files occurred due to climate zone changes.*
4. *There were some anomalies on the application forms, but tracking data contained the correct values.*

[2] Reported savings were provided in Supplement 1: Cost-Effectiveness Report, Demand-Side Management 2016 Annual Report, Idaho Power Company, March 15, 2017

Table 3: Measure type and savings basis

Measure	Tracking savings basis
Connected thermostat	ResConnectedTstats_v1.1.xlsm
Air-source heat pump to air-source heat pump: 8.5 HSPF	ResSFExistingHVAC_v4_1.xlsx ResHeatingCoolingCommissioningControlsSizingSF_v3_6 ResMHExistingHVAC_v3_3 ResMHHeatingCoolingCommissioningControlsSizing_v3_3
Air-source heat pump: 8.5 HSPF	ResSFExistingHVAC_v4_1.xlsx ResHeatingCoolingCommissioningControlsSizingSF_v3_6 ResMHExistingHVAC_v3_3 ResMHHeatingCoolingCommissioningControlsSizing_v3_3
Oil/propane heating system to air-source heat pump: 8.5 HSPF	ResSFExistingHVAC_v4_1.xlsx ResHeatingCoolingCommissioningControlsSizingSF_v3_6
Air-source heat pump to open loop water source heat pump: 3.5 COP	ResGSHP_v2_6
Electric heating system to open loop water source heat pump: 3.5 COP	ResGSHP_v2_6 (with exception) *
Oil/propane heating system to open loop water source heat pump: 3.5 COP	ResGSHP_v2_6 (with exception) *
Open loop water source heat pump: 3.5 COP	ResGSHP_v2_6 (with exception) *
Evaporative cooler - single family	Savings based on DEER 2004-05 Version 2.01, weighted by vintage, IPC Heating & Cooling Evap cooler references.
Evaporative cooler - manufactured home	Savings based on DEER 2004-05 Version 2.01, weighted by vintage, IPC Heating & Cooling Evap cooler references
Electric heating system to air-source heat pump: 8.5 HSPF	ResSFExistingHVAC_v4_1.xlsx
Ductless heat pump	ResSFExistingHVAC_v4_1.xlsx ResMHExistingHVAC_v3_3 (with exception)**
Duct sealing	ResSFPerformanceBasedDuctSealing_v3_2.xlsm
Whole house fan	AEG. Potential Study
EC motor	Idaho Power engineering calculations based on Integrated Design Lab inputs. 2015

* The 8,927 kWh value comes from the original program modeling in 2009 by a Northwest consulting firm, Ecotope. The 8,927 kWh/unit was used until it was determined that ground source heat pump numbers could be used for open loop systems during 2016.

** Projects that did not have a nameplate HSPF value of 9+ or in one situation where the HSPF value was missing were not assigned tiered savings from RTF workbook v4_1. The sub 9 HSPF projects were assigned RTF workbook v2 savings which was the sourced workbook prior to 2016.

DNV GL reviewed the savings algorithms for all the measures. The findings for each measure are listed in Table 4. A general finding for all the measures that involved RTF calculations was that the climate zones assignments were different than that used by Idaho Power. For the evaluation, DNV GL calculated savings with climate zone assignments (based on city and zip code) found in the spreadsheet available on the RTF website.

Table 4. Savings algorithm review by measure

Measure	Findings
Connected thermostat	The ex-ante savings calculations are accurate.
Air-source heat pump to air-source heat pump: 8.5 HSPF	The ex-ante savings calculations are accurate.
Air-source heat pump: 8.5 HSPF	The ex-ante savings calculations are accurate.
Oil/propane heating system to air-source heat pump: 8.5 HSPF	The ex-ante savings calculations are accurate.
Air-source heat pump to open loop water source heat pump: 3.5 COP	Incorrect baseline was used from the RTF spreadsheet (FAF was used instead of ASHP).
Electric heating system to open loop water source heat pump: 3.5 COP	The savings were verified from the sources provided by Idaho Power and they are reasonable.
Oil/propane heating system to open loop water source heat pump: 3.5 COP	The savings were verified from the sources provided by Idaho Power and they are reasonable.
Open loop water source heat pump: 3.5 COP	The savings were verified from the sources provided by Idaho Power and they are reasonable.
Evaporative cooler - single family	Reviewed DEER resource provided by Idaho Power. Climate Zone 12 is used for single family home savings assignments and Climate Zone 16 is used for manufactured home savings assignment. It is not clear why different climate zones were used for same measure type. DNV GL used Climate Zone 16 and the latest DEER version for evaluated savings calculation.
Evaporative cooler - manufactured home	
Electric heating system to air-source heat pump: 8.5 HSPF	The ex-ante savings calculations are accurate.
Ductless heat pump	The savings for systems above 9 HSPF efficiency match the source RTF calculator. The savings for the systems below 9 HSPF efficiency level were sourced from a previous version of the RTF and were verified.
Duct sealing	RTF version 1.1 is used instead of 3.2 listed in the Supplement 1 sources. The savings value used were verified and matched version 1.1.
Whole house fan	The savings value source was provided by Idaho Power and ex-ante savings were verified.
EC motor	The integrated design study was well researched and reasonable for hours of use under different motor operating conditions. Idaho Power provided more resources on the power consumptions used under different operating conditions and they are reasonable values based on DNV GL's research.

4.1.3 Project file review

DNV GL received 26 sampled project files for file review and to perform impact savings calculations. For most of the projects, the savings evaluated were the same as the claimed savings. Table 5 has the details of the project ids where the savings are different and the reason.

Table 5: Summary of sampled projects with different evaluated savings

HCID	Reason for different evaluated savings approach
1286	Different savings value due to different climate zones assignment based on the latest RTF guidelines
1359	Different savings value due to different climate zones assignment based on the latest RTF guidelines
1363	Used DEER latest version and used climate zone 16 values
1410	The application has a heat pump as an existing system type instead of furnace listed in tracking. Assigned savings based on heat pump as an existing system category.
1424	Different savings value due to different climate zones assignment based on the latest RTF guidelines
1449	Used DEER latest version and used climate zone 16 values
1455	Different savings value due to different climate zones assignment based on the latest RTF guidelines
1573	Different savings value due to different climate zones assignment based on the latest RTF guidelines
1658	Different savings value due to different climate zones assignment based on the latest RTF guidelines

Other findings from the project files review are:

1. DNV GL found two versions of heat pump applications. The project application version used for project IDs 1222 and 1499 had fields to fill in the existing cooling system type which was missing in the other sampled heat pump projects. *DNV GL recommends using a version similar to HCID 1222 and 1499 that includes cooling system type for future heat pump projects.*

2. For project ID 1424, both the heating system types are selected in the application. Idaho Power confirmed uses a heat pump as a primary heating system type. *DNV GL recommends adding "primary" heating system type in the application to avoid confusion in the future.*

3. On the ECM application worksheet, there is a line for checking which months the fan is on or in continuous mode. There are several ways that it is unclear how to fill out this part of the form:

    a. The form does not make clear that this mode refers to running the fan only, and not the heating or cooling mechanism.

    b. Also, there is no instructions on the form about a threshold for when to check a month (e.g.: If the fan is on for only one day of the month, should it be checked?)

The application we reviewed had checks on all months. It is unclear if this applicant meant that they ran their HVAC system in some mode or actually had the fan on continuous mode during all months of the year. *DNV GL recommends adding instructions to this section to clarify what Idaho Power wants applicants to enter and/or have the contractors fill out this section and provide more explicit training to those contractors about how to fill in that section.*

4. For the ECM measure, Idaho Power calculated savings separately for heating/cooling mode and continuous operation. *Because both calculations are available, instead of providing one deemed value irrespective of the motor operation mode, DNV GL recommends Idaho Power report savings based on the mode of operation.*

5. For air source heat pump projects, the savings from the RTF depend on the existing heating and cooling system type. Idaho Power currently collects the existing heating system type in the application but not the existing cooling system type (except for the two applications mentioned above). However, the cooling system type is filled in the tracking data. *DNV GL recommends to add "primary existing cooling system type" field in the application so that it can be verified.*

6. There were some inconsistencies found between the tracking database and project files.:

    a. Some of the sampled projects have different zip code values in the project file compared to the tracking database. When researched further, the zip codes in the tracking data base are correct based on the city information. If wrong zip codes are used, it can impact the savings assignments from the RTF calculators.

    b. Phone numbers for some projects listed in the tracking database did not match the values in tracking data.

    c. For Project ID 1410, the project application has heat pump as an existing system type instead of furnace listed in tracking. Further review by the program specialist confirmed that the application was incorrect and the existing heating system is correctly an electric forced air furnace. *DNV GL recommends that the tracking database contain a variable that tracks when corrections such as these occur and make that variable available to evaluators who request tracking data.*

Based on the adjustments described above, using the sample design laid out in the methods section, we expanded the sample results to the population of all projects using a ratio estimate. The ratio estimate leverages the known reported savings for all projects, since it is correlated with the verified savings, to estimate the verified program-level savings and the realization rate.

The total reported savings for the program were 1,113,574 kWh. The sample estimate of the total verified savings is 1,126,591 kWh, for a realization rate (RR) of 1.01. The 90% confidence interval for the verified savings estimate is +/-6,867 kWh, or 0.6%. This far exceeds the 90/10 target for precision. Because of the small sample sizes, we used the variance of the population reported savings for both the reported and verified savings, since it is a more stable estimate of the variance. For the census strata and those strata with all projects with identical reported savings, the variance is zero, so those strata did not contribute to the overall uncertainty of the estimates. Table 6 shows the stratum level results for the sample expansion.

Table 6. Strata-level savings calculations

Group	Stratum	Population Count	Sample Size	Weight	Sample Mean Reported	Variance Reported Savings	Sample Mean Verified	Realization Rate	Variance of Verified (proxy)	Correlation
A	1	92	4	0.19048	1,446.50	642,910	1,446.50	1.00	642,910	1
A	2	73	5	0.15114	5,390.80	1,602,001	5,390.80	1.00	1,602,001	1
A	3	1	1	0.00207	9,573.00	0	5,434.00	0.56	0	1
B	1	16	2	0.03313	8,828.50	280,805	8,828.50	1.00	280,805	1
B	2	1	1	0.00207	14,495.00	0	14,228.00	0.98	0	1
C	1	24	2	0.04969	1,566.00	97,852	2,487.50	1.59	97,852	1
C	2	125	2	0.25880	2,753.00	47,916	2,832.50	1.03	47,916	1
D	1	57	3	0.11801	903.33	40,935	731.67	0.81	40,935	0.8003
E	1	13	1	0.02692	554.00	0	257.30	0.46	0	1
E	2	9	1	0.01863	316.00	0	283.00	0.90	0	1
E	3	3	1	0.00621	1,095.00	0	1,095.00	1.00	0	1
E	4	19	1	0.03934	446.00	0	446.00	1.00	0	1
E	5	50	2	0.10352	515.00	0	515.00	1.00	0	1

5 PROCESS FINDINGS AND TARGETED RECOMMENDATIONS

This section provides detailed findings on program operations and materials. The process evaluation included interviews with program staff, reviewing program logic, reviewing program documentation, reviewing the program's QA/QC procedures, and assessing program marketing materials. In this section, we also offer targeted recommendations for improving individual materials.

Key process findings

1. *Trade allies are a key means of implementing the program*
2. *Program documentation was good but could be improved with several changes:*
    a. *Formatting for improved readability*
    b. *Including program logic model and risk register*
    c. *Adding several fields to applications*
3. *Print collateral was well-done.*

5.1.1 Staff interviews

The staff IDIs revealed that the program is approximately 10 years old, and adds new measures every few years. Incentives range from $50 to $1000, and the program receives approximately 450 applications per year. A major focus of program marketing is to simply raise awareness of the program to the point where homeowners will mention it when they work with contractors on HVAC replacements and repairs.

Trade allies are a key means of implementing the program. Most measures are installed through approved trade allies, and the program specialist spends a significant amount of time managing and educating the trade ally network. The trade allies fall into three categories:

- Top performers, 10-15 companies who install approximately 80% of the program-sponsored measures. These companies generally have been supporting the program since its inception.
- Dabblers, who install a few projects per year
- Non-performers, who have not submitted an application since joining the program

The barriers for trade allies are well-known by the program staff who has identified approximately 12 barriers, the effects of which differ by trade ally. They include issues such as employee turnover, technical inadequacies, and apathy. According to the program specialist, the program needs help from Customer Representatives or additional staff to overcome these barriers.

5.1.2 Program logic review

The program files did not contain a formal logic model. DNV GL generated a draft logic model (Figure 2) based on information found in the program files and the program specialist IDI.

Figure 2. Residential Heating and Cooling logic model

Assumptions

None

External Factors

Use TRM and potential study savings values

Most measures installed by trade allies

Evaluation

Process: 2017

Impact: 2017

Inputs	Outputs		Outcomes – Impact		
	Activities	Participation	Short	Medium	Long
Idaho Power invests: Staff time Incentives Incentives directly to contractors on some measures	**Idaho Power does:** Marketing to customers Educate and engage trade allies Review and approve applications Inspect installations Work with customers to identify additional projects	**Idaho Power reaches:** Customers Trade allies	**Short term** Offset portion of additional capital expenses for more efficient measures Energy savings and number of projects by region	**Mid term**	**Long term** Keep rates low Minimize environ-mental impact Improve customer satisfaction Avoid/ defer building new generation

5.1.3 Program file review

Program manual - The 2016 program handbook contains a high-level description of the program. The handbook lists program goals with specific metrics, and contains a list of the personnel related to the program. Some of this description helped generate the logic model (Figure 2). It contains the minimum amount of information DNV GL looks for in this type of document.

Recommendations: DNV GL recommends the following improvements:

- Include a table at the beginning or end that lists the revision history of the document.

- Add graphics that show a program logic model, organizational chart, and process flow to improve the intuitiveness of the document. The organizational chart should include a box for the trade ally network.
- Include a list of major risks to accomplishing the program's goals, and contingencies for dealing with those situations if they occur.

The *incentive measures available document* contains a list of the incentives available for the current group of program measures.

Recommendations: This document would be more readable if this list were converted into a table. It could also be included in the program manual rather than existing as a separate document.

Application forms- (Note: The forms available on the website have changed since this portion of the evaluation was conducted.) DNV GL reviewed three application forms on the Idaho Power website: air source heat pumps, evaporative coolers, and open loop water source heat pumps. All three forms were very similar. They lacked specific written instructions, but were generally intuitive and easy to follow and fill out. The areas that would be filled by homeowners were jargon-free. The evaporative cooler form contained all information necessary for an application form. The other two forms were missing a location to enter in the specific efficiency or model number of the installed equipment. This would be helpful information to record in program tracking, and there is a place for it on the evaporative cooler form. Forms lacked information on the type of house where the measures were installed (single-family, duplex, triplex, fourplex).

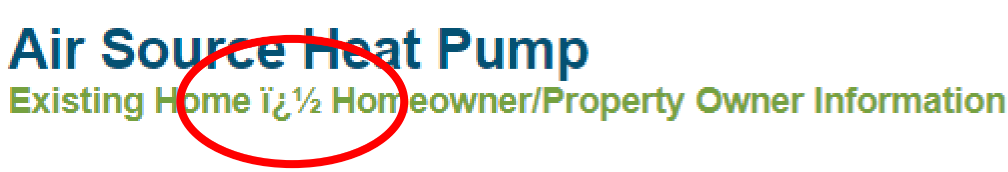
The program specialist IDIs suggested that approximately 10% of sites are inspected. The selection is random. Honeywell reviews the applications, and provides an Excel spreadsheet that tracks this review and the application status up through entry into CLRIS. This spreadsheet has an acceptable level of detail. DNV GL did not receive a description of onsite verification protocols or the results of onsite verifications.

5.1.4 Marketing materials

Website

The program's website is in good condition. It is visually appealing and accurate, conveys the necessary information, and is easy to navigate with no broken links. However, there are strange characters in the subheadings of many of the pages for the individual measures when viewed in the Chrome browser (Figure 3).

Figure 3. Strange characters in subheading



Recommendations: Visual appeal could be increased by adding pictures, particularly those of people. The capabilities of the medium could be better leveraged by linking to videos of success stories if any are available. A good location for both is under the link labeled "success stories." That link currently does not connect to any anecdotal stories about real Idaho Power customers. According to follow up with program staff, this error was corrected sometime along with an update of the entire Idaho Power website in November 2017.

Digital ads and Customer Connections newsletter

The digital ads are likewise well done.

Recommendations: If it is possible to track which of these digital ads customers clicked on to enter the program website, Idaho Power should consider doing so, since this would yield valuable information about which ads are more effective.

Print collateral[3]

DNV GL reviewed printed marketing materials that covered the Residential Heating and Cooling program. These are well done: they are visually appealing, effectively communicate the intended information, are easy to understand, have utility branding and logos, and provide follow-up contact info including web URLs and phone numbers. A particularly positive visual characteristic is that they feature smiling people.

Figure 4. Home Graphic on Print Materials

Recommendations: DNV GL has several recommendations for these materials:

- When possible, include pictures of smiling people
- The graphic of the home (Figure 4) used in the print materials is visually appealing. However, it appears on several different materials, which could cause customers to overlook a piece because they think they have already seen it. Consider occasionally changing the graphics on these materials to attract new attention.
- According to the Burke Report, the most important issues for survey respondents are rates (costs), outages, and seeing Idaho Power as a partner. Marketing materials should address these concepts when possible. For example, rather than emphasizing energy efficiency for its own sake, stress that energy efficiency will save customers money. Marketing materials should also reinforce the message that Idaho Power works with customers as an active partner.

6 CONCLUSIONS AND RECOMMENDATIONS

The program is operating well and meeting its goals. The total reported savings for the program were 1,113,574 kWh. The total verified savings is 1,126,591 kWh, for a realization rate (RR) of 1.01. The 90% confidence interval for the verified savings estimate is +/-6,867 kWh, or 0.6%. The differences were due primarily to changes in the RTF specifications for calculating savings. Program specialists are aware of program operations, and most of the program processes are in good working order. While DNV GL makes several recommendations, we discovered no major red flags during the evaluation.

[3] These included: bill Inserts (BILL-INSERT_HeatingAndCooling_07-17_PRINT.pdf), program brochures (BROCHURE_EE-ProgramSummary_53265_03-17_PRINT.PDF), postcards (DM-POSTCARD_HeatingAndCoolingEE_06-17_PRINT.pdf), and an information card (InfoCard_EEProgramSummary_48677_03-17_PRINT.pdf).

6.1 General recommendations and best practices

Create and maintain a formal, written logic model. Program activities produce desired results according to a certain rationale whether or not the program codifies this rationale in a formal, written logic model. The advantage of writing it down is that the rationale and any assumptions become transparent, which can help current and future program staff evaluate whether the program is still operating as intended, or whether some assumptions need to be revisited. This logic model should be included in the program manual.

Identify and record major risks to program goal achievement, along with mitigation strategies. Even well-run programs face risks. It is better to anticipate these risks and have established plans for mitigating them when they occur than to have to scramble in a crisis. A well-written risk register will position the program to more effectively and adroitly deal with adversity as it arises. The risk register should include a list of the program's potential unintended consequences. Risks should be ranked based on likelihood of occurrence multiplied by the impact on the program in the case of occurrence. Generally, each of these dimensions is scored on a 5-point scale, which means that risks can have a value of 1 to 25. This risk register should be included in the program manual. Table 7 provides an example basic layout of a risk register.

Table 7. Example risk register

Description	Likelihood (1 to 5)	Impact (1 to 5)	Total score (likelihood * impact)	Mitigation
Risk 1	5	5	25	<person/position/department> will do <activity>
Risk 2	4	5	20	<person/position/department> will do <activity>

If practical and allowed by regulations, test or track the effectiveness of marketing methods/campaigns. While marketing materials follow industry best practices, this alone does not guarantee their effectiveness. Testing the effectiveness of marketing materials and campaigns will help Idaho Power spend its finite marketing dollars on the most effective means of outreach. If possible, Idaho Power should consider setting up a way to test or at least track the effectiveness of various marketing approaches. There are several methods for collecting this information (ordered here in terms of least to most effort/cost to implement, and least to most reliability):

- Use surveys to ask participants where they first heard of the program
- Ask about information sources on the application forms
- Put "coupon codes" on marketing materials that customers can enter on applications to get a slightly better incentive or a small bonus. These codes should be unique to each marketing channel or campaign so that applications can be easily associated with each type of outreach.

- Set up randomized experiments where some customers receive one type of marketing and other customers receive another type. This approach could leverage a coupon code or similar means of linking applications back to specific marketing approaches.

Monitor market transformation towards adoption of efficient technologies as standard practice. This will help Idaho Power prioritize which measures to incentivize and at what level.

6.2 Program-specific recommendations

Add content to the program manual. The program manual would benefit from the following additional content:

- Include a table at the beginning or end that lists the revision history of the document.
- Add graphics that show a program logic model, organizational chart, and the process flow. The organizational chart should include a box for the trade ally network.
- Include a risk register
- Include a table that lists program measures and incentives

Use more pictures of smiling people in marketing materials and consider occasionally using a graphic other than the house graphic. These changes will help attract attention to the materials.

Fix strange characters and add visual and video content to website. This content will make the website more appealing and better leverage some of the capabilities of the medium.

Provide space on the application worksheet to indicate type of house: single-family, duplex, fourplex. This piece of information affects the energy savings attributable to the measure, and without a record of it, evaluators cannot verify claimed savings.

Add "primary" in front of "heat source" on the application form. This will help customers know what Idaho Power wants as an answer to that question.

Add primary cooling source to the heat pump installation worksheets. The RTF savings are based on a combination of primary existing heating and cooling systems; this will help Idaho Power select the most accurate savings for each home.

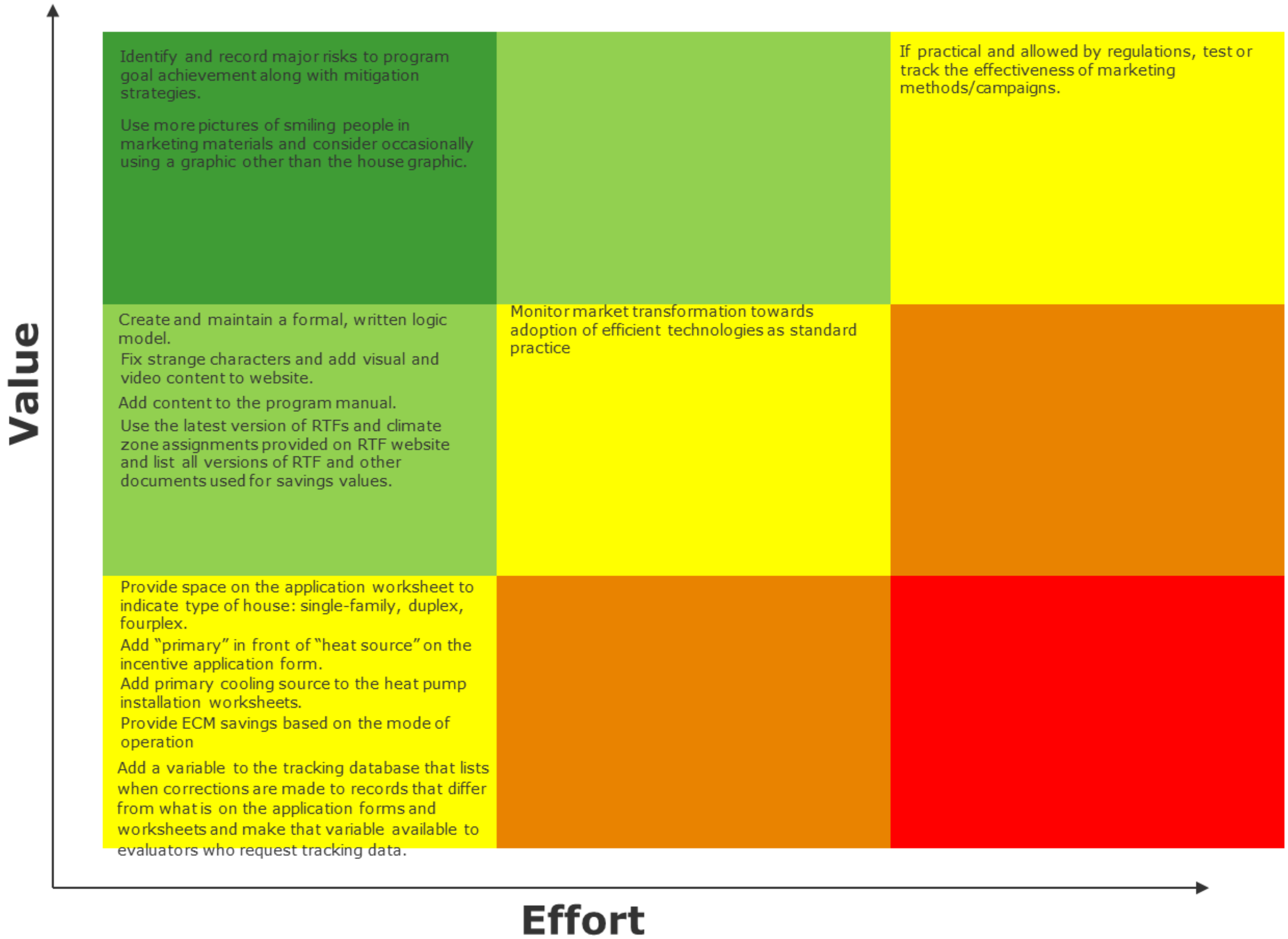
Use the latest version of RTFs and climate zone assignments provided on the RTF website and list all versions of RTF and other documents used for savings values. This will keep program savings up to date with the latest available information from RTF, and it will facilitate future evaluations by making it easier for evaluators to find the references used by the program.

For the ECM measure, report savings based on the mode of operation. Idaho Power collects information and calculates savings for both heating/cooling and continuous operation modes. Thus, a more precise savings estimate is available for no additional work.

If not already present, add a variable to the tracking database that lists when corrections are made to records that differ from what is on the application forms and worksheets and make that variable available to evaluators who request tracking data. This will reduce evaluation risk and help evaluators know when to use data other than what is on the application and worksheets to verify savings.

DNV GL ranked these recommendations according to an estimate of the effort required to undertake them and the value that Idaho Power will derive from them (Figure 5).

Figure 5. Recommendation value * effort map



APPENDIX A. PROGRAM SPECIALIST INTERVIEW GUIDE

Idaho Power PM Interview Guide

1 GOALS OF INTERVIEW

Program	Info to support impact eval	Program design	Program implementation	Program admin and oversight
C&I		✓	✓	✓
Res Heating and Cooling	✓	✓	✓	✓
Res Home Audits	✓			

Program	
Interviewee	
Interviewer	
Completion Date	
Interview Length	

This interview guide is a guide rather than a script. It is intended to remind the interviewer of the topics to cover and provide a guideline for the flow of the interview. It is not a script. The interview guide assumes that the interviewer will be familiar with how similar programs are implemented in the industry and how Idaho Power specifically implements its programs. Furthermore, the interviewer is expected to be an experienced interviewer who knows when and how to ask follow up questions and probe, even if those specific probes are not listed on the interview guide. Thus, the expectation is that the interview will proceed as a conversation and go where the conversation leads, within the bounds of the interviewer covering the topics needed as listed in this guide.

Idaho Power Residential Home Energy Audit Impact Evaluation

1 EXECUTIVE SUMMARY

This report presents findings and recommendations for Idaho Power's Home Energy Audit program, based on the impact evaluation of the program that DNV GL conducted for the 2016 program year. The Home Energy Audit program provides a third-party in-home energy evaluation along with direct installs of efficient light bulbs, high-efficiency showerheads, and pipe insulation.

DNV GL's objectives in the impact evaluation were to determine and verify the energy (kWh) impacts attributable to the 2016 program, provide credible and reliable ex-post realization rates, and offer recommendations to enhance the effectiveness of future ex-ante savings analysis and the accuracy and transparency of program savings. To meet these objectives, DNV GL conducted interviews with program staff, reviewed the tracking system, and reviewed savings algorithms.

1.1 Findings

After reviewing the calculations for all the direct install measures in the Home Energy Audit program, DNV GL confirmed that all the energy savings formulas in the tracking database were calculated accurately. The ex-post savings value for the showerhead and lighting measures use the same deemed per-unit savings used for the ex-ante savings value. However, we have concluded that the deemed savings value used for pipe insulation was too high.

DNV GL computes an overall realization rate for the program of 98%. Lighting and showerheads both had realization rates of 100%; pipe insulation had a realization rate of 87%. The reason for this difference is that DNV GL used the most recently available AEG potential study for the savings attributable to the pipe insulation measure, as described in Section 4.2.

1.2 Recommendations

Use the most recent (AEG 2016) available savings estimate for pipe insulation. This will bring Idaho Power savings estimates more in line with industry standards.

Consider claiming non-energy benefits for pipe insulation and showerheads in homes with gas water heaters. Based on the tracking data, it appears that the program is providing installation of measures in homes with gas water heaters, but is not claiming savings for those measures. These savings are an additional benefit to Idaho Power's customers that the program is currently not getting any credit for.

2 PROGRAM OVERVIEW

The Home Energy Audit program is an in-home energy evaluation conducted by a third-party certified home performance specialist (HPS). The audit includes a visual inspection of the crawl space and attic, a health and safety inspection, and a blower door test. Once it is complete, the customer is supplied with a hard copy or password-protected electronic copy of the HPS's findings and specific recommendations for improving the efficiency, comfort, and health of the home.

In addition to the evaluation, the Home Energy Audit program directly installs some energy-saving improvements (as appropriate) at no additional cost to the customer, including: 1) up to 20 efficient light bulbs (CFLs and LEDs), 2) one high-efficiency showerhead, and 3) pipe insulation from the water heater to the home wall (approximately 3 feet). The program claims savings only from these direct install measures. The program includes a QA/QC follow-up check on a random sample of 5% of homes. These visits have not recently revealed any serious or recurring problems.

To qualify for the Home Energy Audit program, a participant must live in Idaho, and must be the Idaho Power customer of record for a home. The home must be an existing site built home; until 2016, the home also had to be all-electric (but that requirement is no longer in place). Renters may participate with prior written permission from their landlord. Single family homes, duplexes, triplexes, and fourplexes qualify, though multifamily homes must have discrete heating units and meters for each unit.

Participating customers pay $99 (all-electric homes) or $149 (homes using gas, propane or other fuel sources) for the audit and installation of the direct install measures, with the remaining cost covered by the Home Energy Audit program.

2.1 Evaluation overview

DNV GL conducted an impact evaluation. The key objectives included:

- Determine and verify the energy (kWh) impacts attributable to the 2016 program
- Provide credible and reliable ex-post realization rates
- Provide recommendations to enhance the effectiveness of future ex-ante savings analysis and the accuracy and transparency of program savings

To achieve these objectives, DNV GL carried out the following activities:

- Semi-structured interviews with program staff
- Tracking system review
- Review of savings algorithms

DNV GL did not conduct a process evaluation for this program, as it was outside the scope of work for this project.

2.2 Layout of report

The remainder of the report is organized into the following sections:

- Section 3. Methods – describes the evaluation activities in detail

- Section 0. Impact findings – reports the findings relevant to verification of program savings
- Section 5. Conclusions and recommendations – Lays out the key findings and provides recommendations for program improvement

3 METHODS

This section provides detailed descriptions of the methods DNV GL used to evaluate the program.

3.1 Program staff interviews

To understand program history, program delivery, program logic and objectives, perceived program strengths and weaknesses, and what the program staff wants or needs from the evaluation, DNV GL conducted in-depth interviews with Idaho Power staff. These interviews were done in person, and lasted about an hour. The instruments DNV GL developed to guide the interviews are presented in Appendix A. These interviews also helped us craft a data request and determine to conduct impact analysis on the three direct install measures: lighting, showerheads, and pipe insulation.

3.2 Review of ex-ante savings and savings algorithms

DNV GL assessed the program's tracking database, its fields, and the accuracy of the data. DNV GL primarily assessed the accuracy of the program database and savings algorithms. DNV GL reviewed the savings algorithms used by Idaho Power to ensure that the savings claimed for each measure are accurate and appropriate. Specifically, we reviewed each measure to confirm the following:

1. All calculations are consistent with the requirements of the Regional Technical Forum (RTF)
2. Program assumptions about deemed savings levels were reasonable
3. Standard engineering practices were followed

DNV GL recalculated energy savings for all the measures using the applicable savings algorithms as a check to verify that the equations were properly documented and to quantify the impact of changes in input assumptions.

The requirement for any sampling of tracking database records was that the sample should achieve a 10% relative error, with 90% confidence (referred to as "90/10") or better. For this program, all the information about each project was included in the tracking system – there was no additional information included in any backup paper files to request. As a result, we checked the completeness, consistency, and accuracy of savings calculations based on the contents of every record in the database, referred to as a census, so no sampling was needed. Because we used a census, there is no sampling error, which means that this analysis satisfies the need for 90/10 or better, in this case, better.

To provide advice on a suitable deemed savings value for pipe insulation, DNV GL reviewed the 2012, 2014, and 2016 AEG potential studies, information available from the Department of Energy, ASHRAE 90.1, and the calculations in numerous publicly available TRMs, including Mid-Atlantic, Massachusetts, Vermont, Indiana, New York, Ohio, Pennsylvania, Maine, Minnesota, Missouri, Connecticut, Iowa, and Arkansas.

4 IMPACT FINDINGS

4.1 Verified savings

DNV GL reviewed the calculations for all the direct install measures in the Home Energy Audit program: lighting, showerheads, and pipe insulation. The tracking database rigorously documents assumptions as well as reasons why specific savings values were chosen. We confirmed that all the energy savings formulas in the tracking database were calculated accurately.

1. *Realization rates for lighting and showerheads are 100%. DNV GL find no calculation issues with these measures.*
2. *Realization rates for pipe insulation are 87%. The program used a deemed savings of 150 kWh/year for three feet of pipe insulation, while the latest AEG potential study has a value of 131 kWh/year.*

The ex-post savings value for the showerhead and lighting measures use the same deemed per-unit savings used for the ex-ante savings value. However, we have concluded that the deemed savings value used for pipe insulation was too high. Table 1 provides the program ex-post savings summary.

Table 1. Impact evaluation savings summary

Measures	Ex-ante savings	Ex-post savings	Realization rate
Lighting	150,523	150,523	100%
Showerheads	20,726	20,726	100%
Pipe insulation	36,000	31,399	87%
Total	207,249	202,648	98%

4.2 Review of savings algorithms

The program used RTF deemed savings for lighting and showerheads and an AEG potential study for pipe insulation. The deemed savings values for lighting and showerhead measures match the savings values listed in the RTF. DNV GL verified that the calculated savings for lighting and showerhead deemed measures used the correct calculation approach, and that inputs to the algorithm were present and in the right units.[1]

For pipe insulation, DNV GL was unable to match the savings value used for savings in the tracking database from the 2012, 2014, and 2016 AEG potential studies. While there was some degree of variation in the TRMs, the most common approach was based on the formula derived from ASHRAE 90.1 Fundamentals.

Using the ASHRAE approach with reasonable assumptions[2], DNV GL concluded that the value of 130.83 kwh/year reported in the 2016 AEG potential study is a justifiable deemed savings value for pipe insulation. That value is close to what would be derived through applying the assumed values to the complex ASHRAE formula, and close to the average savings numbers one could compute based on information from the Department of Energy.

[1] In accordance with the project scope, DNV GL did *not* review how RTF derived its deemed savings, under the assumption that those results are already fully validated.

[2] 3 feet of pipe insulation, ½ inch insulation thickness with an insulating value of R-3, ½ inch diameter copper pipe, and ΔT of 65 degrees Fahrenheit

5 CONCLUSIONS AND RECOMMENDATIONS

DNV GL computes an overall realization rate for the program of 98%. Lighting and showerheads both had realization rates of 100%; pipe insulation had a realization rate of 87%. The reason for this difference is that DNV GL used the most recently available AEG potential study for the savings attributable to the pipe insulation measure, as described in Section 4.2.

Overall, the tracking database for the Home Energy Audit program is well-organized and the details about assumptions and sources is well-documented.

5.1 Recommendations

Use the most recent (AEG 2016) available savings estimate for pipe insulation. This will bring Idaho Power savings estimates more in line with industry standards.

Consider claiming non-energy benefits for pipe insulation and showerheads in homes with gas water heaters. Based on the tracking data, it appears that the program is providing installation of measures in homes with gas water heaters, but is not claiming savings for those measures. These savings are an additional benefit to Idaho Power's customers that the program is currently not getting any credit for.

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OTHER REPORTS

Table 5. 2017 Other Reports

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2017 Flex Peak Program End-of-Season Annual Report	C/I	Idaho Power	Idaho Power	Impact evaluation
2017 Irrigation Peak Rewards Program Report	Irrigation	Idaho Power	Idaho Power	Impact evaluation
A/C Cool Credit 2017 Demand Response Analysis	Residential	Idaho Power	Idaho Power	Analysis
Idaho Power Energy Wise™ Program Summary Report 2016–2017	Residential/ Educational Distributions	RAP	Idaho Power	Year-end report

2017 Flex Peak Program
End-of-Season Annual Report

November 3, 2017

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Introduction

The Flex Peak Program ("Program") has been operated by Idaho Power Company ("Idaho Power" or "Company") since 2015. The Program is a voluntary demand response ("DR") program available to large commercial and industrial customers that can reduce their electrical energy loads for short periods during summer peak days. By reducing demand on extreme system load days, the Program reduces the amount of generation and transmission resources required to serve customers. This Program, along with Idaho Power's other DR programs, Irrigation Peak Rewards and the Residential Air Conditioner Cycling Program, have helped delay the need to build supply-side resources.

The results presented in this report are from the 2017 Program season, the Company's third year of operating the Program. In its third year, the Program maintained similar load reduction and realization rates as the prior year (2016). There were five new sites added and overall participation resulted in the highest hourly load reduction for the season of 36 megawatts ("MW"). The average realization rate for the three load reduction events that occurred in the 2017 Program season was 81 percent. Enrollment in the Program increased for the 2017 Program season and 99.3 percent of previously participating sites re-enrolled in the Program. The total Program costs through October 1, 2017, were $635,453. The cost of having this resource available was $17.65 per kilowatt ("kW") based on the maximum demand reduction of 36 MW achieved on June 26, 2017.

Background

In 2015, the Company requested approval to implement the Flex Peak Program as an Idaho Power operated program. The Idaho Public Utilities Commission ("IPUC") approved the Company's request in Order No. 33292, and the Public Utility Commission of Oregon ("OPUC") accepted the proposal from Advice No. 15-03. Prior to 2015, a similar DR program for commercial and industrial customers was operated by a third-party vendor.

As part of Advice No. 15-03, the OPUC adopted Staff's recommendation that the Company file an annual end-of-season report with information regarding the Program. The Company was also directed by the IPUC in Order No. 33292 to file an annual end-of-season report detailing the results of the Program. In compliance with the reporting requirements, the annual end-of-season report includes the following:

- Number of participating customers
- Number of participating sites
- MW of demand response under contract
- MW of demand response realized and incented per dispatch
- Percent of nominated MW achieved in each dispatch event by participant
- Cost analysis of the Program
- Number of events called
- Total load dropped for each event
- Event duration
- Total capacity payments made

- Total energy payments made
- Number of customers who failed to meet their load
- Number of Program applications denied due to Program subscription limit
- Benefits identified with each dispatch of the resource
- Assessment of whether the trigger or dispatch price is properly set to utilize the asset most often
- Participant attrition
- Issues the utility has identified meeting requests to participate in the Program
- Changes in baseline methodology taken or anticipated
- Improvements Idaho Power and the Program might benefit from

Program Details

The Program pays participants a financial incentive for reducing load within their facility and is active June 15 to August 15, between the hours of 2 p.m. and 8 p.m. on non-holiday weekdays.

Customers with the ability to nominate or provide load reduction of at least 20 kW are eligible to enroll in the Program. The 20 kW threshold allows a broad range of customers the ability to participate in the Program. Participants receive notification of a load reduction event ("event") two hours prior to the start of the event, and events last between two to four hours.

The parameters of the Program are in Schedule 76[1] in Oregon and Schedule 82[2] in Idaho, and include the following:

- A minimum of three load reduction events will occur each Program season.

- Events can occur any weekday, excluding July 4, between the hours of 2 p.m. and 8 p.m.

- Events can occur up to four hours per day and up to 15 hours per week, but no more than 60 hours per program season.

- Idaho Power will provide notification to participants two hours prior to the initiation of an event.

- If prior notice of a load reduction event has been sent, Idaho Power can choose to cancel the event and notify participants of cancellation 30 minutes prior to the start of the event.

[1] Idaho Power Company, P.U.C. ORE. No. E-27, Schedule 76

[2] Idaho Power Company, I.P.U.C. No. 29, Tariff No. 101, Schedule 82

Program Incentives

The Program includes both a fixed and variable incentive payment. The fixed incentive is calculated by multiplying the actual kW reduction by $3.25 for weeks when an event is called or the weekly nominated kW amount by $3.25 for weeks when an event is not called. The variable energy incentive is calculated by multiplying the kW reduction by the event duration hours to achieve the total kilowatt-hour (“kWh”) reduction during an event. The variable incentive payment is $0.16 per kWh and is implemented for events that occur after the first three events.

The Program also includes an incentive adjustment of $2.00 when participants do not achieve their nominated amount during load reduction events. This adjustment amount is used for the first three events. After the third event, the adjustment is reduced to $0.25 per kW. Incentives are calculated using Idaho Power’s interval metering billing data and participants received the incentive checks within 30 days of the end of the Program season. Participants were mailed their incentive checks or had their Idaho Power account credited by September 15 in 2017. The incentive structure offered for the 2017 season is listed in Table 1.

Table 1.

Fixed-Capacity Payment Rate*	Variable Energy Payment Rate**
$3.25 per Weekly Effective kW Reduction	$0.16 per kWh (Actual kW x Hours of Event)
Adjustment for first three events	**Adjustment after first three events**
$2.00 per kW not achieved up to nomination	$0.25 per kW not achieved up to nomination

*To be prorated for partial weeks

**Does not apply to first three Program events

Program Results

The results presented throughout this report are at the generation level and system losses have been considered. Idaho Power called three load reduction events in 2017. The first event occurred on June 26, the second on July 14, and the third on August 2. The maximum realization rate during the season was 98 percent and the average for all three events combined was 81 percent. The realization rate is the percentage of load reduction achieved versus the amount of load reduction committed for an event. The highest hourly load reduction achieved was during the June 26 event at 36 MW.

Participants had a committed load reduction of 35.1 MW in the first week of the Program. This weekly commitment, or “nomination”, was comprised of 65 customers participating in the Program totaling 141 sites. Out of the total number of sites, 136 sites participated in the 2016 season, and five sites were newly added in 2017. The committed load reduction at the end of the season was 35.8 MW and was the peak committed load reduction for the season.

The first event was called on Monday, June 26. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 35.1 MW. The average load reduction was 34.4 MW. The highest hourly load reduction was 36 MW during hour three. The realization rate for this event was 98 percent.

The second event was called on Friday, July 14. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 35.4 MW. The average load reduction was 26.4 MW. The highest hourly load reduction was 28.4 MW during hour one. The realization rate for this event was 75 percent. The lower realization rate for this event was primarily due to some larger sites that ran reduced shifts on Fridays as well as a lower participation overall due to the timing with the weekend.

The third event was called on Wednesday, August 2. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 35.8 MW. The average load reduction was 25.1 MW. The highest hourly load reduction was 25.5 MW during hour two. The realization rate for this event was 70 percent. The lower realization rate for this event was primarily due to some larger sites that underperformed or had reduced participation due to operational needs of the sites and one larger customer with seven sites that did not participate at all due to operational constraints for this specific customer.

Participation

The number of sites enrolled in the Program for 2017 was 141 from 65 customers, with five new sites enrolling for the Program season. The average number of sites enrolled per participating customer was 2.2. The Program did not experience significant attrition and re-enrollment in the Program was high as 136 of the 137 sites participating from the prior season re-enrolled. One site did not re-enroll from the 2016 season because the site believed the Program would not fit its business operations for the 2017 season due to major renovation at the site location and an expansion of their business which would greatly affect their summertime operation.

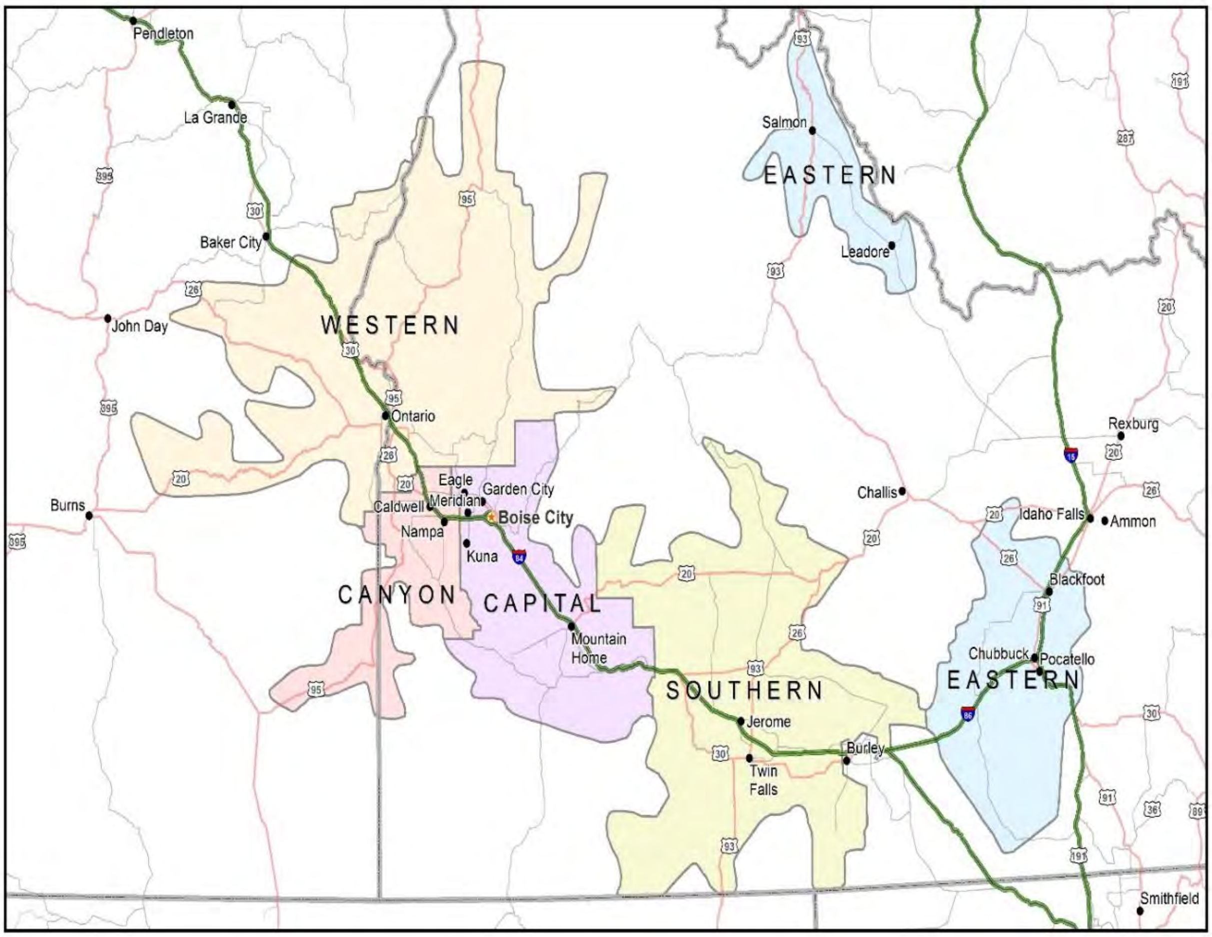
In response to Program participant requests, Idaho Power utilized a new auto-enrollment option for the 2017 season. Existing participants were re-enrolled in the Program automatically and mailed a confirmation packet based on the prior year's enrollment information. Participants notified the Company in writing if they no longer wanted to participate. This new auto-enrollment implementation was successful and many customers voiced positive feedback regarding the change.

While Idaho Power did not actively market the Program, the Company has continued to strive to increase the number and size diversity (in terms of nominated load reduction) of sites enrolled. Since the effort was placed on recruiting more diversity in the Program, the number of sites ranging from 50-200 kW has grown substantially the last two seasons from 32 in 2015 to 69 in 2017.

Pursuant to the Settlement Agreement approved in IPUC Case No. IPC-E-13-14[3] and OPUC UM 1653[4] ("Settlement"), Idaho Power did not actively market the Program prior to the 2017 season as enrolled capacity was maintained at approximately 35 MW, which was the amount agreed upon in the 2013 Settlement. The Company did not deny any Program applications in 2017.

Figure 1 represents Idaho Power's service area divided into five regional areas: Western, Canyon, Capital, Southern, and Eastern.

Figure 1.



[3] In the Matter of the Continuation of Idaho Power Company's A/C Cool Credit, Irrigation Peak Rewards, and FlexPeak Demand Response Programs for 2014 and Beyond, Case No. IPC-E-13-14, Order No. 32923.

[4] In the Matter of Idaho Power Company, Staff Evaluation of the Demand Response Programs, UM 1653, Order No. 13-482.

Figure 2 represents the enrolled capacity (total nominations) that were enrolled in 2017 and the distribution by Idaho Power's regional service areas.

Figure 2.

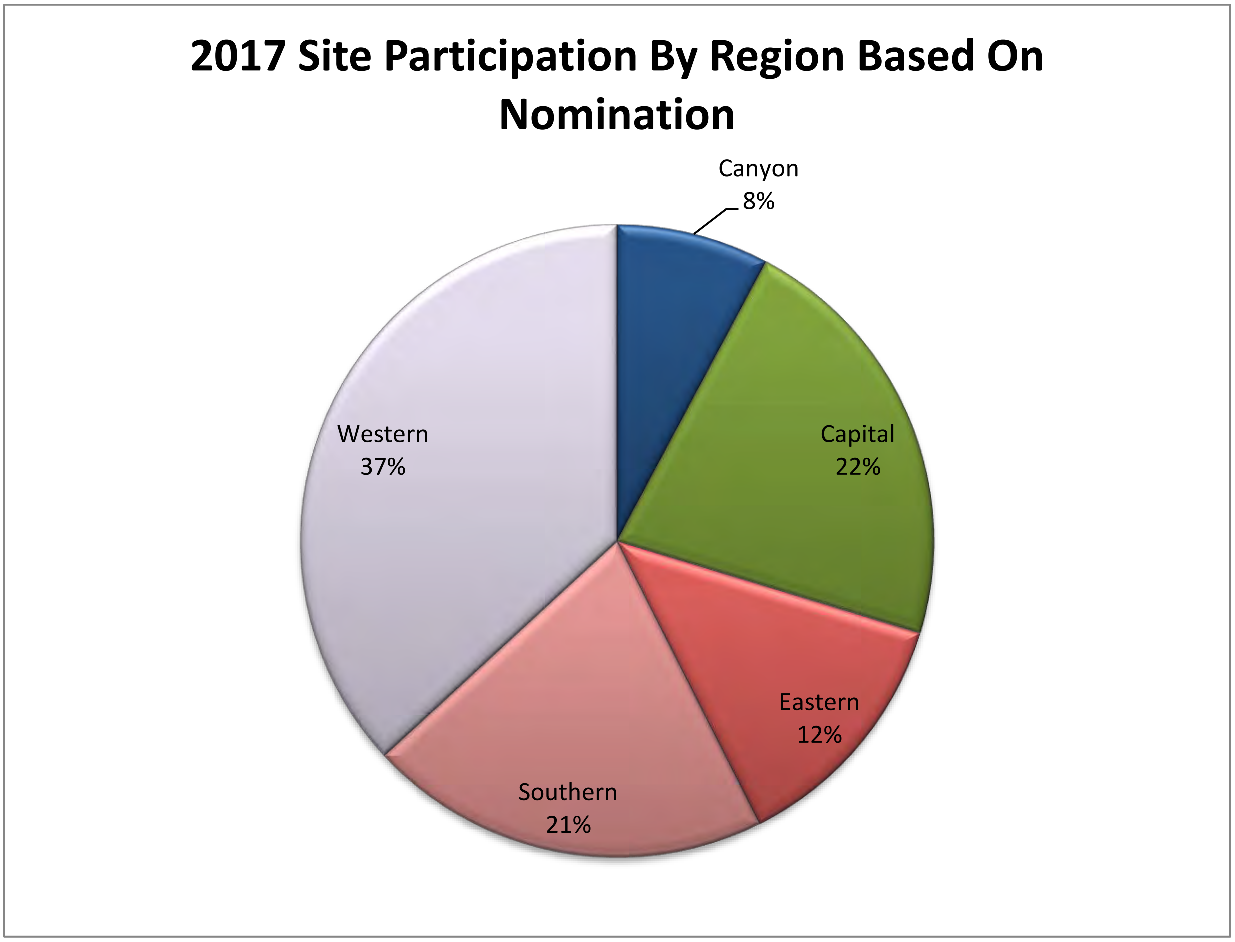
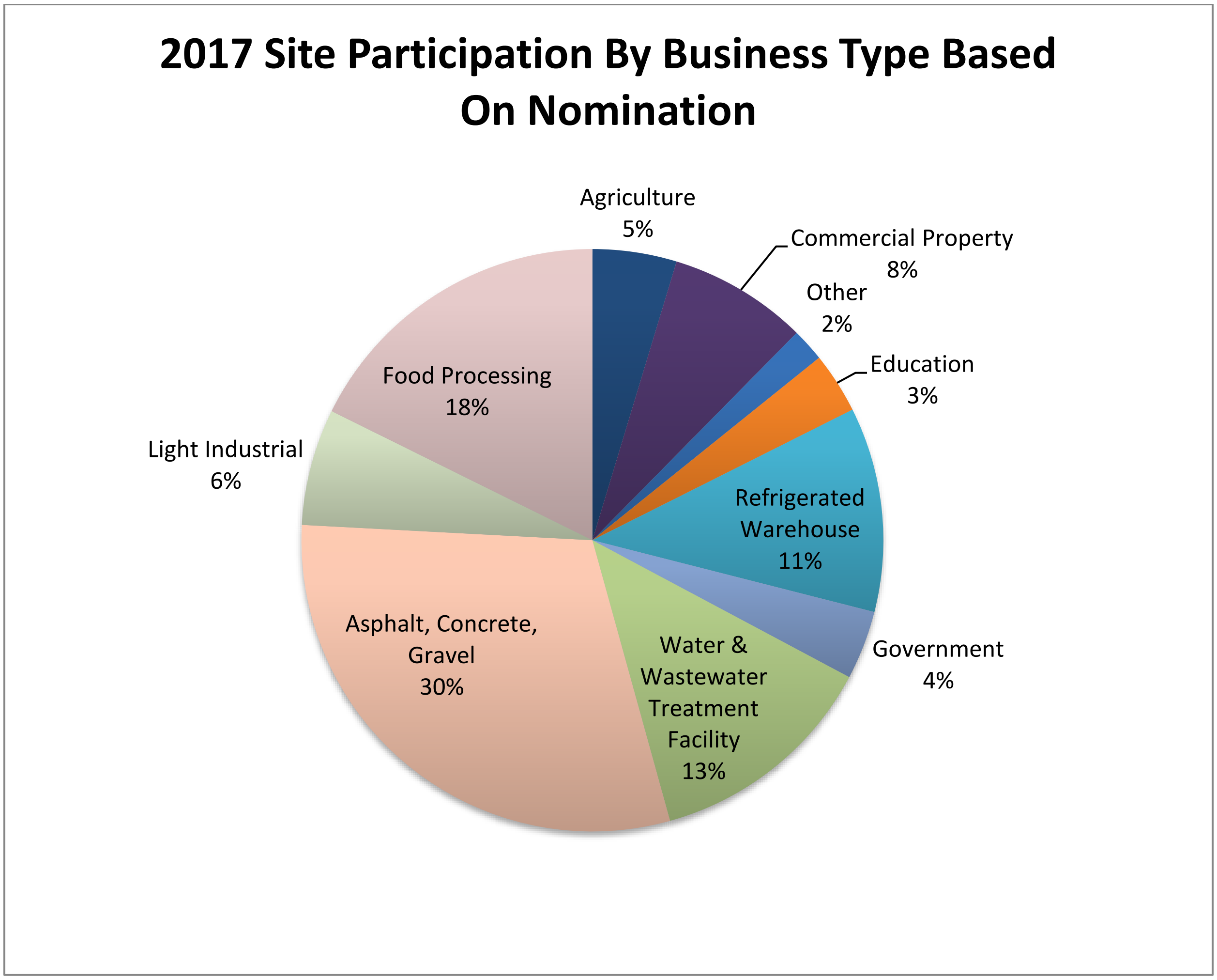


Figure 3 represents the enrolled capacity in 2017 and the diversity based on business type.

Figure 3.



Operations

Interval metering data provides Idaho Power the ability to view all participants' load after events. This metering data was used to calculate the reduction achieved per site during load reduction events. Using this data, Idaho Power provided participants post-event usage reports that showed hourly baseline, actual usage, and reduction during an event. The data assisted participants in refining their nomination for future events. This data also provides information useful in determining which participating sites may have opportunity to provide more reduction or change their reduction strategy if nomination amounts were not achieved.

Load Reduction Analysis

An evaluation of the potential load reduction impacts in 2017 were conducted internally by Idaho Power. The goal of the review performed by Idaho Power was to calculate the load reduction in MW for the Program. The analysis also verified load reduction per site and per event.

The baseline methodology used in 2017 is the same methodology utilized in prior seasons. The baseline that load reductions are measured against during load reduction events is calculated using a 10-day period. The baseline is the average kW of the highest energy usage days during the event availability time (2-8 p.m.) from the highest three days out of the last 10 non-event weekdays. Individual baselines are calculated for each facility site. Once the original baseline is calculated, there is an adjustment included in the methodology called the Day-of-Adjustment ("DOA") that is used to arrive at the adjusted baseline.

Adjustments address situations where load is lower or higher than it has historically been and the baseline does not accurately reflect the load behavior immediately prior to the event. The DOA is applied to each site's original baseline by accounting for the difference between the average baseline kW and the average curtailment day kW during hours 2-3 prior to the start of the event. The DOA is calculated as a flat kW and is applied to all baseline hours and capped at +/- 20 percent of the original baseline kW. The DOA is symmetrical, having either an upward or downward adjustment to the baseline, and is applied to the original baseline kW for each facility site for each hour during the Program event. The Company does not expect or anticipate any changes to the baseline methodology for the upcoming season.

As Figure 4 below depicts, the most commonly nominated load reduction was in the 0-50 kW range, accounting for approximately 40 percent of the sites.

Figure 4.

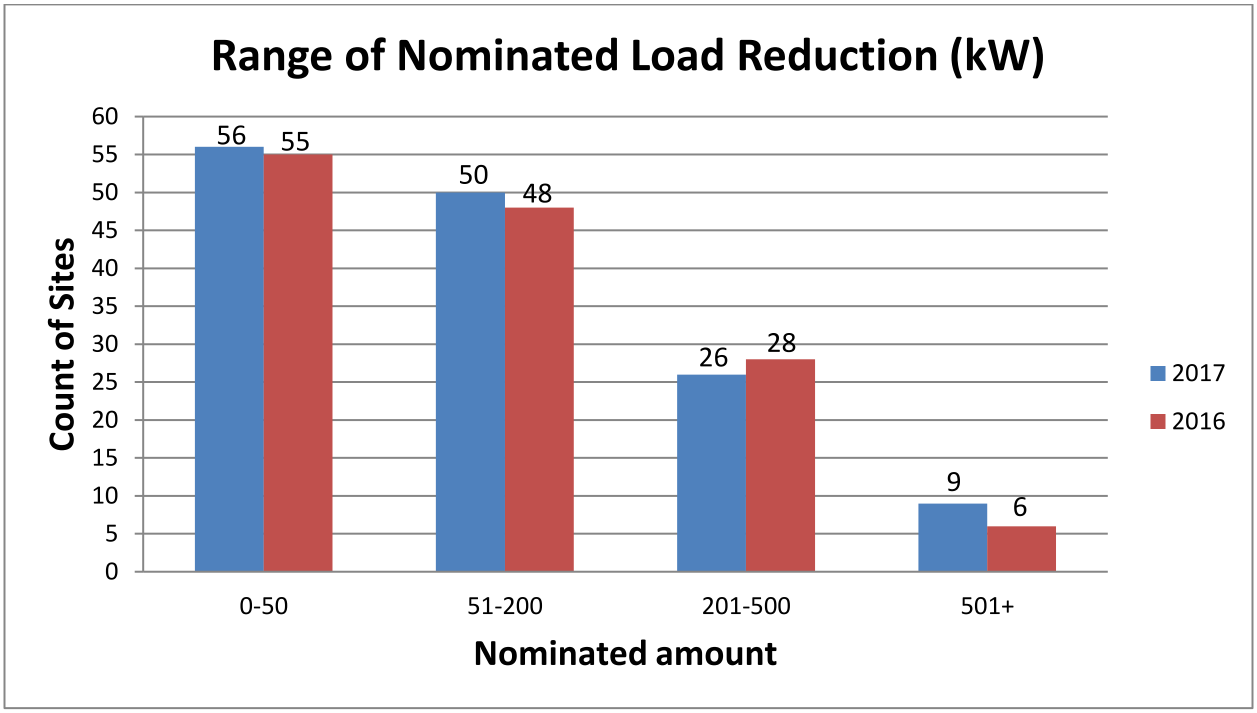


Table 2 shows the Program realization rates for 2017 based on average load reduction per event.

Table 2.

Curtailment Event	Event Timeframe	Nominated Demand Reduction	Average Demand Reduction (MW)	Max Demand Reduction (MW)	Realization Rate*
June 26	4-8 pm	35.1	34.4	36	98%
July 14	4-8 pm	35.4	26.4	28.4	75%
August 2	4-8 pm	35.8	25.1	25.5	70%
Average		35.4	28.6	30	81%

** Based on average reduction*

Figure 5 below shows both the average and peak demand reduction achieved during each of the three curtailment events. The maximum demand reduction achieved ranged from a low of 25.5 MW for the August 2 event to a high of 36 MW for the June 26 event. The August 2 event's 25.5 MW reduction achieved a realization rate of 70 percent, while the June 26 event's 36 MW reduction achieved a realization rate of 98 percent. Combined, the three events had an average realization rate of 81 percent.

The realization rate analysis shows that maximum load reduction was achieved in the first third of the Program season during the first event, which correlates with Idaho Power's overall summer system peak of late June/early July.

Figure 5.

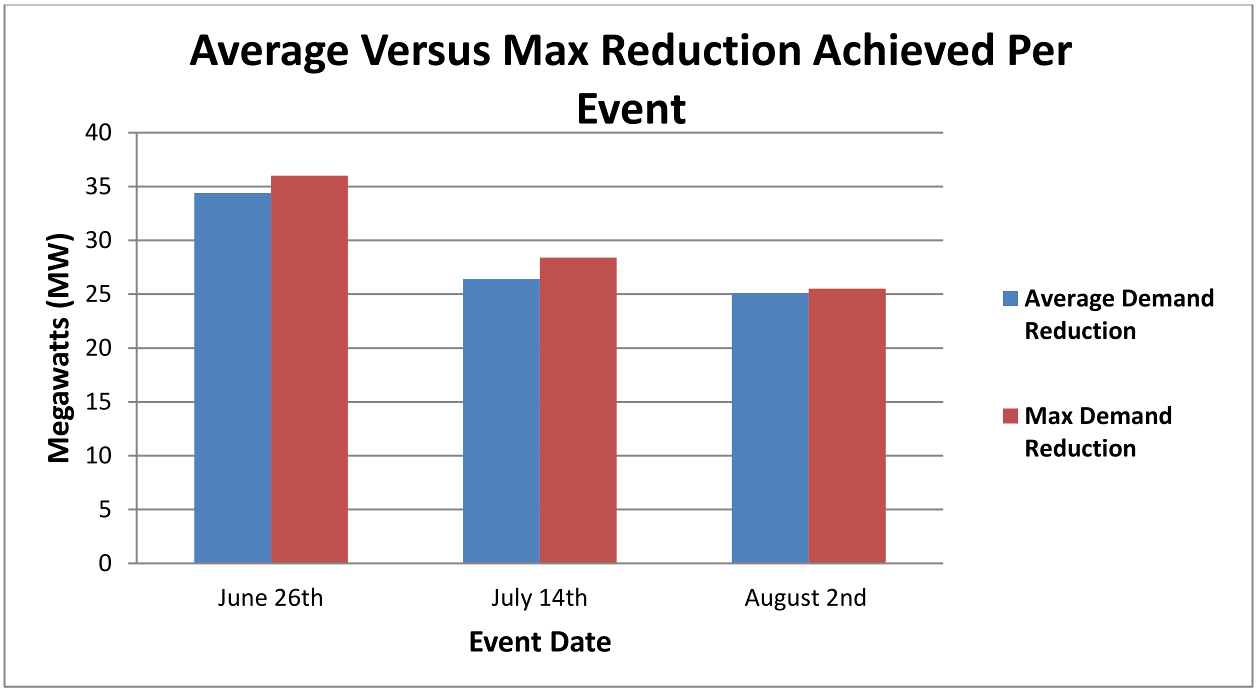


Table 3 shows the realization rate for each participant in the Program for 2017.

Table 3.

Participant Number	June 26 Event Realization	July 14 Event Realization	August 2 Event Realization	Season Realization
1	106%	34%	71%	71%
2	66%	76%	80%	74%
3	113%	26%	29%	56%
4	56%	90%	101%	82%
5	70%	39%	24%	45%
6	46%	88%	77%	70%
7	141%	143%	118%	134%
8	215%	126%	147%	163%
9	2%	84%	139%	75%
10	1%	4%	20%	9%
11	46%	48%	54%	50%
12	64%	51%	53%	56%
13	97%	63%	2%	54%
14	44%	97%	117%	86%
15	27%	3%	30%	20%
16	0%	49%	35%	28%
17	131%	41%	42%	71%
18	26%	79%	113%	73%
19	179%	143%	154%	159%
20	179%	121%	148%	149%
21	61%	113%	40%	71%
22	154%	104%	15%	91%

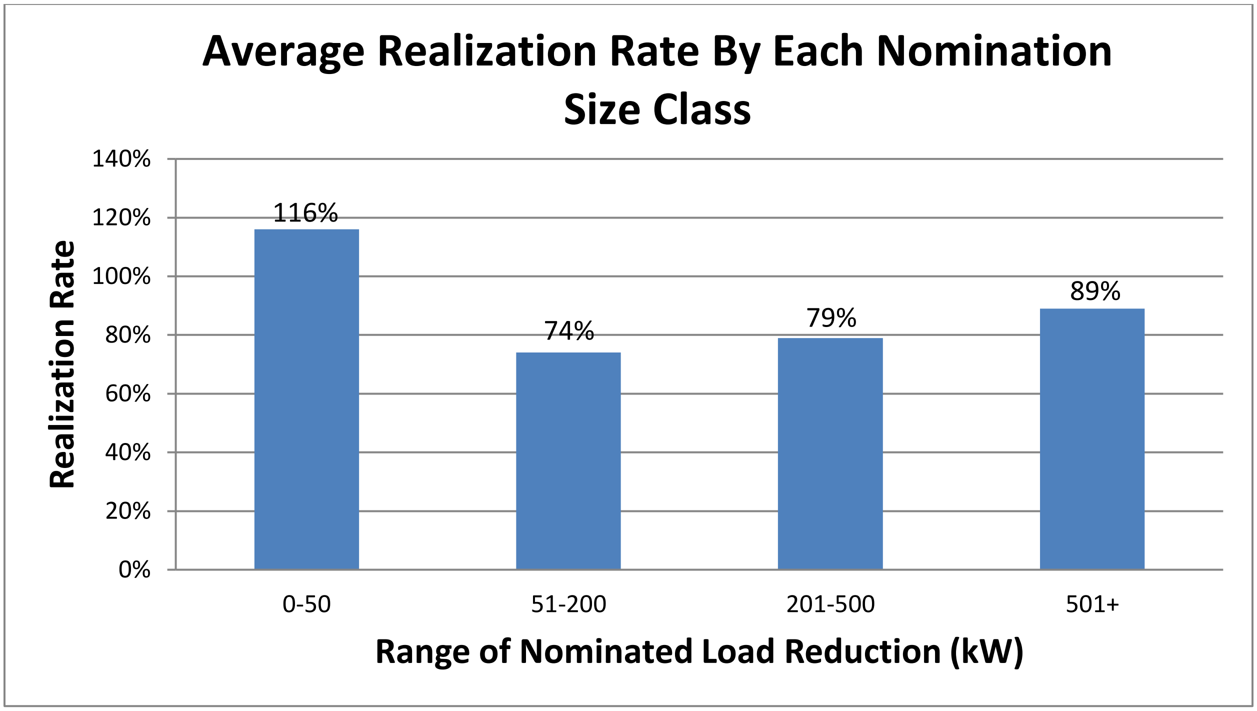
23	15%	63%	0%	26%
24	2%	4%	10%	5%
25	17%	40%	192%	83%
26	195%	0%	89%	95%
27	24%	43%	114%	60%
28	109%	40%	28%	59%
29	140%	113%	135%	129%
30	187%	98%	41%	109%
31	56%	5%	16%	25%
32	147%	140%	123%	137%
33	209%	7%	193%	136%
34	154%	122%	123%	133%
35	76%	112%	115%	101%
36	489%	0%	0%	163%
37	1%	92%	11%	35%
38	97%	67%	82%	82%
39	172%	186%	61%	140%
40	152%	71%	90%	104%
41	2%	0%	15%	6%
42	154%	0%	0%	51%
43	113%	71%	22%	69%
44	58%	7%	88%	51%
45	167%	173%	186%	175%
46	11%	26%	44%	27%
47	273%	125%	131%	176%

48	770%	0%	0%	257%
49	65%	53%	9%	42%
50	24%	20%	29%	24%
51	65%	0%	25%	30%
52	76%	79%	30%	62%
53	102%	82%	89%	91%
54	4%	199%	67%	90%
55	82%	126%	97%	101%
56	163%	14%	0%	59%
57	137%	29%	129%	98%
58	77%	67%	15%	53%
59	94%	91%	101%	96%
60	66%	82%	79%	76%
61	247%	83%	116%	148%
62	76%	19%	0%	32%
63	80%	44%	18%	47%
64	69%	94%	83%	82%
65	72%	70%	2%	48%

Broken out across four size classes, the sites with the smallest nominated load reduction, 0–50 kW, achieved the highest average realization rate across the three events at 116 percent. The 0-50 kW group had the largest portion of sites enrolled in the Program, totaling 56 sites that accounted for 40 percent of total enrolled sites. The second smallest size class, 51–200 kW, had 50 sites enrolled and achieved the lowest average realization rate at 74 percent. The 201-500 kW group had 26 sites enrolled and achieved a realization rate of 79 percent. The largest size class, 501+ kW, had nine sites enrolled and achieved a realization rate of 89 percent. Idaho Power will continue to work with all customer segments to help refine nominations to align closer with realistic reduction opportunities which will increase the overall program realization rate.

Figure 6 below represents the realization rate achieved by each nomination group, averaged across all three events. To calculate the results, each site's average load reduction (across three events) was divided by its average nomination across the three events and then grouped by size.

Figure 6.



Program Costs

Program costs totaled $635,453 through October 1, 2017. Incentive payments were the largest expenditure comprising approximately 89 percent of total costs. The incentive payments were fixed-capacity payments resulting from the three events called during the 2017 Program season. The fixed capacity payments total was $564,954 and the variable energy payments total was $0. Variable energy payments were not made during the season because the variable energy payment is implemented starting with the fourth event. Preliminarily, the total Program costs for 2017 are estimated to be $17.65 per kW based on the maximum demand reduction of 36 MW, or $22.22 per kW, based on average load reduction for the season of 28.6 MW.

Table 4 below displays the 2017 year-to-date ("YTD") Program costs by expense category.

Table 4.

Expense Category	2017 YTD Program Costs
Materials & Equipment	$785
Contract Services	$11,018
Marketing & Administration	$58,696
Incentive payments	$564,954
Total	**$635,453**

Benefit-Cost Analysis

The Benefit-Cost analysis for the Program is based on a 20-year model that uses financial and demand-side management alternate cost assumptions from the *2015 Integrated Resource Plan* ("IRP"). The Settlement, as approved in IPUC Order No. 32923 and OPUC Order No.13-482, established a new method for valuing DR and defined the annual cost of operating Idaho Power's three DR programs for the maximum allowable 60 hours as no more than $16.7 million. This amount was reevaluated in the 2015 IRP, as agreed upon in the Settlement, to be $18.5 million.

In 2017, the preliminary cost estimate of operating all three of Idaho Power's DR programs was $8.5 million through October 1, 2017. It is estimated that if the three programs were dispatched for the full 60 hours, the total costs would have been approximately $12.4 million, which is below the total annual costs agreed upon in the Settlement as revised in the 2015 IRP.

Idaho Power's cost-effectiveness evaluation for DR programs is updated annually. A more comprehensive cost-benefit analysis will be included in the Company's Demand-Side Management 2017 Annual Report when all the data will be available.

Idaho Power believes the purpose of demand response is to minimize or delay the need to build new supply-side peaking generation resources and to reduce load during extreme system peaks. The benefits of having the Program available, and with each load reduction event, provide Idaho Power a supply side resource to mitigate any system peak deficits. DR helps fulfill the current system capacity need and prolongs the need to build new generation resources.

The Company believes by calling at least three events per season the Program will be more effective in providing consistent and reliable reduction. Having a minimum of three events allows the Company to test processes and software and helps customers fine tune their curtailment plan. The Company did not call more than three load reduction events during the 2017 Program season because Idaho Power's generation resources were sufficient to satisfy system load. However, in all three events the Program provided a resource to assist in balancing the wind forecast when that forecast did not always align with Idaho Power's peak load, as well as potentially avoiding additional market purchases. Based on market prices for each of the days in 2017 the Program was dispatched, Idaho Power estimates the Program saved a total of $27,000 worth of energy purchases.

The variable energy price for utilizing the Program after the third event is $0.16/kWh and could be considered the dispatch price for calling load reduction events beginning with the fourth event. The price of $0.16/kWh is typically higher than the energy market price. The Company believes the variable energy price is appropriate because having a dispatch price below $0.16/kWh could cause the Company to call events more frequently resulting in reduced participant performance and event fatigue. The Company also believes that a lower dispatch price to trigger more load reduction events could send the wrong signal regarding the purpose of the Program and DR.

Customer Satisfaction Results

Idaho Power did not conduct a post-season survey this year as there were not significant changes made to the Program from the last two seasons. The prior two year's surveys were favorable and the Company believes conducting a survey every 2-3 years will reduce survey fatigue considering this customer segment also participates in the quarterly *Customer Satisfaction Research Survey* conducted by Burke, Inc.

Program Activities for 2018

The primary improvement Idaho Power and the Program could benefit from is a more consistent and firm load reduction when events are called. The Company will continue to communicate the value proposition with enrolled customers and the importance of active participation when events are called. Recruitment efforts for the 2018 season will begin the first quarter of 2018 to encourage participation. Idaho Power will meet with existing participants during the off-season to discuss past-season performance and upcoming season details.

The Program will be jointly marketed along with Idaho Power's applicable energy efficiency programs as needed. The Company will utilize its Customer Representatives to retain the currently enrolled sites and encourage new sites to participate.

For the upcoming season, Idaho Power plans to focus on retaining currently enrolled customers. While Idaho Power does not plan to actively market the Program, it will enroll new customers that show interest and are a good fit for the Program.

Conclusion

The Program currently contributes approximately 10 percent of the Company's overall DR portfolio and can be relied on to provide dispatchable load reduction to the electrical grid. When analyzing the Program at the generation level, industrial and commercial customers have made noteworthy contributions to Idaho Power's DR programs. The Program had a total of 141 sites reducing peak demand by 36 MW. The Program retained 99.3 percent of past enrolled sites (136 of 137) from the prior season and added five additional sites in 2017. Load reduction event results showed maximum reductions of 36, 28.4, and 25.5 MW, respectively, for the three events, with an average of 30 MW. The events achieved realization rates of 98 percent, 75 percent, and 70 percent, respectively, averaging 81 percent for the season. The total Program costs for 2017 through October 1st were $635,453. The cost of having this resource available was $22.22 per kW based on average reduction (28.6 MW) for the season.

2017 Irrigation Peak Rewards Program Report

January 2018

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INTRODUCTION

The Irrigation Peak Rewards Program (IPR) is a voluntary demand response program available to Idaho Power Company's (IPC) agricultural irrigation customers since 2004. IPR pays irrigation customers a financial incentive for the ability to turn off participating irrigation pumps at potential high-system load periods (summer peak).

Details

Interruption Options

IPR is available to IPC irrigation customers receiving service under Schedule 24 in Idaho and Oregon. Due to settlement agreements reached in Case No. IPC-13-14 and UM 1653, eligibility is based on prior program participation at the pump location. The pump location may have a device installed on the panel to automatically dispatch or remotely turn off the pump when a demand response event is called or the participant may shut down manually at the event start time.

Automatic Dispatch Option

Pumps enrolled in the automatic dispatch option have one of two devices installed at the pump location to allow IPC the ability to send a signal that controls the associated irrigation pump(s). This option requires all pumps at a site to be controlled. IPC sends a signal to the device during a load control event to turn off the pump. Nearly 90 percent of the devices use IPC's Automated Metering Infrastructure (AMI) to send the signal to the demand response unit (DRU). In addition to the DRU, approximately 12 percent of the automatic dispatch option pumps have a cellular network device installed at the pump panel. The device has the same control feature as the AMI DRU but a cellular network signal is used to communicate with the device.

Manual Dispatch Option

Pumps with at least 1,000 cumulative horse power (hp) or that IPC has determined to have limited communication availability are eligible for the manual dispatch option (manual). Participants under this classification choose to manually control which pumps are turned off during a load control event. Manual participants are required to nominate the amount of kilowatts (kW) available to dispatch during load control events. IPC uses interval metering data to monitor load reduction at these locations.

Program Parameters

- Season dates are June 15 through August 15
- A minimum of three load control events occur each program season

- Dispatch load control events could occur any weekday or Saturday, excluding July 4 holiday between 1:00 p.m. and 9:00 p.m.
- Four dispatch groups are offered:
    - 2:00 to 6:00 p.m.
    - 3:00 to 7:00 p.m.
    - 4:00 to 8:00 p.m.
    - 5:00 to 9:00 p.m.
- Load control events may occur up to four hours per day and up to 15 hours per week, but no more than 60 hours per program season
- IPC provides notification via phone, email and/or text to Automatic participants four hours prior to the start of the event whenever possible
- IPC provides notification via phone, email and/or text to Manual participants four hours prior to the start of the event
- IPC could choose to cancel the load control event and notify participants of cancellation up to 30 minutes prior to the event start time
- Parameters for IPR do not apply to system emergencies

Incentives

Automatic dispatch participants receive incentives in the form of a billing credit. The billing credit is made up of a demand credit and an energy credit applied to the monthly bill from June 15 to August 15. The demand and energy credits for the manual dispatch participants are paid with a physical check.

Demand credits are calculated by multiplying the monthly billing kW by the demand-related incentive amount. The energy credits are calculated by multiplying the monthly billing kilowatt-hour (kWh) usage by the energy-related incentive amount. Credits are prorated for periods when meter reading/billing cycles do not align with the IPR season dates.

The incentive structure includes *fixed* and *variable* incentives. Variable incentives apply if more than three events occur in the season. Participants who choose the extended 5:00 to 9:00 p.m. group are paid a larger variable credit incentive if more than three events are called in the same season. No variable incentive payments were made in 2017. Incentives are calculated for manual and automatic dispatch participants using IPC metered billing data.

Monthly billing credits are calculated and applied using IPC's billing software. Manual incentives are calculated using interval metering data and nominated kW and issued via mail in the form of a check. The incentive rates for 2017 are listed in Table 1.

Table 1
2017 Incentive rates for manual and automatic options

Fixed Demand Credit ($/billing kW)	Fixed Energy Credit ($/billing kW)	Variable Energy Credit ($/billing kW)	Extended Variable Energy Credit* ($/billing kW)
$5.00	$0.0076	$0.148	$0.198

*(5–9 p.m. group)

Opt Outs

Under the rules of the automatic dispatch option, participants have the freedom to opt out of a load control event up to five times per pump per season. Opt out fees are equal to $5.00 per billed kW for that billing cycle. Opt outs are defined in one of two categories. The first being an explicit opt out where the irrigator calls on the event date to request to not participate. The second opt out category is defined as the pump going off with the initial communication but then being turned back on in the field by over-riding the event turn off command.

RESULTS

Participation

IPR enrollment packets were mailed to all past participants in March 2017. Contents of the packet included an IPR brochure, program application, incentive structure details, eligible pump locations, and an estimated incentive for each pump location.

IPC agricultural representatives (ag reps) presented IPR information at irrigation workshops across the service area. Ag reps also communicated program details while staffing the IPC booth at four agricultural shows across the service area. IPC ag reps continue to make a concerted effort to encourage past participants to re-enroll.

2017 total billing demand enrollment was 411.4 MW with 2,307 pumps. The total pump count increased, while the nominated kW decreased 1 percent from 415.1 MW in 2016 to 411.4 MW in 2017. A total of 83.5 percent of the eligible pumps enrolled, an increase over last year of 1.5 percent.

Figure 1 shows IPC's service area divided into five regional areas; Western, Canyon, Capital, Southern, and Eastern. IPC has three main areas, Canyon-West, Capital and South East. Five regional areas are referenced throughout this report due to how the program areas are defined.

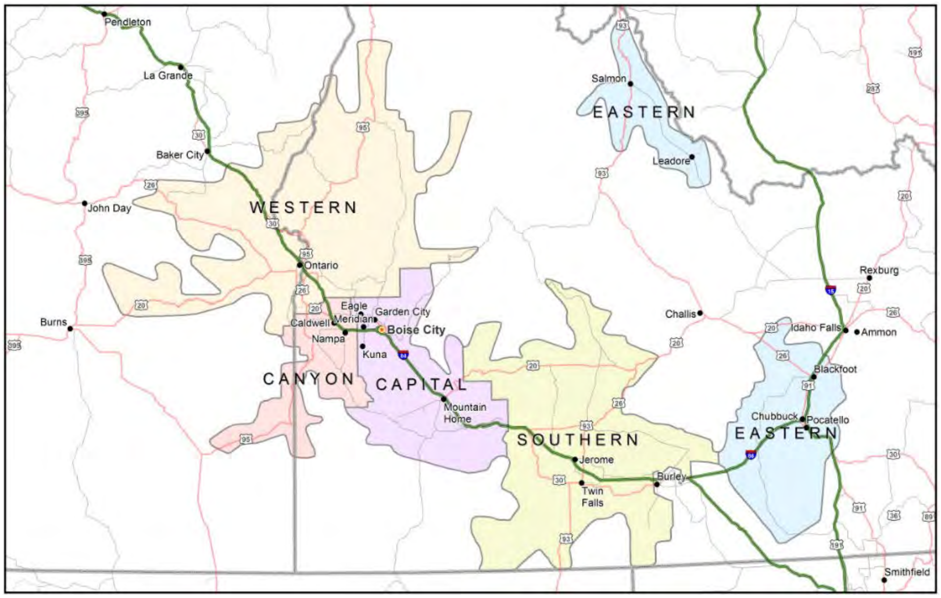


Figure 1
Idaho Power service area

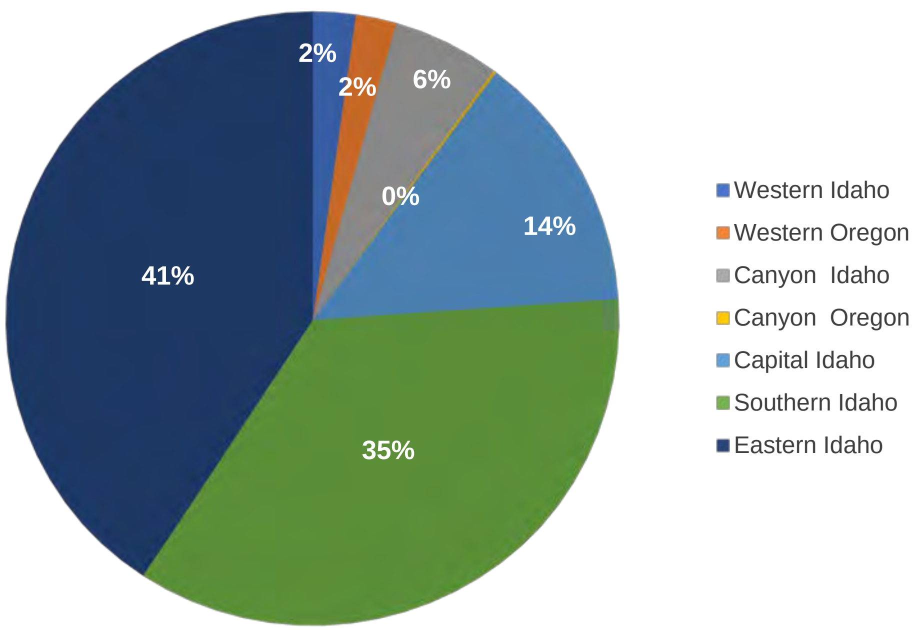


Figure 2
Distribution of service area by 2017 participants

Table 2
2017 Eligible pump locations and participation levels by area

IPC Area	State	Eligible Service Locations	Manual Dispatch Option	Automatic Dispatch Option	Total Enrolled by area	Eligible Enrolled
Western	Idaho	62	0	36	36	58%
	Oregon	59	4	43	47	80%
Canyon	Idaho	156	11	128	139	89%
	Oregon	4	0	3	3	75%
Capital	Idaho	379	26	304	330	87%
Southern	Idaho	978	6	828	834	85%
Eastern	Idaho	1,123	0	918	918	82%
Total		**2,761**	**47**	**2,260**	**2,307**	

Operations

Equipment and Monitoring

IPC has been expanding the use of AMI technology with the use of DRUs installed at pump locations. AMI technology provides the ability to turn off pumps during an IPR event by sending communication through the power line to the DRU and allows IPC to monitor the status of many participating pumps during load control events through an hourly usage report. These reports provide data to help determine which DRU's functioned properly and which pumps were off during the event.

In addition to using AMI technology, IPC developed its own load control device. This device uses a cellular network signal to communicate with and shut off the pump during a load control event and are installed where AMI technology is not available. The data available from the cellular device systems allow IPC to view run circuit current for each location and successful cellular communication. Hourly usage data is not available at these sites. Knowledge of the run circuit current allows IPC to determine whether a pump is on or off. During the 2017 season, 336 cellular devices were installed at 293 pump locations.

Analysis

The load reduction analysis (i.e., performance of the program) is calculated using five sources:

1. Program participant list
2. AMI hourly usage data
3. Interval metering (not connected to the AMI system). MV-90 interval usage data

4. Cellular device run circuit data

5. Total system load data for event days and a surrogate day

The IPR participant data for each load reduction event day includes the following the pump number, meter number, 2017 dispatch option, dispatch group, nominated kW and the cellular device or DRU number. IPC system load monitoring was used as a comparison for impact of the load reduction during the event. The system load monitoring provides readings (MW) in five minute increments on event days as well as one comparative nonevent day.

Data Gathering and Processing

Data analysis is the basis for payment, troubleshooting and program performance. The first steps of the data analysis are gathering and processing the data. The data collected was AMI Data, cellular device run time, and MV90 data. The data was then separated into three data sets:

1. Pumps with AMI technology and hourly usage data

2. Pumps with cellular devices and run circuit data

3. Pumps running on the manual dispatch option with interval data or hourly AMI data

Baseline and Event Calculations for Interval Metering Data

The performance of the program is calculated by comparing the usage prior to the event and usage during the event. The first step in this calculation is to determine the baseline.

To do that, IPC averages the hourly interval readings in the second, third, and fourth hours after the first hour of the event. The first hour is not considered in the baseline data due to the potential for a delay in AMI communications. The message may take up to 10 minutes to register at any specific pump location to shut down for the event. The pumps may not shutoff for that 10 minutes, therefore showing usage data in the first hour.

Each pump's usage during the baseline hours are summed to arrive at a combined baseline for each dispatch group (reference the Appendix 1 for the demand reduction calculation method and definition of terms). The demand reduction for each pump with hourly usage data was calculated during the last three hours of each load control event.

The total load reduction was calculated by summing the Automatic Dispatch Option sites and the Manual Dispatch Option Sites.

Load Reduction Results

Table 3
Hourly demand reduction results (MW) for each event

Event Date	2–3 p.m.	3–4 p.m.	4–5 p.m.	5–6 p.m.	6–7 p.m.	7–8 p.m.	8–9 p.m.
6/20/2017	66.4	133.1	192.2	248.0	181.3	114.6	55.5
w/ losses*	72.9	146.1	211.0	272.2	199.0	125.8	60.9
7/6/2017	74.5	149.3	217.4	289.8	215.0	140.1	72.0
w/ losses*	81.7	163.9	238.7	318.1	236.0	153.8	79.0
8/3/2017	45.0	105.2	165.4	214.7	169.4	109.1	49.0
w/ losses*	49.4	115.5	181.5	235.7	185.9	119.8	53.8

*IPC system losses 9.76% added in

Realization Rate Analysis

A potential realization rate is used to determine the IPR potential performance for any day during the season. It is defined as the likelihood that an irrigation pump is shutoff during the demand response event and is reduced by equipment failures, opt outs and small loads left on during an event.

This rate is typically higher at the end of June and the beginning of July when a large fraction of irrigation pumps run nearly 24 hours per day seven days per week. Service area wide, irrigation pumps are providing the largest load because nearly all crops in the service area are being irrigated at this time of year. The realization rate is lower later in the irrigation season when many pumps are not operating due to crop maturity and reduced irrigation demands (primarily small grain crops).

Device failures also effect realization rates because they reduce how much load reduction can be achieved during an event. Device failures include AMI communication problems, wiring issues, inadequate cellular coverage, administrative errors and inoperable devices. Identification and correction of device failures is an ongoing effort before season begins and throughout the season. The AMI hourly data and the AMI communication reports are used to indicate potential malfunctioning DRU’s.

In the field, a variety of issues with the DRUs were identified:

- Inoperable
- Fuse in the DRU failed or removed and needed replacement
- DRU identification number had been recorded inaccurately and the system could not find the correct communication path
- New panel install at the pump site

- Water damage to the DRU
- DRU was removed entirely

Table 4 shows the 2017 IPR program realization rates and the seasonal average percent categorized load expected to not be turned off during a load control event had it occurred during each respective two-week period throughout the program season.

Table 4
2017 program realization rates

Date Range	Average Pump Off in Baseline Rate	Opt-Out Rate	Device Failure Rate*	Did not reduce total nominated kW**	Counterfactual Realization Rate	Total
June 15–30	34.0%	1.0%	3.5%	1.5%	60.1%	100.0%
July 1–15	24.4%	0.5%	3.4%	1.3%	70.4%	100.0%
July 16–31	24.4%	0.5%	3.4%	1.3%	70.4%	100.0%
August 1–15	43.5%	0.4%	3.2%	1.4%	51.5%	100.0%

*

**

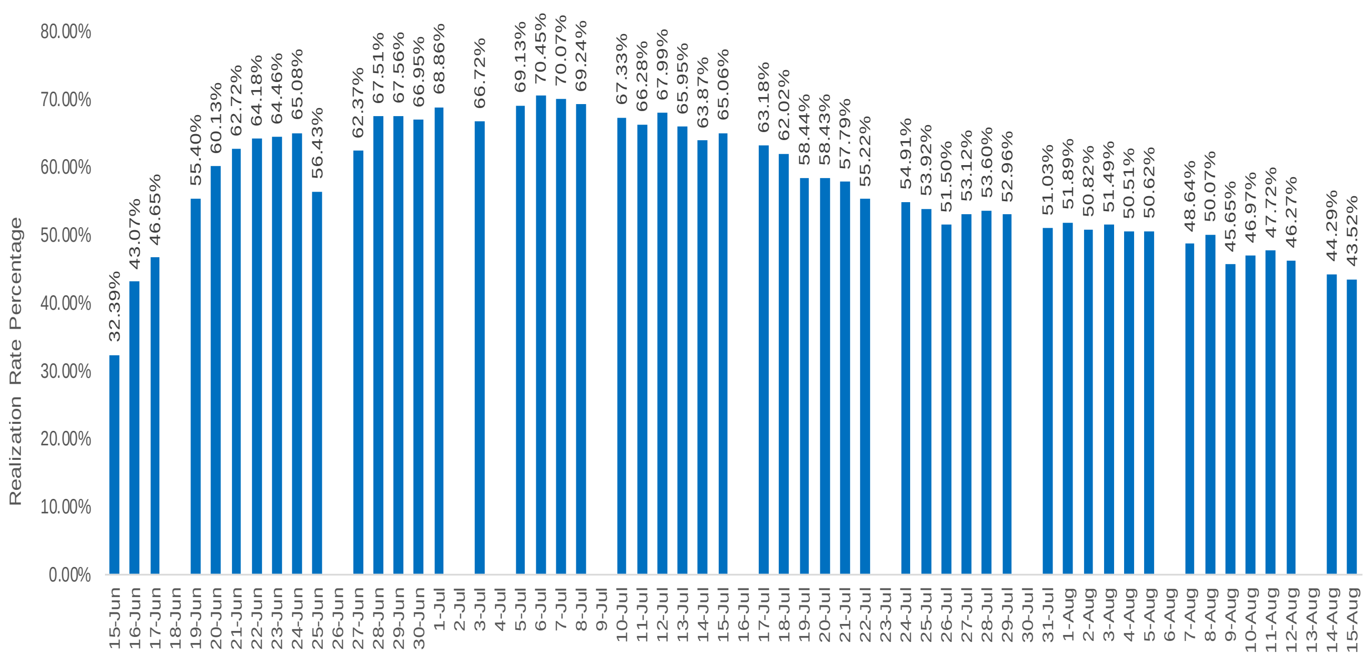


Figure 3
2017 IPR season expected realization rate per day (excluding Sundays and July 4)

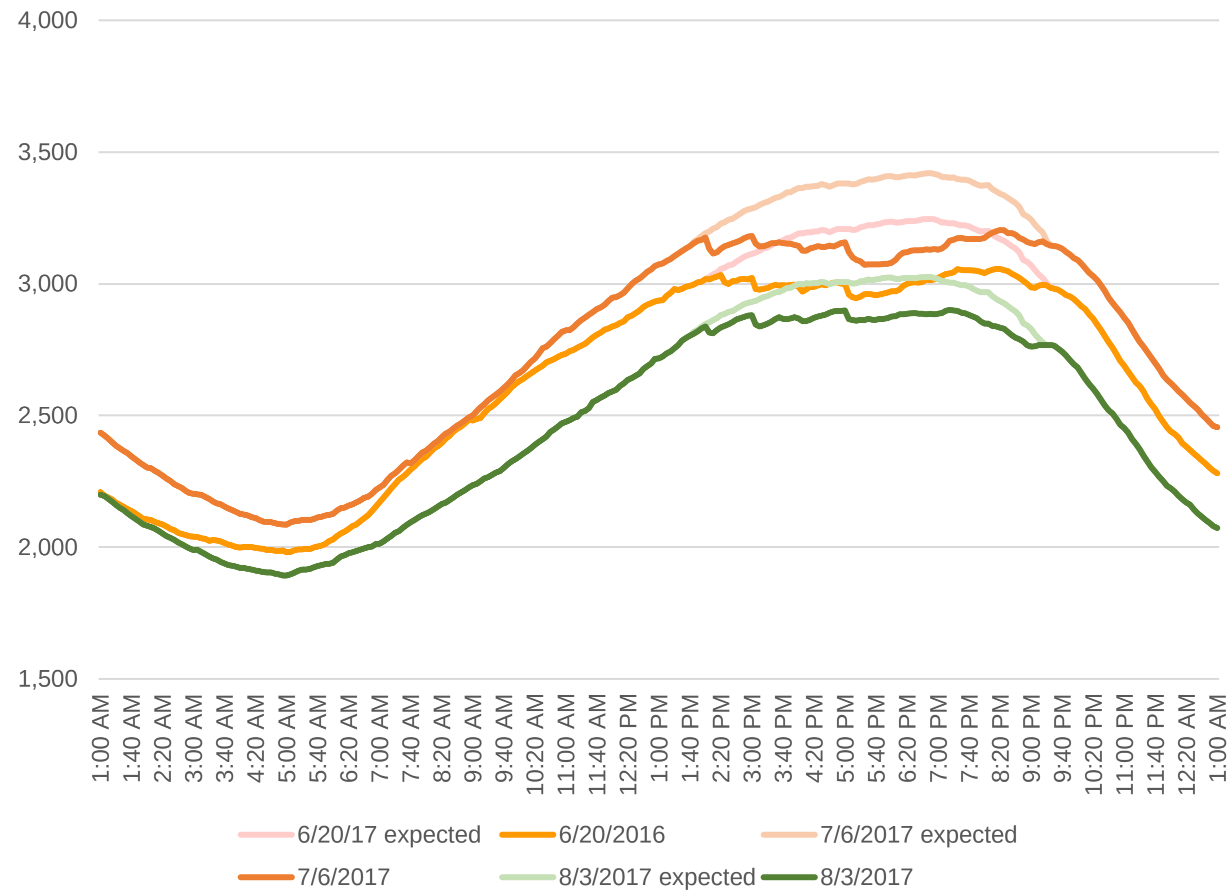


Figure 4
2017 load reduction results—total system load data

Other Events from the 2017 season

IPC brought the entire program in-house over the winter of 2016/17 and contracted with three electricians to exchange 1587 Enernoc devices with AMI controlled DRU's and 336 cellular devices throughout the service area.

Although the initial exchange was expensive due to the labor and materials to convert to AMI DRU's and cellular devices, after a year and a half it is anticipated that the program will be saving money by not contracting with an outside vendor.

IPC updated the dispatch interface and added an automated messaging option for the event notifications. The June 20th event experienced a 25-minute delay in the communication to the devices due to an internal situation. IPC was monitoring the communication and messaging and caught the issue shortly after the 2:00 pm event start timeframe, delaying the shutoff by approximately 25 minutes. The issue was fixed and did not occur on the second and third events.

Costs

IPR spent a total of $7,223,101.43 with the incentive credit being the largest portion at $6,412,298.73 of total costs.

Table 5
Annual program costs by category

Expense Item	2017 Total Cost
Materials and equipment	$209,060.77
Contract services	$504,515.53
Incentive payments	$6,412,289.73
Administration	$97,266.40
Total	$7,223,101.43

CONCLUSIONS

The 2017 IPR program resulted in a total reduction of 318.1 MW for the season. The irrigation season started out slow overall due to a higher than normal water year and a cooler June. IPC runs three demand response programs. Of the three IPC load reduction programs the IPR program represents approximately 83 percent of the total load reduction for the company. Highlights listed below:

- 1587 EnerNOC devices exchanged for AMI DRU’s
- 336 EnerNOC devices exchanged for IPC cellular device
- Increased enrollment to include over 83.5 % of eligible pump locations.
- 2307 pumps enrolled
- 318.1 MW total load reduction
- The cost of having this resource available was $23 per kW

Appendix 1
Demand Reduction Calculation Method

Abbreviations

ADO—Automatic Dispatch Option
AEL—Average Event Load
AMI—Automated Metering Infrastructure
BL—Baseline Load
DR—Demand Reduction
MDO—Manual Dispatch Option
MV90—Specific Meter Package with Interval Data
∑—Sum

Automatic Dispatch Option

Load reduction for each event was calculated using hourly data for each pump using the last three hours of each curtailment event was calculated as follows:

$$DR_{pump} = BL_{pump} - AEL_{pump}$$

The load reduction for all pumps within a dispatch group is the total hourly reduction for each group as calculated below:

$$DR_{group} = \sum DR_{pump\ (groups\ 1\text{-}4)}$$

Load reduction for the automatic dispatch option was calculated as follows:

$$DR_{ado} = \sum DR_{group}$$

Manual Dispatch Option

Data utilized for manual dispatch option participants is AMI hourly usage or MV90 interval data. Load reduction for manual dispatch option was calculated as follows:

$$DR_{group} = \sum DR_{pump\ AMI} + \sum DR_{pump\ MV90}$$

The total demand reduction for the Manual Dispatch Option was calculated as follows:

$$DR_{MDO} = \sum DR_{group}$$

The total IPR load reduction was calculated by summing the Automatic Dispatch Option sites and the Manual Dispatch Option sites calculated reduction:

$$\text{Total Program DR} = DR_{MDO} + DR_{Group}$$

A/C Cool Credit

2017 Demand Response Analysis

Prepared by: Idaho Power

November 2017

Executive Summary

The three 2017 AC Cool Credit events occurring on June 26, July 14, and August 2 resulted in max peak meter level kW/participant reductions of 0.97, 0.80, and 0.78 respectively. The 0.97 kW/participant max reduction resulted in 26,349 kW (26.3 MW) of reduction at customer's meters and was recorded between 6 and 7 p.m. on June 26. Accounting for system energy losses between generation facilities and customers, the max peak total generation reduction was 28.9 MW.

The average hourly meter level demand reduction was 0.86, 0.76, 0.72 kW per participant, respectively, for the three events. The August 2 event was called one hour later at 5 p.m. and ended one hour later at 8pm than the other two events. All three curtailment events were three hours in length.

Analysis Methodology

AC Cool Credit participants' hourly consumption data was used to estimate demand reduction. The hourly consumption data approach was validated in the 2012 impact evaluation which analyzed both AMI and logger data, and showed both sources to produce similar estimations of energy reduction per curtailment event.

Data Cleaning

Participants were merged with hourly consumption data for each event day and the ten previous non-weekend days. Error codes were pulled in for all hours and any hour that had an error code, outage flag, or was marked as an estimated read during event hours or one hour prior to the event was removed prior to analysis. Ninety-nine percent of all customer sites were preserved after data cleaning.

The sub-sections below describe the project's methodology related to the sampling plan and demand reduction analysis.

Table 1
2017 Summary of event hours and participation

Curtailment Event	Event Hours	AC units enrolled	Sites Analyzed for Reduction*
June 26**	4 p.m.–7 p.m.	28,214	27,117
July 14**	4 p.m.–7 p.m.	28,214	27,117
August 2	5 p.m.–8 p.m.	28,054	26,964

*Customer sites may have more than one AC unit enrolled in program
**Customer participants file from July 17th was used for analysis basis for both events

Baseline Data

The load reduction achieved during curtailment events was calculated by comparing the average load from each curtailment day against the average load developed from non-curtailment days selected for the baseline. The "previous days" approach was used, which utilizes the average load data from the previous ten non-weekend, non-curtailment days. Baseline kW was calculated as the average of the three days with the greatest demand from these previous 10 non-curtailment days, as ranked by the highest hourly demand occurring during the curtailment timeframe. Curtailment days normally occur on hot, high demand days, thus selecting high demand days for the baseline ensures a similar load profile is used for the baseline days as the curtailment days.

Offset Factor

To effectively compare baseline and curtailment day loads, the baseline load was adjusted using an offset factor, calculated as the difference in kW between the baseline and curtailment event day load during the hour prior to the start of the curtailment. The offset factor was applied to the baseline day to “normalize” the baseline kW to the curtailment day kW. The offset factor mitigates underlying differences in load due to slight differences in outdoor temperature or other external factors.

Results

A total of three curtailment events were completed as part of the 2017 A/C Cool Credit program. Table 2 below details the characteristics of these events, including high temperature, event time period, and cycling percent.

Table 2
2017 summary results of curtailment events

Date and High Temp	Percent Curtailment	Region	Avg. kW Reduction per Participant	Max kW Reduction per Participant	Avg. kW Reduction Total	Max kW Reduction Total
June 26	55%	All	0.86	0.97	23,344	26,349
Boise: 95° Poc/TF: 96°		Boise	0.90	1.01	20,705	23,420
		Poc/TF	0.74	0.83	2,945	3,318
July 14	55%	All	0.76	0.80	20,547	21,572
Boise: 100° Poc/TF: 94°		Boise	0.81	0.85	18,748	19,729
		Poc/TF	0.51	0.54	2,049	2,149
Aug 2	55%	All	0.72	0.78	19,373	21,046
Boise: 100° Poc/TF: 95°		Boise	0.73	0.79	16,744	18,179
		Poc/TF	0.54	0.60	2,143	2,391

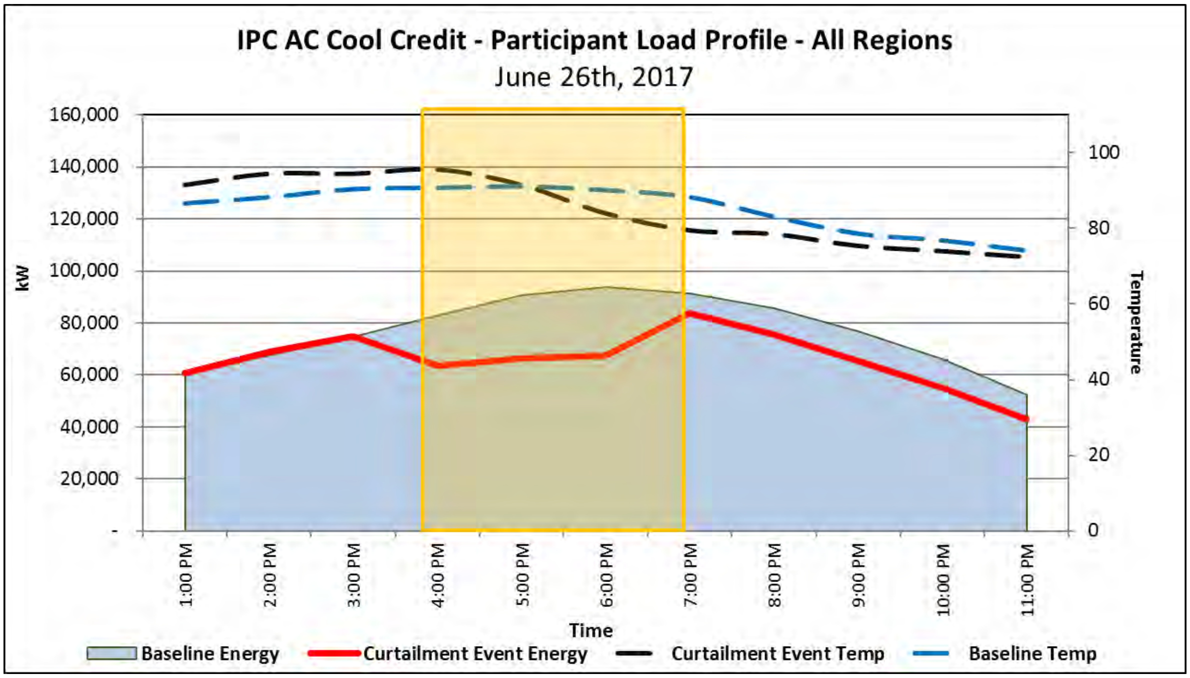


Figure 1
June 26, 2017 participant load profile—all regions

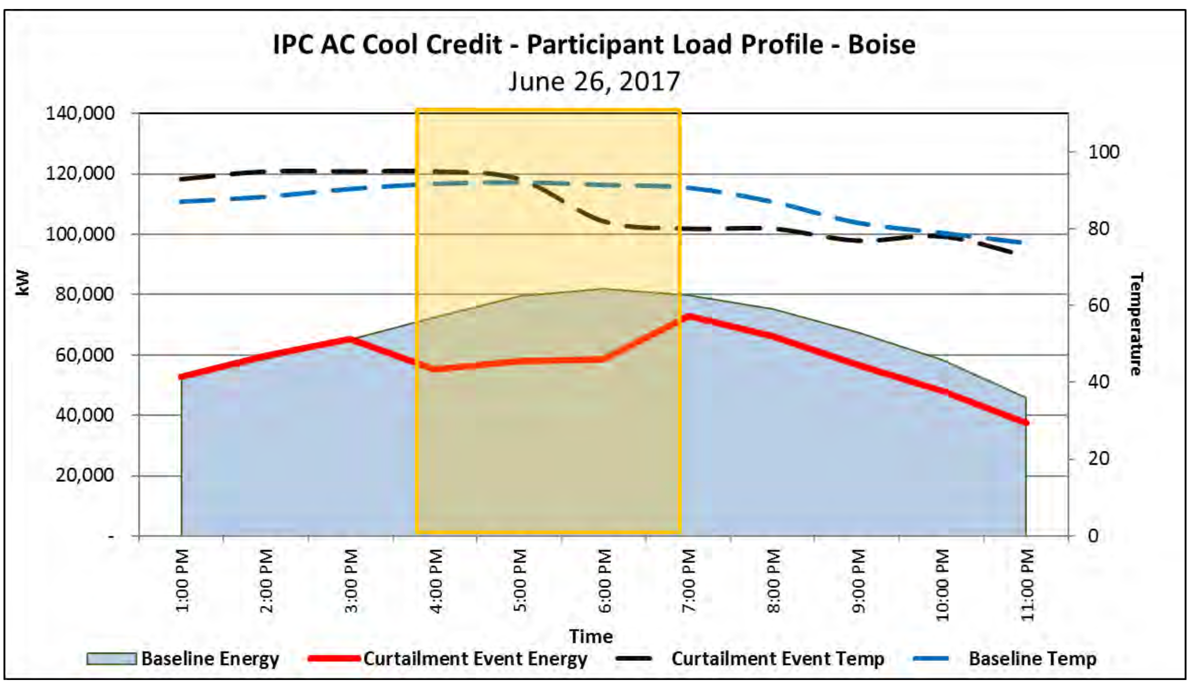


Figure 2
June 26, 2017 participant load profile—Boise

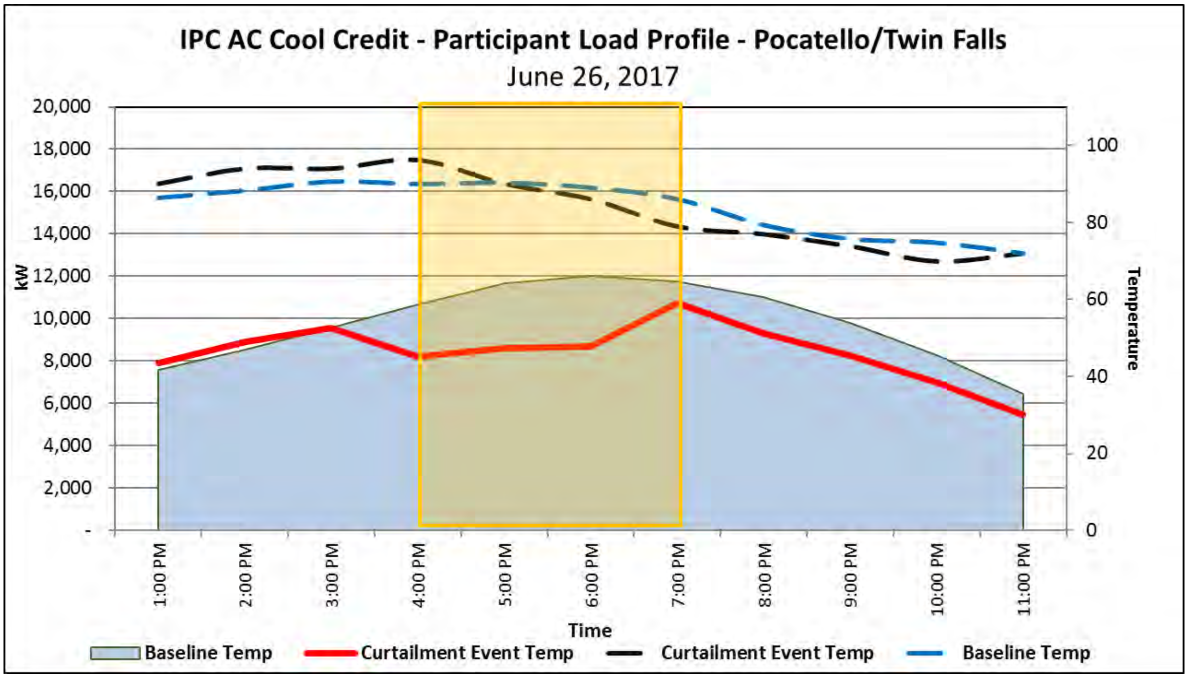


Figure 3
June 26, 2017 participant load profile—Pocatello/Twin Falls

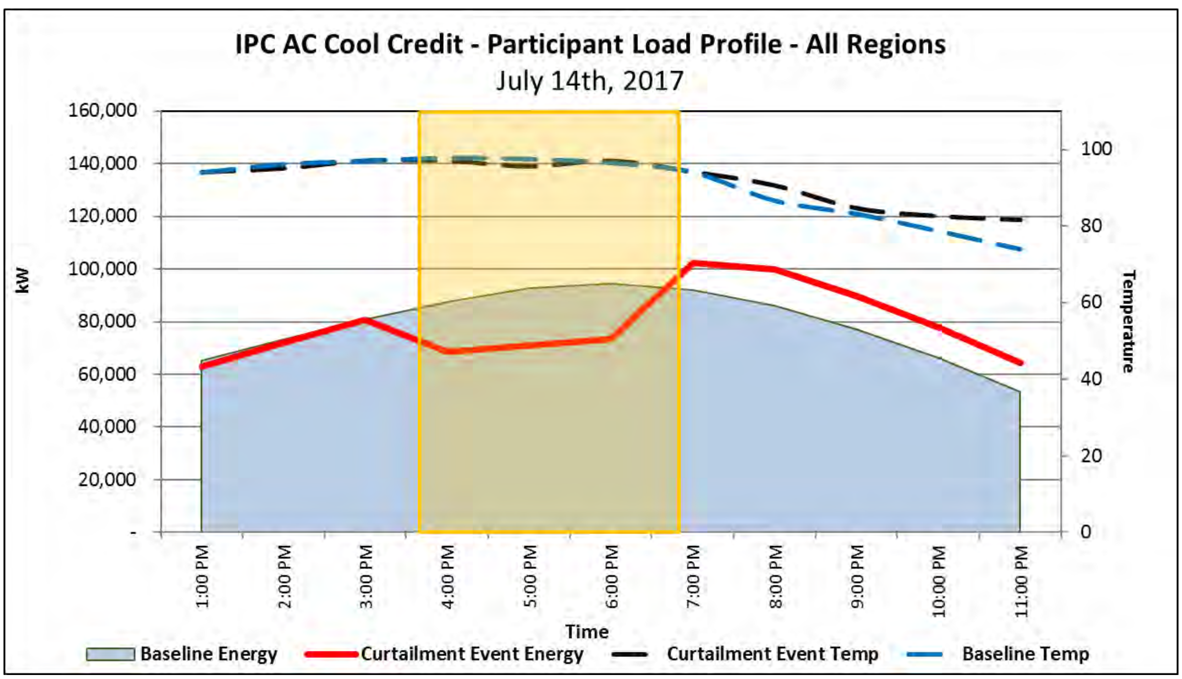


Figure 4
July 14, 2017 participant load profile—all regions

Figure 5
July 14, 2017 load profile—Boise

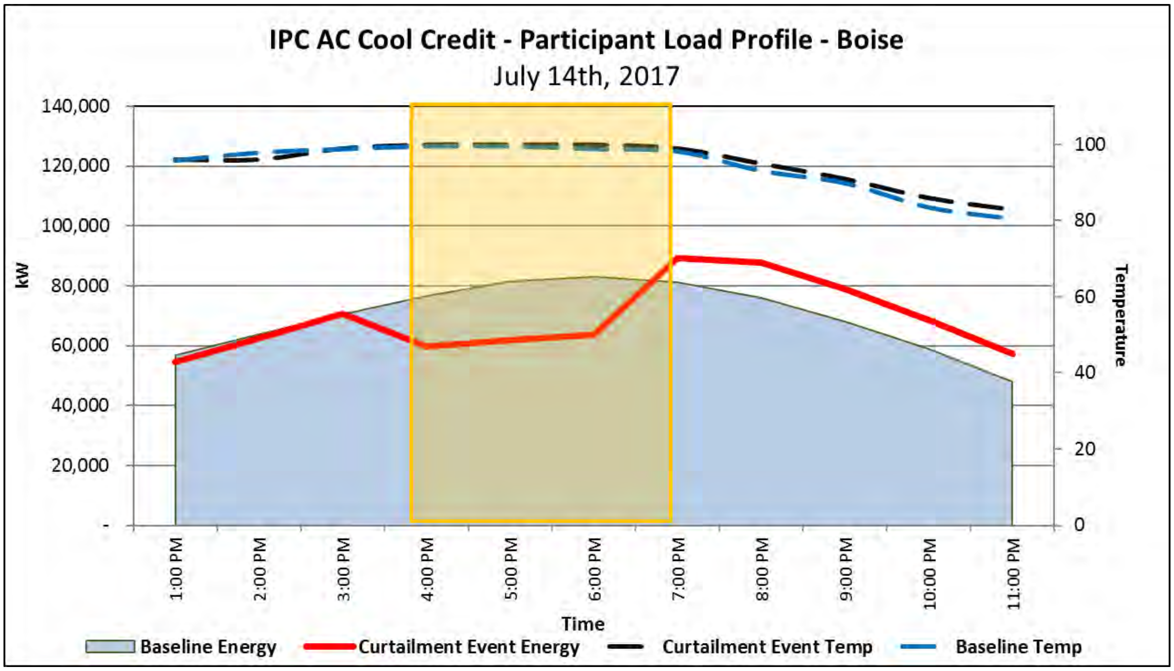


Figure 5
July 14, 2017 load profile—Boise

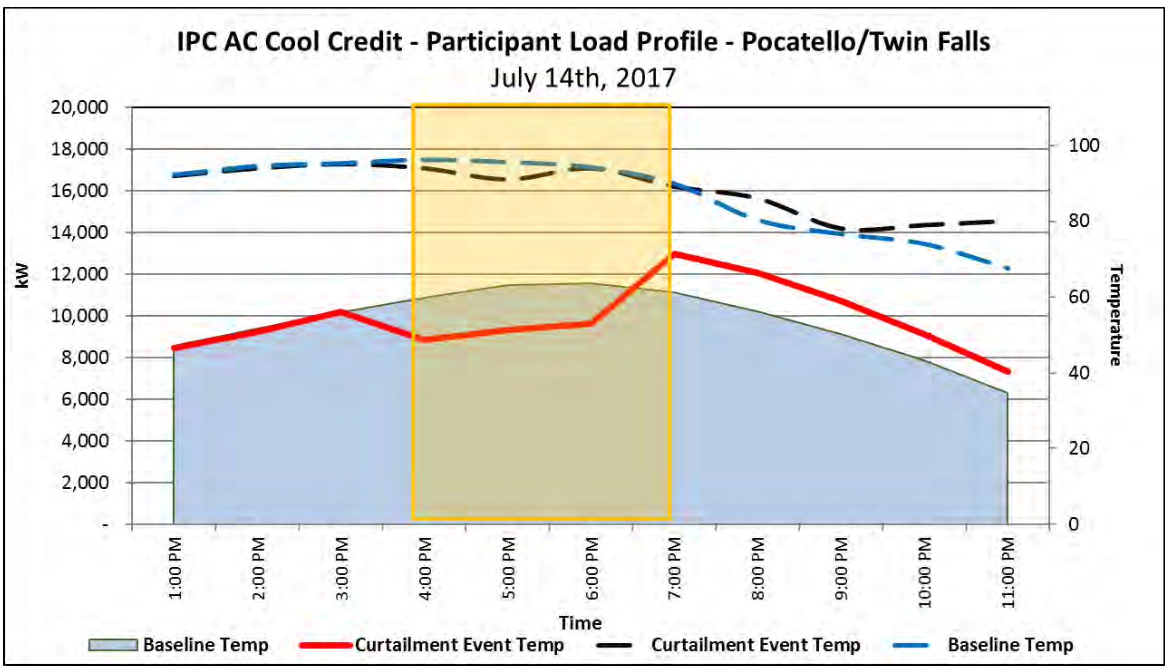


Figure 6
July 14, 2017 load profile—Pocatello/Twin Falls

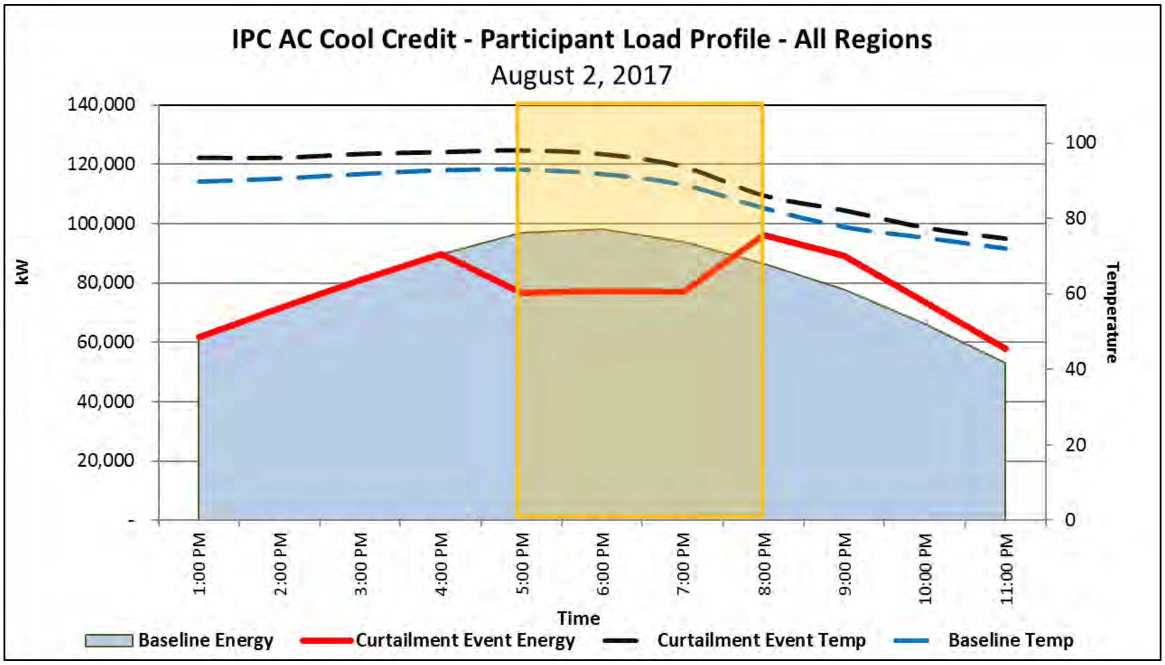


Figure 7
August 2, 2017 participant load profile—all locations

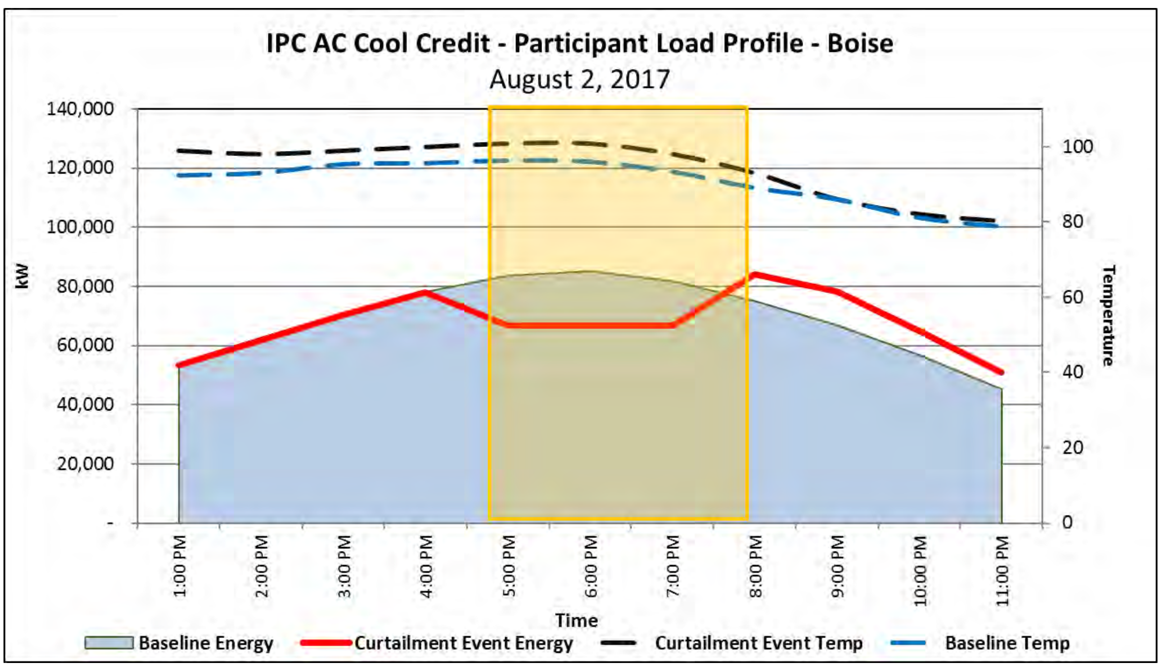


Figure 8
August 2, 2017 load profile—Boise

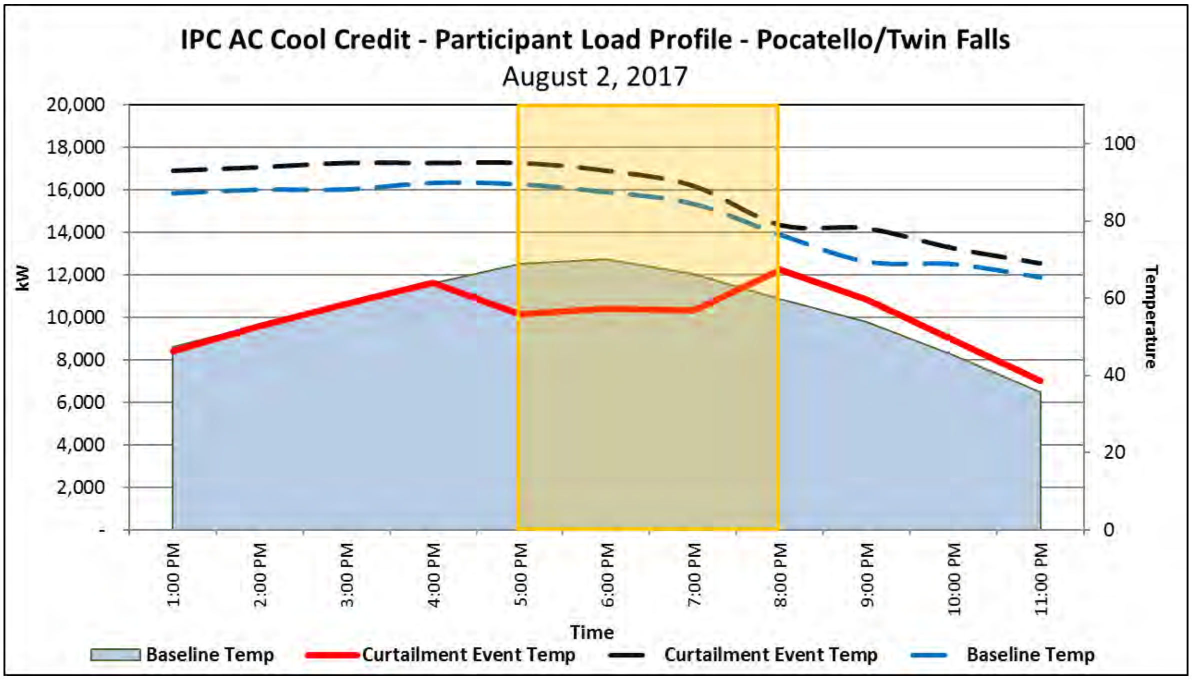


Figure 9
August 2, 2017 load profile—Pocatello/Twin Falls

IDAHO POWER ENERGY WISE®
PROGRAM SUMMARY REPORT

2016-2017

SUBMITTED BY:

RESOURCEACTION PROGRAMS
A FRANKLIN ENERGY COMPANY

Idaho Power Energy Wise®
Program Summary Report
2016-2017

Made possible by:

IDAHO POWER®

An IDACORP Company

Submitted by:

RESOURCEACTION PROGRAMS

September 2017

"The students really liked the activities and readings as well as the at home portion. This is one of my favorite yearly projects!"

Heather Mueller, Teacher

Washington Elementary School

Table of Contents

"My son was very interested in all of your programs. They are hands-on and the kids appreciate that. They like to be involved!"

[redacted] **Parent**
Eliza Hart Spalding Elementary School

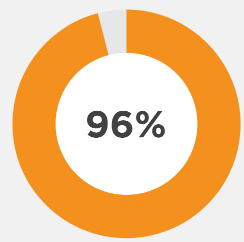
Executive Summary

Resource Action Programs® (RAP) is pleased to present this Program Summary Report to Idaho Power, which summarizes the 2016-2017 Idaho Power Energy Wise® Program. The program was implemented in the Idaho Power service area in the state of Idaho by 8,910 teachers, students, and their families.

The following pages provide an overview of the program and materials, outline of program implementation, introduction to the program team, description of program enhancements, impact of the program, and summary of results from the home activities. In addition to this information, evaluations, letters, and comments are provided for a glimpse into actual participant feedback. Lastly, projected savings from the individual measures found within the Energy Wise Kit are also included.

Participant Satisfaction

A successful program excites and engages participants. Students, parents, and teachers are asked to evaluate the program and provide personal comments. A sample of the feedback is given in the margin. ›

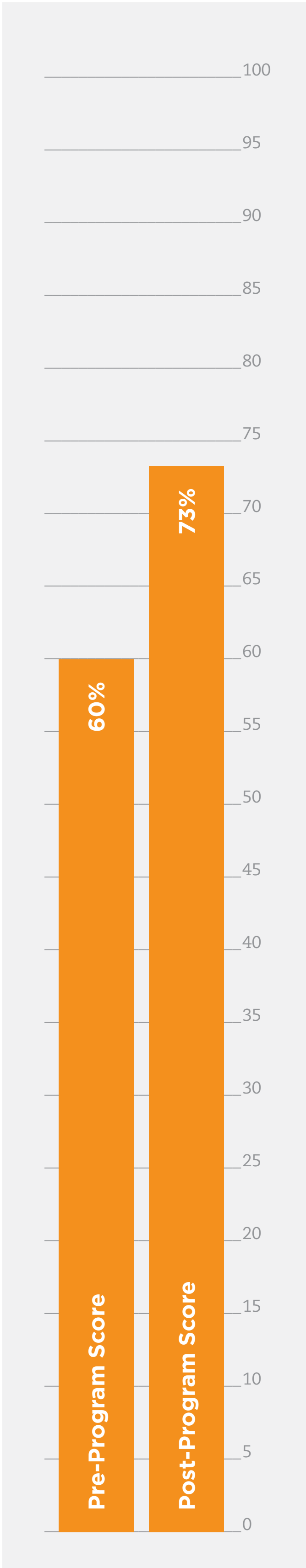


Teachers who indicated parents supported the program.

Teachers who indicated they would recommend this program to other colleagues.

Teachers who indicated they would conduct this program again.

A summary of responses can be found in Appendix D.



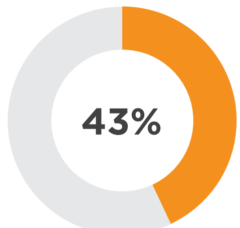
Knowledge Gained

Identical tests were administered to the students prior to the program and again upon program completion to measure knowledge gained. Scores and subject knowledge improved from **60%** to **73%**.

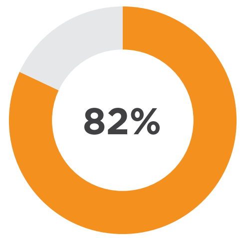
Measures Installed

Students completed take-home activities as part of the program and reported on the kit measures they installed in their homes.

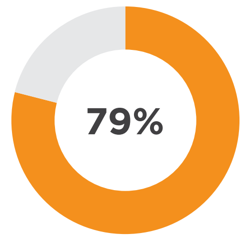
A summary of responses can be found in Appendix B.



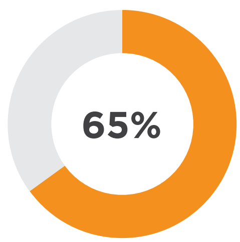
Students who reported they installed the High-Efficiency Showerhead.



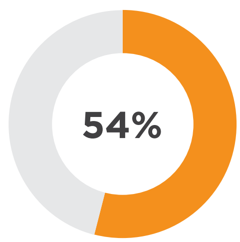
Students who indicated they installed the LED Night Light.



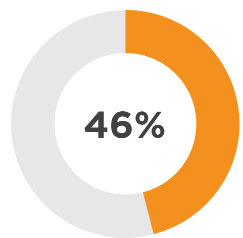
Students who reported they used the Shower Timer.



Students who reported they installed the first 9-watt LED.



Students who reported they installed the second 9-watt LED.



Students who reported they installed the third 9-watt LED.

Student Survey Response by Region

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	8,910	2,465	2,833	1,511	1,205	896
Students	8,602	2,383	2,734	1,458	1,165	862
Surveys Received	5,150	1,121	1,988	1,056	514	471
Percent Response	58%	45%	70%	70%	43%	53%

Energy and Water Savings Results

In addition to educating students and their parents, a primary program goal is to generate cost-effective energy and water savings. Student home surveys not only provided the data used in the savings projections, but also reinforced the learning benefits.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

PROJECTED ANNUAL SAVINGS	
22,099,443	gallons of water saved
2,583,030	kWh of electricity saved
81,062	therms of gas saved
22,099,443	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS	
152,483,410	gallons of water saved
22,793,540	kWh of electricity saved
586,459	therms of gas saved
152,483,410	gallons of wastewater saved

PROJECTED ANNUAL SAVINGS PER HOME	
2,480	gallons of water saved
290	kWh of electricity saved
9	therms of gas saved
2,480	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS PER HOME	
17,114	gallons of water saved
2,558	kWh of electricity saved
66	therms of gas saved
17,114	gallons of wastewater saved

"As a teacher, I liked the understanding the kids gain about resources, and how they can conserve energy personally in the way they conduct their lives."

Brenda Fly, Teacher
Birch Elementary School

Program Overview

The Idaho Power Energy Wise® Program, a school-based energy efficiency education program, is designed to generate immediate and long-term resource savings by bringing interactive, real-world education home to students and their families. The 2016-2017 program was taught in grades 3-6 throughout the Idaho Power service area.

The Idaho Power Community Education Representative program team identifies and enrolls students and teachers within the designated service area. The program physically begins with classroom discussions in a Student Guide that provide the foundations of using energy and water efficiently, followed by hands-on, creative, problem solving activities led by the classroom teacher.

All program materials support state and national academic standards to allow the program to fit easily into a teacher's existing curriculum and requirements. The participating classroom teachers follow the Teacher Book and lesson plan. Information is given to guide lessons throughout the program in order to satisfy each student's individual needs, whether they are visual, auditory, or kinesthetic learners.

The Energy Wise Kit and Student Workbook comprise the take-home portion of the program. Students receive a kit containing high-efficiency measures they use to install within their homes. With the help of their parents/guardians, students install the kit measures and complete a home survey. The act of installing and monitoring new energy efficiency devices in their homes allows students to put their learning into practice. Here, participants and their parents/guardians realize actual water and energy savings within their home, benefitting two generations.

A critical element of RAP program design is the use of new knowledge through reporting. At the end of the program, the Idaho Power program team tabulates all participant responses—including home survey information, teacher responses, student letters, and parent feedback—and generates this Program Summary Report.

“I loved that the program went along with our science. The program provided students with vocabulary that was meaningful and made students think.”

Aubrey Eldredge, Teacher

Syringa Elementary School

Program Materials

Each participant in the Idaho Power Energy Wise® Program receives classroom materials and energy efficiency kits containing high-efficiency measures to perform the program's take-home activities. Program materials for students, parents/guardians, and teachers are outlined below.

Each Student & Teacher Receives

Student Guide

Student Workbook

Parent Letter/Pledge Form

Student Survey Form

Certificate of Achievement

Energy Wise Kit Containing:

- High-Efficiency Showerhead
- Shower Timer
- LED Night Light
- (3) 9-watt LED Light Bulbs
- FilterTone® Alarm
- Digital Thermometer
- Reminder Stickers and Magnet Pack
- Flow Rate Test Bag
- Natural Resource Fact Chart
- Parent/Guardian Program Evaluation
- Illustrated Instruction Guide

Idaho Power "Get Wise" Wristband

Website Access at:
http://www.idahopower.com/wise

Toll-Free HELP Line

Each Teacher/Classroom Receives

Teacher Book

Idaho Power Custom Introduction Video Flash Drive

Step-by-Step Program Checklist

Lesson Plans

Idaho State and National Academic Standards Chart

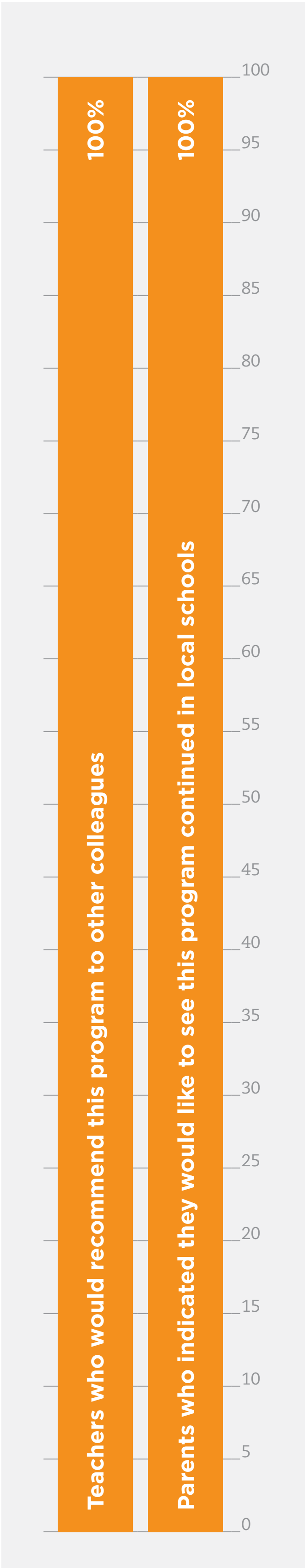
Extra Activities Booket

Teacher Survey Form

Pre/Post Student Survey Answer Keys

Electricity Poster

Self-Addressed Postage-Paid Envelope



Custom Branding

In addition to increasing resource awareness and efficiency, the program has been designed to strengthen bonds between Idaho Power and the community. One of the steps taken to ensure the greatest possible exposure is to feature the Idaho Power logo throughout each Energy Wise Kit. In addition to the kit, the Teacher Survey Form, Parent Letter/Pledge Form, Student Guide, Student Workbook, Teacher Book, and Idaho Power exclusive Introduction Video (flash drive) also feature Idaho Power branding. Further, a custom Teacher Solicitation Flyer was created for Community Education Representatives' program promotion.

2016-2017 Idaho Power Energy Wise® Program

Participate in Idaho Power's 4th – 6th grade Energy Wise Program

Idaho Power's Energy Wise Program provides 4th – 6th grade students in schools served by Idaho Power with quality, age-appropriate instruction regarding the wise use of electricity. Each student that participates receives a take-home kit containing products to encourage energy savings at home and engage families in activities that support and reinforce the concepts taught at school.

Each Student/Teacher Receives:

Student Guide
Student Workbook
Parent Letter/Pledge Form
Student Survey Form
Certificate of Achievement
Energy Wise Kit:
- LED Night Light
- (3) 9-Watt LED Light Bulbs (800 Lumens, 60-Watt Equivalent)
- Shower Timer
- Digital Thermometer
- FilterTone® Alarm
- Water Flow Rate Test Bag
- High-Efficiency Shower Head
- Natural Resource Fact Chart
- Parent/Guardian Program Evaluation

Illustrated Instruction Booklet
"Get Wise" Wristband Reward
Unlimited Access to Program Website
Toll-Free HELP Line

Each Teacher/Classroom Receives:

TTeacher Book with Lesson Plans Included
Step-By-Step Program Checklist
Teacher Materials Folder:
- Flash Drive (Video Presentation)
- State Education Standard Correlation Charts
- Pre/Post Scantron Survey Answer Keys
- Extra Activities Booklet
- Electricity Poster for Classroom
- Mini-Grant Requirements
- Teacher Program Welcome Letter/Evaluation Form
- Self-Addressed Postage-Paid Envelope

Website Access for Additional Program Activities
Toll-Free Telephone Support
Mini-Grant e-Card of Up to $100 (See Back for Details)

There is no cost to participate and a great chance to win a mini-grant!

When you enroll, you will be asked to provide a student count and the month you would like to receive your materials.

IDAHO POWER
An IDACORP Company

For more information, contact: Danielle Ready
Office: 208-642-6291
Cell: 208-999-1449
dready@idahopower.com

Continued on back

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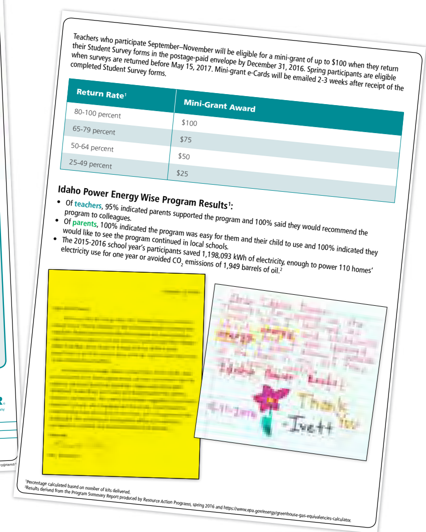


Teachers who participate September–November will be eligible for a mini-grant of up to $100 when they return their Student Survey forms in the postage-paid envelope by December 31, 2016. Spring participants are eligible when surveys are returned before May 15, 2017. Mini-grant e-Cards will be emailed 2-3 weeks after receipt of the completed Student Survey forms.

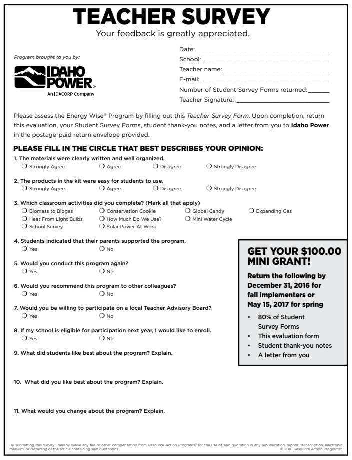
Return Rate[1]	Mini-Grant Award
80-100 percent	$100
65-79 percent	$75
50-64 percent	$50
25-49 percent	$25

Idaho Power Energy Wise Program Results[1]:

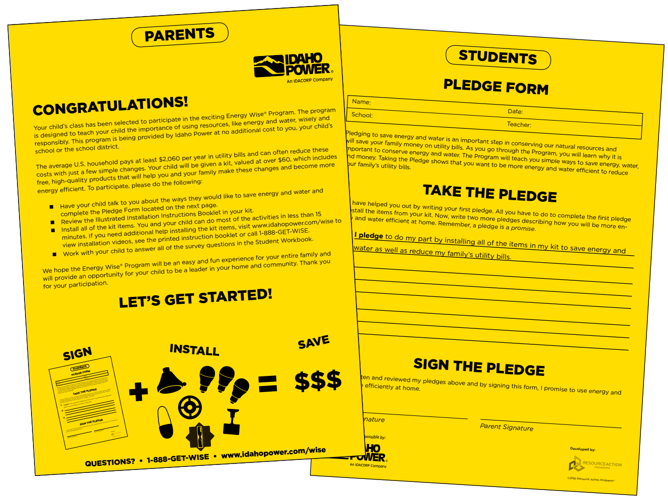
- Of teachers, 95% indicated parents supported the program and 100% said they would recommend the program to colleagues.
- Of parents, 100% indicated the program was easy for them and their child to use and 100% indicated they would like to see the program continued in local schools.
- The 2015-2016 school year's participants saved 1,198,093 kWh of electricity, enough to power 110 homes' electricity use for one year or avoided CO_2 emissions of 1,949 barrels of oil.[2]

[1]Percentage calculated based on number of kits delivered.
[2]Results derived from the Program Summary Report produced by Resource Action Programs, spring 2016 and https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

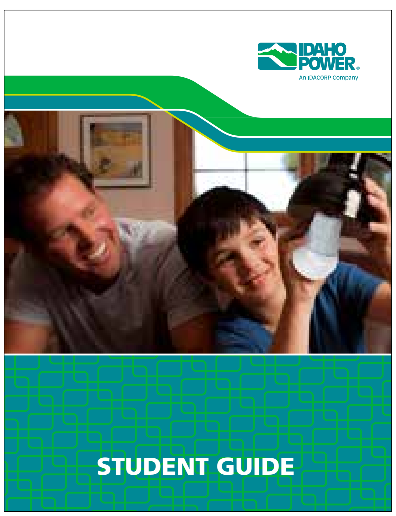
Program Materials



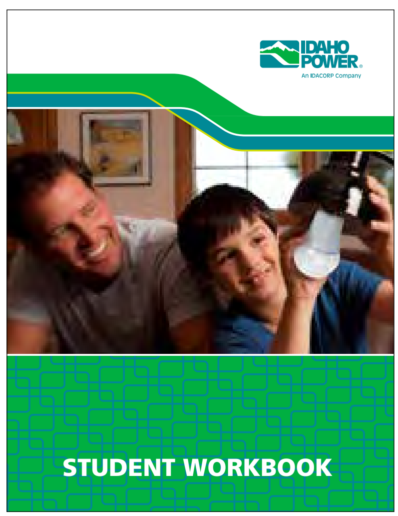
Teacher Evaluation Form



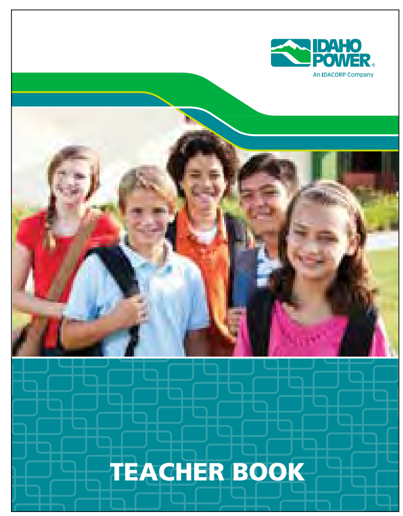
Parent Letter/Pledge Form



Student Guide

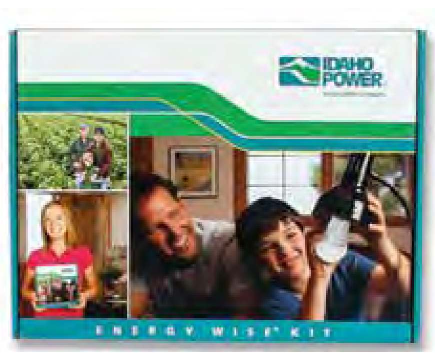


Student Workbook



Teacher Book

Certificate of Achievement



Kit Box

Introduction Video (flash drive) Pen

"The info supplied was very informative and a great way to teach kids about energy and its conservation. We also enjoyed the home involvement and the ability to learn and see what the kids are learning! :)"

[redacted] **Parent**
Maple Grove Elementary

Program Implementation

The 2016-2017 Idaho Power Energy Wise® Program followed this comprehensive implementation schedule:

1. Identification of Idaho state and national academic standards & benchmarks
2. Curriculum development and refinement (completed annually)
3. Curriculum correlation to Idaho state and national academic standards & benchmarks
4. Materials modification to incorporate Idaho Power branding
5. Incentive program development
6. Teacher outreach and program introduction by Idaho Power CERs
7. Teachers enrolled in the program individually by Idaho Power CERs
8. Implementation dates scheduled with teachers by Idaho Power CERs
9. Program material delivered to coincide with desired implementation date
10. Delivery confirmation
11. Periodic contact to ensure implementation and teacher satisfaction
12. Program completion incentive offered
13. Results collection
14. Program completion incentive delivered to qualifying teachers
15. Thank you cards sent to participating teachers
16. Data analysis
17. Program Summary Report generated and distributed

Participating teachers are free to implement the program to coincide with their lesson plans and class schedules. Appendix C provides a comprehensive list of classrooms in grades 3-6 that participated during the 2016-2017 school year.

For more than 23 years, Resource Action Programs (RAP) has designed and implemented Measure-Based Education® programs that inspire change in household energy and water use while delivering significant, measurable resource savings. All RAP programs feature a proven blend of innovative education, comprehensive implementation services, and hands-on activities to put efficiency knowledge to work in students' homes.

RAP has a strong reputation for providing a high level of client service as part of a wide range of energy efficiency education solutions for utilities, municipalities, states, community agencies, corporations, and more. In 2013, RAP was the only conservation services provider honored by the American Council for an Energy-Efficient Economy (ACEEE) and the Alliance for Water Efficiency (AWE) as one of 12 top programs that provides sustained achievement. RAP was honored for market penetration, innovative design, and its ability to achieve substantial/sustained energy and water savings.

ACEEE
American Council for an Energy-Efficient Economy

Alliance for Water Efficiency

Program Team

RAP implements nearly 300 individual programs that serve more than 400,000 households each year. All-inclusive program delivery occurs in its 80,000 square-foot Nevada Program Center where implementation teams and support departments work together to provide:

- 1:1 teacher support
- Curriculum development
- Customized materials
- Data tracking and reporting
- Energy and water efficiency measures
- Graphic and web design
- Kit assembly
- Marketing communications
- Shipping
- Printing
- Program management
- Participant enrollment
- Warehousing

The Implementation Team

For the Idaho Power Energy Wise® Program, RAP assigned a specific implementation team to Idaho Power made up of a PMP®-designated Program Manager, CEM®-designated energy analyst, graphic designer, outreach personnel, educator, and administrative staff. This team immersed themselves into the Idaho Power brand, and handled all program implementation for Idaho Power. Idaho Power also received the benefit of fully staffed support departments, which worked with the implementation team to define success for Idaho Power. These departments include education, marketing, information technology, and warehouse/logistics.

Continuous Improvement

In addition to successful implementation of the Idaho Power Energy Wise Program, RAP engages in continuous program improvement, as well as enhancements to educational materials, with modifications based on emerging technology, industry trends, and EM&V findings.

As part of this plan, RAP utilizes an extensive network of educators for program feedback. This feedback ensures that educational components meet the changing needs of educators, keep information relevant to students, and, in turn, provide increased water and energy literacy amongst program participants.

"As a parent, I liked the excitement my child had when she brought the kit home. Maybe now she'll understand what I'm talking about when I say to turn lights off, etc."

[redacted] **Parent**
Morningside Elementary School

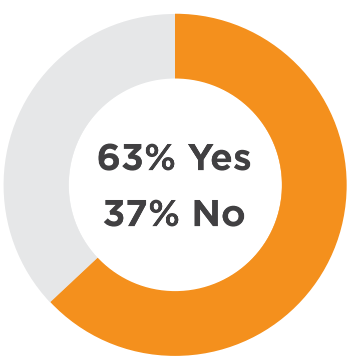
Program Impact

The Idaho Power Energy Wise® Program has had a significant impact within the community. As illustrated below, the program successfully educated participants about energy and water efficiency while generating resource savings through the installation of efficiency measures in homes. Home survey information was collected to track projected savings and provide household consumption and demographic data. Program evaluations and comments were collected from teachers, students, and parents. The following program elements were used to collect this data:

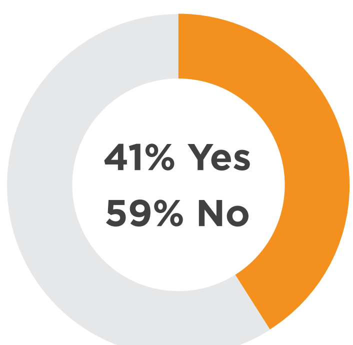
A. Home Survey for Capital Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 82 participating teachers in the Capital region, 44 (54%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,383 participating children in the Capital region, 1,121 (47%) returned completed surveys.

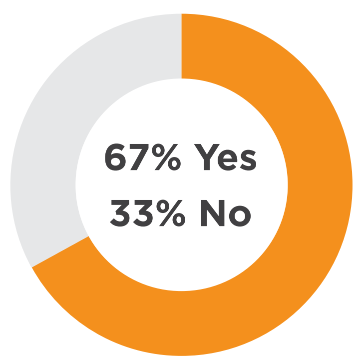
Did your family install the first 9-watt LED Light Bulb?	**Yes - 63%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 41%**
Did your family change the way they use energy?	**Yes - 67%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

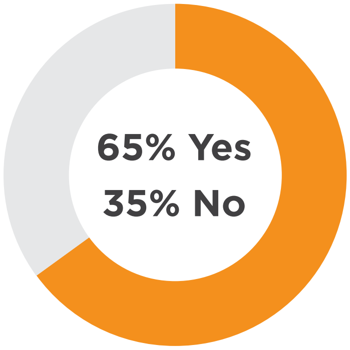


Students who indicated their family changed the way they use energy.

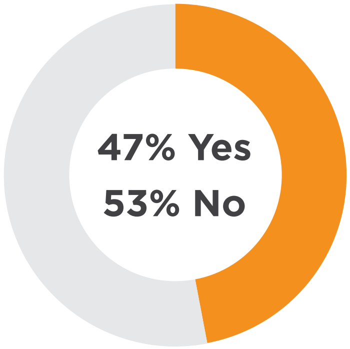
Home Survey for Canyon Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 99 participating teachers in the Canyon region, 80 (81%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,734 participating children in the Canyon region, 1,988 (73%) returned completed surveys.

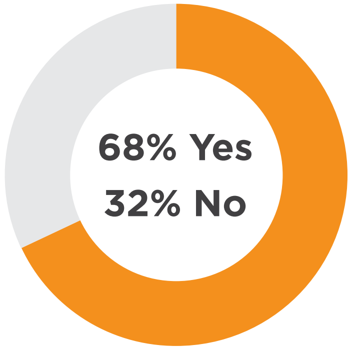
Did your family install the first 9-watt LED Light Bulb?	**Yes - 65%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 47%**
Did your family change the way they use energy?	**Yes - 68%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

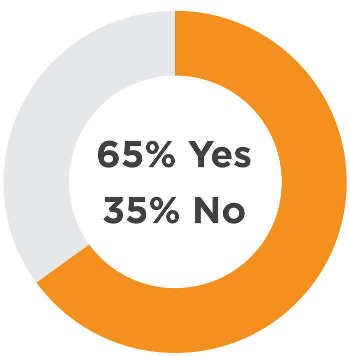


Students who indicated their family changed the way they use energy.

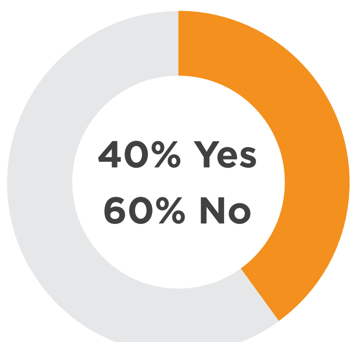
Home Survey for Eastern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 53 participating teachers in the Eastern region, 41 (77%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,458 participating children in the Eastern region, 1,056 (72%) returned completed surveys.

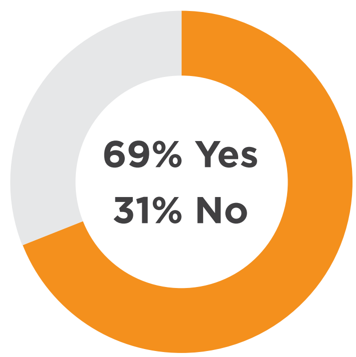
Did your family install the first 9-watt LED Light Bulb?	**Yes - 65%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 40%**
Did your family change the way they use energy?	**Yes - 69%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

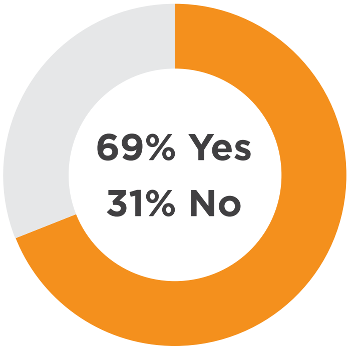


Students who indicated their family changed the way they use energy.

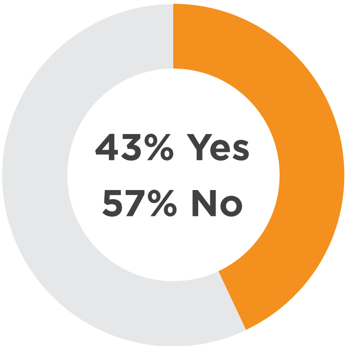
Home Survey for Southern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 40 participating teachers in the Southern region, 23 (58%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,165 participating children in the Southern region, 514 (44%) returned completed surveys.

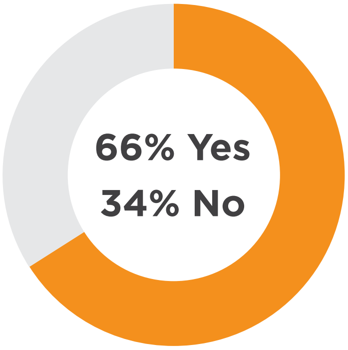
Did your family install the first 9-watt LED Light Bulb?	**Yes - 69%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 43%**
Did your family change the way they use energy?	**Yes - 66%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

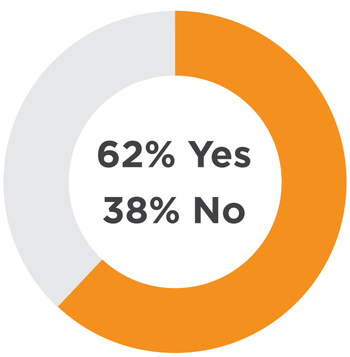


Students who indicated their family changed the way they use energy.

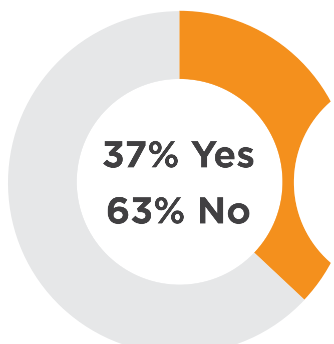
Home Survey for Western Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 34 participating teachers in the Western region, 20 (59%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 862 participating children in the Western region, 471 (55%) returned completed surveys.

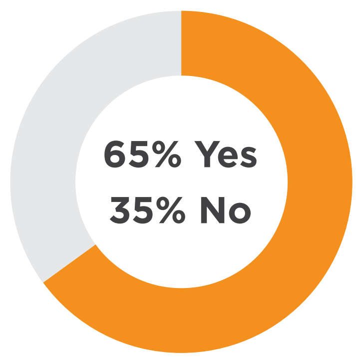
Did your family install the first 9-watt LED Light Bulb?	**Yes - 62%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 37%**
Did your family change the way they use energy?	**Yes - 65%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

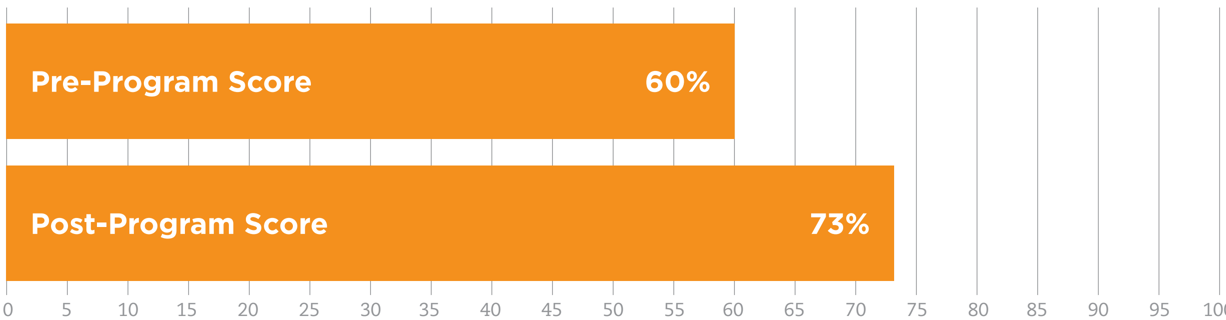


Students who indicated their family changed the way they use energy.

B. Pre-Program and Post-Program Tests

Students were asked to complete a 10-question test before the program was introduced and then again after it was completed to determine the knowledge gained through the program. The average student answered **6.0** questions correctly prior to being involved in the program and then improved to answer **7.3** questions correctly following participation. Of the 8,602 student households participating, 5,150 returned survey responses.

Scores improved from 60% to 73%.



Pre-Program and Post-Program Test Questions

		Pre	Post
1	Which layer of Earth do we live on?		
	Crust	71%	86%
	Mantle	7%	3%
	Inner Core	6%	3%
	Outer Core	16%	8%
2	Non-Potable water is safe to drink.		
	True	25%	15%
	False	75%	84%
3	Which of these is not a renewable resource?		
	Wind	21%	12%
	Plants	5%	3%
	Gold	58%	76%
	Animals	16%	9%
4	Saving water saves energy.		
	True	88%	94%
	False	12%	6%

Pre-Program and Post-Program Test Questions

		Pre	Post
5	Which are fossil fuels?		
	Coal	24%	19%
	Oil	10%	6%
	Natural Gas	13%	7%
	All of the above	53%	68%
6	Which type of energy is created in the process of Photosynthesis?		
	Nuclear Energy	21%	16%
	Thermal Energy	24%	22%
	Chemical Energy	30%	48%
	Electric Energy	25%	13%
7	Which Kit item will save the most natural resources?		
	Compact Fluorescent Lamp	37%	37%
	High-Efficiency Showerhead	30%	46%
	FilterTone® Alarm	16%	9%
	LED Night Light	16%	8%
8	Which major appliance uses the most energy?		
	Dishwasher	22%	17%
	Refrigerator	57%	65%
	Dryer	21%	18%
9	An LED (light emiting Diode) light bulb uses more energy than an incandescent bulb.		
	True	34%	19%
	False	66%	81%
10	On-peak time is the best time to play video games.		
	True	29%	17%
	False	71%	83%

C. Home Activities—Summary

As part of the program, parents and students installed resource efficiency measures in their homes. They also measured the pre-existing devices to calculate savings that they generated. Using the family habits collected from the home survey as the basis for this calculation, 6,305 households are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come. Of the 6,086 student households participating, 4,294 returned survey responses.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Number of Participants:	**8,910**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	13,535,566	135,355,657	gallons
Product Life: 10 years	892,816	8,928,163	kWh
	44,288	442,879	therms
Projected reduction from first 9-watt LED Light Bulb:	294,673	3,536,072	kWh
Product Life: 25,000 hours (12 years)			
Projected reduction from second 9-watt LED Light Bulb:	241,508	2,898,093	kWh
Product Life: 25,000 hours (12 years)			
Projected reduction from third 9-watt LED Light Bulb:	204,957	2,459,485	kWh
Product Life: 25,000 hours (12 years)			
Projected reduction from LED Night Light retrofit:	207,517	2,075,170	kWh
Product Life: 10,000 hours			
Projected reduction from FilterTone® installation:	176,680	1,766,796	kWh
Product Life: 10 years	8,754	87,539	therms
Projected reduction from Shower Timer installation:	8,563,877	17,127,754	gallons
Estimated Life: 2 years	28,021	56,041	therms
	564,880	1,129,760	kWh
TOTAL PROGRAM SAVINGS:	22,099,443	152,483,410	gallons
	2,583,030	22,793,540	kWh
	81,062	586,459	therms
TOTAL PROGRAM SAVINGS PER HOUSEHOLD:	2,480	17,114	gallons
	290	2,558	kWh
	9	66	therms

D. Teacher Program Evaluation

Program improvements are based on participant feedback received. One of the types of feedback obtained is from participating teachers via a Teacher Program Evaluation Form. They are asked to evaluate relevant aspects of the program and each response is reviewed for pertinent information. The following is feedback from the Teacher Program Evaluation for the Idaho Power Energy Wise Program. Of the 308 participating teachers, 175 returned teacher program evaluation surveys.

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

100% of participating teachers indicated they would conduct the program again given the opportunity.

100% of participating teachers indicated they would recommend the program to their colleagues.

What did students like best about the program? Explain.

"The lessons are standards-based and interesting. The students loved the kits."
Rene Bilkiss, Hunter Elementary School

"The students like the kits the best. Thy said their parents were surprised to learn how to save energy and water."
Angel Zeimantz, Wilson Elementary School

"Most were fascinated by how much electricity and water they use."
Katrina Burkhardt, Highlands Elementary School

"Looking at their thank you notes, it seems like they like the night lights! I think they also enjoyed the class discussions."
Lisa Jimenez, Silver Sage Elementary School

"The shower head and that the program helps their families save money. It teaches them ways to use energy efficiently and it gave them activities that they could do with their families."
Katie Strawser, Desert Springs Elementary School

"Students really enjoyed learning about alternative energy sources."
Rebecca Davis, Crimson Point Elementary

"The experiments and activities went over very well. The students also liked the materials that went home."
Jenni Jacobson, Filer Intermediate School

"They loved receiving the kits. The natural resources chapter fascinated them, and they loved the mini water cycles."
Elizabeth Waldon-Brooks, Amity Elementary School

"They asked to do this program all the time. They were sad when it was over, they wanted more."
Teresa O'Toole, Washington Elementary School

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

What did you like best about the program? Explain.

"It's hard to narrow it down to one thing because it is so well-written, organized, and fun."
Michelle Jenkins, Roosevelt Elementary

"I love that this program provides great opportunities to discuss conservation, resources, and the environment."
Melody Craw, Purple Sage Elementary School

"Many of the concepts are on the Science ISAT — so it is good introduction and learning for the test."
Megan Bullock, Edahow Elementary School

"I love that the students get to make a difference. They get to be educated on what our resources are and then work together to help conserve them."
Heather Mueller, Washington Elementary School

"I like that it ties in with our science and math standards. Also, we have a very low income district, students may not have access to these things under normal circumstances."
Katie Strawser, Desert Springs Elementary School

"I like the alignment to science standards and connection to real world needs. It makes conservation relevant to students."
Mickie Barrett, Crimson Point Elementary

"The materials really helped explain energy and ways students can make an impact. Thank you for including the standards for each grade."
Rhonda Wilson, Roosevelt Elementary

"The program covers our science standards, so we don't have to 'make' a hole in our teaching for it."
Jenni Jacobson, Filer Intermediate School

What would you change about the program? Explain.

"I really like what Idaho Power has put together. Maybe help with some suggestions for community service opportunities."
Sandra Otero, Wilson Elementary School

"My delivery. It is my first year teaching this. Next year will be better. :)"
Sally Blair, Snake River Elementary

"I would give myself more time to prepare and try to do the classroom activities. But I wouldn't change the program."
Danielle Hayes, Westside Elementary School

E. Parent/Guardian Program Evaluation

Parent involvement with program activities and their children is of paramount interest to both Idaho Power and teachers in the program. When parents take an active role in their child's education it helps the schools and strengthens the educational process considerably. When students successfully engage their families in retrofit, installation, and home energy efficiency projects, efficiency messages are powerfully delivered to two generations in the same household. The program is a catalyst for this family interaction, which is demonstrated by feedback from Parent/Guardian Program Evaluations. The following is feedback from the Parent/Guardian Program Evaluations for the Idaho Power Energy Wise Program. Of the 8,602 participating families, 101 parents returned program evaluation surveys.

Parent Response

(A summary of responses and regional data can be found in Appendix E)

100% of participating parents indicated that the program was easy to use.

100% of participating parents indicated they would continue to use the kit items after the completion of the program.

100% of participating parents indicated they would like to see this program continued in local schools.

As a parent, which aspect of the program did you like best?

"The hands-on involvement and educational value for my daughter."
[redacted] **Camas County School**

"My daughter was so excited to bring home a box of things to make our home more efficient and set them all up."
[redacted] **Crimson Point Elementary**

"I liked that my 4th grader started taking shorter showers and helping us all remember to turn off lights."
[redacted] **Eliza Hart Spalding Elementary School**

"I like that my child was really excited to teach us how to save energy and how we can make a difference."
[redacted] **Glenns Ferry Elementary**

"I think it's very important to raise this kind of awareness. My daughter and I learned a lot of interesting new things."
[redacted] **Idaho Arts Charter School**

"Teaching the kids why it's important to save power and helping them want to do it."
[redacted] **Lakevue Elementary School**

"The shower timer was a great visual for my kids. They tried to beat the time. The air filter prompted me to find my air filter and then realize that it was past due to change."
[redacted] **Owyhee Elementary**

"The packet was easy to understand. We completed it as a family. Great Program."
[redacted] **Blackfoot Charter Community Learning Center**

Parent Response

(A summary of responses and regional data can be found in Appendix E)

"The ease of the kit, the excitement my child had to conserve energy. It was easy to implement but had high impacts!"
[redacted] **Pierce Park Elementary**

"The whole program was beneficial and educational for the whole family."
[redacted] **Wilson Elementary School**

Are there any comments you would like to express to your child's program sponsor?

"Keep this up! The more our children understand that they can make choices for better efficiency, energy saving and how to save money the better off our future environment will be!"
[redacted] **Christine Donnell School of Arts**

"Thank you! We live in a new home, but we discovered that our house isn't quite as energy efficient as it could be. And all of the kids are on board to use the shower timer, etc."
[redacted] **Crimson Point Elementary**

"Thank you! What a wonderful way to help parents see the actually savings from making minor home changes. And the gifts for this purpose were much appreciated."
[redacted] **Cynthia Mann Elementary School**

"I think this is a great program to set kids to be aware of energy conservation."
[redacted] **Cynthia Mann Elementary School**

"The program is one of the best I have seen for my son. Everyone in the family is now aware of how to be energy efficient. Thank you!"
[redacted] **Eliza Hart Spalding Elementary School**

"Continue sharing this with kids to make them more conscientious of the ways we can help save the environment. My kid was really excited when he got home. The awareness it brings is amazing what they can learn and appreciate with this new information."
[redacted] **Hunter Elementary School**

"My daughter loves summer and was excited to start this program. The program helps our family to learn how to better use our energy."
[redacted] **Wilson Elementary School**

"Really good program to teach our kids the value of things."
[redacted] **Glenns Ferry Elementary**

"Thank you for stressing the importance of saving energy."
[redacted] **Groveland Elementary**

F. Teacher Letters

Dear Idaho Power,

Thank you so much for the opportunity to participate in this program! It was a great chance for the students to experience hands on how they can conserve energy and make our city a cleaner and better place to live.

The students really enjoyed receiving their kits and completing the activities at home. I know that many were excited about the simple ways that they can conserve such as using the shower timer, switching out light bulbs, and simply plugging in an LED night light. The ease of the Energy Kits was great for the students and teacher.

It was such a simple process to go through the text with the students. I loved how organized the materials were and how meaningful the activities were. As a whole, the program is organized extremely well. In fact, I recently sent in a request for an energy kit for my home through Idaho Power.

The students learned a lot about conservation through this program. In fact, during our Genius Hour (a time students get to research and learn about a topic of their choice) a student chose to research pollution/energy and what she as a 5th grader could do to improve the environment. It was neat to see a student take a real interest and dip deeper into a topic that was interesting to her.

I am excited to participate in this program again next year. I hope to be able to spend more time on activities to make the program even more meaningful for the students.

Thank you again for providing schools and students with such a simple, well organized, and meaningful way for students to learn about conservation and energy. It is a great experience for all students!

With much appreciation,

Laura VanDerschaaf

Laura VanDerschaaf
5th Grade – Lake Ridge Elementary

Teacher Letters

(continued)

I.T. STODDARD

April 10, 2017

Stoddard Stars
Phone 208-785-8832
Fax 208-785-8834

Principal, Christine Silzly
460 York Drive
Blackfoot, ID 83221

To Whom It May Concern:

Thank you for the opportunity to teach the Idaho Power Energy Wise Program. It was a very beneficial program for my students. They gained knowledge about natural resources, renewable and nonrenewable resources, how electricity was made and how to save energy.

My students were thrilled to receive their energy saving kits. Their parents were also delighted. I was excited with the way the program aligned with the science curriculum we are required to teach in fifth grade.

Thank you again for the funding, time and effort you put into this beneficial program. We appreciate your support.

Sincerely,

Kimberly Burk
5th grade teacher
Stoddard Elem.

Idaho Power
750 4th Street
Sparks, NV 89431-9998

To Whom It May Concern:

On January 25, 2017, a local representative from Idaho Power visited my classroom of fourth graders to introduce the Energy Wise Program. The students were very excited! This person did an outstanding job of getting the students eager to learn how they can, at their young age, help conserve energy. The students were amazed at the items located in their Energy Wise box as well as the Student Workbook.

As we incorporated energy into our curriculum, the students learned of the various forms of energy and how Idaho Power and Idaho citizens can help ensure that power remains available to all of us. I greatly appreciate the Student Guidebooks for students to follow along and learn. The added bonus of the wristband was very encouraging for students to complete the assignments.

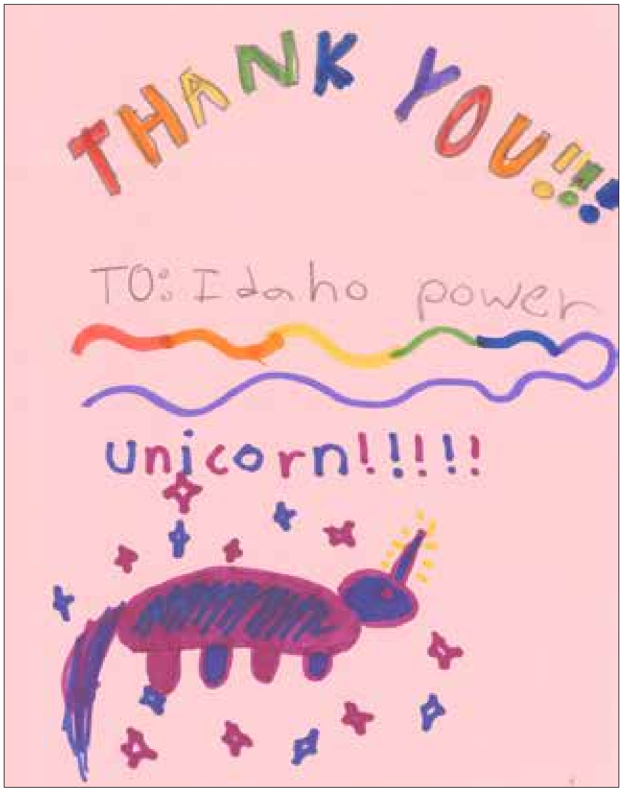
It is very generous of Idaho Power to provide these materials and instructions books to each fourth grader in our school. As an educator who formerly taught in another district, I was pleased to see that this program was available to my students at this school district as well. The students tell me often that they continue to use the items provided and they are becoming energy responsible.

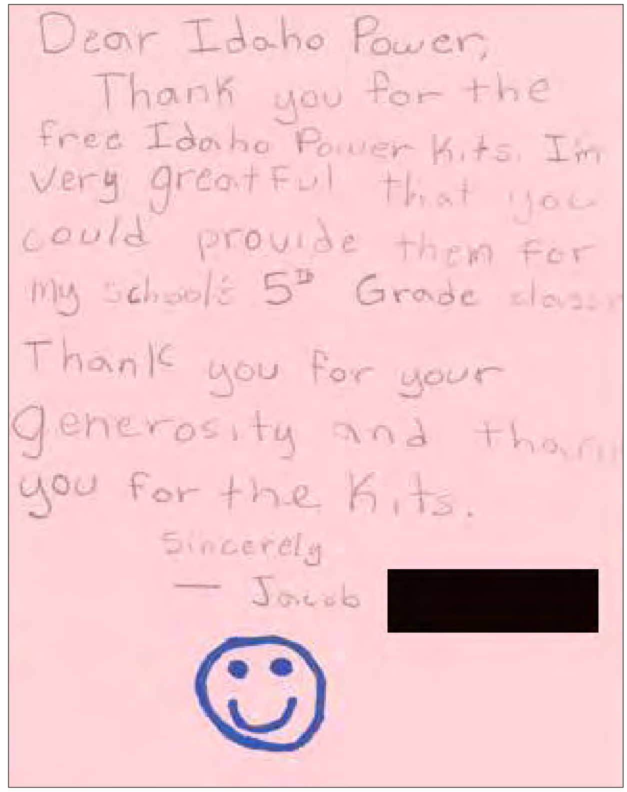
I look forward to implementing your program in my classroom again next year and, again, thank you for providing the materials, home kits, lesson plans, and on-site visit to our classes.

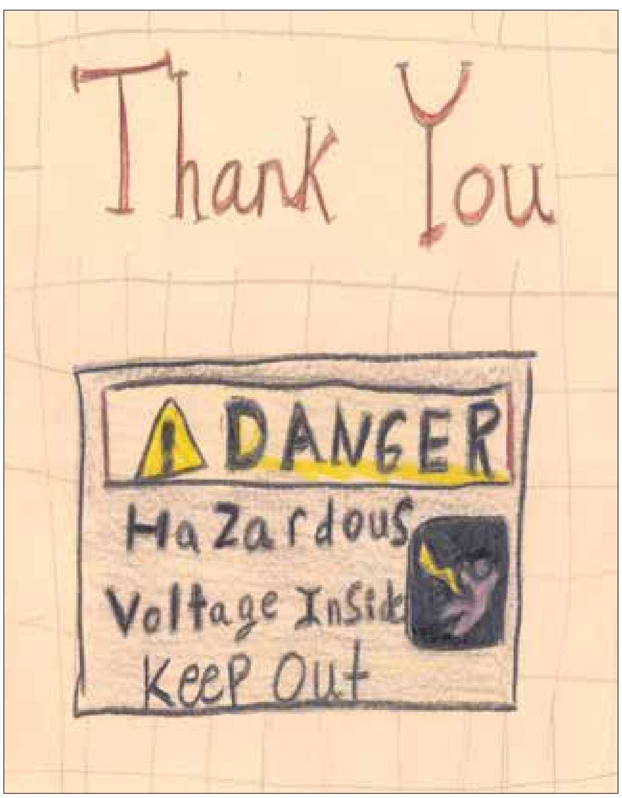
Sincerely,
Terri Domme

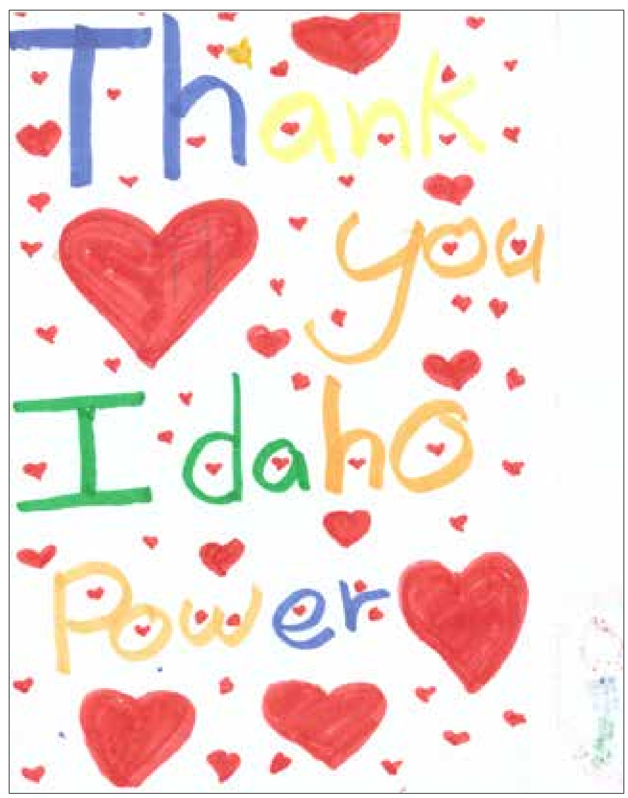
Terri Domme
Mill Creek Elementary
500 N Middleton Road
Middleton, ID 83644
tdomme@msd134.org

G. Student Letters




Dear Idaho Power,
Thank you for the free Idaho Power Kits. I'm very greatful that you could provide them for my school's 5th Grade clas
Thank you for your generosity and than you for the kits.
Sincerely
— Jacob [redacted]





Student Letters

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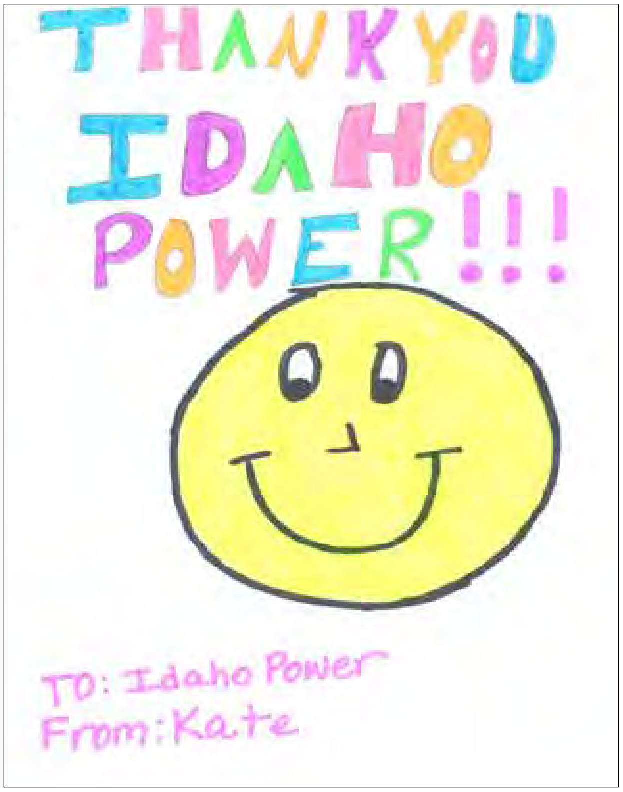

Student Letters

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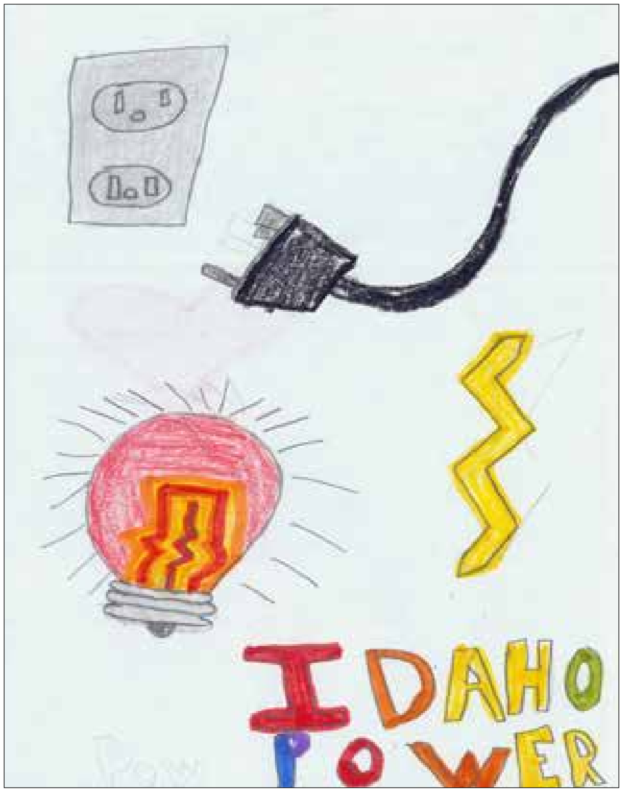

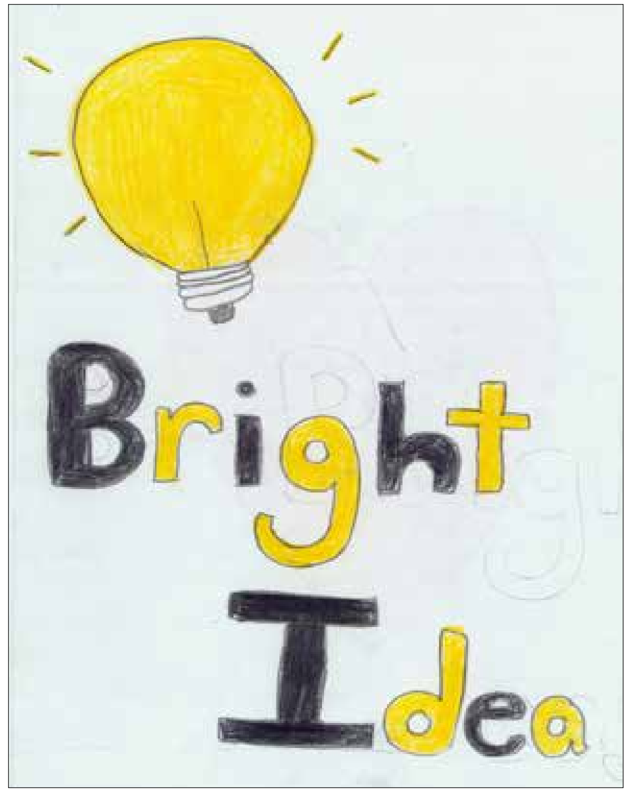

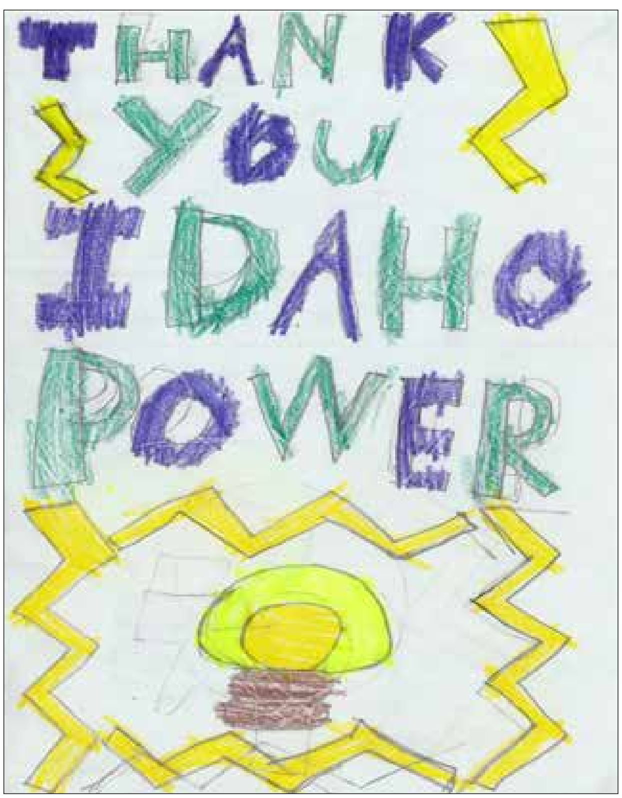

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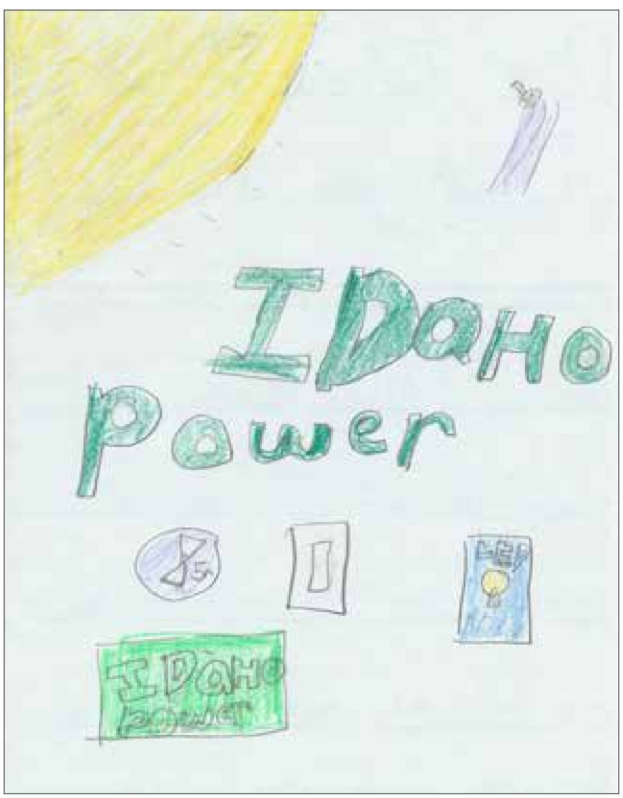

Student Letters

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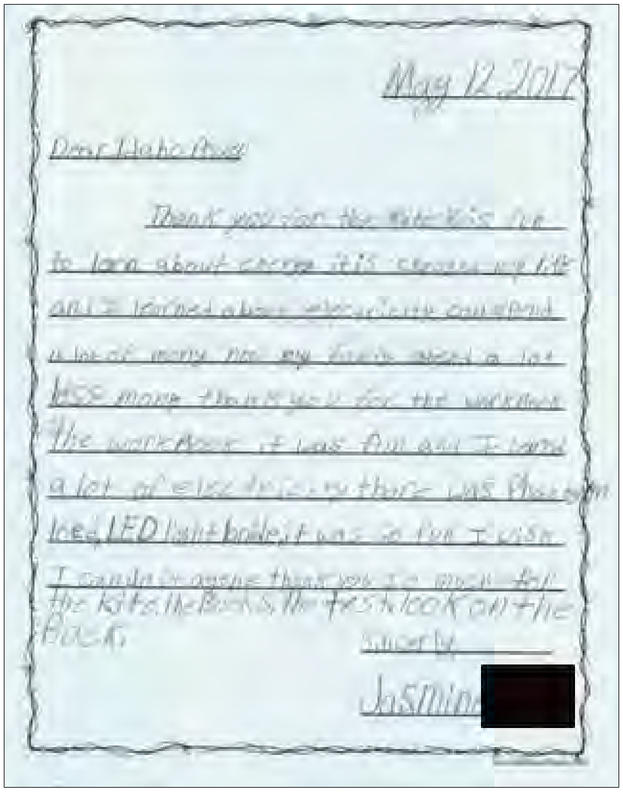


May 12, 2017

Dear Idaho Power

Thank you for the [illegible] fun
to learn about energy it's [illegible]
and I learned about electricity [illegible]
a lot of money [illegible] my family [illegible] a lot
less money thank you for the workbook
the workbook it was fun and I learned
a lot of electricity there was [illegible]
LED light bulb, it was so fun I wish
I [illegible] thank you so much for
the kits the Books the [illegible] on the
Book.

Sincerly,

Jasmine [redacted]

May 12, 2017

Dear Idaho Power,

Thank you for the kit. I [illegible]
with my family to save money
and electricity. One of my favorite
lesson is how to get rid of phantom
load. I use the LED light bulb.
That will help me with money.
I'm going to use the night light
to save more money than a lamp.
Thank you so much!

Sincerely,

Brooke [redacted]

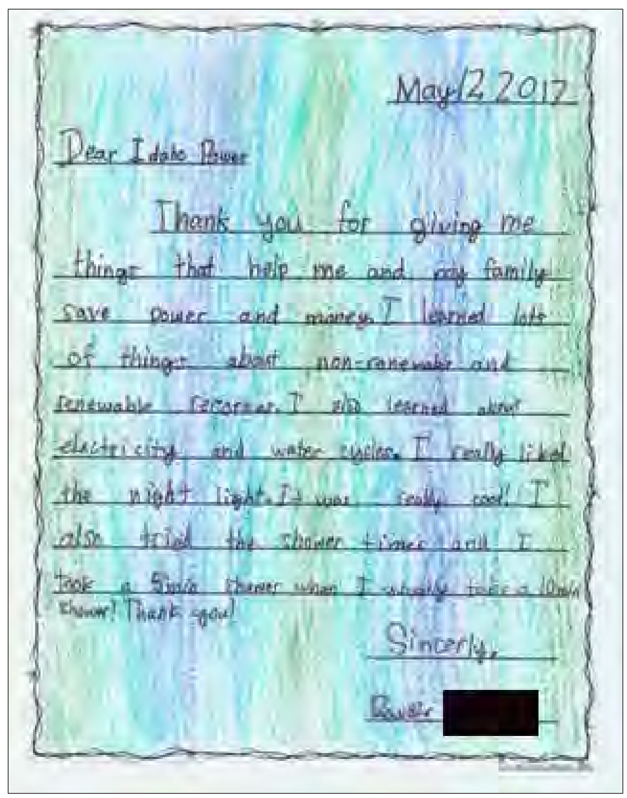
May 12, 2017

Dear Idaho power,

Thank you for the kit
cause the kits helped us
alot to save money and
we learned alot about
energy. My favorite part was
trying the items in the
kit my favorite thing to
do was see how much
the water flows in seconds.

Sincerly,

Aaliyah [redacted]



May 12 2017

Dear Idaho Power

Thank you for giving me
things that help me and my family
save power and money. I learned lots
of things about non-renewable and
renewable resorces. I also learned about
electricity and water cycles. I really liked
the night light. It was really cool! I
also tried the shower timer and I
took a 5min shower when I usually take a 10min
shower! Thank you!

Sincerly,

Rowen [redacted]

(continued)

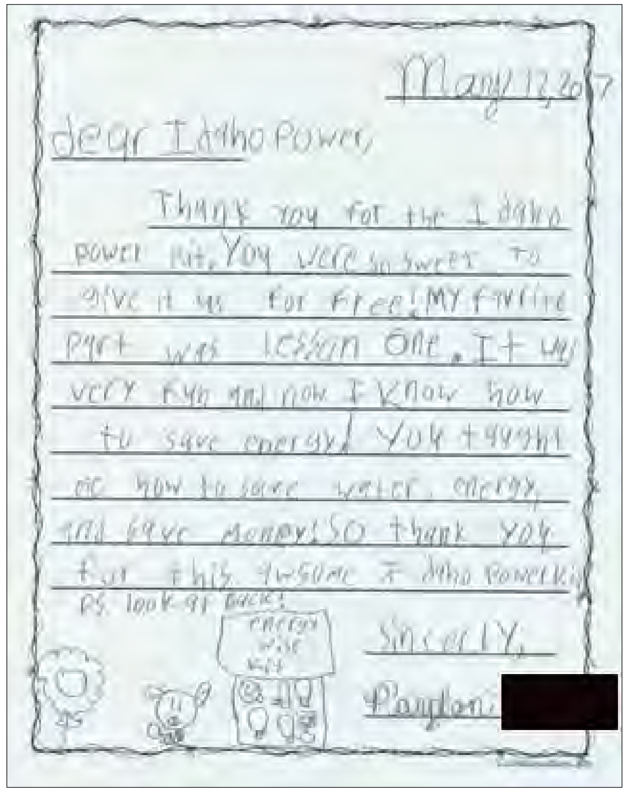
May 12 2017

dear Idaho Power,

Thank you this wonderful kit! You have helped me and my family! You guys have taught me to save money and reduce power. I loved learning about the three r's reduce, recycle, and reuse. To thank you for saving me and my family money, P.S look at down

Sincerly

Payton [redacted]



May 12, 2017

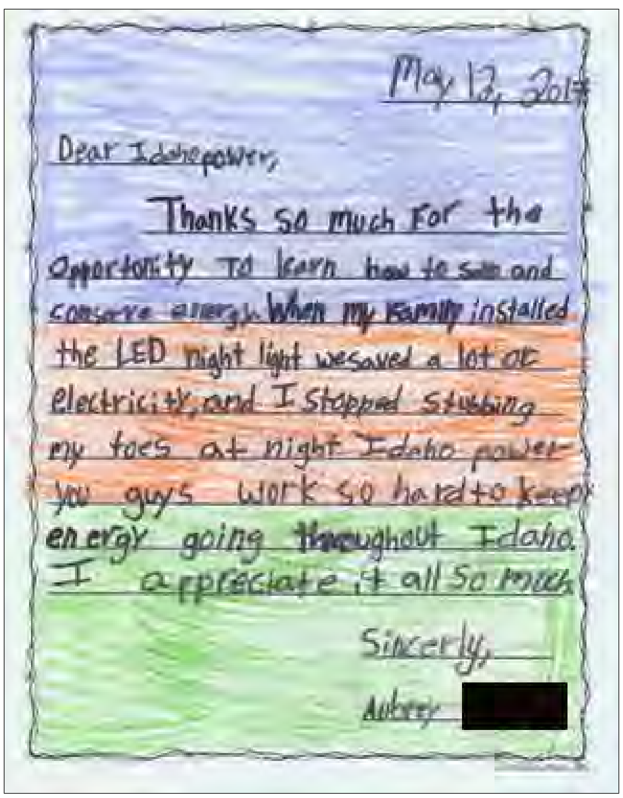
dear Idaho Power,

Thank you for the Idaho power kit. You were so sweet to give it us for free! My favrite part was lesson one. It was very fun and now I know how to save energy! You taught me how to save water, energy, and save money! So thank you for this awsome Idaho Power kit

P.S. look at back!

Sincerly,

Paylon [redacted]



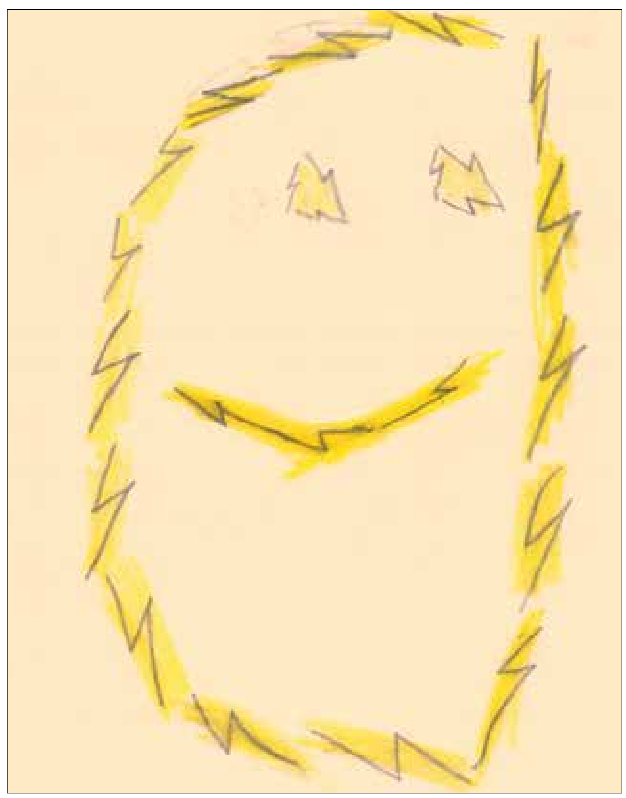
May 12, 2017

Dear Idahopower,

Thanks so much for the opportunity to learn how to save and conserve energy. When my family installed the LED night light we saved a lot of electricity, and I stopped stubbing my toes at night. Idaho power you guys work so hard to keep energy going throughout Idaho. I appreciate it all so much.

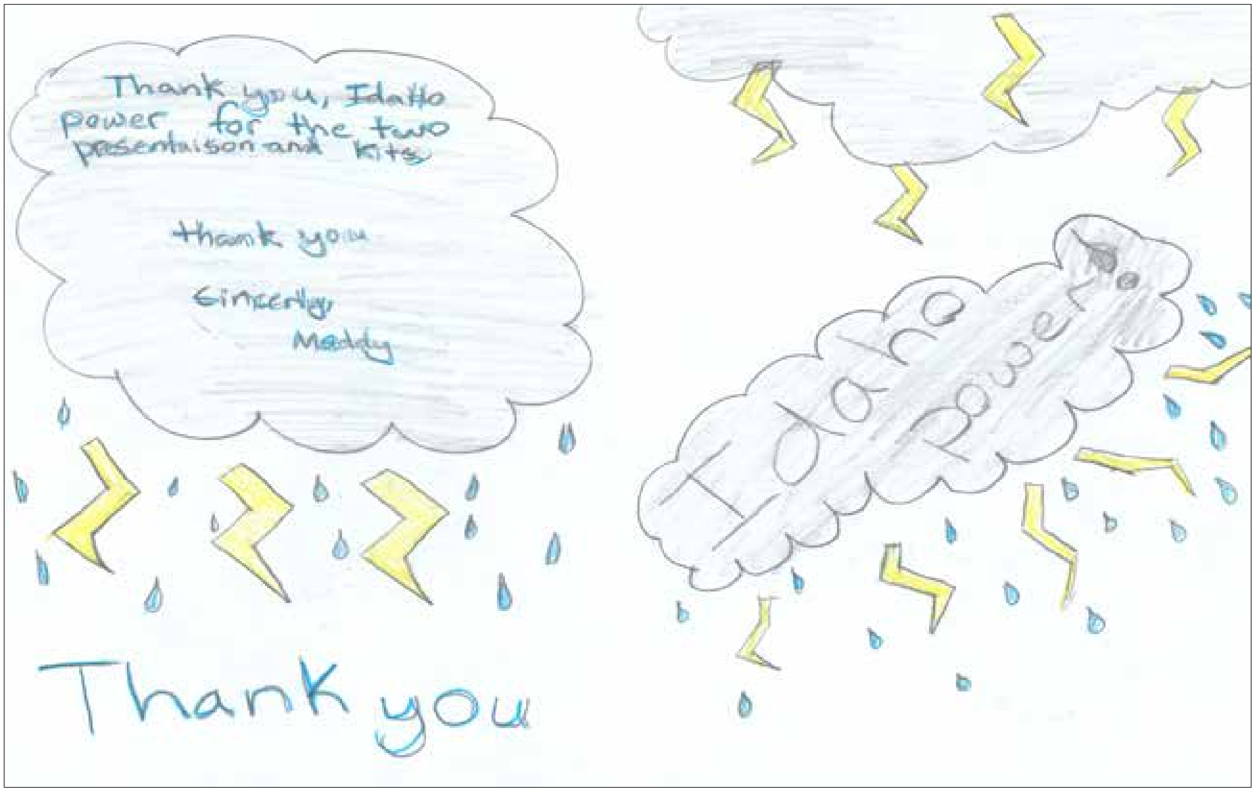
Sincerly,

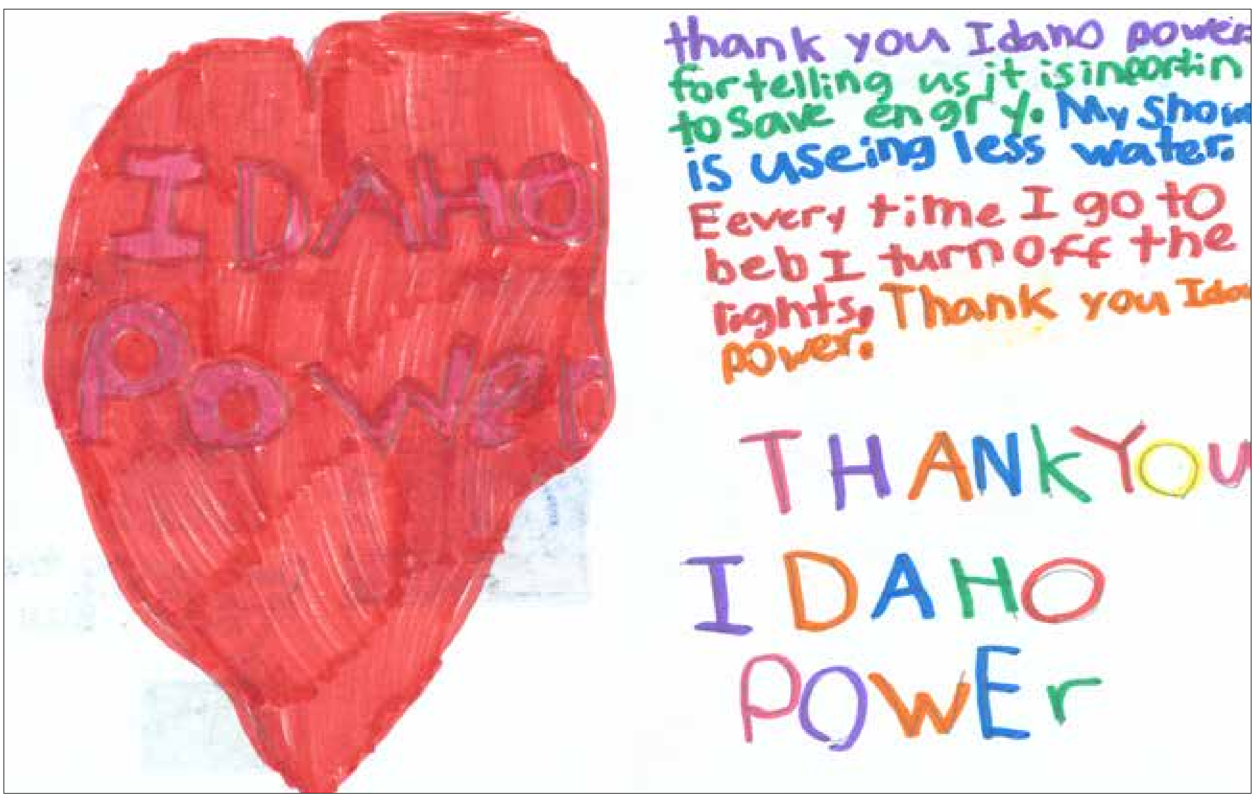
Aubrey [redacted]



Student Letters

(continued)





Student Letters

(continued)

Dear Idaho Power,

Thank you for everything you have done for us this year. When the lady came to give us the lesson I was kinda freaked out after that video. But The kits look cool. I never actually used anything in there. I don't even know whats in the kit. But if I ever open it I will make sure that I use the stuff in it. I know that there is a LED light bulb, Shower timer, and a fringe thing.

I know I haven't used them but I think that they would be great. But thank you for everything that you have done for us. Giving us the kits, student workbooks, and guidebooks. So thank you. I have no more to say. I mean I learned a lot. Like Phantom Loads. Those are very interesting like I know that sometimes power would stay on but not that whole time unless shut down completely. So once again thank you for everything that you have done for us.

So thank you for everything that you have given us and shared with us. It's awesome to think about isn't it. That I thought Idaho Power wouldn't do anything this year but you did. THANKS

Sincerely,

[redacted]

Jeffrey [redacted]

Dear Idaho Power,

Thank you so much for the energy saving kit. I've only used the LED light bulbs and the night light. They both work really good. The light bulbs work better than I expected. The night light is my favorite because it only comes on when my lights are off or when my room is dark. I plan on using the rest of the things in my kit. Thanks for the opportunity to learn about energy saving. I appreciate the things i got in the kit. The LED light must have been a lot of money because they work so well. I never knew that it took 100 gallons of water to produce a potato and 700 gallons of water to produce one cotton shirt. I also didn't know that saving water saves energy. Thank you for everything.

Sincerely,

Saige

Saige

THANK YOU IDAHO POWER!

I'm thanking you for giving me the Idaho power Box Kit. I used the light bulbs in my room on my lamp. I thought i should say Thanks for The Kit because we need to save more energy and not use a whole lot. I also used the night light now i really don't need my tvs light when i go to sleep. I also use things like the thermometer. It helped a lot my fridge was not too cold and not to hot. We couldn't put in the shower head. I also used the shower timer but I really didn't go the right amount of time because i wash my hair twice.

I will use these items for when we are like running out of water. I plan on using the shower head when i move away because like i would use it now but my show thing is bent and not able to be put on. I know for a fact i will use all of it. I will use each lightbulb in every nook and cranny in my house. I thank you for coming in and talking to me and my classmates. It made us all learn about safety in how the like wires on the pole are electical so we shouldn't touch them because literally you will go to the hospital and maybe possibly die. So thanks for coming. We all seriously learned a lot from that talk. I learned a lot to. So thank you for coming and giving us our Idaho Power Kit box.

Sincerely,

Kandace Kandace

Dear Idaho Power,

Thank you for everything you do in the city. You guys can do things that are very dangerous and stuff that can sometimes be bad enough to kill people. I have learned a lot of new things because of the book you guys gave us. I used the night light for my brother because he is scared of the dark. I learned how leaving doors open isn't that good so now I close them when I leave rooms. I have learned so much from you guys!

The Idaho Power book you gave to us was very useful. I have used everything in it. Although, the shower timer fell because it didn't stick to the wall so that broke. I use the timer on my phone though. I time it for 4 minutes. Sometimes 5. My parents are remodeling their room and they don't have a shower thing(I can't remember what it is called) so they used the nice one I got from the kit. I was the first one to use it.

In conclusion I really want to thank you guys for everything that you do. You have already done so much for our community. You guys deserve to get a box of doughnuts and chocolate every day. Sorry I don't have that type of money but for what you do you deserve great stuff everyday of your lives. Thank you Idaho Power!!

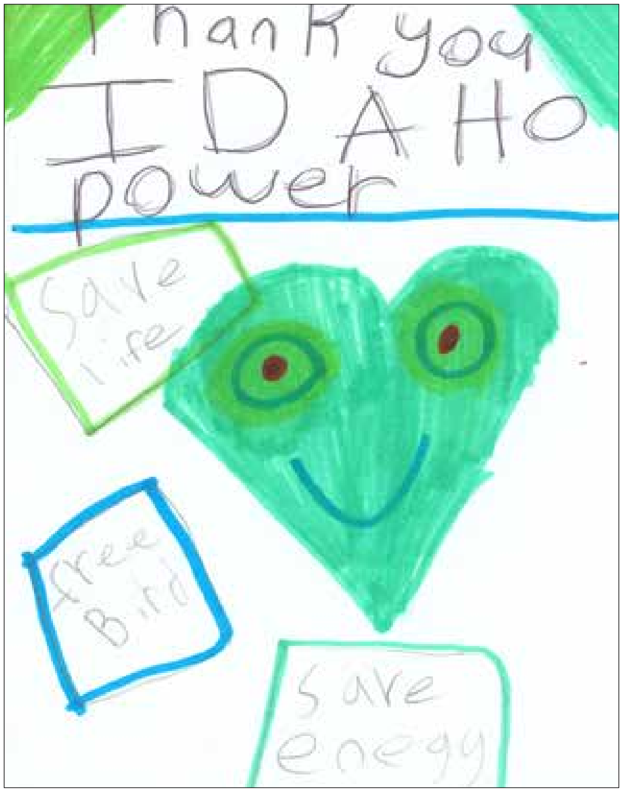
From,

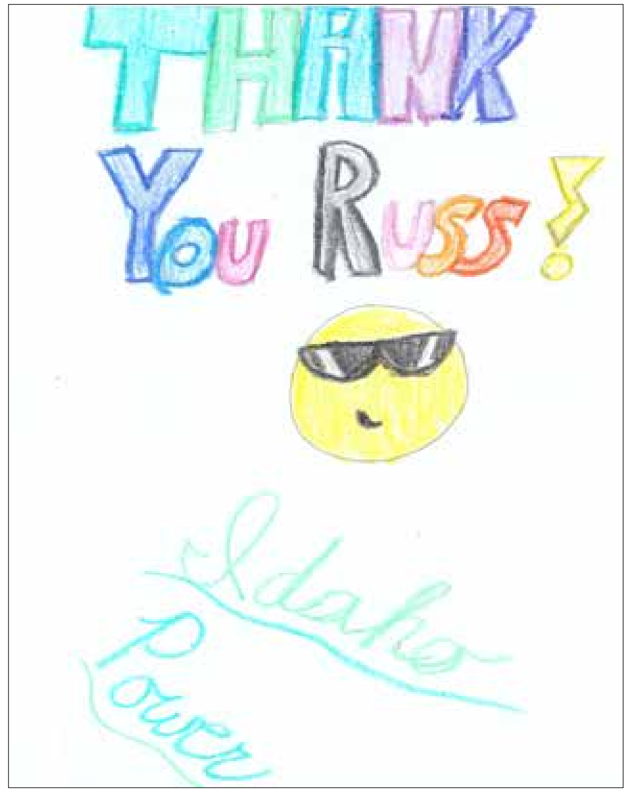
Tyson [redacted]

Tyson [redacted]

Student Letters

(continued)





Dear Idaho Power,

Thank you for our kits you gave us and all the stuff inside of it of the kits.

I am grateful for them even though I only used the the night light and the bag rest of the stuff in the kit. I also used the bag thing. It was very useful cause we found out that we were using a lot and I mean a lot of water. so my dad fixed that.

All the stuff we did not used went to people around my neighborhood that need it. All of them also wanted to say thank you soo very much. I am very happy for the kit and everything in it.

But thank you so much for the kits and all the stuff in it. Even though that I am not going to use all of the stuff I am really grateful for all of it.

Sincerely,

Fiona [redacted]

Fiona [redacted]

Thank You Idaho Power 4-14-17

Thank you Idaho Power for everything you have done. Thank you for coming into our classroom and teaching us how to be safe around electricity. Thank you for building big turbines and windmills to help give power to Idaho. Thanks for giving us a Idaho power book to help us learn more about science and how to save some electricity. You have helped me understand what a kilowatt and kilowatt-hour is. You've helped me understand what a non renewable resource and a renewable resource is.

Thank you for providing us a Idaho Power kit to help save energy. Thank you for giving me a shower head to help save water and lower water bills. Thank you for giving me a thermostat to attach to my fridge. Thanks for the led light bulbs to help save power and lower electricity bills. Thank you for giving me a night light to help me go to sleep. Thank you for everything that you have provided us and much more.

-From

[redacted]

Dear Idaho Power,

Thank you very much for the light bulb, shower head, and the shower timer. I learned a lot about Idaho Power because of the student workbook. It had a lot of facts about how 71% of are surface is water! Thank you very much for all the stuff that you gave us and our families.

Idaho Power, you guys gave us a lot of things that has helped me and my family. I am really thankful because it helps families that don't have anything really for there houses! That shower head is really handy and can help many people that take long showers.

Thank you again for all the things that you gave us in the kit because it has helped A LOT. The student workbook is very good thing to have to because there is a glossary and some Did You Know questions. Again and Again the kits are very helpful and they have helped my family a lot and the books that went with the kits these are nice to! Thank you, Thank you, Thank you!!

Sincerely,

Hallie [redacted]

Hallie [redacted]

"I like the understanding the kids gain about resources, and how they can conserve energy personally in the way they conduct their lives."

Brenda Fly, Teacher
Birch Elementary School

Appendices

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Projected Savings from Showerhead Retrofit

Showerhead Retrofit Inputs and Assumptions:

Average household size:	5.12	people[1]
Average number of full bathrooms per home:	2.01	full bathrooms per home[1]
% of water heated by gas:	49.80%	[1]
% of water heated by electricity:	50.20%	[1]
Installation / participation rate of:	42.89%	[1]
Average Showerhead has a flow rate of:	1.97	gallons per minute[1]
Retrofit Showerhead has a flow rate of:	1.27	gallons per minute[1]
Number of participants:	8,910	[1]
Shower duration:	8.20	minutes per day[2]
Showers per day per person:	0.67	showers per day[2]
Product life:	10	years[3]

Projected Water Savings:

Showerhead retrofit projects an **annual** reduction of:	13,535,566	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	135,355,657	gallons[5]

Projected Electricity Savings:

Showerhead retrofit projects an **annual** reduction of:	892,816	kWh[2,6]
Showerhead retrofit projects a **lifetime** reduction of:	8,928,163	kWh[2,7]

Projected Natural Gas Savings:

Showerhead retrofit projects an **annual** reduction of:	44,288	therms[2,8]
Showerhead retrofit projects a **lifetime** reduction of:	442,879	therms[2,9]

1 *Data Reported by Program Participants.*

2 *(March 4, 2010). EPA WaterSense® Specification for Showerheads Supporting Statement. Retrieved from http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf*

3 *Provided by manufacturer.*

4 *[(Average Household Size x Shower Duration x Showers per Day per Person) ÷ Average Number of Full Bathrooms per Home] x (Average Showerhead Flow Rate - Retrofit Showerhead Flow Rate) x Number of Participants x Installation Rate x 365 days*

5 *[(Average Household Size x Shower Duration x Showers per Day per Person) ÷ Average Number of Full Bathrooms per Home] x (Average Showerhead Flow Rate - Retrofit Showerhead Flow Rate) x Number of Participants x Installation Rate x 365 days x Product Life*

6 *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity*

7 *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Product Life*

8 *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas*

9 *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Product Life*

Projected Savings from Shower Timer Installation

Shower Timer Inputs and Assumptions:

% of water heated by gas:	**49.80%**	[1]
% of water heated by electricity:	**50.20%**	[1]
Installation / participation rate of Shower Timer:	**75.79%**	[1]
Average showerhead has a flow rate of:	**1.97**	gallons per minute[1]
Retrofit showerhead has flow rate of:	**1.27**	gallons per minute[1]
Number of participants:	**8,910**	[1]
Average of baseline and retrofit showerhead flow rate:	**1.62**	gallons per minute[2]
Shower duration:	**8.20**	minutes per day[3]
Shower timer duration:	**5.00**	minutes per day[4]
Showers per capita per day (SPCD):	**0.67**	showers per day[3]
Percent of water that is hot water:	**73%**	[5]
Days per year:	**365.00**	days
Product life:	**2.00**	years[5]

Projected Water Savings:

Shower Timer installation projects an **annual** reduction of:	**8,563,876.91**	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	**17,127,753.82**	gallons[7]

Projected Electricity Savings:

Shower Timer installation projects an **annual** reduction of:	**564,880**	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	**1,129,760**	kWh[9]

Projected Natural Gas Savings:

Shower Timer installation projects an **annual** reduction of:	**28,021**	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	**56,041**	therms[11]

1 Data Reported by Program Participants.

2 Average of the baseline GPM and the retrofit GPM

3 (March 4, 2010). EPA WaterSense® Specification for Showerheads Supporting Statement. Retrieved from http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf

4 Provided by manufacturer.

5 Navigant EM&V Report for Super Savers Program in Illinois PY7

6 Annual water savings = Water Flow (Average of baseline and retrofit flow) × (Baseline Shower duration - Shower Timer duration) × Participants × Days per year × SPCD × Installation Rate of Shower Timer

7 Projected Annual Water Savings x Product Life

8 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Participants

9 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Product Life x Participants

10 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Participants

11 Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Product Life x Participants

Projected Savings from FilterTone® Alarm Installation

FilterTone® Installation Inputs and Assumptions:

Annual energy (electricity) use by a central air conditioner:	**4,467**	kWh[1]
Annual energy (natural gas) use by a central space heating or furnace:	**421**	therms[1]
Projected increase in efficiency (electricity):	**1.75%**	[2]
Projected increase in efficiency (natural gas):	**0.92%**	[2]
Product life:	**10**	years[3]
Installation / participation rate of:	**25.37%**	[4]
Number of participants:	**8,910**	[4]

Projected Electricity Savings:

The FilterTone installation projects an **annual** reduction of:	**176,680**	kWh[5]
The FilterTone installation projects a **lifetime** reduction of:	**1,766,796**	kWh[6]

Projected Natural Gas Savings:

The FilterTone installation projects an **annual** reduction of:	**8,754**	therms[7]
The FilterTone installation projects a **lifetime** reduction of:	**87,539**	therms[8]

1 U.S. Department of Energy, Energy Information Administration 2005 Residential Energy Consumption Web site for Mountain West States: http://www.eia.gov/consumption/residential/data/2005/

2 Reichmuth P.E., Howard. (1999). Engineering Review and Savings Estimates for the 'Filtertone' Filter Restriction Alarm.

3 Provided by manufacturer.

4 Data reported by program participants.

5 Annual energy (electricity) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (electricity) x Installation rate x Number of participants

6 Annual energy (electricity) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (electricity) x Installation rate x Number of participants x Product life

7 Annual energy (natural gas) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (natural gas) x Installation rate x Number of participants

8 Annual energy (natural gas) use by a central air conditioner, heat pump or furnace x Projected increase in efficiency (natural gas) x Installation rate x Number of participants x Product life

Projected Savings from First 9-watt LED Light Bulb Retrofit

First 9-Watt LED Light Bulb Retrofit Inputs and Assumptions:

Product life:	**25,000**	hours[1]
Watts used by the LED light bulb:	**9**	watts[1]
Hours of operation per day:	**2.81**	hours per day[2]
Watts used by the replaced incandescent light bulb:	**58.79**	watts[3]
Installation / participation rate of:	**64.77%**	[3]
Number of participants:	**8,910**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**294,673**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**3,536,072**	kWh[2,5]

1 Provided by manufacturer.

2 Frontier Associates. (2011). Oncor's LivingWise Program: Measurement & Verification Update.

3 Data reported by program participants.

4 {[(Wattage of incandescent light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Number of participants x Installation rate

5 {[(Wattage of incandescent light bulb replaced - Wattage of LED light bulb) x 12 years] ÷ 1,000} x Number of participants x Installation rate

Projected Savings from Second 9-watt LED Light Bulb Retrofit

Second 9-Watt LED Light Bulb Retrofit Inputs and Assumptions:

Product life:	**25,000**	hours[1]
Watts used by the LED light bulb:	**9**	watts[1]
Hours of operation per day:	**2.81**	hours per day[2]
Watts used by the replaced incandescent light bulb:	**57.80**	watts[3]
Installation / participation rate of:	**54.15%**	[3]
Number of participants:	**8,910**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**241,508**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,898,093**	kWh[2,5]

1 Provided by manufacturer.

2 Frontier Associates. (2011). Oncor's LivingWise Program: Measurement & Verification Update.

3 Data reported by program participants.

4 {[(Wattage of incandescent light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Number of participants x Installation rate

5 {[(Wattage of incandescent light bulb replaced - Wattage of LED light bulb) x 12 years] ÷ 1,000} x Number of participants x Installation rate

Projected Savings from Third 9-watt LED Light Bulb Retrofit

Third 9-Watt LED Light Bulb Retrofit Inputs and Assumptions:

Product life:	**25,000**	hours[1]
Watts used by the LED light bulb:	**9**	watts[1]
Hours of operation per day:	**2.81**	hours per day[2]
Watts used by the replaced incandescent light bulb:	**58.00**	watts[3]
Installation / participation rate of:	**45.77%**	[3]
Number of participants:	**8,910**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**204,957**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,459,485**	kWh[2,5]

1 Provided by manufacturer.

2 Frontier Associates. (2011). Oncor's LivingWise Program: Measurement & Verification Update.

3 Data reported by program participants.

4 {[(Wattage of incandescent light bulb replaced - Wattage of LED light bulb) x Hours of operation per day x 365 Days] ÷ 1,000} x Number of participants x Installation rate

5 {[(Wattage of incandescent light bulb replaced - Wattage of LED light bulb) x 12 years] ÷ 1,000} x Number of participants x Installation rate

Projected Savings from LED Night Light Retrofit

Energy Efficient Night Light Installation Inputs and Assumptions:

Average length of use:	**4,380**	hours per year[1]
Average night light uses:	**7**	watts
Retrofit night light uses:	**0.5**	watts
Product life:	**10**	years[2]
Energy saved per year:	**28**	kWh per year
Energy saved over life expectancy:	**285**	kWh
Installation / participation rate of:	**81.81%**	[3]
Number of participants:	**8,910**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light installation projects an **annual** reduction of:	**207,517**	kWh
The Energy Efficient Night Light installation projects a **lifetime** reduction of:	**2,075,170**	kWh

1 Assumption (12 hours per day)

2 Product life provided by manufacturer

3 Data reported by program participants

Home Check-Up

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	8,910	2,465	2,833	1,511	1,205	896
Students	8,602	2,383	2,734	1,458	1,165	862
Surveys Received	5,150	1,121	1,988	1,056	514	471
Percent Response	58%	45%	70%	70%	43%	53%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What type of home do you live in?						
Single Family Home (Mobile)	11%	8%	12%	10%	10%	11%
Single Family Home (Manufactured)	8%	6%	6%	9%	13%	15%
Single Family Home (Built)	66%	73%	66%	63%	64%	60%
Multi-Family (2-4 units)	9%	7%	10%	10%	8%	7%
Multi-Family (5-20 units)	4%	4%	5%	5%	4%	4%
Multi-Family (21+ units)	2%	2%	1%	2%	1%	3%
2 Was your home built before 1992?						
Yes	45%	41%	38%	57%	51%	57%
No	55%	59%	62%	43%	49%	43%
3 Is your home owned or rented?						
Owned	73%	81%	70%	72%	73%	70%
Rented	27%	19%	30%	28%	27%	30%
4 How many kids live in your home (age 0-17)?						
1	13%	14%	12%	12%	11%	12%
2	29%	37%	28%	24%	30%	27%
3	25%	24%	25%	26%	24%	29%
4	18%	13%	18%	22%	18%	17%
5+	15%	11%	17%	16%	17%	14%

Due to rounding of numbers, percentages may not add up to 100%

Home Check-Up

(continued)

		Total	Capital	Canyon	Eastern	Southern	Western
5	How many adults live in your home (age 18+)?						
	1	12%	11%	11%	13%	13%	16%
	2	68%	74%	67%	67%	64%	67%
	3	12%	10%	13%	13%	15%	10%
	4	5%	3%	5%	4%	6%	6%
	5+	3%	1%	4%	2%	2%	1%
6	Does your home have a programmable outdoor sprinkler system?						
	Yes	65%	79%	72%	53%	55%	41%
	No	35%	21%	28%	47%	45%	59%
7	Does your home have a programmable thermostat?						
	Yes	76%	84%	80%	69%	70%	64%
	No	24%	16%	20%	31%	30%	36%
8	What is the main source of heating in your home?						
	Natural Gas	44%	58%	49%	41%	28%	16%
	Electric Heater	40%	34%	38%	40%	52%	48%
	Propane	4%	1%	3%	6%	4%	8%
	Heating Oil	1%	1%	1%	1%	1%	3%
	Wood	6%	2%	4%	8%	10%	17%
	Other	5%	4%	5%	4%	5%	7%
9	What type of air conditioning unit do you have?						
	Central Air Conditioner	70%	85%	78%	51%	58%	57%
	Evaporative Cooler	6%	3%	6%	7%	9%	10%
	Room Unit	14%	7%	10%	22%	19%	20%
	Don’t Have One	10%	4%	7%	20%	14%	14%
10	Does your home have a Dishwasher?						
	Yes	85%	94%	88%	79%	79%	72%
	No	15%	6%	12%	21%	21%	28%

Due to rounding of numbers, percentages may not add up to 100%

Home Check-Up

(continued)

	Total	Capital	Canyon	Eastern	Southern	Western
11 How many half-bathrooms are in your home?						
0	65%	52%	60%	77%	76%	75%
1	28%	40%	32%	16%	16%	18%
2	5%	6%	5%	5%	5%	6%
3	1%	2%	2%	2%	1%	1%
4+	1%	1%	1%	1%	2%	0%
12 How many full bathrooms are in your home?						
1	25%	15%	23%	33%	33%	37%
2	53%	55%	62%	39%	51%	50%
3	17%	24%	13%	23%	12%	11%
4	3%	5%	2%	3%	3%	1%
5+	1%	1%	1%	1%	1%	1%
13 How many toilets are in your home?						
1	19%	9%	17%	26%	27%	29%
2	42%	33%	43%	41%	50%	51%
3	29%	42%	33%	23%	14%	16%
4	7%	13%	6%	7%	6%	2%
5+	2%	3%	1%	2%	3%	1%
14 How is your water heated?						
Natural Gas	50%	62%	58%	43%	31%	22%
Electricity	50%	38%	42%	57%	69%	78%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	8,910	2,465	2,833	1,511	1,205	896
Students	8,602	2,383	2,734	1,458	1,165	862
Surveys Received	5,150	1,121	1,988	1,056	514	471
Percent Response	58%	45%	70%	70%	43%	53%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What is the flow rate of your old showerhead?						
0 - 1.0 GPM	12%	9%	13%	15%	11%	13%
1.1 - 1.5 GPM	21%	20%	21%	19%	21%	23%
1.6 - 2.0 GPM	22%	25%	21%	20%	19%	24%
2.1 - 2.5 GPM	20%	20%	20%	19%	22%	20%
2.6 - 3.0 GPM	14%	15%	14%	16%	12%	12%
3.1+ GPM	11%	12%	10%	11%	14%	9%
2 Did you install the new High-Efficiency Showerhead?						
Yes	43%	41%	47%	40%	43%	37%
No	57%	59%	53%	60%	57%	63%
3 If you answered “yes” to question 2, what is the flow rate of your new showerhead?						
0 - 1.0 GPM	24%	23%	22%	25%	24%	33%
1.1 - 1.5 GPM	42%	40%	47%	38%	41%	36%
1.6 - 1.75 GPM	33%	36%	31%	36%	35%	31%
4 Did you use the Shower Timer?						
Yes	76%	76%	80%	73%	71%	68%
No	24%	24%	20%	27%	29%	32%
5 Did your family install the first 9-watt LED Light Bulb?						
Yes	65%	63%	65%	65%	69%	62%
No	35%	37%	35%	35%	31%	38%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

(continued)

	Total	Capital	Canyon	Eastern	Southern	Western
6 If you answered "yes" to question 5, what is the wattage of the incandescent bulb you replaced?						
40-watt	17%	16%	19%	15%	18%	16%
60-watt	42%	45%	41%	45%	42%	32%
75-watt	15%	14%	13%	14%	20%	18%
100-watt	9%	7%	10%	8%	8%	11%
Other	17%	17%	17%	19%	12%	22%
7 Did your family install the second 9-watt LED Light Bulb?						
Yes	54%	52%	56%	54%	56%	48%
No	46%	48%	44%	46%	44%	52%
8 If you answered "yes" to question 7, what is the wattage of the incandescent bulb you replaced?						
40-watt	19%	16%	19%	18%	25%	20%
60-watt	40%	45%	40%	42%	33%	34%
75-watt	14%	13%	14%	14%	19%	18%
100-watt	8%	5%	9%	8%	8%	8%
Other	18%	20%	18%	18%	15%	20%
9 Did your family install the third 9-watt LED Light Bulb?						
Yes	46%	42%	49%	45%	48%	40%
No	54%	58%	51%	55%	52%	60%
10 If you answered "yes" to question 9, what is the wattage of the incandescent bulb you replaced?						
40-watt	17%	15%	18%	17%	21%	15%
60-watt	38%	41%	38%	41%	33%	31%
75-watt	15%	14%	14%	14%	18%	22%
100-watt	9%	7%	10%	8%	9%	7%
Other	21%	22%	21%	21%	18%	25%
11 Did your family install the FilterTone® Alarm?						
Yes	25%	22%	30%	25%	18%	21%
No	75%	78%	70%	75%	81%	79%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

(continued)

	Total	Capital	Canyon	Eastern	Southern	Western
12 How much did your family turn down the thermostat in winter for heating?						
1 - 2 Degrees	19%	22%	18%	21%	14%	24%
3 - 4 Degrees	19%	19%	21%	19%	14%	20%
5+ Degrees	14%	11%	16%	12%	12%	14%
Didn't Adjust Thermostat	48%	48%	46%	48%	60%	41%
13 How much did your family turn up the thermostat in summer for cooling?						
1 - 2 Degrees	17%	18%	18%	15%	17%	18%
3 - 4 Degrees	17%	16%	20%	15%	15%	14%
5+ Degrees	14%	13%	15%	13%	13%	14%
Didn't Adjust Thermostat	52%	53%	47%	56%	55%	54%
14 Did you install the LED Night Light?						
Yes	82%	82%	84%	80%	83%	73%
No	18%	18%	16%	20%	16%	27%
15 Did your family lower your water heater settings?						
Yes	25%	23%	28%	24%	20%	23%
No	75%	77%	72%	76%	80%	77%
16 Did your family raise the temperature on your refrigerator?						
Yes	18%	16%	22%	15%	17%	17%
No	82%	84%	78%	85%	83%	83%
17 Did you complete the optional online energy use activity?						
All of it	8%	5%	9%	10%	8%	8%
Some of it	15%	13%	18%	13%	12%	11%
None	77%	82%	73%	77%	80%	81%
18 Did you work with your family on this Program?						
Yes	67%	69%	66%	72%	65%	53%
No	33%	31%	34%	28%	34%	47%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

(continued)

	Total	Capital	Canyon	Eastern	Southern	Western
19 Did your family change the way they use water?						
Yes	59%	58%	59%	61%	58%	55%
No	41%	42%	41%	39%	42%	45%
20 Did your family change the way they use energy?						
Yes	67%	67%	68%	69%	66%	65%
No	33%	33%	32%	31%	34%	35%
21 How would you rate the Idaho Power Energy Wise® Program?						
Great	54%	53%	54%	56%	54%	54%
Pretty Good	36%	37%	36%	34%	36%	32%
Okay	8%	8%	8%	8%	8%	10%
Not So Good	2%	2%	2%	2%	2%	3%

Due to rounding of numbers, percentages may not add up to 100%

Participant List

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	Alameda Elementary School	[redacted]	1	25	No
Western	Alameda Elementary School	[redacted]	1	26	No
Western	Alameda Elementary School	[redacted]	1	25	No
Eastern	American Falls Intermediate School	[redacted]	1	7	No
Capital	Amity Elementary School	[redacted]	1	29	Yes
Capital	Amity Elementary School	[redacted]	1	29	Yes
Capital	Amity Elementary School	[redacted]	1	29	Yes
Western	Annex Charter School	[redacted]	1	17	Yes
Capital	Barbara Morgan STEM Academy	[redacted]	1	27	Yes
Capital	Barbara Morgan STEM Academy	[redacted]	1	27	Yes
Capital	Barbara Morgan STEM Academy	[redacted]	1	27	No
Canyon	Birch Elementary School	[redacted]	1	26	Yes
Canyon	Birch Elementary School	[redacted]	1	26	Yes
Canyon	Birch Elementary School	[redacted]	1	26	Yes
Canyon	Birch Elementary School	[redacted]	1	27	Yes
Eastern	Blackfoot Charter Community Learning Center Middle	[redacted]	1	29	Yes
Southern	Bliss Elementary School	[redacted]	1	12	Yes
Southern	Bliss Elementary School	[redacted]	1	7	Yes
Southern	Bliss Elementary School	[redacted]	1	16	Yes
Western	Cairo Elementary	[redacted]	1	25	No
Southern	Camas County School	[redacted]	1	14	Yes
Southern	Camas County School	[redacted]	1	25	Yes
Western	Cascade Elementary School	[redacted]	1	19	No
Western	Cascade Elementary School	[redacted]	1	23	Yes
Western	Cascade Elementary School	[redacted]	1	9	No
Western	Cavalry Christian Academy	[redacted]	1	15	No
Capital	Cecil Andrus Elementary	[redacted]	1	33	Yes
Canyon	Centennial Elementary School	[redacted]	1	29	Yes
Canyon	Centennial Elementary School	[redacted]	1	29	Yes
Canyon	Centennial Elementary School	[redacted]	1	30	No
Canyon	Central Elementary School	[redacted]	1	25	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Central Elementary School	[redacted]	1	25	Yes
Canyon	Central Elementary School	[redacted]	1	23	Yes
Capital	Christine Donnell School of Arts	[redacted]	1	94	Yes
Eastern	Chubbuck Elementary School	[redacted]	1	30	No
Eastern	Claude A. Wilcox Elementary School	[redacted]	1	30	Yes
Eastern	Claude A. Wilcox Elementary School	[redacted]	1	30	Yes
Eastern	Claude A. Wilcox Elementary School	[redacted]	1	30	Yes
Western	Council Elementary School	[redacted]	1	24	Yes
Canyon	Crimson Point Elementary	[redacted]	1	30	Yes
Canyon	Crimson Point Elementary	[redacted]	1	30	Yes
Canyon	Crimson Point Elementary	[redacted]	1	30	Yes
Capital	Cynthia Mann Elementary School	[redacted]	1	24	Yes
Capital	Cynthia Mann Elementary School	[redacted]	1	25	Yes
Capital	Cynthia Mann Elementary School	[redacted]	1	25	No
Capital	Cynthia Mann Elementary School	[redacted]	1	20	Yes
Canyon	Desert Springs Elementary School	[redacted]	1	28	Yes
Canyon	Desert Springs Elementary School	[redacted]	1	30	Yes
Canyon	Desert Springs Elementary School	[redacted]	1	29	Yes
Canyon	Desert Springs Elementary School	[redacted]	1	29	Yes
Canyon	Desert Springs Elementary School	[redacted]	1	29	Yes
Eastern	Donald D. Stalker Elementary School	[redacted]	1	26	Yes
Eastern	Donald D. Stalker Elementary School	[redacted]	1	24	Yes
Western	Donnelly Elementary	[redacted]	1	24	No
Canyon	East Canyon Elementary	[redacted]	1	25	Yes
Canyon	East Canyon Elementary	[redacted]	1	26	No
Canyon	East Canyon Elementary	[redacted]	1	26	No
Canyon	East Canyon Elementary	[redacted]	1	26	Yes
Eastern	Edahow Elementary School	[redacted]	1	29	Yes
Eastern	Edahow Elementary School	[redacted]	1	28	Yes
Capital	Eliza Hart Spalding Elementary School	[redacted]	1	32	Yes
Capital	Eliza Hart Spalding Elementary School	[redacted]	1	32	No
Capital	Eliza Hart Spalding Elementary School	[redacted]	1	32	Yes

Note: "T" represents number of teachers and "S" represents number of students

Appendix C

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Eliza Hart Spalding Elementary School	[redacted]	1	32	Yes
Eastern	Ellis Elementary School	[redacted]	1	26	Yes
Eastern	Ellis Elementary School	[redacted]	1	26	Yes
Eastern	Ellis Elementary School	[redacted]	1	26	Yes
Canyon	Endeavor School	[redacted]	1	100	Yes
Southern	Filer Intermediate School	[redacted]	1	27	Yes
Southern	Filer Intermediate School	[redacted]	1	27	Yes
Southern	Filer Intermediate School	[redacted]	1	26	Yes
Southern	Filer Intermediate School	[redacted]	1	27	Yes
Southern	Filer Intermediate School	[redacted]	1	27	Yes
Southern	Filer Intermediate School	[redacted]	1	23	Yes
Southern	Filer Intermediate School	[redacted]	1	25	No
Southern	Filer Intermediate School	[redacted]	1	25	Yes
Western	Fruitland Elementary School	[redacted]	1	31	No
Western	Fruitland Elementary School	[redacted]	1	29	Yes
Western	Fruitland Elementary School	[redacted]	1	29	Yes
Western	Fruitland Elementary School	[redacted]	1	29	Yes
Western	Fruitland Elementary School	[redacted]	1	29	No
Capital	Galileo STEM Academy	[redacted]	1	32	Yes
Capital	Galileo STEM Academy	[redacted]	1	32	Yes
Capital	Galileo STEM Academy	[redacted]	1	32	Yes
Western	Garden Valley Elementary	[redacted]	1	42	Yes
Eastern	Gate City Elementary School	[redacted]	1	31	Yes
Capital	Glenns Ferry Elementary	[redacted]	1	23	No
Capital	Glenns Ferry Elementary	[redacted]	1	25	Yes
Capital	Glenns Ferry Elementary	[redacted]	1	28	No
Capital	Glenns Ferry Elementary	[redacted]	1	32	Yes
Eastern	Grace Lutheran School	[redacted]	1	26	Yes
Eastern	Green Acres Elementary School	[redacted]	1	29	Yes
Eastern	Green Acres Elementary School	[redacted]	1	29	Yes
Eastern	Groveland Elementary	[redacted]	1	24	Yes
Eastern	Groveland Elementary	[redacted]	1	24	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Southern	Hansen Elementary School	[redacted]	1	32	No
Southern	Hansen Elementary School	[redacted]	1	28	No
Southern	Harrison Elementary School	[redacted]	1	67	No
Capital	Hawthorne Elementary School	[redacted]	1	25	Yes
Capital	Highlands Elementary School	[redacted]	1	24	Yes
Capital	Highlands Elementary School	[redacted]	1	24	Yes
Capital	Highlands Elementary School	[redacted]	1	18	No
Capital	Highlands Elementary School	[redacted]	1	22	No
Capital	Hillsdale Elementary School	[redacted]	1	29	Yes
Capital	Hillsdale Elementary School	[redacted]	1	32	Yes
Western	Horseshoe Bend Elementary School	[redacted]	1	20	Yes
Capital	Hunter Elementary School	[redacted]	1	32	Yes
Capital	Hunter Elementary School	[redacted]	1	31	Yes
Capital	Hunter Elementary School	[redacted]	1	31	Yes
Capital	Hunter Elementary School	[redacted]	1	31	No
Capital	Hunter Elementary School	[redacted]	1	31	No
Southern	I.B. Perrine Elementary School	[redacted]	1	26	Yes
Southern	I.B. Perrine Elementary School	[redacted]	1	29	Yes
Southern	I.B. Perrine Elementary School	[redacted]	1	26	Yes
Canyon	Idaho Arts Charter School	[redacted]	1	31	Yes
Canyon	Idaho Arts Charter School	[redacted]	1	30	Yes
Canyon	Idaho Arts Charter School	[redacted]	1	30	No
Canyon	Idaho Arts Charter School	[redacted]	1	30	No
Canyon	Idaho Arts Charter School	[redacted]	1	30	No
Canyon	Idaho Arts Charter School	[redacted]	1	30	No
Canyon	Idaho Arts Charter School	[redacted]	1	30	No
Canyon	Idaho Arts Charter School	[redacted]	1	30	No
Canyon	Indian Creek & Ross Elementary School	[redacted]	1	28	Yes
Canyon	Indian Creek & Ross Elementary School	[redacted]	1	28	No
Canyon	Indian Creek & Ross Elementary School	[redacted]	1	28	No
Eastern	Indian Hills Elementary	[redacted]	1	24	Yes
Eastern	Inkom Elementary School	[redacted]	1	24	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	Inkom Elementary School	[redacted]	1	22	Yes
Eastern	Inkom Elementary School	[redacted]	1	24	Yes
Eastern	Jefferson Elementary	[redacted]	1	22	No
Eastern	Jefferson Elementary	[redacted]	1	22	No
Eastern	Jefferson Elementary	[redacted]	1	22	Yes
Capital	Joplin Elementary School	[redacted]	1	29	No
Capital	Joplin Elementary School	[redacted]	1	29	No
Capital	Joplin Elementary School	[redacted]	1	29	No
Capital	Joplin Elementary School	[redacted]	1	28	No
Capital	Lake Hazel Elementary	[redacted]	1	25	No
Capital	Lake Hazel Elementary	[redacted]	1	25	No
Capital	Lake Hazel Elementary	[redacted]	1	25	No
Canyon	Lake Ridge Elementary School	[redacted]	1	30	Yes
Canyon	Lake Ridge Elementary School	[redacted]	1	30	Yes
Canyon	Lake Ridge Elementary School	[redacted]	1	30	Yes
Canyon	Lake Ridge Elementary School	[redacted]	1	30	Yes
Canyon	Lakevue Elementary School	[redacted]	1	21	Yes
Canyon	Lakevue Elementary School	[redacted]	1	22	Yes
Canyon	Lakevue Elementary School	[redacted]	1	21	Yes
Canyon	Lakevue Elementary School	[redacted]	1	21	No
Canyon	Lakevue Elementary School	[redacted]	1	21	No
Canyon	Lewis & Clark Elementary	[redacted]	1	30	Yes
Canyon	Lewis & Clark Elementary	[redacted]	1	30	Yes
Canyon	Lewis & Clark Elementary	[redacted]	1	30	No
Eastern	Lewis and Clark Elementary	[redacted]	1	29	Yes
Eastern	Lewis and Clark Elementary	[redacted]	1	28	Yes
Capital	Longfellow Elementary School	[redacted]	1	25	Yes
Capital	Longfellow Elementary School	[redacted]	1	25	Yes
Capital	Maple Grove Elementary	[redacted]	1	29	Yes
Capital	Maple Grove Elementary	[redacted]	1	29	No
Capital	Maple Grove Elementary	[redacted]	1	28	Yes
Capital	Maple Grove Elementary	[redacted]	1	63	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	Marsing Elementary School	[redacted]	1	31	No
Western	Marsing Middle School	[redacted]	1	60	Yes
Western	May Roberts Elementary School	[redacted]	1	21	No
Western	May Roberts Elementary School	[redacted]	1	20	Yes
Capital	Meridian Elementary	[redacted]	1	24	No
Capital	Meridian Elementary	[redacted]	1	24	No
Capital	Meridian Elementary	[redacted]	1	24	No
Canyon	Mill Creek Elementary School	[redacted]	1	25	Yes
Canyon	Mill Creek Elementary School	[redacted]	1	25	Yes
Canyon	Mill Creek Elementary School	[redacted]	1	25	Yes
Canyon	Mill Creek Elementary School	[redacted]	1	25	Yes
Canyon	Mill Creek Elementary School	[redacted]	1	25	Yes
Capital	Monroe Elementary School	[redacted]	1	20	No
Capital	Monroe Elementary School	[redacted]	1	18	No
Capital	Monroe Elementary School	[redacted]	1	15	No
Southern	Morningside Elementary School	[redacted]	1	120	No
Southern	North Valley Academy	[redacted]	1	21	Yes
Southern	North Valley Academy	[redacted]	1	23	Yes
Western	Nyssa Elementary School	[redacted]	1	24	Yes
Western	Nyssa Elementary School	[redacted]	1	25	Yes
Southern	Oregon Trail Elementary School	[redacted]	1	27	Yes
Southern	Oregon Trail Elementary School	[redacted]	1	26	No
Southern	Oregon Trail Elementary School	[redacted]	1	26	No
Canyon	Owyhee Elementary	[redacted]	1	28	Yes
Canyon	Owyhee Elementary	[redacted]	1	28	Yes
Canyon	Owyhee Elementary	[redacted]	1	28	Yes
Canyon	Owyhee Elementary School	[redacted]	1	20	No
Western	Park Intermediate	[redacted]	1	26	Yes
Western	Park Intermediate	[redacted]	1	26	Yes
Western	Park Intermediate	[redacted]	1	24	No
Capital	Peregrine Elementary School	[redacted]	1	29	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Pierce Park Elementary	[redacted]	1	26	Yes
Capital	Pierce Park Elementary	[redacted]	1	30	No
Capital	Pierce Park Elementary	[redacted]	1	28	No
Capital	Pierce Park Elementary	[redacted]	1	28	No
Western	Pine Eagle Elementary School	[redacted]	1	21	No
Capital	Prospect Elementary	[redacted]	1	28	Yes
Capital	Prospect Elementary	[redacted]	1	29	No
canyon	Purple Sage Elementary School	[redacted]	1	25	Yes
canyon	Purple Sage Elementary School	[redacted]	1	25	Yes
canyon	Purple Sage Elementary School	[redacted]	1	25	Yes
Canyon	Reed Elementary	[redacted]	1	23	Yes
Canyon	Reed Elementary	[redacted]	1	22	Yes
Canyon	Reed Elementary	[redacted]	1	30	Yes
Canyon	Reed Elementary	[redacted]	1	23	Yes
Eastern	Ridge Crest Elementary School	[redacted]	1	27	Yes
Eastern	Ridge Crest Elementary School	[redacted]	1	27	Yes
Eastern	Ridge Crest Elementary School	[redacted]	1	21	No
Capital	Riverside Elementary School	[redacted]	1	25	No
Southern	Rock Creek Elementary	[redacted]	1	30	No
Southern	Rock Creek Elementary	[redacted]	1	30	No
Southern	Rock Creek Elementary	[redacted]	1	30	No
Eastern	Rockford Elementary School	[redacted]	1	22	No
Eastern	Rockford Elementary School	[redacted]	1	22	No
Eastern	Rockford Elementary School	[redacted]	1	21	No
Eastern	Rockford Elementary School	[redacted]	1	23	No
Eastern	Rockford Elementary School	[redacted]	1	22	No
Eastern	Rockford Elementary School	[redacted]	1	20	Yes
Eastern	Rockland Elementary School	[redacted]	1	27	No
Canyon	Ronald Reagan Elementary School	[redacted]	1	25	Yes
Canyon	Ronald Reagan Elementary School	[redacted]	1	22	Yes
Canyon	Ronald Reagan Elementary School	[redacted]	1	24	Yes
Canyon	Roosevelt Elementary	[redacted]	1	24	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Roosevelt Elementary	[redacted]	1	26	Yes
Canyon	Roosevelt Elementary	[redacted]	1	24	No
Canyon	Roosevelt Elementary	[redacted]	1	27	Yes
Canyon	Sacajawea Elementary School	[redacted]	1	31	Yes
Canyon	Sacajawea Elementary School	[redacted]	1	30	Yes
Canyon	Sacajawea Elementary School	[redacted]	1	30	Yes
Capital	Sage International School of Boise	[redacted]	1	25	Yes
Capital	Sage International School of Boise	[redacted]	1	25	Yes
Capital	Sage International School of Boise	[redacted]	1	25	Yes
Eastern	Salmon Middle/High School	[redacted]	1	55	Yes
Western	Shadow Butte Elementary School	[redacted]	1	33	Yes
Capital	Shadow Hills Elementary School	[redacted]	1	25	Yes
Capital	Silver Sage Elementary School	[redacted]	1	35	Yes
Capital	Silver Sage Elementary School	[redacted]	1	35	No
Canyon	Silver Trail Elementary School	[redacted]	1	29	Yes
Canyon	Silver Trail Elementary School	[redacted]	1	30	Yes
Canyon	Silver Trail Elementary School	[redacted]	1	29	Yes
Canyon	Silver Trail Elementary School	[redacted]	1	30	Yes
Canyon	Snake River Elementary	[redacted]	1	23	No
Canyon	Snake River Elementary	[redacted]	1	26	No
Canyon	Snake River Elementary	[redacted]	1	23	Yes
Canyon	St. Paul's Catholic School	[redacted]	1	33	Yes
Capital	Star Elementary School	[redacted]	1	33	No
Capital	Star Elementary School	[redacted]	1	33	No
Capital	Star Elementary School	[redacted]	1	33	No
Eastern	Stoddard Elementary School	[redacted]	1	28	Yes
Eastern	Stoddard Elementary School	[redacted]	1	28	Yes
Eastern	Stoddard Elementary School	[redacted]	1	25	Yes
Southern	Summit Elementary School	[redacted]	1	29	Yes
Southern	Summit Elementary School	[redacted]	1	29	Yes
Southern	Summit Elementary School	[redacted]	1	28	Yes
Southern	Summit Elementary School	[redacted]	1	29	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Southern	Summit Elementary School	[redacted]	1	28	No
Southern	Summit Elementary School	[redacted]	1	28	No
Southern	Summit Elementary School	[redacted]	1	28	No
Southern	Summit Elementary School	[redacted]	1	27	No
Southern	Summit Elementary School	[redacted]	1	30	No
Southern	Summit Elementary School	[redacted]	1	28	No
Southern	Summit Elementary School	[redacted]	1	29	No
Southern	Summit Elementary School	[redacted]	1	30	Yes
Eastern	Syringa Elementary School	[redacted]	1	25	Yes
Eastern	Syringa Elementary School	[redacted]	1	25	Yes
Eastern	Syringa Elementary School	[redacted]	1	25	Yes
Capital	Taft Elementary School	[redacted]	1	24	No
Capital	Taft Elementary School	[redacted]	1	24	Yes
Eastern	Tendoy Elementary	[redacted]	1	26	Yes
Eastern	Tendoy Elementary	[redacted]	1	27	Yes
Capital	Trail Wind Elementary School	[redacted]	1	30	No
Capital	Trail Wind Elementary School	[redacted]	1	30	No
Eastern	Tyhee Elementary School	[redacted]	1	25	Yes
Eastern	Tyhee Elementary School	[redacted]	1	25	Yes
Eastern	Tyhee Elementary School	[redacted]	1	25	No
Capital	Valley View Elementary School	[redacted]	1	30	Yes
Capital	Valley View Elementary School	[redacted]	1	30	Yes
Eastern	Wapello Elementary School	[redacted]	1	20	Yes
Eastern	Wapello Elementary School	[redacted]	1	21	Yes
Canyon	Washington Elementary School	[redacted]	1	24	Yes
Canyon	Washington Elementary School	[redacted]	1	24	Yes
Canyon	Washington Elementary School	[redacted]	1	27	Yes
Canyon	Washington Elementary School	[redacted]	1	24	Yes
Canyon	Washington Elementary School	[redacted]	1	21	Yes
Canyon	Washington Elementary School	[redacted]	1	21	Yes
Canyon	West Canyon Elementary	[redacted]	1	32	Yes
Canyon	West Canyon Elementary	[redacted]	1	32	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	West Canyon Elementary	[redacted]	1	32	Yes
Canyon	West Canyon Elementary	[redacted]	1	32	Yes
Western	Westside Elementary School	[redacted]	1	22	Yes
Western	Westside Elementary School	[redacted]	1	22	Yes
Western	Westside Elementary School	[redacted]	1	22	Yes
Western	Westside Elementary School	[redacted]	1	22	Yes
Western	Westside Elementary School	[redacted]	1	22	Yes
Capital	Whitney Elementary School	[redacted]	1	33	Yes
Capital	Whittier Elementary School	[redacted]	1	33	No
Capital	Whittier Elementary School	[redacted]	1	33	No
Capital	Whittier Elementary School	[redacted]	1	34	Yes
Capital	Whittier Elementary School	[redacted]	1	25	Yes
Eastern	William Thomas Middle School	[redacted]	1	125	Yes
Canyon	Willow Creek Elementary School	[redacted]	1	28	Yes
Canyon	Willow Creek Elementary School	[redacted]	1	27	Yes
Canyon	Willow Creek Elementary School	[redacted]	1	26	Yes
Canyon	Willow Creek Elementary School	[redacted]	1	29	Yes
Canyon	Wilson Elementary School	[redacted]	1	24	Yes
Canyon	Wilson Elementary School	[redacted]	1	26	No
Canyon	Wilson Elementary School	[redacted]	1	27	Yes
Canyon	Wilson Elementary School	[redacted]	1	19	Yes
Canyon	Wilson Elementary School	[redacted]	1	26	Yes
		TOTALS	308	8,602	
		TOTAL PARTICIPANTS	8,910		
TOTAL PARTICIPATING 2016-2017 TEACHERS		308	208	68%	YES
			100	32%	NO
TOTAL STUDENT SURVEYS RETURNED		5,150			
TOTAL INCENTIVE PAID OUT		$19,775			
FULL YEAR SURVEY RETURN PERCENTAGE		60%			

Note: "T" represents number of teachers and "S" represents number of students

Teacher Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	308	82	99	53	40	34
Surveys Received	208	44	80	41	23	20
Percent Response	68%	54%	81%	77%	58%	59%

		Percent	Number
1	The materials were clearly written and well organized.		
	Strongly Agree	118	68%
	Agree	55	32%
	Disagree	0	0%
	Strongly Disagree	1	1%
2	The products in the Kit were easy for students to use.		
	Strongly Agree	96	55%
	Agree	74	43%
	Disagree	2	1%
	Strongly Disagree	1	1%
3	Students indicated that their parents supported the program.		
	Yes	164	96%
	No	6	4%
4	Would you conduct this Program again?		
	Yes	175	100%
	No	0	0%
5	Would you recommend this program to other colleagues?		
	Yes	175	100%
	No	0	0%
6	If my school is eligible for participation next year, I would like to enroll.		
	Yes	172	99%
	No	2	1%

Due to rounding of numbers, percentages may not add up to 100%

Parent/Guardian Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	8,602	2,383	2,734	1,458	1,165	862
Surveys Received	101	34	32	18	11	6
Percent Response	1.2%	1.4%	1.2%	1.2%	0.9%	0.7%

Total Parent Responses **80**

		Number	Percent
1	Was the Program easy for you and your child to use?		
	Yes	101	100%
	No	0	0%
2	Will you continue to use the Kit items after the completion of the Program?		
	Yes	99	100%
	No	0	0%
3	Would you like to see this Program continued in local schools?		
	Yes	100	100%
	No	0	0%

Due to rounding of numbers, percentages may not add up to 100%

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976 United Circle • Sparks, NV 89431
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