DEMAND-SIDE MANAGEMENT

2019 Annual Report

Supplement 2: EVALUATION

MARCH 15 • 2020

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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 Corporate Services. 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.

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, 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 and improve Idaho Power's DSM programs.

In 2019, Idaho Power contracted with DNV GL to conduct program impact and program process evaluations for Energy House Calls and the Residential New Construction Pilot Program. They also conducted impact evaluations for the Commercial/Industrial Energy Efficiency program: Retrofits and New Construction options. Resource Action Programs conducted a program summary analysis for residential Energy-Saving Kits (ESK). Aclara conducted a summary analysis for the Home Energy Report Pilot Program. DNV GL conducted further savings estimates analysis for the Shade Tree Project to better determine potential tree life and mortality rate. Idaho Power contracted with DNV GL to determine the 2019 demand reduction from the A/C Cool Credit program and the company conducted internal analyses of the 2019 demand response events for Irrigation Peak Rewards and Flex Peak Programs.

Throughout 2019, 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 online Empowered Community.

An evaluation schedule and final reports from all evaluations, research, and surveys are included in this *Demand-Side Management 2019 Annual Report, Supplement 2: Evaluation*.

Evaluation Plan

Energy Efficiency 2010–2021 Program Evaluation Plans

Program Evaluation Schedule	2021	2020	2019	2018	2017
Residential Energy Efficiency Programs					
Educational Distributions		I/P			
Energy Efficient Lighting				I	
Energy House Calls			I/P		
Heating & Cooling Efficiency Program	I/P				I/P
Home Energy Audit	P				I
Home Energy Reports	O	P/O		O	
Multifamily Energy Savings Program	I/P			I/P	
Rebate Advantage		I			
Residential Energy Efficiency Education Initiative					
Residential New Construction Pilot Program			I/P		
Shade Tree Project	O		O	O	
Simple Steps, Smart Savings™					
Weatherization Assistance for Qualified Customers		I			
Weatherization Solutions for Eligible Customers		I			
Commercial/Industrial Energy Efficiency Programs					
Commercial Energy-Saving Kits					
Custom Projects	I/P			I	P
New Construction	I/P		I		P
Retrofits	I/P		I		P
Small Business Direct-Install		P			
Irrigation Energy Efficiency Programs					
Irrigation Efficiency Rewards		I/P			
Demand-Response Programs					
A/C Cool Credit	I	O	I	O	O
Flex Peak Program	I	O	O	O	O
Irrigation Peak Rewards	I	O	O	O	O

Evaluation Type: I = Impact, P = Process, O = Other

Program not yet in existence:

Program Evaluation Schedule	2016	2015[1]	2014	2013	2012	2011	2010
Residential Energy Efficiency Programs							
Educational Distributions							
Energy Efficient Lighting			I	P			
Energy House Calls						I	P
Heating & Cooling Efficiency Program				P	I		P
Home Energy Audit			P				
Home Energy Reports							
Multifamily Energy Savings Program							
Rebate Advantage	I/P					I	
Residential Energy Efficiency Education Initiative	O						P
Residential New Construction Pilot Program							
Shade Tree Project			P				
Simple Steps, Smart Savings™							
Weatherization Assistance for Qualified Customers			O	P	I		
Weatherization Solutions for Eligible Customers			O	P	I		
Commercial/Industrial Energy Efficiency Programs							
Commercial Energy-Saving Kits							
Custom Projects			I/P			I	P
New Construction	I				I		P
Retrofits	I			P	I		P
Small Business Direct-Install							
Irrigation Energy Efficiency Programs							
Irrigation Efficiency Rewards	I/P		P/O	P/I			P
Demand-Response Programs							
A/C Cool Credit	O	O	O	O	P	O	
Flex Peak Program	O	O		P/O		O	
Irrigation Peak Rewards	O	O	O	O		O	

Evaluation Type: I = Impact, P = Process, O = Other

Program not yet in existence:

[1] Energy efficiency programs evaluated in 2015 have since been combined with another program or eliminated

ENERGY EFFICIENCY ADVISORY GROUP NOTES

The following pages include notes from EEAG meetings held on January 23, May 1, August 8, and November 18, 2019. A copy of the revised notes from the January 23 meeting is included to denote a section that has been revised.

Energy Efficiency Advisory Group (EEAG)
Notes January 23, 2019

Present:

Kent Hanway-CSHQA
Wil Gehl–Community Action Partnership Assoc. of ID
Stacey Donohue–Idaho Public Utilities Commission (via phone)
Diego Rivas–Northwest Energy Coalition
Connie Aschenbrenner–Idaho Power
Anna Kim–Public Utility Commission of Oregon (via phone)
Haley Falconer-City of Boise
Pete Pengilly*-Idaho Power
Ben Otto-Idaho Conservation League (via phone)
Katie Pegan–Office of Energy & Mineral Resources
Sid Erwin–Idaho Irrigation Pumpers Association
Jim Hall-Bodybuilding.com
Selena O'Neal-Ada County Operations

Not Present:

Don Strickler–Simplot
Tina Jayaweera-Northwest Power & Conservation Council

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Tracey Burtch*–Idaho Power
Shelley Martin–Idaho Power
Billie McWinn*–Idaho Power
Melissa Thom–Idaho Power
Tracey Burtch*–Idaho Power
Annie Meyer–Idaho Power
Brad Iverson-Long-Idaho Public Utilities Commission
Krista West-Idaho Power
Brittany Nixon–Idaho Power
Theresa Drake–Idaho Power
Becky Arte-Howell–Idaho Power
Melissa Thom-Idaho Power
Tonja Dyke–Idaho Power
Zeke VanHooser-Idaho Power
Chris Pollow–Idaho Power
Donn English-Idaho Public Utilities Commission

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:32 a.m.

Pete convened the meeting with housekeeping items and announcing Wil Gehl of Community Action Partnership Association of Idaho as a new EEAG member. He informed the group that member, Scott Pugrud, has taken new position within the Office of Energy and Mineral Resources and will no longer be a member of EEAG. Katie Pegan would be sitting in for Scott today. Pete provided the balances for the Idaho and Oregon rider. Connie updated the group on the recent filing made in Oregon to adjust the rider tariff and the solar PV rider tariff. She also stated that Idaho Power is looking at assessing the appropriate level of collection for the Idaho Rider. The company will update EEAG members at a future conference call. Rosemary asked for introductions of members and guests and any comments or questions on the October meeting notes.

9:43 a.m. October EEAG meeting Follow-up

Kathy provided an update on weatherization measures that could be included in the multifamily housing program. This idea was brought up during the October 30 meeting. Kathy stated that Idaho Power looked at savings numbers from the Regional Technical Forum (RTF) and other utilities around the country. The numbers she found were based on single family homes, not multi-family. Preliminarily, these measures could be cost-effective. Idaho Power's next steps will be to talk to contractors who currently work with the Home Energy Audit and Energy House Calls programs and explore options with them.

Kathy also addressed the topic of the drying racks and how the survey results from empowered community compared with the participant pre and post survey. The type of questions asked were; do you have clothes washer, what is the age of the washer, how many loads of laundry, and how many loads go into the dryer. The survey results were consistent.

Quentin provided an update on the savings numbers from the Irrigation program. At the last meeting he suggested that Idaho Power would use the adjusted savings numbers for 2019 and convene a workgroup to explore options. Based on feedback at the meeting, the company decided to accept the RTF savings numbers instead. The cost-effective exceptions filing in Oregon were approved. The incentives will be the same, but the savings will be adjusted. When the RTF updated the savings, they did not have a workgroup with experts in the area, so Idaho Power still plans to convene a workgroup moving forward to investigate further if the new RTF savings used the correct assumptions.

Quentin updated the group on the potential Small Business Direct Install program. The request for proposal (RFP) is in the final edit stage. Once the company receives responses it will evaluate the proposals, look at the cost effectiveness, and bring back those findings to the next EEAG meeting.

10:00 a.m. Evaluation Proposal—Pete Pengilly

Pete provided a historical look at Idaho Power's evaluations and the company's proposed 2019-2020 evaluation strategy. At the last EEAG meeting, the company heard from members that there could be cost savings by leveraging multi-year evaluation contracts. He asked for comments and feedback from EEAG.

There were comments regarding frequency, the need for evaluating programs with small percentage of overall portfolio savings, and the comment that the Idaho Public Utilities Commission (IPUC) staff direct other utilities to look at Idaho Power's evaluations as an example of what to do. There was a comment cautioning the company to not go in the wrong direction since there didn't seem to be a problem with the frequency and method of previous evaluations.

10:16 a.m. 2017 Idaho Prudence Order—Connie Aschenbrenner

Connie reminded the group of the Idaho Commission's order to address several issues with the EEAG and highlighted the topics that the company planned to discuss today.

Topic #7- "Consider tailoring its marketing efforts to achieve the micro-targeting proposed by the Company's evaluator." Tracey informed the group that Idaho Power does include micro-targeting in its marketing and will do a better job of communicating that with EEAG. The evaluator was making the recommendation regarding the Rebate Advantage program. Idaho Power conducted research and found that the Rebate Advantage customers have a lower overall adoption of technology, are likely to listen to the radio, and they are an older and more rural population.

Tracey provided examples of other types of micro-targeting that the company has done and asked EEAG members for feedback on 2019 marketing options from slide 13. Those options were: 1. Accept evaluator's proposal of search and display ads and geofencing, 2. Consider more traditional methods, or 3. Hybrid of option 1 and 2.

There were comments and questions regarding how many manufactured homes were purchased over the internet, whether the company puts flyers in areas where people utilize the internet, and if it was possible to put ads on manufacturer websites. In general, the group was supportive of Idaho Power using a common-sense approach to the evaluator's recommendation. One member favored Idaho Power using the hybrid approach of option 1 and 2.

Topic #8- "Apply the UCT, not the TRC, as the best measure of the costs and benefits of efficiency programs as a resource."

An energy efficiency potential study is used to identify the amount of energy efficiency potential to include in the Company's Integrated Resource Plan (IRP). The amount of energy efficiency potential included in the IRP establishes the targets to be achieved by energy efficiency programs. Guided by these targets, the energy efficiency programs group designs, implements and evaluates energy efficiency programs. Pete reviewed the cost-effectiveness tests that Idaho Power uses in planning programs.

The Company explained that it believes this topic is most appropriately considered in the context of the IRP, but that it wanted to update the EEAG on the issue and solicit any feedback EEAG members had regarding the cost-effectiveness perspective utilized from a long-term resource planning perspective. The Company shared that from its perspective, using the Total Resource Cost (TRC) test is preferred because it results selecting resources that will provide the lowest overall energy costs for customers across its system.

There was discussion about the different tests, the differences in how they are used for resource planning vs. program planning, why the company utilizes the TRC for resource planning, why the company uses all three tests for program planning, and the importance of Idaho Power being a trusted energy advisor for its customers. The Company explained that it does not want to encourage customers to make uneconomical decisions. One member suggested that it might be helpful for program participants if Idaho Power could provide a cost calculator associated with programs on its website. The Company stated that the IRP discussion is ongoing and committed to following up with the EEAG in the future with the outcome of those discussions.

12:00 Lunch

12:48 Meeting Reconvened Topic #9- "Reconsider the discontinuation of the Home Improvement Program."

Billie provided a timeline of the Home Improvement Program (HIP) history and its cost-effectiveness. She also provided a slide that outlined what the company looked at when it revisited the cost-effectiveness. Based on past discussions with EEAG on the topic of cost effectiveness of programs, the Company is committed to providing a more transparent proposal for discussions about the future treatment of existing programs at the May EEAG meeting.

There was general agreement from EEAG that the explanation that was provided by Idaho Power on its discontinuation of the HIP was satisfactory and they were happy to see the company committed to presenting a proposal in the May EEAG meeting regarding a framework for future program continuation decision making.

Topic #10 "Rigorously examine the potential for expanded demand response in its 2019 IRP.

Quentin informed the group that the information had previously been presented to the IRP advisory committee (IRPAC), but that it wanted to update the EEAG on the issue and solicit any feedback EEAG members had regarding how Idaho Power planned to model demand response (DR) in its IRP. Quentin briefly explained the three DR programs and provided a snapshot of all the demand response programs 2018 performance. He provided an abbreviated presentation of the one given to the IRPAC. Quentin explained that the Company has evaluated capacity need outside of the Aurora Model and is putting DR into the Aurora Model with some constraints and allowing Aurora to determine whether it is needed in different portfolio scenarios.

There were questions and comments regarding expanding the program event hours, customer tolerance for cycling events, and concern over adding additional costs to customers if the demand response programs were expanded. It was stated that once the company pays more for market energy vs. incentives, that would be the time to expand the programs. It was suggested that Idaho Power could pick up additional participants in the irrigation sector in the current timeframe, but they would not go beyond the four-hour cycling event. It is one thing to decide the company needs more demand response and another thing to get more participation. It was also suggested that the irrigation program is a good example of optimizing dispatch times. The same type of spreading customers into multiple groups could be applied to Flex Peak and A/C Cool Credit. That would be utilizing lessons learned and applying those to the other two programs.

Topic #11- "Work with the EEAG to ensure that Energy Independence Security Act program savings remain healthy beyond 2020.

Pete provided the background of the Energy Independence Security Act (EISA) and how it will impact energy savings for the programs that have lighting measures. Billie reminded the group of the numerous presentations that Idaho Power has given on how EISA will reduce the residential programs savings potential. The energy savings will still occur, but they will be the result of federal standards and not Idaho Power programs.

There were questions and comments regarding the next steps in lighting, controls, Idaho Power providing more education regarding building codes, and providing more opportunities for the residential customers to participate in. It was suggested that as a group, EEAG could go through activities to work through perceived program constraints to look for opportunities that are "outside the box." Every program has constraints, is there a way the group can go through those to find a new opportunity? Billie reiterated that the Company believes a key role of the EEAG is to have these discussions and to have an exchange of ideas. It was suggested that Idaho Power could provide members with information so that they can provide advice and suggestions, such as:

- Reports from organizations like NW Power and Conservation Council and Regional Technical Forum to kick-start a brainstorming session.
- What other utilities, that are struggling with the same issues, are looking towards for new opportunities.

Opportunities that can be explored by the EEAG include:

- Partnering with other utilities or co-branding.
- Behavioral programs
- Ways to work closer with rural areas to capture "low-hanging fruit" in those areas.

Pete stated that Idaho Power staff will talk about these suggestions and can bring back some of the resources that EEAG suggested. Theresa thanked the group for the great conversation and input.

2:24 Meeting Adjourned

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There was discussion about the different tests, the differences in how they are used for resource planning vs. program planning, why the company utilizes the TRC for resource planning, why the company uses all three tests for program planning, and the importance of Idaho Power being a trusted energy advisor for its customers. The Company explained that it does not want to encourage customers to make uneconomical decisions. One member suggested that it might be helpful for program participants if Idaho Power could provide a cost calculator associated with programs on its website and some members stated that there are other decision-making factors that individuals consider regarding energy efficiency, including comfort, environment, etc.

The Company stated that the IRP discussion is ongoing and committed to following up with the EEAG in the future with the outcome of those discussions.

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Pete stated that Idaho Power staff will talk about these suggestions and can bring back some of the resources that EEAG suggested. Theresa thanked the group for the great conversation and input.

2:24 Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes May 1, 2019

Present:

Jim Hall-Bodybuilding.com
Wil Gehl–Community Action Partnership
Stacey Donohue–Idaho Public Utilities Commission
Diego Rivas–Northwest Energy Coalition
Connie Aschenbrenner–Idaho Power
Anna Kim–Public Utility Commission of Oregon (via phone)
John Chatburn–Office of Energy & Mineral Resources
Selena O'Neal-Ada County Operations
Don Strickler–Simplot
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Sid Erwin–Idaho Irrigation Pumpers Association
Pete Pengilly*-Idaho Power
Tina Jayaweera-Northwest Power & Conservation Council (via phone)
Haley Falconer-City of Boise

Not Present:

Kent Hanway-CSHQA
Name–Company
Name–Company

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Tracey Burtch*–Idaho Power
Don Reading-Industrial Customers of Idaho
Billie McWinn*–Idaho Power
Gary Grayson–Idaho Power
Todd Greenwell–Idaho Power
Chellie Jensen–Idaho Power
Adam Richins*-Idaho Power
Alexis Freeman-Idaho Power
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Melissa Thom*- Idaho Power
Phil DeVol*-Idaho Power
Mary Hacking-Idaho Power
Denise Humphreys-Idaho Power
Donn English-Idaho Public Utilities Commission
Brittany Nixon-Idaho Power
Paul Goralski-Idaho Power
Cassie Koerner-Idaho Public Utilities Commission
Mindi Shodeen-Idaho Power

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:32 a.m.

Pete convened the meeting with housekeeping item, member and guest introductions, and January meeting note review. One member had some revisions that they would like added to the document. Rosemary suggested that they submit those changes via email and Idaho Power will consider those edits and redistribute. Theresa Drake introduced Adam Richins, Vice President of Customer Operations & Business Development to discuss Idaho Power's Clean Energy Goal.

9:38 am-Idaho Power's Clean Energy Goal—Adam Richins

Adam Richins spoke to members of EEAG about Idaho Power's Clean Energy Goal, and the company's current energy mix as compared to the national average. He spoke about how the company plans to reach this goal by the year 2045 and how energy efficiency plays a part. He concluded by thanking members of EEAG for their efforts in assisting the company reach this goal.

9:45 am-2019 Integrated Resource Plan—-Phil DeVol

Phil explained the primary goals of the Integrated Resource Plan (IRP), the technical achievable bundles, the role of demand response in the IRP, portfolio development, the menu of resources options and the different energy efficiency options that were considered, and the preferred portfolio. He also explained the Aurora production cost model that builds various portfolios based on the futures that are inputted.

There were comments and questions on how the bundles were constructed, if there is documentation on what is in the bundle, and if the cost bundles include utility or participant costs. Pete answered that the cost bundles are net total resource cost. One EEAG member thanked Idaho Power for incorporating feedback from stakeholders and taking an innovative approach in the development of the 2019 IRP.

10:15 am Updates: Residential Campaign & DSM Prudence Filing—Melissa Thom & Connie Aschenbrenner

Melissa presented the new residential campaign and showed the video featuring Joulee and Wattson that has been airing on local television stations.

Connie provided an update on the DSM Prudence filing, the Energy Efficiency Rider decrease, and thanked EEAG for collaborating on the topics from the previous prudence case. Idaho Power has filed their report with the Idaho Public Utilities Commission as directed.

10:21 am-Programs—Billie McWinn & Quentin Nesbitt

Billie provided year-to-date savings and participation for the residential programs. She provided an overview of the Energy Saving Kits, the history, and the several types of kits available. She highlighted the mail by request kits and the installation rates of the water saving showerhead. The savings associated with these kits come from the Regional Technical Forum (RTF). The RTF shows a 90% installation rate but through surveys, Idaho Power is seeing about a 57% installation rate. Due to the installation rate reduction, electric water heating customers are now asked if they want the water savings measure included with their kit when ordering online.

Billie provided an update and overview of the Heating and Cooling Efficiency (H&CE) program. Currently, to qualify for the smart thermostat incentive, a licensed contractor must install thermostats. Idaho Power is considering changing the contractor requirement and would like feedback from EEAG. Billie provided a list of risks and opportunities for a self-install option and showed a sample of the installation instructions for heat pumps. She asked the group for feedback on whether the company should allow self-install option for electric furnaces, heat pumps, or both. She also asked if it should be for a trial period or long term and how or when should the company revisit the topic.

There were comments and questions on why the company is considering removing the contractor install requirement. Billie answered that this requirement implemented when Idaho Power brought this measure to EEAG initially, when the market was newer, and that the Company is reviewing the requirement now, in part, because the market and technology have had time to mature. Cost effectiveness of the measure may be helped with the self-install option due to the reduction in installation costs, but Idaho Power would need to look at the assumptions behind the RTF savings numbers to determine that. An increase in the number of smart thermostat incentives could also reduce the overall cost-effectiveness of the program because the cost-effectiveness of smart thermostats is lower than the program cost-effectiveness. Most members of EEAG were in favor of removing the contract install requirement, even after acknowledging the possible difficulties with installing them on a heat pump. Some suggestions were that the company could provide information on the website or marketing material to advise of the potential risks to equipment if not installed properly. The Energy Trust has had a self-install option for years and one member suggested the company reach out to them.

Commercial/Industrial/Irrigation Update

Quentin provided year-to-date savings and participation for the commercial, industrial, and irrigation programs. He also highlighted program performance year-to-date compared to same time in 2018. He updated EEAG on the Small Business Direct Install offering. The company is in the process of selecting a vendor.

There were comments and questions about when energy savings are counted, what types of lighting options might be used in the direct install offering, past participation in the retrofit program and what their return on investment was. Quentin answered that energy savings is counted when the incentive is paid. The lighting options for the direct install would need to be what is ultimately best for the customer and the needs of their space. There was a comment about the value of the cohorts feeding into other program participation and if there is a way to evaluate that. Quentin answered that cost effectiveness is done differently around the region and currently Idaho Power has not included capital projects paid through the normal program in cost effectiveness calculations for each cohort. Idaho Power also uses an average administration cost from the overall C & I program rather than the specific cohort costs to determine cost effectiveness. One member stated that there is value in cohort participants sharing their results and that it can drive engagement with others.

There were comments on the Commercial trainings and how beneficial they are. There was also a question about the status of the savings numbers for the Irrigation Menu measures. Quentin stated that Idaho Power is continuing to work with the RTF but haven't come to any conclusions yet. One member commented that the RTF numbers are good for knowing what the savings are, but if Idaho Power can come up with more accurate numbers for its service area that those might be better numbers to use. One member received a call from a company that makes LED lamps for non-traditional usage and dark sky compliant. The Sawtooth National Recreation area has this designation and as result surrounding areas may become more interested in lighting that is compliant.

12:00 Lunch

1:00 Meeting Reconvened

1:00 pm Evaluation results—Kim Bakalars-Tetra Tech

Tetra Tech performed evaluations on the Multifamily, Energy Efficient lighting, and the Commercial/Industrial Custom programs. Kim went over the results and recommendations of each program. Th overall results of these evaluations are that Idaho Power staff are committed and conscientious in the way these programs are managed, and savings calculations were reasonable.

1:37 pm Cost Effectiveness—Pete Pengilly

At the last EEAG meeting in January, Idaho Power made a commitment to come back and have a discussion around cost effectiveness for program continuation. Pete briefly explained cost-effectiveness and the several types of tests the company uses; Total Resource Cost, Utility Cost Test, Participant Cost Test, and the requirements in Oregon.

There was discussion around what the threshold or ratios should be used for program continuation, which tests are more important, the importance of all the test used together, the cost-effectiveness ratios should be higher for a new program or measure vs. a continuation. Adjustments could be made on an established program, but it isn't a good idea to start a new program that isn't cost effective. Starting a program that is not cost effective can erode customer confidence in the program. One member commented that they appreciate Idaho Power taking time to create the proposal considering the future of energy efficiency and the changes that are on the horizon. This can help especially with what is in the future for EE and the changes that are coming. This could help EEAG in creating a framework for program development. Connie concluded the discussion and thanked the group for the feedback. Idaho Power will use this information to put together a more detailed proposal and bring it back to EEAG at a future meeting.

2:43 pm DSM Activity—Pete Pengilly

Pete gave the history of the DSM Annual Report. This report is a regulatory requirement, so Idaho Power is not asking to discontinue the report, the company is seeking input from EEAG on ways to make it meaningful and valuable for stakeholders, are there ways the company can streamline the format.

Discussion.

Group 1 Comments:

Our group found no major changes needed. It is useful and readable. The useful content depends on who is reading it. There seem to be more pictures, tables and graphs that take up space and made it longer. The increase in marketing discussion could have made it longer, that could be a place to find space saving. EEAG has been asking for marketing for years so having it is nice, but the company could consolidate it. Maybe formatting to make it more comfortable to read it. Having color coded edge to distinguish the different sections. Customer satisfaction and marketing overview were less helpful than the granular level for each program. The company could provide program summaries as a pdf that could be sent out in a more digestible format.

Group 2 Comments:

Once we determined the audience of this report; regulatory and intervenors, they all think it is great. We recommend not changing anything since it works for them. If you want others to use the report, then pull some stuff out, less fluff and do a 20-page executive summary that explains what is in the other report. It could be something you could use beyond regulatory.

3:33 pm- Wrap-up

I enjoy these meetings and the updates. I liked the discussion on cost effectiveness. The evaluation presentation is important since it shows how these programs are managed. Discussing the DSM Annual Report was helpful because it shows how much work goes into putting it together.

It was a good meeting and I appreciate all the work in putting the annual report together.

I appreciated the deep dives on a couple key programs. For the next meeting it would be nice to see new program ideas or measures as a topic.

The flow of agenda was good, not too much. We need to start looking at some new things since IRP process is almost complete. We shouldn't wait too long even if they are just ideas that need flushing out.

I learned a lot today especially around cost effectiveness.

Thank you for all the feedback on programs and program continuation. Appreciate the nature of discussion and differing opinions and viewpoints.

I am looking forward to version two of cost effectiveness program continuation proposal conversation and what it brings back to the next meeting.

I appreciate the discussion on smart thermostats.

3:40 Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated August 8th, 2019

Present:

Selena O'Neal-Ada County Operations
Wil Gehl–Community Action Partnership Assoc. of Idaho
Stacey Donohue–Idaho Public Utilities Commission
Katie Pegan–Office of Energy & Mineral Resources
Connie Aschenbrenner–Idaho Power
Tina Jayaweera-Northwest Power & Conservation Council
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
Haley Falconer-City of Boise
Sid Erwin–Idaho Irrigation Pumpers Association
Pete Pengilly*-Idaho Power

Not Present:

Kent Hanway-CSHQA
Jim Hall-Bodybuilding.com
Diego Rivas–Northwest Energy Coalition
Anna Kim–Public Utility Commission of Oregon

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Tracey Burtch*–Idaho Power
Shelley Martin–Idaho Power
Billie McWinn*–Idaho Power
Paul Goralski–Idaho Power
Todd Greenwell–Idaho Power
Chellie Jensen–Idaho Power
Andrea Salazar*-E Source
Kurt Kolnowski*-Applied Energy Group
Kevin Keyt-Idaho Public Utilities Commission
Peter Richardson-Industrial Customers of Idaho
Tom Lienhard-Avista Corp
Leslie Cuen-Idaho Power Intern
Tonja Dyke-Idaho Power
Becky Arte-Howell-Idaho Power
John Bernardo-Idaho Power
Kassie McCool-Idaho Power
Mindi Shodeen-Idaho Power
Theresa Drake–Idaho Power
Andrea Simmonsen–Idaho Power
Annie Meyer*-Idaho Power
Cheryl Paoli–Idaho Power
Zeke VanHooser-Idaho Power
Chris Pollow–Idaho Power
Mark Rehley*-Northwest Energy Efficiency Alliance
Lynn Tominaga-Idaho Irrigation Pumpers Association
Jennifer Lightfoot-Ada County Operations
Donn Reading-Industrial Customer of Idaho
Ryan Finesilver-Avista Corp
Randy Thorn-Idaho Power
Cheryl Paoli-Idaho Power
Brittany Nixon-Idaho Power
Cassie Koerner-Idaho Public Utilities Commission
Serena Lloyd*-Idaho Power Intern

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:33 AM

Pete convened the meeting with housekeeping items, member and guest introductions, and May meeting note review. One member asked if the revisions from the January 2019 meeting had been incorporated into the notes. At that time, the member who had suggested revisions had not sent those to Idaho Power.

9:45 a.m. Preliminary Cost-Effectiveness—Kathy Yi

Kathy's presentation covered cost-effectiveness assumptions, DSM alternate cost comparisons, an explanation of the three cost-effectiveness tests that the company uses, 2019 preliminary program cost-effectiveness, and the future of lighting as it relates to the Energy Independence and Security Act 2007 (EISA). In previous meetings, Idaho Power has shared the potential impacts that EISA will have on programs going forward.

There were questions and comments regarding the sources of determining incremental costs and why Green Motors is not analyzed as its own program. Idaho Power explained green motors is considered a measure within the Irrigation and Custom programs due to the small amount of energy savings. Regarding lighting programs in 2020, Kathy stated that there is uncertainty among many utilities on which savings numbers to use going forward.

10:34 a.m. Residential Programs—–Billie McWinn

Billie provided an update of the Heating & Cooling program improvements, Residential New Construction Pilot, and Residential Education. She thanked EEAG for their input for removing the installer requirement for smart thermostats in the Heating & Cooling program.

There were questions and comments about smart thermostats being available to small commercial customers. Billie answered that this measure is available through the Retrofit program. One member asked why eligibility for smart thermostats wasn't based on the Energy Star® designation rather than a Qualified Products List (QPL). Billie stated that she would research that.

Billie provided a detailed overview of the current Residential New Construction Pilot. This program uses a regional software tool called REM Rate. With numerous inputs, including current building code, the software calculates energy savings associated with energy efficiency built into new residential construction. The methodology for calculating the percent savings above code is changing, which will impact eligibility for the current program. Idaho Power would like input from EEAG on several options it is exploring.

There were questions and comments regarding the software, how the REM Rate savings compares to deemed savings, and about the change in calculations of percent savings above code. Most EEAG members liked the 2-tier approach. A couple members suggested having a stretch or reach goal along with the 2-tier approach. One member sated that they liked a non-monetary incentive for a lower percentage above code and then add in the monetary incentive as the percentage increases. Billie thanked the group for their input and stated that at the next meeting there should be more information for an update.

Billie presented Serena Lloyd, student intern, who has been working on an energy efficiency video game. Serena provided an explanation and demonstration of the game.

11:23 a.m. Commercial/Industrial/Irrigation Programs—Quentin Nesbitt

Quentin provided year-to-date savings and participation for the commercial, industrial, and irrigation programs. He also highlighted program performance year-to-date compared to same time in 2018. Quentin provided an update on the small commercial customer kits and how many were distributed in 2019. One member commented on receiving one, how impressed they were with the contents and how well put together it was.

Quentin stated that Idaho Power selected a vendor and is working on the contract for the Small Business Direct Install program. An audience member asked what the size limit is for a small business. Quentin stated that it is 25,000 kWh/year as the upper limit. Quentin also spoke about the different intern/externships the department had this year and the new Sensor Suitcase that Idaho Power is purchasing for the Integrated Design Lab tool loan library to be used to analyze buildings typically less than 50,000 sq./ft.

There were questions and comments on how the New Construction program calculates energy savings and if the company knows how much of all new construction comes thru this program. Quentin answered that savings are based on code and what the builder does over code. It is hard to track the percentage of all new construction in the area and how much of that comes through this program.

Idaho Power is currently using the new savings numbers from the Regional Technical Forum (RTF) for the Irrigation Menu program. The company and the RTF are working on a research plan for the impacted prescriptive measures. One member asked that Idaho Power keep EEAG informed on the status of the research and incentive levels.

12:00 p.m. Lunch

1:00 p.m. Meeting Reconvened

1:04 p.m. Marketing—Annie Meyer and Tracey Burtch

Annie explained the "No Sweat Summer Sweepstakes" and showed earned media spot. One member commented on the July edition of Connections. They appreciated how well written and included energy efficiency tips and fun facts. Tracey showed the new Retrofit brochure created in an easy to understand format that Energy Advisors can use when meeting with customers. She also highlighted the industry specific brochures and passed them around for EEAG members to look at. A new informational brochure has been created for perspective customers who may not be aware of the program offerings available from Idaho Power.

There was conversation about how Idaho Power markets the Green Motors program to the commercial/industrial customers. Quentin mentioned it is marketed to customers on our website and through presentations at workshops. Quentin and Pete indicated that the company has been looking at better ways communicate that information and welcome any ideas from EEAG.

1:28 p.m. Technologies Panel

Pete introduced each of the panelists and encouraged the group to ask questions**.**

Andrea Salazar-E Source

- **Low-E window films**
- **The Smart Home**

Kurtis Kolnowski-AEG

- **Non-intrusive load metering and Sub-metering (NILM)**
- **Ultraviolet C (UV-C) LED's for water disinfection**

Mark Rehley-NEEA

- **Phase change materials (PCM)**
- **Heat Pumps**

Questions and comments from EEAG included: Black box technologies, window film energy savings, residential and commercial building automation and the value for Idaho Power programs, heat pump technology in the summer, UV disinfection in the waste water industry, and ultrasonic dryers.

3:30 p.m. Wrap-up/Open Discussion

The panel discussion was enjoyable. I was glad to see Idaho Power provide a current explanation on EISA and the impacts to programs. It would be interesting to get an update in 2020.

I enjoyed the panel discussion

I really enjoyed the industry brochures and would like to receive a link. They are hard to find on the website.

I look forward to hearing more about how lighting changes will affect programs. The emerging technologies panel was interesting.

It was great to hear what else is out there from the panel

I liked the mix of the day, it was a good balance

I enjoyed hearing about lighting issues and how the government issues impact programs and what the company is doing.

I would like to have a discussion of non-energy benefits and how to evaluate them, it's not about getting the numbers right.

This current focus of EEAG is on the value of energy efficiency, but there may be more value in controlling customer's loads. That might require re-thinking the value streams and alternative costs. Over the next several years we may need to think differently about energy. The role of this group may need to switch focus to the broader subject of demand side management, load shifting.

3:44 Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated November 13th, 2019

Present:

Jim Hall-Bodybuilding.com	Don Strickler–Simplot
Wil Gehl- Community Action Partnership Assoc. of Idaho	Haley Falconer-City of Boise
Donn English–Idaho Public Utilities Commission	Katie Pegan–Office of Energy & Mineral Resources
Amy Wheeless–Northwest Energy Coalition	Selena O'Neal-Ada County Operations
Connie Aschenbrenner–Idaho Power	Pete Pengilly*-Idaho Power
Lynn Tominaga–Idaho Irrigation Pumpers Association	Tina Jayaweera-Northwest Power & Conservation Council (On phone)

Not Present:

Kent Hanway-CSHQA
Ben Otto-Idaho Conservation League
Anna Kim–Public Utility Commission of Oregon
Stacey Donohue-Idaho Public Utilities Commission (Donn English sitting in for Stacey)
Diego Rivas-Northwest Energy Coalition (Amy Wheeless sitting in for Diego)
Sid Erwin-Idaho Irrigation Pumpers Association (Lynn Tominaga sitting in for Sid)

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power	Chad Severson–Idaho Power
Tracey Burtch*–Idaho Power	Theresa Drake*–Idaho Power
Shelley Martin–Idaho Power	Andrea Simmonsen–Idaho Power
Billie McWinn*–Idaho Power	Annie Meyer*-Idaho Power
Bo Hanchey*–Idaho Power	Cheryl Paoli–Idaho Power
Todd Greenwell–Idaho Power	Zeke VanHooser-Idaho Power
Randy Thorn–Idaho Power	Chris Pollow–Idaho Power
Melissa Thom*-Idaho Power	Peter Richardson-Industrial Customers of Idaho
Don Reading-Industrial Customers of Idaho	Paul Goralski-Idaho Power
Krista West-Idaho Power	Ryan Finesilver-Avista (on phone)
Madison Olson-Office of Energy & Mineral Resources	Becky Arte-Howell-Idaho Power
Denise Humphreys-Idaho Power	Brad Iverson-Long-Idaho Public Utilities Commission
Rachelle Farnsworth-Idaho Public Utilities Commission	Sheree Willhite-Idaho Power
Tonja Dyke-Idaho Power	Brittany Nixon-Idaho Power

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30 am

Pete convened the meeting with housekeeping and safety information. He introduced Chad Severson, new Energy Efficiency Analyst. He informed the group of leadership changes at the company and introduced Bo Hanchey, Vice President of Customer Operations and Chief Safety Officer. Bo shared his background at Idaho Power, highlighted the ranking that Idaho Power just received from JD Power and thanked members of EEAG for their continued input with energy efficiency programs.

Rosemary had guests and EEAG members introduce themselves and asked if there were any comments or questions on the August 8th meeting notes. Haley provided her suggested revisions to the January 2019 meeting notes via email. EEAG members will receive an updated copy of the January 2019 notes before the next meeting.

9:40 am-Updates—Theresa Drake

Theresa provided an update regarding the Northwest Energy Efficiency Alliance (NEEA) contract for the 2020-2024 cycle. Idaho Power and NEEA have reached an agreement that has been filed with the Idaho Public Utilities Commission (IPUC).

Idaho Power and Avista have met with a third party to explore new opportunities for market transformation in Idaho. She also updated the group regarding a new App that the company is pursuing. She will keep the group updated as the company works through the process.

9:45 am-Financials/Evaluation Schedule/2019 Evaluation & Research Progress—Pete Pengilly

Pete showed appendix 1 and 2, provided an update of research that will be complete in 2019, and an overview of current evaluations taking place. Pete also provided the evaluation plan for 2020-2021 and asked for feedback or concerns with the plan.

10:10 am-Connie provided an update on the approval and acknowledgement by the IPUC of Idaho Power's filing for prudence determination. The IPUC determined the company's $41 million in 2018 DSM expenditures to be prudently incurred and determined Idaho Power complied with the directives in Order No. 34141. The IPUC also determined the company should rely on the Utility Cost Test (UCT) perspective for determining the level of energy efficiency that will be included in the Integrated Resource Plan. One member asked what happens if the IPUC disallows the money spent. Connie explained the process and how it ultimately affects the company's bottom line.

10:16 am-Prospective Cost Effectiveness 2020/Lighting—Kathy Yi

This presentation was a continuation of the presentation from the August EEAG meeting. Kathy provided a cost effectiveness test refresher, the Demand Side Management (DSM) alternative cost comparisons, 2018-2020 program assumptions, preliminary 2019 cost effectiveness summary, anticipated changes that will impact 2020, and the future of lighting savings.

There were comments and questions on how non-energy benefits are quantified and if greenhouse gasses or carbon reduction were included in those numbers. Pete and Quentin commented that some of the savings numbers from the Regional Technical Forum (RTF) have a carbon dollar benefit. The 10% adder could also have some environmental components included. One member commented that the RTF savings numbers are supposed to cover those non-energy benefits. It is not in-lieu of other non-energy impacts. The Council recommends adding the 10% adder to the UCT and has a social cost of carbon in its avoided costs.

Idaho Power stated that for residential lighting, it planned to used RTF workbook version 7.1 for program year 2020 to align with the Bonneville Power Administration's (BPA) version adoption. One member stated that a new RTF workbook was recently adopted and why Idaho Power could use those newer savings instead of following BPA. Kathy stated that the main reason was due to fact that the payment to the vendor are set by BPA and are based on the kWh savings. Idaho Power wanted to align the payments to the savings. Also, the newest version 8 of the workbook came out in September of 2019 and the hasn't been through its QA/QC review. However, the Company will review the newest workbook once it's released and relook at this decision

Billie informed the group of Idaho Power's plan for residential programs that include lighting. The company will be using the RTF savings but assuming that nothing is changing with EISA as of Jan 1, 2020. The company has implemented certain contingencies if anything changes. An example would be with the Energy Savings Welcome Kits. Items within the kit can be modified if savings drop significantly.

11:17 am-Marketing/Marketing Analytics—Tracey Burtch/Melissa Thom

Tracey provided a detailed explanation of the information provided to Idaho Power from Google Display Metrics. She explained what an impression is, clicks, click-thru-rates, and size. She provided the search engine marketing results for September and how the company utilizes that information.

Melissa provided an update on the Fall Campaign Digital Ads, the My Account pop-up quiz results, the impacts of the program promo pop-up, and a sneak peak of future pop-ups that the company will be using.

There was a question about the paid ads and a comment on the recent Energy Efficiency Fall/Winter Guide and how well put together it is and loaded with timely content.

11:30 am Lunch

12:30 pm Meeting Reconvened

12:30 pm-Programs—Billie McWinn and Quentin Nesbitt

Billie provided year-to-date savings for the residential programs. She provided an in-depth update for Energy House Calls and Residential New Construction programs and an update on the smart thermostat qualifications. At the August 2019 EEAG meeting a question was asked about why Idaho Power didn't use the Energy Star® qualified products list for the smart thermostat qualification. Billie explained that the list is very limited due, in part, to their requirements for manufacturers being more stringent. One member asked when smart thermostats will be evaluated. Billie answered that it will be in 2021 to allow a year's worth of data.

Billie provided an update to EEAG that participation in the Energy House Calls program has seen a steady decline. She provided a 10-year snapshot view of participation levels. There will be a time in the future when this program is no longer cost-effective

At the August 2019 EEAG meeting Billie presented some options the company was considering due to the REM Rate software change that would affect the Residential New Construction program. In her discussion, she provided an overview of the current and the new methodologies and the different options for incentive tiers that were discussed at the August 2019 meeting. She followed up on questions regarding the existing eligibility requirements and incentive amounts. Billie explained the company is considering a 3-tier approach for this program and asked EEAG for input regarding the incentive level for the lowest tier option. There was some discussion on the impacts of setting the level anywhere from $1,000 to $1,300 and while EEAG did not have a strong opinion on which level was optimal, they supported something in that range.

There were also questions and comments regarding new building codes that will go into effect in 2021 and if that will change considerations, the company should consider grandfathering projects in the pipeline to preserve customer trust. Billie explained that she will update the group on the status of the final offering at the next EEAG meeting.

Billie updated EEAG on the status of some non-communicating devices in the AC Cool Credit program. She reminded EEAG of the process to remove participants from the program that met certain non-communication criteria and informed EEAG that approximately 130 customers will be receiving communication about their removal from the program, starting in January 2020.

Billie provided a brief update of the energy efficiency video game concept that was previewed at the August 2019 meeting. While the game will not be completed or made available on the company website, Billie explained that the Energy Advisors are reaching the target audience of school-aged children by increasing their presence within the various school districts in the service area.

Idaho Power is planning on a full program roll out of the Home Energy Reports. Billie explained the mechanics of the program, including that there is no need to weather normalize the data since the treatment and control group experience the same weather at the same time. Based on the savings calculated from the treatment group vs. control group, it is cost-effective.

Billie reviewed the Easy Savings pilot and informed the group that the pilot will be transitioning to a full program in 2020.

1:30 pm-Programs—Quentin Nesbitt

Quentin provided year-to-date savings and participation for the commercial, industrial, and irrigation programs. He also highlighted program performance year-to-date compared to same time in 2018. The Small Business Direct Install program officially launched on November 4th in Aberdeen. Letters were sent to customers and the company is now scheduling appointments for assessments. There was a question about area selection; Quentin explained that the program will be delivered throughout Idaho Power's service area, but some of the smaller regions will be targeted first to get a sense of how the program mechanics work. The program was launched in in Eastern Idaho where customers haven't been as engaged with current retrofit program.

Quentin highlighted that the Water/Wastewater cohort has created numerous capital projects both from participating municipalities as well as non-participants in the cohort. It is because of the relationships that are built with the engineering firms that work for municipalities.

Quentin also highlighted a potential modification to the C & I program that would better target energy management (Operational Energy Savings) opportunities. This offering would target buildings between 25,000-100,000 square feet and would focus on operational behavior type savings. One member stated that the city of Seattle has a successful energy management program that includes a tune-up requirement that is very successful and encouraged Idaho Power to look at their program. It targets buildings under 100,000sqft.

As a follow-up from the August 2019 EEAG meeting, Quentin provided a detailed description of the Green Motors program and how the program works and is promoted.

2:01pm- Wrap-up/Open Discussion

There are a lot of new things going on and I am looking forward to hearing more about them.

It is exciting to see what is happening with the Home Energy Reports and the new custom offerings.

I enjoyed hearing about the newer initiatives. Having an in-depth walk thru of the lighting was great and very helpful.

It was a good meeting and there were a lot of good points brought up. I was a little confused with the different workbook versions with lighting.

I enjoyed the program cost-effectiveness and results. I enjoy looking ahead at new possibilities and potential for programs. Marketing does reach people, I have had a couple people ask me if I work for Idaho Power.

I'm finally starting to get comfortable and appreciate all the work that Idaho Power does. I am excited about the energy management program.

It was a good meeting. The energy management program is very interesting. Idaho Power has done a good job at promoting operational efficiency.

It was great to hear what is going on in Idaho. I am happy to share any insights regarding operational management.

Rosemary reminded everyone that Shawn will be sending out a Doodle poll for the 2020 EEAG meetings.

2:20 pm- Meeting Adjourned

NEEA Market Effects Evaluations

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2014 & 2017 Walk-in Coolers and Freezers Standards Evaluation: Final Report	Commercial/Industrial	TRC	NEEA	Market Assessment
2019 Manufactured Homes Program Assessment	Residential	Energy 350	NEEA	Qualitative Research
2019 Oregon New Commercial Construction Code Evaluation Study	Commercial	Ecotope	NEEA	Analysis
2019 Q1: Emerging Technology Quarterly Report	Commercial/Industrial, Residential, Irrigation	NEEA	NEEA	Quarterly Report
2019 Q2: Emerging Technology Quarterly Report	Commercial/Industrial, Residential, Irrigation	NEEA	NEEA	Quarterly Report
2019 Q3: Emerging Technology Quarterly Report	Commercial/Industrial, Residential, Irrigation	NEEA	NEEA	Quarterly Report
2019 Q4: Emerging Technology Quarterly Report	Commercial/Industrial, Residential, Irrigation	NEEA	NEEA	Quarterly Report
2019 Reduced Wattage Lamp Replacement Transition Progress Market Evaluation Report	Commercial/Industrial, Residential	Cadeo Group	NEEA	Market Assessment
Beverage Vending Machines Standard Evaluation	Commercial	TRC	NEEA	Analysis
Building Commissioning—2018 Long-Term Monitoring and Tracking Report	Commercial/Industrial	The Cadmus Group	NEEA	Market Assessment
Ceiling Fan Standard Evaluation Report	Commercial, Residential	TRC	NEEA	Analysis
Commercial Code Enhancement Audience Research	Commercial/Industrial	NMR Group	NEEA	Survey
Commercial High-Performance HVAC Market Characterization	Commercial/Industrial	Opinion Dynamics	NEEA	Market Assessment
Condensing Rooftop Unit Field Study: Baseline and Final Report—2018–2019 Heating Season	Commercial/Industrial	Energy 350	NEEA	Analysis
Desktop Power Supplies ENERGY STAR Version 6 Baseline Methodology and Specification Influence Review	Commercial	Apex Analytics	NEEA	Analysis
Drive Power Initiative—2018 Long Term Monitoring and Tracking (LTMT) Report	Commercial/Industrial	The Cadmus Group	NEEA	Market Assessment
Extended Motor Products Market Characterization	Commercial/Industrial	The Cadmus Group	NEEA	Market Assessment
Extended Motor Products Savings Validation Research on Clean Water Pumps and Circulators	Commercial/Industrial	Cadeo Group	NEEA	Analysis
LLLC Savings Methodology Review	Commercial/Industrial	Energy 350	NEEA	Market Assessment

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
Natural Gas Water Heater and HVAC Installer Research Report	Residential	Illume Advising	NEEA	Market Assessment
Northwest Ductless Heat Pump Initiative: Market Progress Evaluation # 8	Residential	The Cadmus Group	NEEA	Market Assessment
Northwest Heat Pump Water Heater Initiative Market Progress Evaluation Report #5	Residential	NMR Group	NEEA	Market Assessment
Q1 2019 Emerging Technology Quarterly Report	Residential	NEEA	NEEA	Quarterly Report
Q1 2019 Market Research and Evaluation Quarterly Newsletter	Commercial/Industrial, Residential	NEEA	NEEA	Quarterly Report
Q1 2020 Market Research and Evaluation Quarterly Newsletter	Commercial/Industrial, Residential	NEEA	NEEA	Quarterly Report
Q2 2019 Emerging Technology Quarterly Report	Residential	NEEA	NEEA	Quarterly Report
Q2 2019 Market Research and Evaluation Quarterly Newsletter	Commercial/Industrial, Residential	NEEA	NEEA	Quarterly Report
Q3 2019 Emerging Technology Quarterly Report	Residential	NEEA	NEEA	Quarterly Report
Q4 2019 Emerging Technology Quarterly Report	Residential	NEEA	NEEA	Quarterly Report
Q4 2019 Market Research and Evaluation Quarterly Newsletter	Commercial/Industrial, Residential	NEEA	NEEA	Quarterly Report
Results of 2017-2018 Northwest Residential Lighting Long-Term Monitoring and Tracking Study	Residential	CADEO Group	NEEA	Market Assessment
Results of the 2018 Northwest Residential Lighting Long-Term Monitoring and Tracking Study	Residential	Apex Analytics	NEEA	Market Assessment
Retail Product Portfolio Evaluation—Final Report	Residential	Apex Analytics	NEEA	Market Assessment
Strategic & Business Plans 2020—2024	Commercial/Industrial, Residential	NEEA	NEEA	Planning

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/.

INTEGRATED DESIGN LAB

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2019 Task 1: Foundational Services Summary of Projects	Commercial	IDL	Idaho Power	EE Assistance & Education
2019 Task 2: Lunch and Learn Summary of Effort Outcomes	Commercial	IDL	Idaho Power	EE Training & Education
2019 Task 3: BSUG Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	EE Training & Education
2019 Task 4: New Construction Verifications Summary of Projects	Commercial	IDL	Idaho Power	EE Verifications
2019 Task 5: Tool Loan Library Summary of Effort and Outcomes	Commercial	IDL	Idaho Power	EE Assistance & Education
2019 Task 6 (1.6): Thermal Energy Savings Tool Summary of Progress*	Commercial	IDL	Idaho Power	EE Assistance & Education
2019 Task 7: BEMS Predictive Control Case Study Summary of Work	Commercial	IDL	Idaho Power	EE Research
2019 Task 8: RTU Control Retrofits for Small Commercial Facilities Summary of Work	Commercial	IDL	Idaho Power	EE Research

*Task 6 was numbered 1.6 in 2019.

INTEGRATED DESIGN LAB
University of Idaho

2019 Task 1: Foundational Services

Summary of Projects

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 1901_001-01

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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:
Ken Baker

Author:
Damon Woods

Prepared for:
Idaho Power Company

Contract Number:
5277

Please cite this report as follows: Woods, D. (2019). *2019 TASK 1: Foundational Services – Summary of Projects* (1901_001-01). University of Idaho Integrated Design Lab, Boise, ID.

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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Acronyms and Abbreviations

AIA	American Institute of Architects
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
EMS	Energy Management System
IDL	Integrated Design Lab
IPC	Idaho Power Company
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
UI	University of Idaho

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) provided technical assistance in 2019 for energy efficiency building projects through the Foundational Services task. This program, supported by Idaho Power (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.

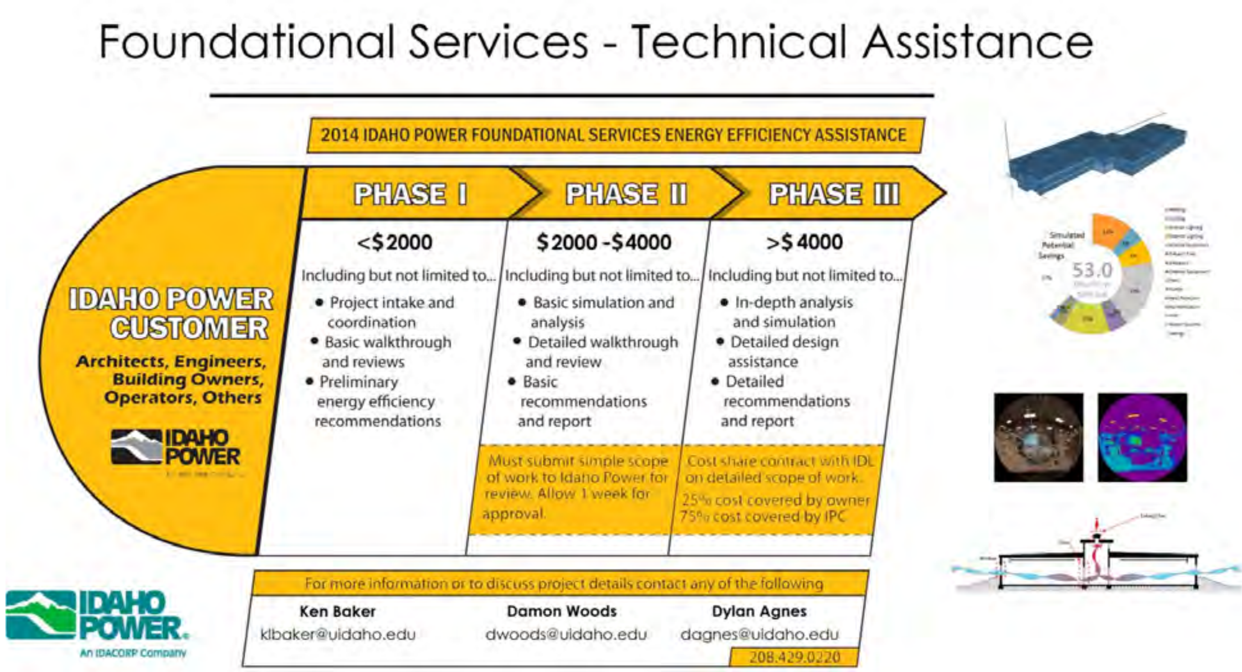

Figure 1: Foundational Services Flyer Outlining Phases

Information on the Foundational Services program was provided at each Lunch and Learn and BSUG presentation. Advertising for the program was also offered over the course of the year to local government officials, developers, and the architects and engineers that interacted with IDL.

2. Project Summary

The IDL worked on 13 Foundational Service projects in 2019. Two projects were for a municipality, while the majority were requested by private companies. There are currently requests for six new projects that are set to begin in 2020. In total, there were five Phase I projects, five Phase II projects, one Phase III project, and two internal requests from Idaho Power. The projects were split evenly between consultations on retrofits and new construction. The full list of projects is shown in the appendix below. Details on the projects that resulted in a memo or report are included in the individual project reports submitted to IPC and are included as the appendix in the internal report. In 2019, the IDL assisted with approximately 275,000 ft^2 of buildings. This is slightly more than the 250,000 ft^2 worked on in 2018.

Table 1: 2019 Foundational Services Project Summary

Project Type	Size	Retrofit/New	Location
Civic/Government	15,000	Retrofit	Boise
Civic/Government	16,300	Retrofit	Boise
Hotel	500,000	Retrofit	Fort Hall
Civic/Government	20,000	Retrofit	Boise
Emerging Technology	N/A	New Construction	Boise
Emerging Technology	N/A	N/A	N/A
Aircraft Hangar	17,400	New Construction	Boise
Restaurant	1,000	Retrofit	Salmon
NGO	13,000	Retrofit	Boise
Hotel	43,200	New Construction	Ketchum
NGO	13,000		Boise
Civic/Government	73,500	New Construction	Boise
Office	78,750	New Construction	Eagle
School	Unknown	New Construction	Boise
Car Wash	Unknown	New Construction	
Civic/Government	30,000	Retrofit	Boise
Office	65,000	Retrofit	Boise
Office	40,000	Retrofit	Meridian
Office	20,000	Retrofit	Boise

2019 Task 2: Lunch and Learn

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 1901_002-01

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Prepared by:
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IDL Director:
Ken Baker

Authors:
Dylan Agnes

Prepared for:
Idaho Power Company

Contract Number:
#5277

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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

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1. 2019 SUMMARY AND CUMULATIVE ANALYSIS

Table 1: 2019 Lunch and Learn Summary

	Date	Title	Presenter	Group / Location	Attendees
1	4/16	The Architect's Business Case for Energy Performance Modeling	Ken	Architectural Firm 1	7
2	4/17	VRFs & Heat Pumps	Damon	Engineering Firm 1	10
3	5/8	The Architect's Business Case for Energy Performance Modeling	Ken	Architectural Firm 2	8
4	5/15	Future of Lighting Controls	Dylan	Architectural Firm 2	8
5	5/30	Daylight in Buildings - Getting the Details Right	Dylan	Architectural Firm 1	13
6	6/5	Chilled Beams	Damon	Engineering Firm 2	6
7	6/13	Future of Lighting Controls	Dylan	Architectural Firm 3	6
8	7/9	High Efficiency Heat Recovery	Damon	Engineering Firm 1	9
9	7/11	Radiant System Design Considerations	Damon	Architectural Organization 1	11
10	7/17	Hybrid Ground Source Heat Pump System	Damon	Engineering Firm 2	6
11	7/18	The Architect's Business Case for Energy Performance Modeling	Ken	Architectural Firm 4	8
12	7/24	Cold Feet: Managing Controls and Condensation for Radiant Slab Cooling	Damon	Architectural Organization 2	9
13	8/13	Indoor Air Quality (IAQ) and Energy Efficiency in Buildings	Ken	Architectural Organization 3	7
14	8/15	Future of Lighting Controls	Dylan	Architectural Firm 4	8
15	8/21	The Architect's Business Case for Energy Performance Modeling	Ken	Architectural Firm 5	9
16	9/5	Indoor Air Quality (IAQ) and Energy Efficiency in Buildings	Ken	Architectural Organization 1	6
17	9/25	Daylight in Buildings - Getting the Details Right	Dylan	Architectural Firm 5	9
18	10/16	VRFs & Heat Pumps	Damon	Architectural Firm 2	7
19	11/14	High Efficiency Heat Recovery	Damon	Architectural Organization 3	5
20	12/5	Daylight in Buildings - Getting the Details Right	Dylan	Architectural Organization 1	5
				Total Attendees	157

Table 1 on the previous page summarizes all Lunch and Learn presentations given in 2019. The statistics in this section are cumulative for the 20 presentations. 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:	95	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:	19	Other:	21
Elec. Engineer:		None Specified:	22
Total (In-Person):	157		

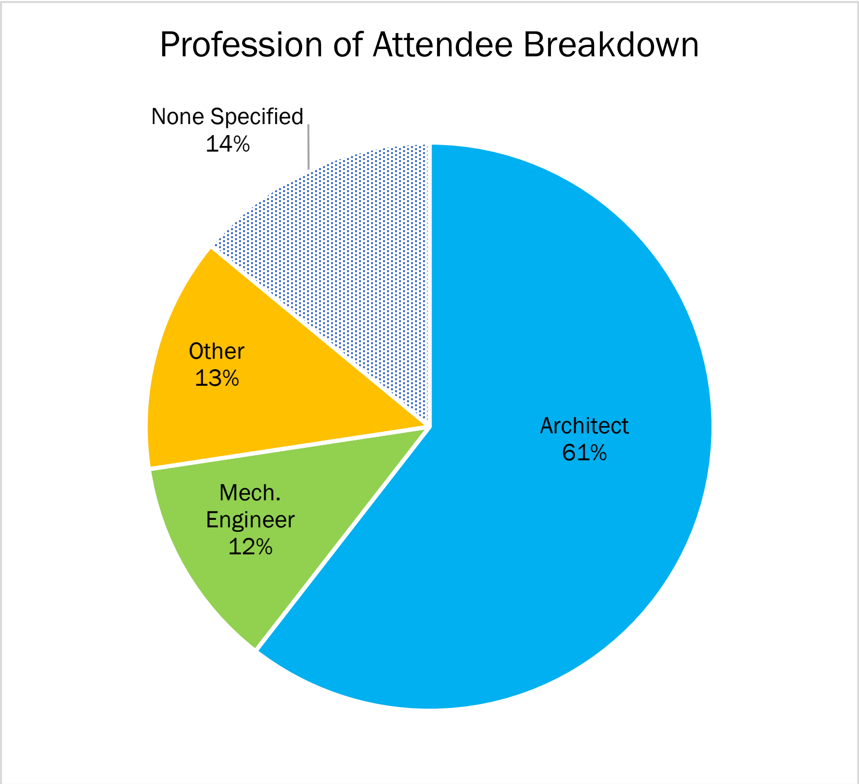


Figure 1: Attendee Profession

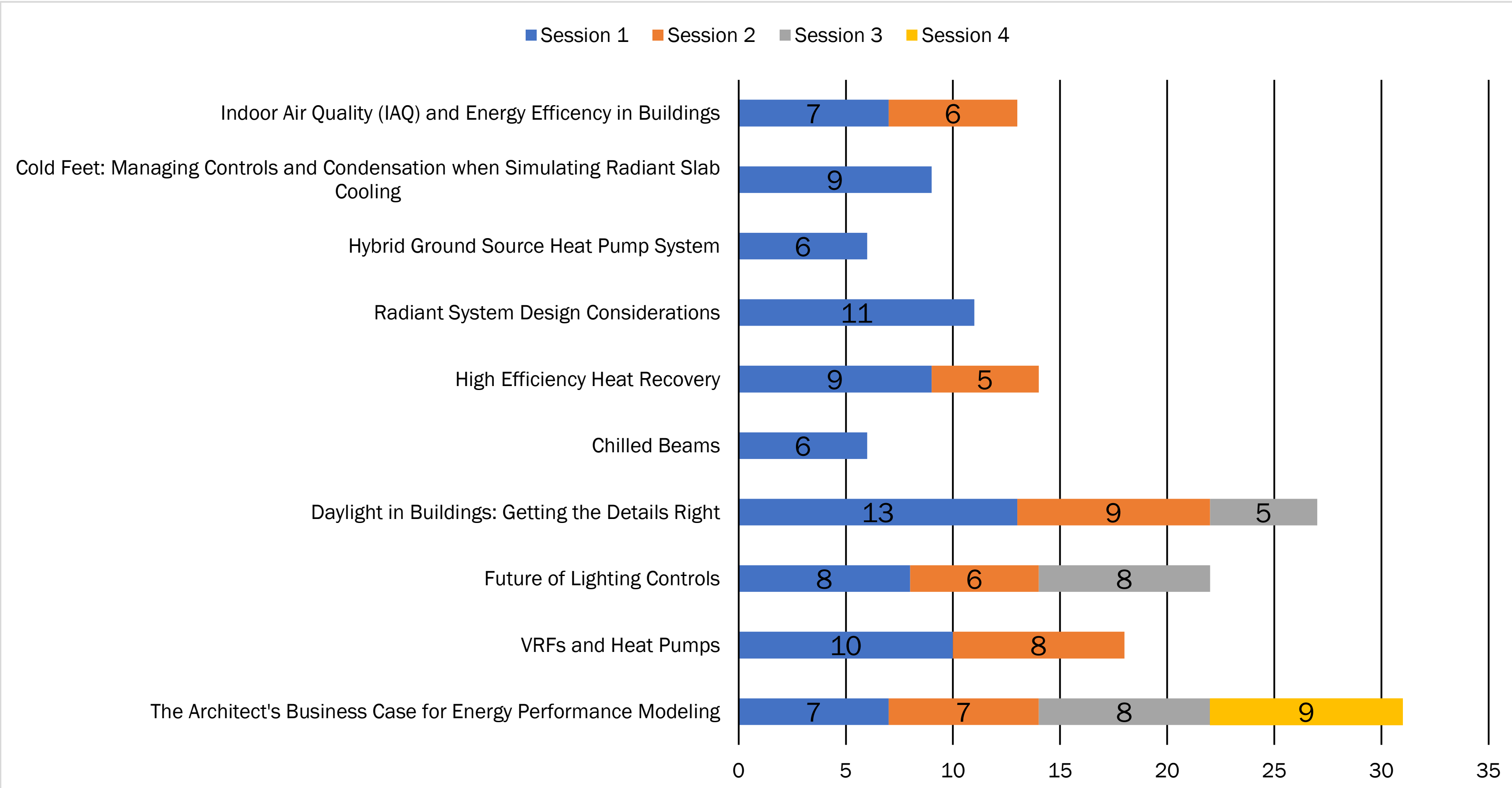


Figure 2: Attendee Count by Title and Number of Session

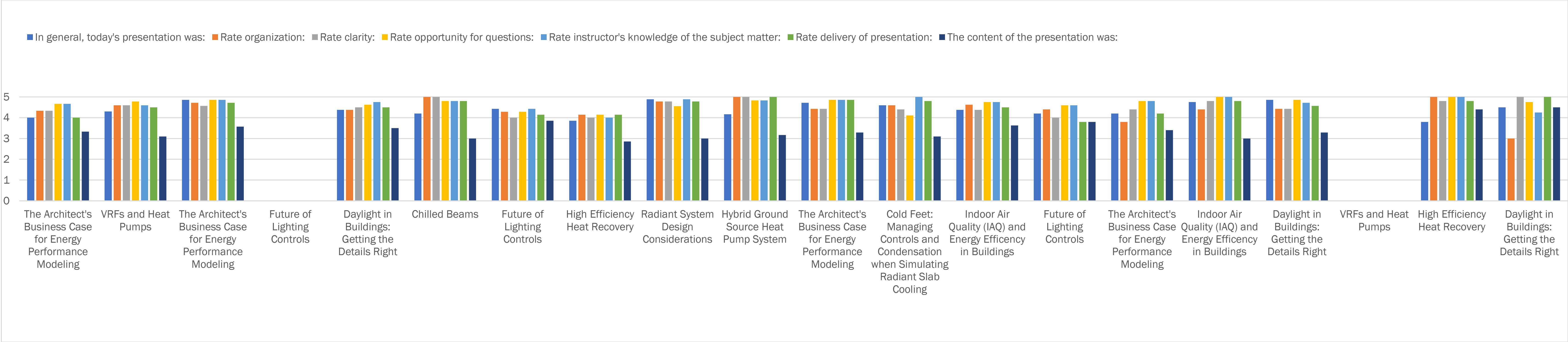
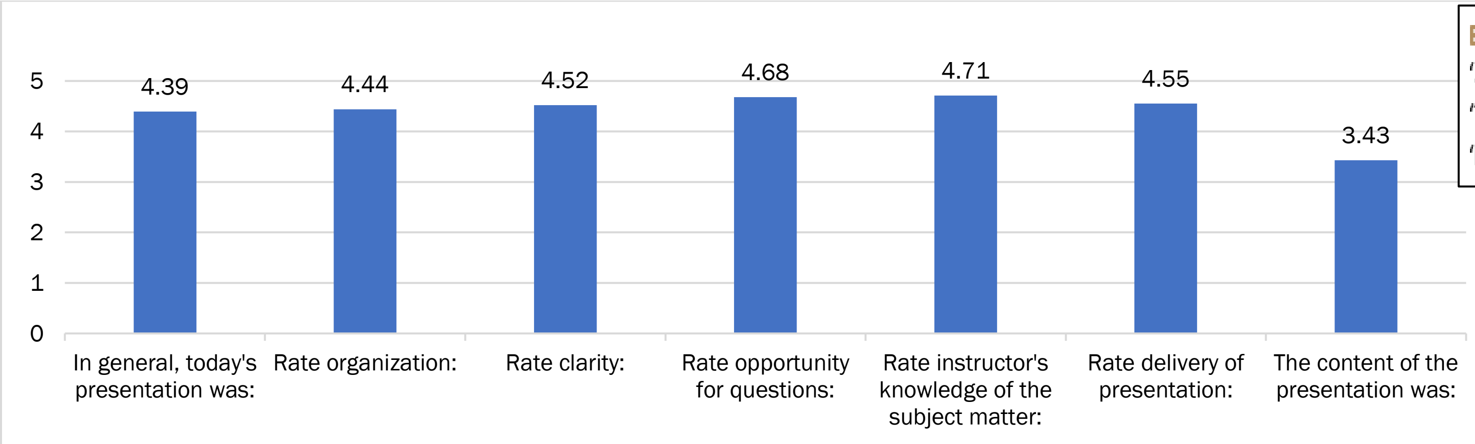


Figure 3: Average Evaluations by Session Title



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 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: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (04/16/2019)

Title: The Architect's Business Case for Energy Performance Modeling

Description: Most of us think of energy modeling as an engineering exercise. The truth is that more models and simulations are performed, and to better result, if the architect understands when and how to support the process and how to utilize the output. A building energy model can provide the architect an iterative process to increase the real-world effectiveness of energy systems within a building. This session will explore the value-add of energy modeling from the architect's perspective, providing a business case for more active involvement in advocation for energy performance modeling.

Presentation Info:

Date:	04/16/19
Location:	Architectural Firm 1 – Boise, ID
Presenter:	Ken Baker

Attendance:

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

2.2 SESSION 2: VRFS AND HEAT PUMPS (04/17/2019)

Title: VRFs and Heat Pumps

Description: Designing features of decoupled buildings. Sizing VRF and heat pump systems for Idaho's climates. Including ERVs with DOAS.

Presentation Info:

Date:	04/17/19		
Location:	Engineering Firm 1 – Meridian, ID		
Presenter:	Damon Woods		

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	7
Elec. Engineer:		None Specified:	3
Total (In-Person):	**10**		

2.3 SESSION 3: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (05/08/2019)

Title: The Architect's Business Case for Energy Performance Modeling

Description: Most of us think of energy modeling as an engineering exercise. The truth is that more models and simulations are performed, and to better result, if the architect understands when and how to support the process and how to utilize the output. A building energy model can provide the architect an iterative process to increase the real-world effectiveness of energy systems within a building. This session will explore the value-add of energy modeling from the architect's perspective, providing a business case for more active involvement in advocation for energy performance modeling.

Presentation Info:

Date:	05/08/19
Location:	Architectural Firm 2 – Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	3	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	5
Total (In-Person):	**8**		

2.4 SESSION 4: FUTURE OF LIGHTING CONTROLS (05/15/2019)

Title: Future of Lighting Controls

Description: Although LEDs have shown, they are a big game changer in the commercial lighting realm; lower lighting power density is not the only area of value when considering lighting. We can further increase savings from these highly efficient lighting systems by introducing control systems that collect data and user input to create an evolving feedback loop that seeks peak system operation. While LLLC's (Luminaire Level Lighting Control) use this feature, they still use the same infrastructure as the lighting and control system that have come before it, which can be a limitation for expanding the systems efficiency and integration to other building systems. We believe the internet of things (IoT) will change the lighting and controls industry, providing an excellent medium for an integrated, multi-service IoT platform. Why? Where there are people, there are lights; where there are people, there will also be the need for connectivity. New and connected lighting controls provide a means to deliver valuable IoT services and increased energy savings.

Presentation Info:

Date:	05/15/19
Location:	Architectural Firm 2 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	4	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	4
Total (In-Person):	8		

2.5 SESSION 5: DAYLIGHT IN BUILDINGS – GETTING THE DETAILS RIGHT (05/30/2019)

Title: Daylight in Buildings – Getting the Details Right

Description: This session lays out the process of creating high quality and comfortable day-lit spaces. Following the schematic design documentation of the key surfaces for daylighting within a space, there are several details that can make or break the overall success of the daylighting design. This presentation highlights the importance of interior surface colors and reflectance, interior space layouts, furniture design, window details (including glazing specifications), and shading strategies. Concepts of lighting control systems to ensure that energy is saved from the inclusion of daylight are also presented.

Presentation Info:

Date:	05/30/19
Location:	Architectural Firm 1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	9	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	3
Elec. Engineer:		None Specified:	1

Total (In-Person): 13

2.6 SESSION 6: CHILLED BEAMS (06/05/2019)

Title: Chilled Beams

Description: How to incorporate chilled beams into building design: the costs, the energy savings, and the impacts on the architectural program and HVAC system.

Presentation Info:

Date:	06/05/19
Location:	Engineering Firm 2- Meridian, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:	2	Other:	3
Elec. Engineer:		None Specified:	1

Total (In-Person): 6

2.7 SESSION 7: FUTURE OF LIGHTING CONTROLS (06/13/2019)

Title: Future of Lighting Controls

Description: Although LEDs have shown, they are a big game changer in the commercial lighting realm; lower lighting power density is not the only area of value when considering lighting. We can further increase savings from these highly efficient lighting systems by introducing control systems that collect data and user input to create an evolving feedback loop that seeks peak system operation. While LLLC's (Luminaire Level Lighting Control) use this feature, they still use the same infrastructure as the lighting and control system that have come before it, which can be a limitation for expanding the systems efficiency and integration to other building systems. We believe the internet of things (IoT) will change the lighting and controls industry, providing an excellent medium for an integrated, multi-service IoT platform. Why? Where there are people, there are lights; where there are people, there will also be the need for connectivity. New and connected lighting controls provide a means to deliver valuable IoT services and increased energy savings.

Presentation Info:

Date:	06/13/19
Location:	Architecture Firm 3 - Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	3	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	2
Elec. Engineer:		None Specified:	1
Total (In-Person):	6		

2.8 SESSION 8: HIGH EFFICIENCY HEAT RECOVERY (07/09/2019)

Title: High Efficiency Heat Recovery

Description: This session will cover the role that high efficiency HRV's play in designing and specifying high-performing Dedicated Outdoor Air systems. Several recent northwest case studies have shown whole-building savings of 40 to 60% on existing building retrofits using DOAS with high efficiency heat recovery. The current code requirements of HRVs will be contrasted with the performance of new and emerging products. High efficiency HRV's can have a high capital cost but can generate large energy savings with increased control of cooling and ventilation. Several economic models will be presented showing financial impacts of using high efficiency HRVs in a project.

Presentation Info:

Date:	07/09/19
Location:	Engineering Firm 1 – Meridian, ID
Presenter:	Damon Woods

Attendance:

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

2.9 SESSION 9: RADIANT SYSTEM DESIGN CONSIDERATIONS (07/11/2019)

Title: Radiant System Design Considerations

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 design reduces loads to levels achievable by radiant systems. This collaboration between the disciplines has a direct relationship to the ultimate performance of the system and comfort of the building. Key decisions must be made early in the design process to ensure the feasibility and performance of an installed system. A wide spectrum of configurations and types of radiant systems are available for designers, with each having different capabilities, 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:	07/11/19
Location:	Architectural Organization 1 – Boise, ID
Presenter:	Damon Woods

Attendance:

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

2.10 SESSION 10: HYBRID GROUND SOURCE HEAT PUMP SYSTEM (07/17/2019)

Title: Hybrid Ground Source Heat 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 while reducing initial cost and maintaining a low operating cost. The GSHP system should be sized based on coincidental building loads and the system components including, the heat exchanger and additional central plant equipment.

Presentation Info:

Date:	07/17/19
Location:	Engineering Firm 2 –Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:	1	Other:	4
Elec. Engineer:		None Specified:	1
Total (In-Person):	**6**		

2.11 SESSION 11: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (07/18/2019)

Title: The Architect's Business Case for Energy Performance Modeling

Description: Most of us think of energy modeling as an engineering exercise. The truth is that more models and simulations are performed, and to better result, if the architect understands when and how to support the process and how to utilize the output. A building energy model can provide the architect an iterative process to increase the real-world effectiveness of energy systems within a building. This session will explore the value-add of energy modeling from the architect's perspective, providing a business case for more active involvement in advocation for energy performance modeling.

Presentation Info:

Date:	07/18/19
Location:	Architectural Firm 4 – Boise, ID
Presenter:	Ken Baker

Attendance:

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

2.12 SESSION 12: COLD FEET – MANAGING CONTROLS AND CONDENSATION WHEN SIMULATING RADIANT SLAB CONTROL (07/24/2019)

Title: Cold Feet – Managing Controls and Condensation when Simulating Radiant Slab Control

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 session 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. We will present some of the latest research on radiant systems, their unique load profiles, and control requirements.

Presentation Info:

Date:	07/24/19
Location:	Architectural Organization 2 – Idaho Falls, ID
Presenter:	Damon Woods

Attendance:

Architect:	9	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	

Elec. Engineer:		None Specified:	
Total (In-Person):	9		

2.13 SESSION 13: INDOOR AIR QUALITY (IAQ) AND ENERGY EFFICIENCY IN BUILDINGS (08/13/19)

Title: Indoor Air Quality (IAQ) and Energy Efficiency in Buildings

Description: In an effort to operate buildings in the most energy efficient manner, we are designing building envelopes to be as airtight as possible with as little outside air as allowable. In this presentation the following issues are addressed: significance of IAQ to human health and productivity, the link between IAQ and building energy demands, and efficient technologies for optimizing IAQ.

Presentation Info:

Date:	08/13/19
Location:	Architectural Organization 3 – Ketchum, ID
Presenter:	Ken Baker

Attendance:

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

2.14 SESSION 14: FUTURE OF LIGHTING CONTROLS (08/15/2019)

Title: Future of Lighting Controls

Description: Although LEDs have shown, they are a big game changer in the commercial lighting realm; lower lighting power density is not the only area of value when considering lighting. We can further increase savings from these highly efficient lighting systems by introducing control systems that collect data and user input to create an evolving feedback loop that seeks peak system operation. While LLLC's (Luminaire Level Lighting Control) use this feature, they still use the same infrastructure as the lighting and control system that have come before it, which can be a limitation for expanding the systems efficiency and integration to other building systems. We believe the internet of things (IoT) will change the lighting and controls industry, providing an excellent medium for an integrated, multi-service IoT platform. Why? Where there are people, there are lights; where there are people, there will also be the need for connectivity. New and connected lighting controls provide a means to deliver valuable IoT services and increased energy savings.

Presentation Info:

Date:	08/15/19

Location:	Architectural Firm 4 – Boise, ID		
Presenter:	Dylan Agnes		

Attendance:

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

2.15 SESSION 15: THE ARCHITECT'S BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (08/21/2019)

Title: The Architect's Business Case for Energy Performance Modeling

Description: Most of us think of energy modeling as an engineering exercise. The truth is that more models and simulations are performed, and to better result, if the architect understands when and how to support the process and how to utilize the output. A building energy model can provide the architect an iterative process to increase the real-world effectiveness of energy systems within a building. This session will explore the value-add of energy modeling from the architect's perspective, providing a business case for more active involvement in advocation for energy performance modeling.

Presentation Info:

Date:	08/21/19
Location:	Architectural Firm 5 – Boise, ID
Presenter:	Ken Baker

Attendance:

Architect:	7	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	2
Elec. Engineer:		None Specified:	
Total (In-Person):	**9**		

2.16 SESSION 16: INDOOR AIR QUALITY AND ENERGY EFFICIENCY IN BUILDINGS (09/05/2019)

Title: Indoor Air Quality and Energy Efficiency in Buildings

Description: In an effort to operate buildings in the most energy efficient manner, we are designing building envelopes to be as airtight as possible with as little outside air as allowable. In this presentation the following issues are addressed: significance of IAQ to human health and productivity, the link between IAQ and building energy demands, and efficient technologies for optimizing IAQ.

Presentation Info:

Date:	09/05/19
Location:	Architecture Organization 1 – Boise, ID
Presenter:	Ken Baker

Attendance:

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

2.17 SESSION 17: DAYLIGHT IN BUILDINGS – GETTING THE DETAILS RIGHT (09/25/2019)

Title: Daylight in Buildings – Getting the Details Right

Description: This session lays out the process of creating high quality and comfortable day-lit spaces. Following the schematic design documentation of the key surfaces for daylighting within a space, there are several details that can make or break the overall success of the daylighting design. This presentation highlights the importance of interior surface colors and reflectance, interior space layouts, furniture design, window details (including glazing specifications), and shading strategies. Concepts of lighting control systems to ensure that energy is saved from the inclusion of daylight are also presented.

Presentation Info:

Date:	09/25/19
Location:	Architecture Firm 5 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	4
Elec. Engineer:		None Specified:	
Total (In-Person):	9		

2.18 SESSION 18: VRFS & HEAT PUMPS (10/16/2019)

Title: VRFs & Heat Pumps

Description: Designing features of decoupled buildings. Sizing VRF and heat pump systems for Idaho's climates. Including ERVs with DOAS.

Presentation Info:

Date:	10/16/19
Location:	Architecture Firm 2 – Boise, ID
Presenter:	Damon Woods

Attendance:

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

2.19 SESSION 19: HIGH EFFICIENCY HEAT RECOVERY (11/14/2019)

Title: High Efficiency Heat Recovery

Description: This session will cover the role that high efficiency HRV's play in designing and specifying high-performing Dedicated Outdoor Air systems. Several recent northwest case studies have shown whole-building savings of 40 to 60% on existing building retrofits using DOAS with high efficiency heat recovery. The current code requirements of HRVs will be contrasted with the performance of new and emerging products. High efficiency HRV's can have a high capital cost but can generate large energy savings with increased control of cooling and ventilation. Several economic models will be presented showing financial impacts of using high efficiency HRVs in a project.

Presentation Info:

Date:	11/14/19
Location:	Architecture Organization 3 –Ketchum, ID
Presenter:	Damon Woods

Attendance:

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

2.20 SESSION 20: DAYLIGHT IN BUILDING – GETTING THE DETAILS RIGHT (12/05/2019)

Title: Daylight in Building – Getting the Details Right

Description: This session lays out the process of creating high quality and comfortable day-lit spaces. Following the schematic design documentation of the key surfaces for daylighting within a space, there are several details that can make or break the overall success of the daylighting design. This presentation highlights the importance of interior surface colors and reflectance, interior space layouts, furniture design, window details (including glazing specifications), and shading strategies. Concepts of lighting control systems to ensure that energy is saved from the inclusion of daylight are also presented.

Presentation Info:

Date:	12/05/19
Location:	Architecture Organization 1 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

3. FUTURE WORK

Feedback was gathered from the 114 Lunch and Learn evaluations received throughout 2019. The comments from these were valuable in defining possible future Lunch and Learn topics and informed the list of suggestions below.

Potential Future Topics:

- VAV/VRV/Chillers
- Specific presentations for various types of construction (Multi-Family, Hotels, Retail, Etc..)
- How to take BIM models to BEM model
- FC/Lux recommendations for work tasks
- DOAS
- Passive Strategies/House
- Residential Energy Design/Efficiency
- Why this can help you and here’s how to start type guides
- Thermal Bridges, Envelope Control Layers
- Best solutions by budget
- Residential Solar Design

2019 TASK 3: BSUG

SUMMARY OF EFFORT AND OUTCOMES

IDAHO POWER COMPANY EXTERNAL YEAR-END REPORT

December 31, 2019

Prepared for:

Idaho Power Company

Author:

Dylan Agnes

Report Number: 1901_003-01

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Prepared for:
Idaho Power Company

Contract Number:
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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
LLLC	Luminaire Level Lighting Control
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
TMY	Typical Meteorological Year
UDC	Urban Design Center
UI	University of Idaho
USGBC	U.S. Green Building Council

2. Introduction

The 2019 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. 2019 Summary and Cumulative Analysis

In 2019, 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**
3/28	OpenStudio SDK – Tips and Tricks for Easier Molding with Ruby Scripts	Eric Ringold	kW Engr.	7	22	7	16
4/25	Sensor Suitcase	Sammuel Graham	Green Path	8	11	7	8
5/23	Project StaSIO – Why Beautiful Data Matters	Jacob Dunn	ZGF	22	32	18	17
6/27	The Maalka Platform	Clay Teeter	Maalka	8	17	6	9
9/26	Luminaire Level Lighting Controls	Dylan Agnes	IDL	15	26	14	7
11/13	Achieving Thermal Comfort in Design and Practice	Damon Woods	IDL	36	29	23	14
			Total:	**96**	**137**	**75**	**71**
				233		**147**	

3.1 2019 Attendance

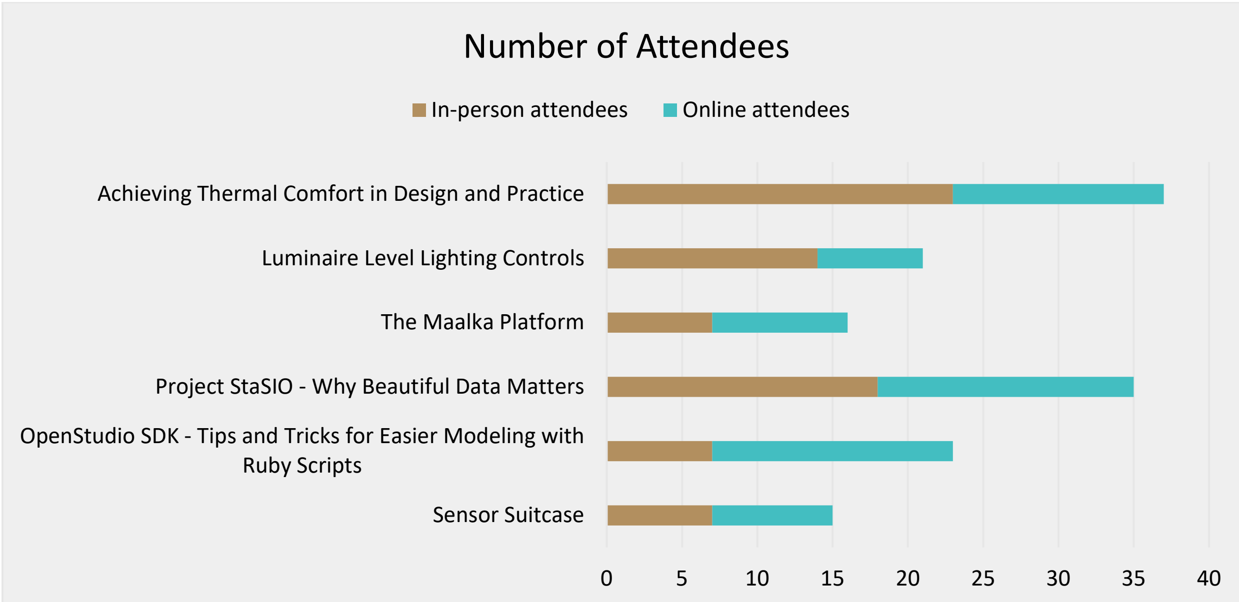


Figure 1: Attendee Count by Session and Type

Table 2: Overall Attendance Breakdown

Architect:	19	Electrician:	
Engineer:	41	Contractor:	
Mech. Engineer:	12	Other:	9
Elec. Engineer:		None Specified:	65
Total (In-Person):	**75**		
Total (Online):	**71**		
Total (Combined):	**146**		

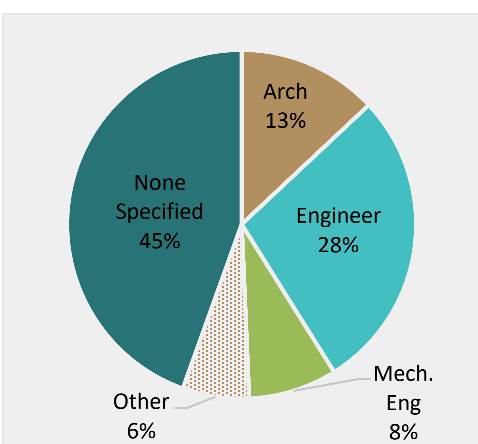


Figure 2: Attendee Profession Breakdown

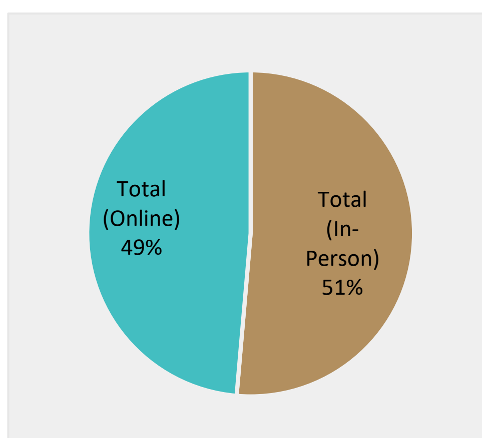


Figure 3: Attendee Type Breakdown

3.2 2019 Evaluations

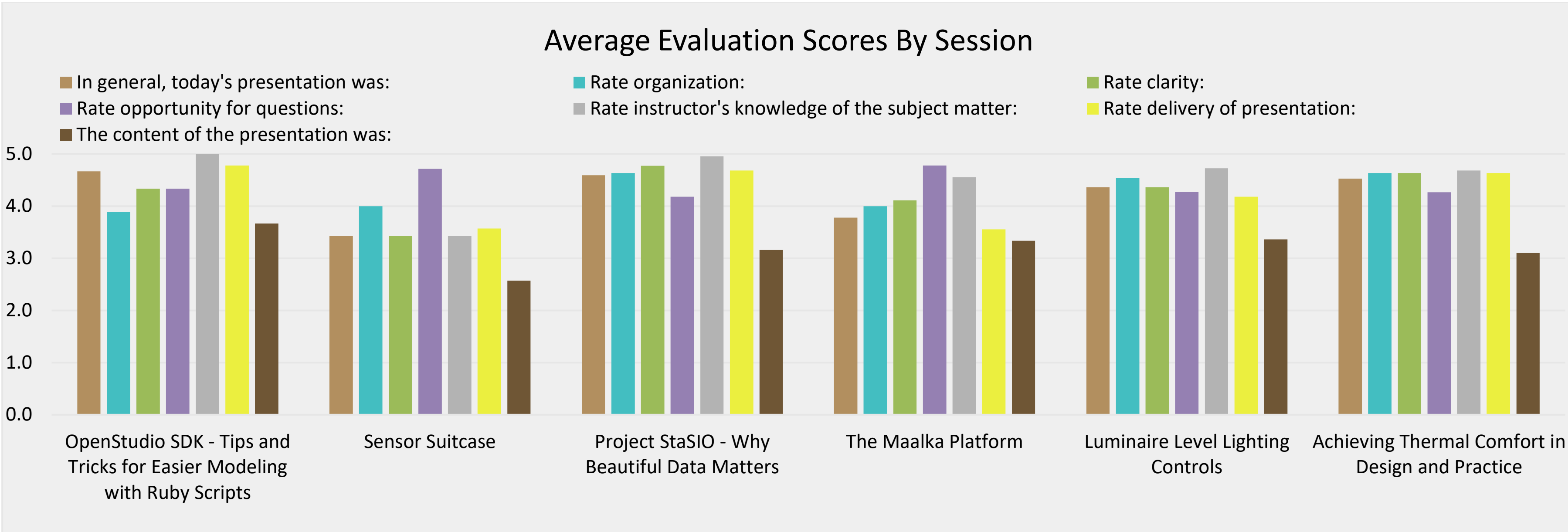
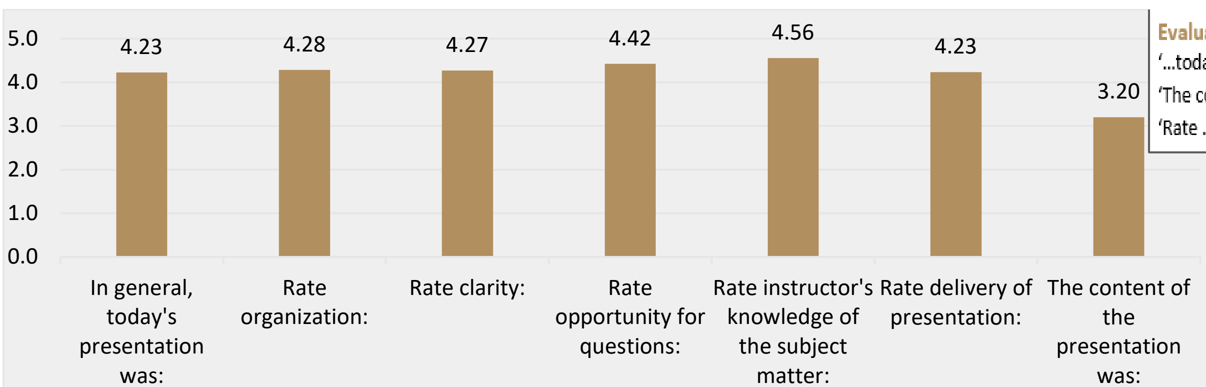


Figure 4: Average Evaluations by Session



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: OpenStudio SDK – Tips and Tricks for Easier Modeling with Ruby Scripts (3/28/19)

Title: OpenStudio SDK – Tips and Tricks for Easier Modeling with Ruby Scripts

Date: 03/28/19

Description: The presentation will help demystify the use of the OpenStudio Software Development Kit (SDK) by energy modelers to save time and improve their modeling workflows, informing architects and engineers about the capabilities of the simulation tool for design studies. It will address questions such as: what is the OpenStudio SDK; what are OpenStudio Measures; how do I get started with using Ruby and OpenStudio for creating and extracting information from energy models; and, what resources are available to help? The session is geared toward non-programmers who like the idea of letting their computers do more work.

Presenter: Eric Ringold

Attendance:

Architect:	1	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	11
Total (In-Person):	**7**		
Total (Online):	**16**		
*If 'Other' was noted:	Energy Manager/Modeler		

Evaluation Highlights (What attendees found most valuable):
- Understanding how to interpret the OpenStudio SDK website.
- Resources for further reading.

4.2 Session 2: Sensor Suitcase (04/25/19)

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

Date: 04/25/19

Description: The Sensor Suitcase is a portable diagnostic toolkit with sensors that gather information about how a building operates. The result of a collaborative effort by PNNL, Lawrence Berkeley National Laboratory (LBNL), and Oak Ridge National Laboratory (ORNL), it serves as a tool to simplify and streamline the retro-commissioning process by enabling non-experts to identify energy-saving operational changes, while keeping the costs of this service low. Total energy cost savings for retro-commissioning are estimated to be 15 percent.

Presenter: Samuel Graham

Attendance:

Architect:		Contractor:	
Mech. Engineer:	7	Other*:	
Elec. Engineer:		None Specified:	8
Total (In-Person):	**7**		
Total (Online):	**8**		
*If 'Other' was noted:			

Evaluation Highlights (What attendees found most valuable):

- Cool idea, practical solution.
- The comprehensive range of sensors in the suitcase – very useful.

4.3 Session 3: Project StaSIO – Why Beautiful Data Matters (05/23/19)

Title: Project StaSIO – Why Beautiful Data Matters

Date: 05/23/19

Description: Project StaSIO is a website designed to help designers articulate and advocate the value of early performance modeling. It does this by crowd sourcing the most compelling, beautiful, and informational performance graphics and case studies from the simulation community. The works are then displayed in a website that allows a user to navigate by various filters like the ASHRAE 209 cycle, type of investigation, inputs/outputs, tools, etc. Perhaps most importantly, each graphic upload contains info from the contributor of not only how the graphic was made---but how it influenced the design process. The website is currently undergoing a makeover with funding from the Department of Energy to get it ready to support the 2nd annual Project Stasio competition (check out the winners from the first round here: https://www.projectstasio.com/new-page-4).

Presenter:

Attendance:

Architect:	13	Electrician:	
Engineer:	10	Contractor:	
Mech. Engineer:		Other*:	3
Elec. Engineer:		None Specified:	9
Total (In-Person):	**18**		
Total (Online):	**17**		

*If 'Other' was noted: Energy Consulting/Manager/Modeler

Evaluation Highlights (What attendees found most valuable):
- Great graphics and insight.
- The range of tools available for developing graphics is exciting.

4.4 Session 4: Maalka Platform (06/27/19)

Title: Maalka Platform

Date: 06/27/19

Description: The Maalka Platform is based on the principle of continuous expansion - start with a basic program that works for you and add new programs when you're ready. Working with lots of data can get messy. The Maalka Platform is there to guide your organization along automated workflows to ensure that data across your portfolio is accurate and up-to-date, buildings are progressing towards goals, and participants are fully engaged. Maalka is helping cities and organizations all across the country succeed in their sustainability initiatives. Through collaboration with these partners, Maalka is continuously integrating new tools onto our open platform to help teams effectively manage data, interact with building owners and program stakeholders, and track progress toward their sustainability goals.

Presenter: Clay Teeter

Attendance:

Architect:	5	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	8
Total (In-Person):	**6**		
Total (Online):	**9**		
*If 'Other' was noted:			

Evaluation Highlights (What attendees found most valuable):
- Good info on an innovative new product.
- Seeing that its possible to take lots of data and efficiently synthesize it to relevant info.

4.5 Session 5: LLLCs – Luminaire Level Lighting Control (09/26/19)

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

Date: 09/26/19

Description: LLLCs have sensors and controls within individual fixtures that enable them to be controlled remotely or on a case by case basis. Remote control allows users to adjust the programming criteria or illumination levels without replacing the fixtures. In conventional lighting systems lighting zones are defined as a collective unit and thus are centrally controlled. LLLCs however, incorporate sensors into each fixture, such as occupancy, daylight, temperature or receive/broadcast signals. Therefore, each fixture has the potential to become a semi-autonomous zone that is capable of responding to small changes in the area under each fixture. Furthermore, individual fixtures can communicate with other fixtures, using wireless or infrared signals, to share data for an even greater potential to increase energy savings and user satisfaction.

Presenter: Dylan Agnes

Attendance:

Architect:	4	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:		Other*:	2
Elec. Engineer:		None Specified:	6
Total (In-Person):	**14**		
Total (Online):	**7**		
*If 'Other' was noted:	Energy Manager		

Evaluation Highlights (What attendees found most valuable):

- Examples were helpful to explain concepts and LLLC's are used.
- Graphics showing the potential combinations of luminaire + zoned control in a actual office layout.

4.6 Session 6: Achieving Thermal Comfort in Design and Practice (11/13/19)

Title: Achieving Thermal Comfort in Design and Practice

Date: 11/13/19

Description: Human comfort is more than just a number on a thermostat. ASHRAE's thermal comfort standard (Standard 55 – 2017) includes many factors that affect occupant satisfaction including air velocity, clothing levels, and outdoor conditions. This presentation will cover how to size systems to meet ASHRAE 55, how to commission a building's comfort level for LEED points, and how to estimate the financial implications of enhancing occupant comfort.

Presenters: Damon Woods

Attendance:

Architect:	1	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:	10	Other*:	2
Elec. Engineer:		None Specified:	23

Total (In-Person):	**23**
Total (Online):	**14**
*If 'Other' was noted:	Project Manager, ATS

Evaluation Highlights (What attendees found most valuable):

- Comparison of cost to optimize thermal comfort vs employee salary cost and the effect on productivity.
- Info on tools to use during design.

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, 2019 and November 21, 2019, total page views summed to 867 with unique page views at 564 for 353 total sessions at the site. Of the 353 sessions, 37 (10.5%) 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.

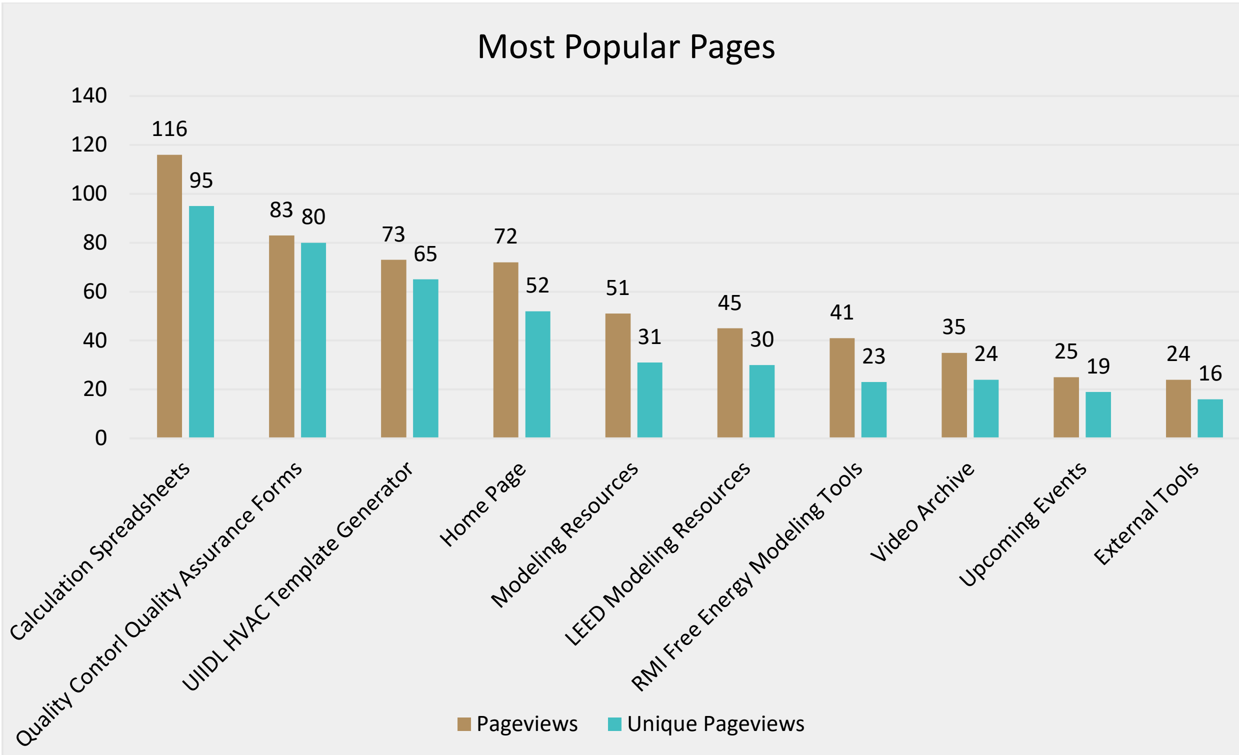


Figure 6: Number of Page Views for the Ten Most Popular Pages in 2019

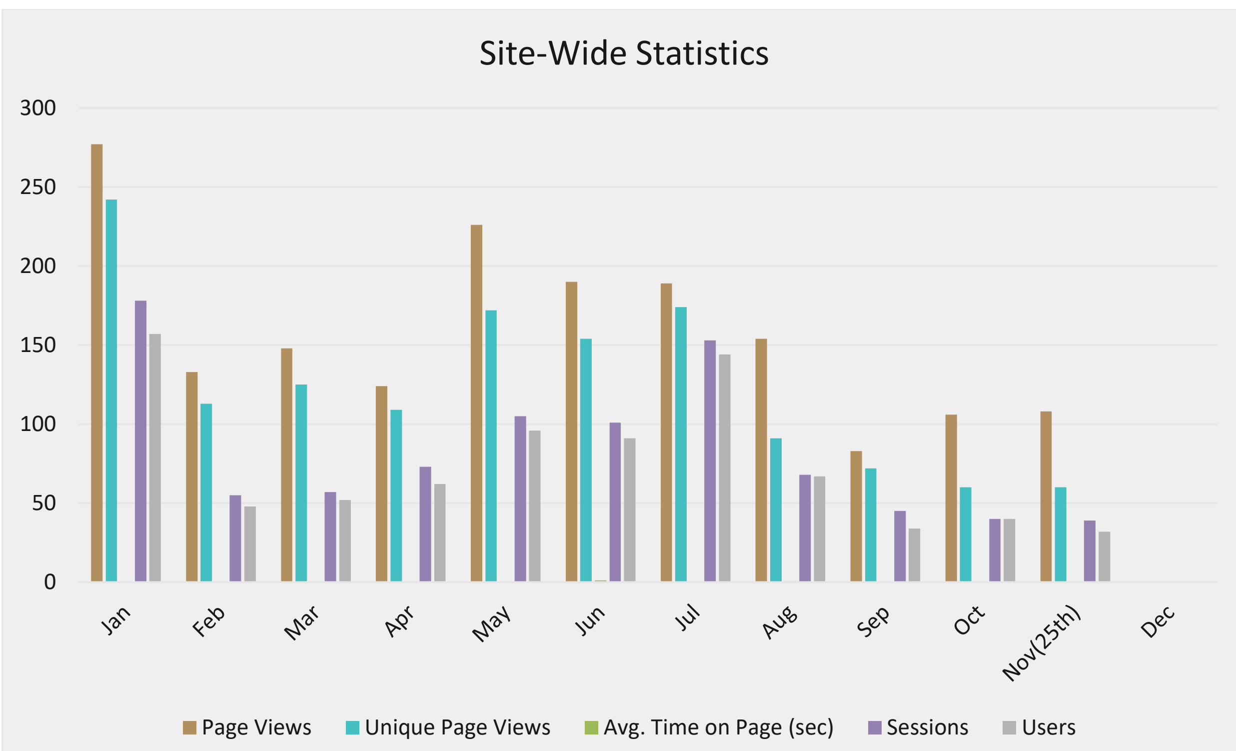


Figure 7: Monthly Site-Wide Statistics

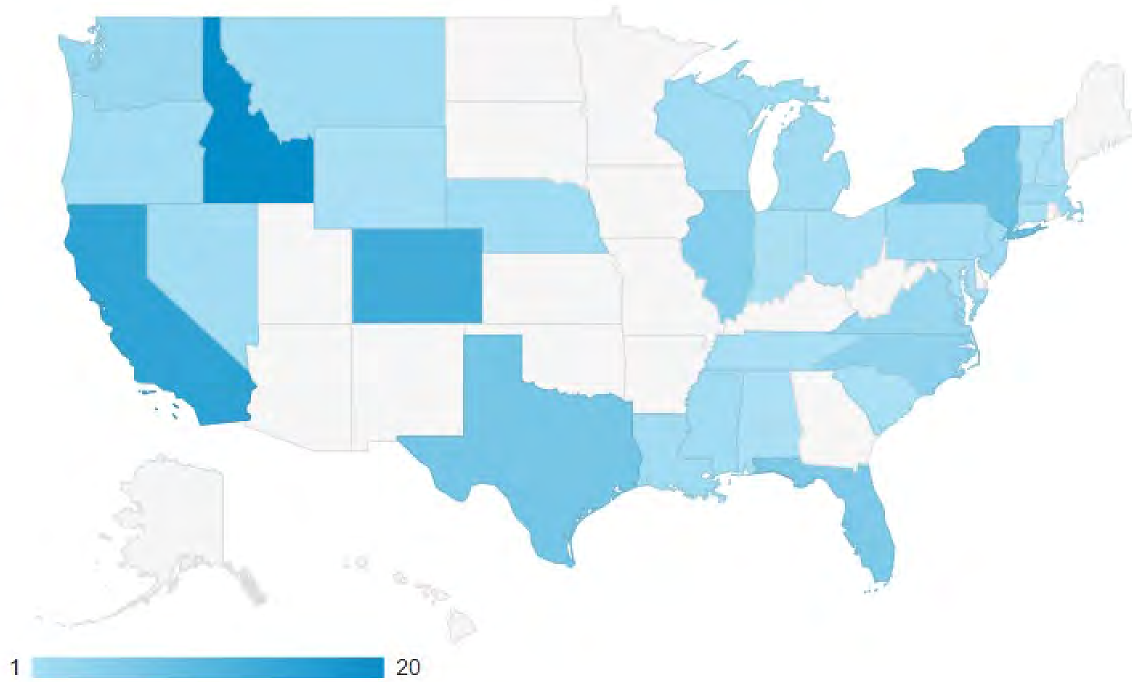


Figure 8: Heat Map of All U.S. Sessions in 2019

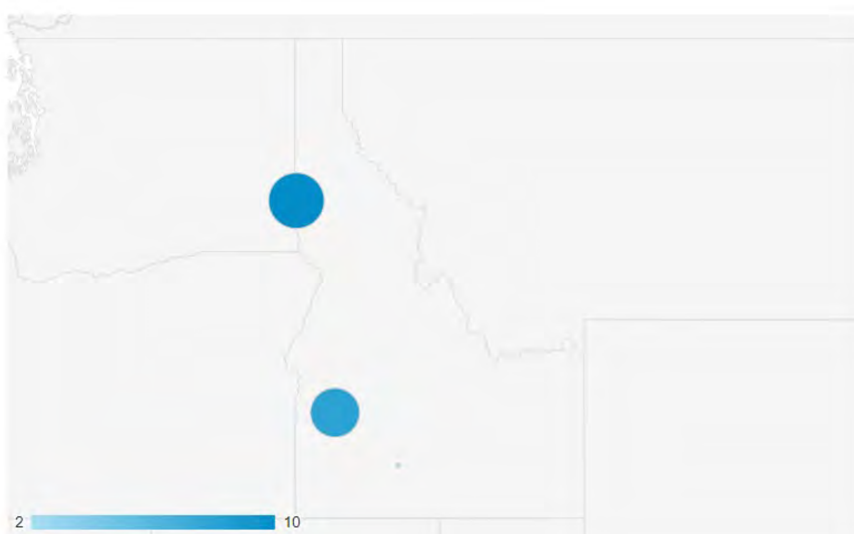


Figure 9: Bubble Maps of Idaho Sessions in 2019

6. Other Activities and Suggestions for Future Improvements

We saw an increase in average attendance for each session this year and gained 3 in-person (2.7%) for overall attendance from 2018. However, online attendance is on par for what it was last year. This year was successful for the BSUG task with 6 sessions completed and 146 total attendees – 75 in-person and 71 online. Feedback was provided by attendees via the evaluation forms, 77 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.

2019 Task 4: New Construction Verifications

Summary of Projects

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:
Idaho Power Company

Author:
Dylan Agnes

Report Number: 1901_004-01

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Prepared for:
Idaho Power Company

Contract Number:
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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
HP	Heat Pump

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) had two roles for the New Construction Verification (NCV) task in 2019. The primary role was to conduct on-site verification reports for approximately 10% 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 purpose of the application reviews and audits is to assist IPC in program quality assurance, the review also looks to capture any inconsistences in the application of code incentive measures. 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 are intended to increase energy savings and quality of design through the inclusion of additional design and commissioning recommendations.

2. 2019 New Construction Verification Projects

The UI-IDL completed seventeen New Construction Verification projects in 2019. A detailed report for each project was submitted to IPC, including claimed and actual installation for each specific incentive the project applied for. All of the projects reviewed in 2019 were finalized and paid in 2019 and resided under the 2016 and 2018 program format. The specific incentives for this program are outlined in Table 1 and 2.

The table summarize the seventeen projects and respective qualified incentive measures which were verified by UI-IDL. For the projects listed, more than 59% were conducted outside the capital service 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: 2018 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	High-Volume Low-Speed Fan
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
	C6	Dairy Vacuum Pump Variable Speed Drives
	C7	Wall or Engine-Block Heater Controls
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
	R4	Refrigerator and Freezer Strip Curtains
	R5	Automatic High-Speed Doors
Office Equipment	P1	Smart Strip Power Strips
Compressed Air Equipment	CA1	Air Compressor VSDs
	CA2	No-Loss Condensate Drain
	CA3	Low-Pressure Drop Filter
	CA4	Cycling Refrigerated Compressed Air Dryer
	CA5	Efficient Compressed Air Nozzle

Table 3: Project Summary

IPC Project #	Facility Description	Location	Incentive Measures	UI-IDL Site-Visit Date
14-029	Office Building	Twin Falls, ID	L1, L2, L3, L4, L5, B1, C3	07/24/19
16-110	Retail w/ Office and Warehouse	Meridian, ID	L1, L2, L3, L4, L5, A1, B1, C1	07/24/19
16-224	Fitness	Twin Falls, ID	L1, L4, L5, A1	07/23/19
16-326	Warehouse	American Falls, ID	L1	07/16/19

16-385	School	Boise, ID	L1	07/30/19
16-461	Warehouse	American Falls, ID	L1	07/16/19
16-467	Onion Storage	Payette, ID	L1, C5	07/24/19
16-482	Warehouse	Blackfoot, ID	L1	07/24/19
18-032	Other	Chubbuck, ID	L1, L2	07/16/19
18-058	Other	Fruitland, ID	L1, L2	07/24/19
14-093	Other	Twin Falls, ID	L1, L5	11/01/19
16-399	Restaurant	Boise, ID	L1	11/26/19
18-085	Industrial – Large	Caldwell, ID	L1, L2, A1, A4, B1, CA1	11/14/19
18-129	Other	Eagle, ID	L4, L5, A1, C4, D1, D2	12/19/19
18-195	Office Building	Meridian, ID	A6	11/06/19
18-235	Industrial – Mid	Boise, ID	CA1, CA4	11/26/19
18-229	Office Building	Boise, ID	L1, A2	12/11/19

3. 2019 Photo Controls Review Projects

In 2019, the UI-IDL received at least 15 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 8 of these projects including offices, hospital, mixed-use, multi-family, grocery, warehouse and student union.

2019 Task 5: Tool Loan Library

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 1901_005-05

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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 creates a user account. Then the user has access to the tool loan portal where they fill out a tool loan proposal form. 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. An approval email is sent and 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 2019, as well as on the UI-IDL website. The flyer layout was changed from a single sheet to a tri-fold brochure: it is in Figure 1 and Figure 2 on the next page. The ERL catalog was redesigned by Idaho Power during 2019 and has been returned to the IDL for completion in 2020. For more information about the flyer or the Energy Resource Catalog please refer to Q4 report. 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, and the City of Boise.

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 to request tools, all online. In 2019, the TLL home page had 2,653 visitors. Changes and progress for the TLL homepage can be found in Appendix D.

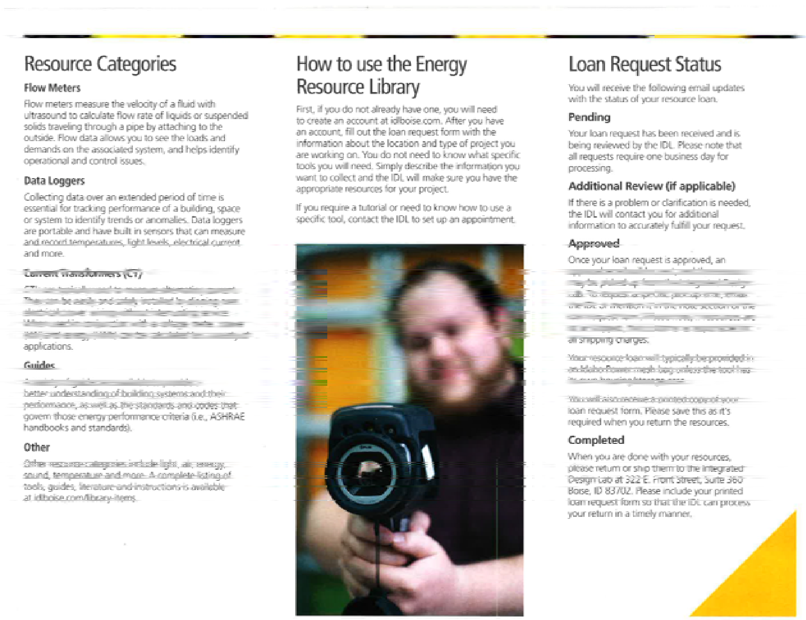

Figure 1: TLL Flyer Inside

Figure 2: TLL Flyer Outside

3. New Tools & Tool Calibration Plan

In 2019, forty-nine new tools and five accessories were added to the TLL to replace old data logging models, to create beta tool loan kits as well as additional analog connectors for the XC power logger series as it was discovered the previous series connectors are not compatible.

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 perform the following to ensure items are within specified calibration tolerances:

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. 2019 Summary Of Loans

In 2019, loan requests totaled 26 with 26 loans completed, 4 loans are on-going. The first quarter had the highest volume of loans at 8 total. Loans were made to 9 different locations and 17 unique users and 6 new TLL 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 2019.

TABLE 1: PROJECT AND LOAN SUMMARY

	Request Date	Location		Project	Type of Loan	# of Tools Loaned
1	1/7/2019	Boise	ID	EWDC	Audit	1
2	1/24/2019	Boise	ID	AOTP	Audit	1
3	1/28/2019	Salmon	ID	IGCLNGP	Audit	16
4	2/5/2019	Boise	ID	TCMS	Audit	16
5	2/27/2019	Meridian	ID	DTBA	Audit	4
6	2/28/2019	Boise	ID	CSFS	Audit	1
7	3/13/2019	Lava Hot Springs	ID	NRCS	Audit	6
8	3/26/2019	Murphy	ID	IPDM	Audit	6
9	4/1/2019	Boise	ID	SFTH	Audit	7
10	4/3/2019	Salmon	ID	SLLDD	Baseline measurement of EEMs	10
11	4/16/2019	Nampa	ID	PCJD	Verification of EEMs	1
12	4/18/2019	Meridian	ID	ESS	Audit	1
13	5/6/2019	Lava Hot Springs	ID	SDAS	Baseline measurement of EEMs	5
14	5/7/2019	Twin Falls	ID	HHSSU	Verification of EEMs	2
15	5/23/2019	Boise	ID	AOTP2	Audit	19
16	7/11/2019	Burley	ID	CADW	Audit	16
17	8/14/2019	Boise	ID	OTYDW	Baseline measurement of EEMs	10
18	8/21/2019	Boise	ID	GCA	Audit	18

19	9/26/2019	Blackfoot	ID	CCS	Audit	1
20	10/3/2019	Salmon	ID	OTP	Verification of EEMs	14
21	10/14/2019	Boise	ID	HWP	Audit	1
22	11/5/2019	Boise	ID	IRCBC	Audit	11
23	11/8/2019	Boise	ID	EAAC	Baseline measurement of EEMs	13
24	11/25/2019	Boise	ID	BCCC	Audit	13
25	12/6/2019	Meridian	ID	RTSA	Audit	1
26	12/17/2019	Boise	ID	MCPBAP	Audit	1

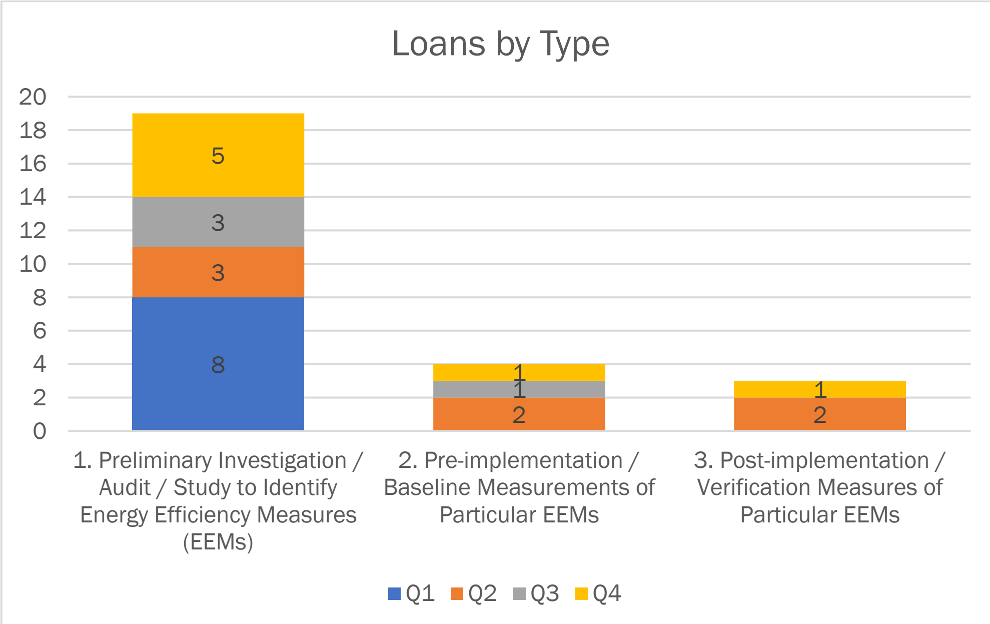

FIGURE 3: LOANS BY TYPE

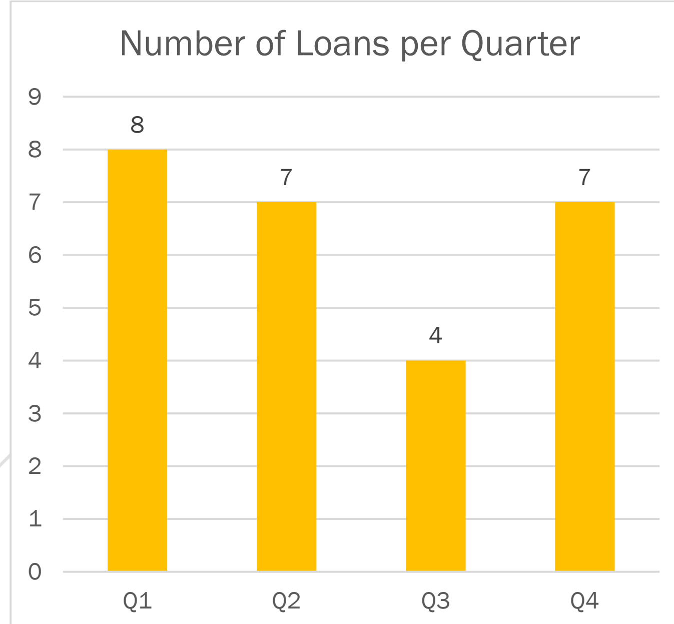

FIGURE 4: NUMBER OF LOANS PER QUARTER

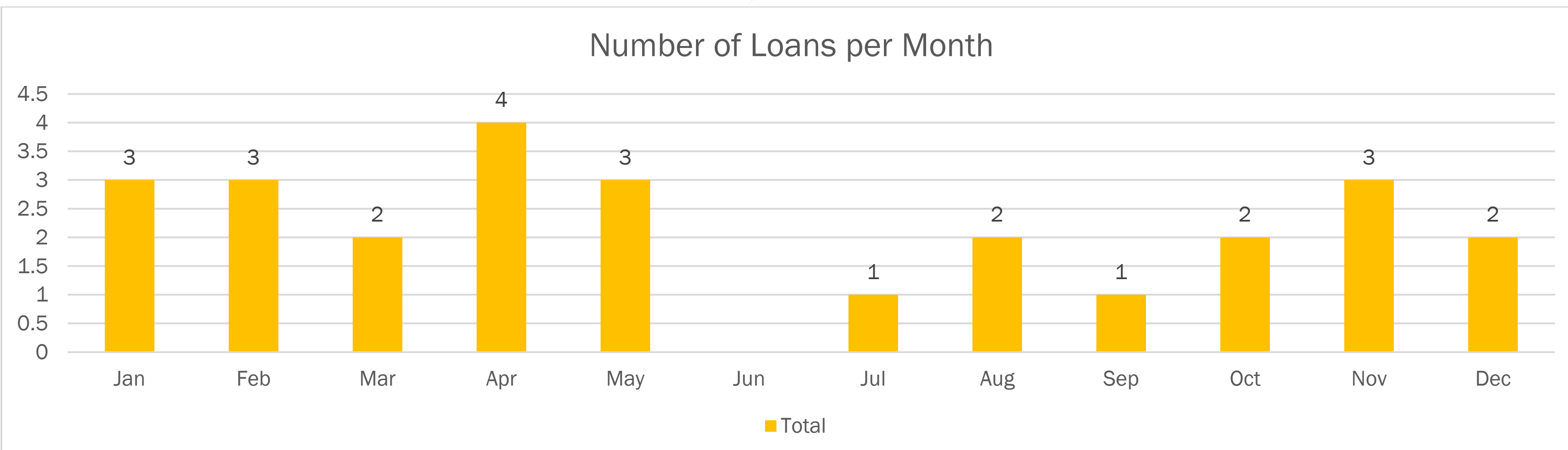

FIGURE 5: NUMBER OF LOANS PER MONTH

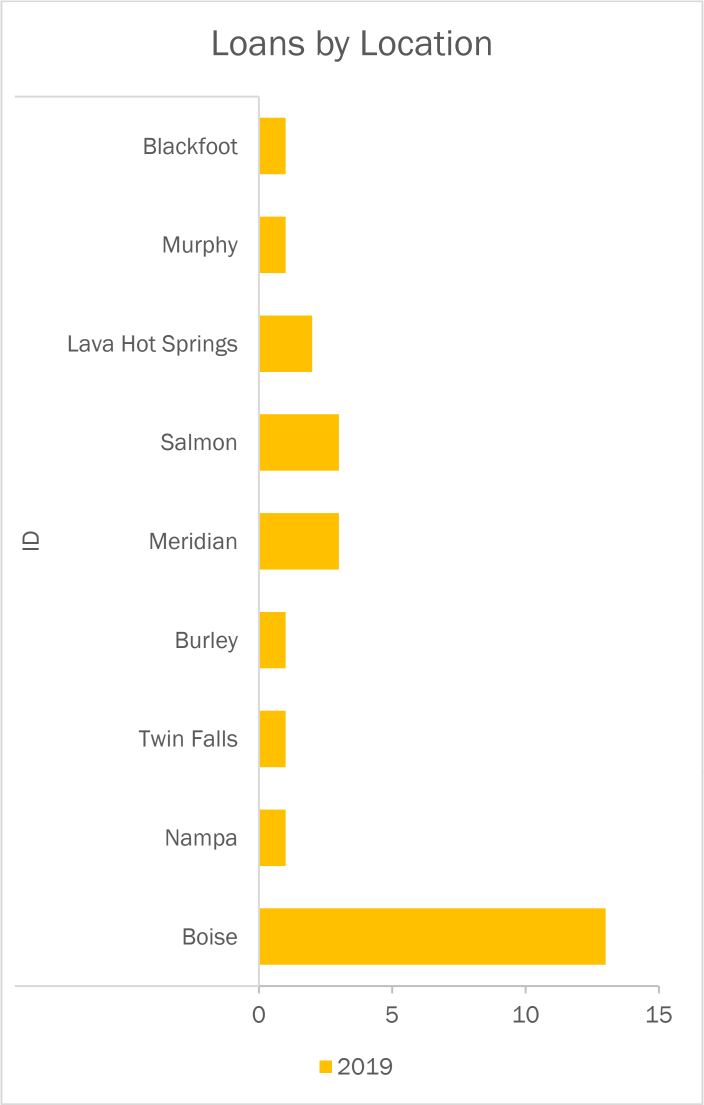

FIGURE 6: NUMBER OF LOANS BY LOCATION

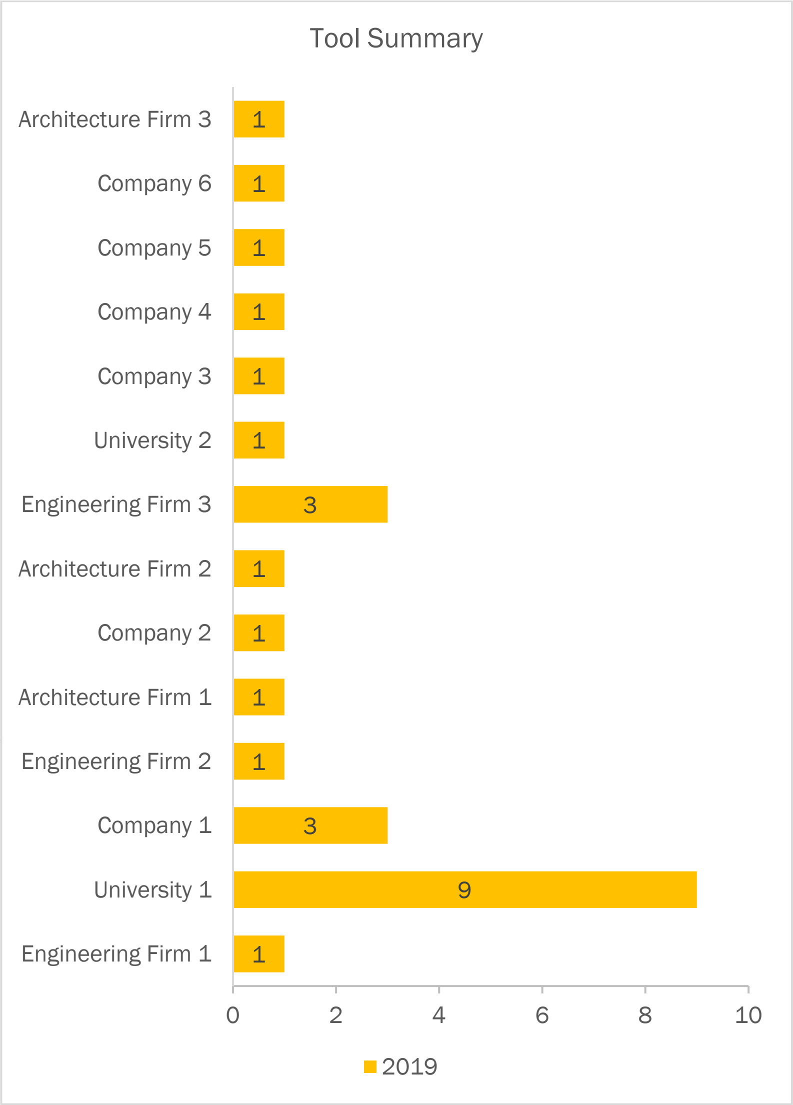

FIGURE 7: NUMBER OF LOANS BY USER

TOTAL TOOLS LOANED: 195	Q1=51	Q2=45	Q3=45	Q4=54

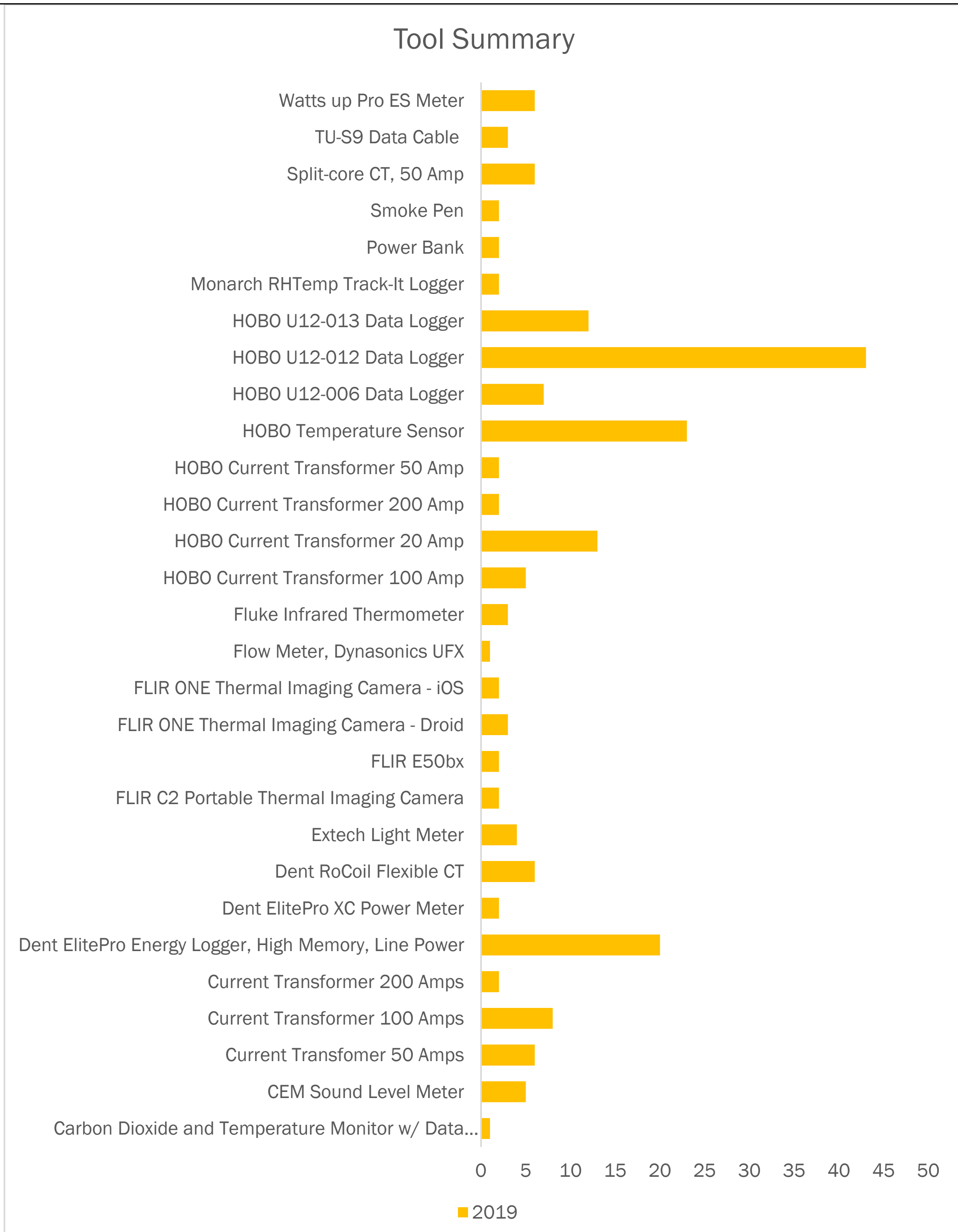

FIGURE 8: SUMMARY OF TOOLS LOANED

2019 Task 1.6: Thermal Energy Savings Tool

Summary of Progress

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:

Idaho Power Company

Authors:

Damon Woods

Report Number: 1801_010-06

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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
TEST	Thermal Energy Savings Tool
UI	University of Idaho
VRF	Variable Refrigerant Flow
WSHP	Water-Source Heat Pump

1. Introduction

The 2019 Thermal Energy Savings Tool (TEST) development task was a continuation of work done by the University of Idaho Integrated Design Lab (UI-IDL) for Idaho Power Company (IPC). The original tool development began 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 incorporates several climate design tools and has been improved over time. Tool improvements have included the following:

2014 – Methods verified and user feedback incorporated

2015 – Residential space-type added

2016 – Climate design tools and new weather files included

2017 – Outreach, education, and customization provided for users

2018 – Code defaults updated and continued maintenance and outreach

2019 – Continued maintenance and outreach

Details of the 2019 maintenance and outreach are outlined in this report.

2. Maintenance and Outreach

This task was limited to minimal support for IPC staff and other beta version users in 2019. Improvements this year included finalizing the code default option to IECC 2015. The IDL included information on the TEST in many of the Lunch and Learn presentations delivered at architecture and engineering firms in Idaho. The IDL also provided it to graduate architecture and engineering students enrolled in the Building Performance Simulation course at the University of Idaho. Students used the tool to estimate changes in heat loads based on envelope alterations as part of a homework assignment. Whenever a user requested access to the tool, the IDL sent the TEST spreadsheet through the service WeTransfer as it is too large to attach in a traditional email. A disclaimer is included with each tool download that makes clear that the tool does not guarantee savings and that the user is responsible for verifying their own calculations. As the IDL website is improved, the tool will be hosted online for registered users to request and download after accepting a similar disclaimer. Tool requests were received from the following organizations in 2019:

- Software company in Colorado
- Local architecture firm
- The students of ARCH 574/ME 571 at University of Idaho

3. Appendix – Tool Images

INTEGRATED DESIGN LAB University of Idaho

Thermal Energy Savings Tabulator (TEST)

IDAHO POWER An IDACORP Company

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

Step-by-Step Procedures

Next, work through the orange-colored tabs at the bottom of this Excel workbook which will lead the user through step-by-step processes for the following procedures:

Project : Climate: Boise Air Terminal Code Cycle: IECC 2015/90.1-2013

GENERAL BUILDING INFO

Building Location:	Boise, ID
Building Use:	Office
Total Building Area (ft^2):	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:	0.52

Roof slope (degrees):	0
Roof azimuth (degrees	

	Total Area (ft^2)	U-Value (Btu/hr-ft^2-°F)	Envelope Heat Rate (Btu/hr-°F)	Glazing Area (ft^2)	Glazing U-Value (Btu/hr-ft^2-°F)	Glazing SHGC	Percent Shaded
(All vert. walls)		0.055			0.42	0.32	0%
North	3800	0.055	162.8	840	0.42	0.32	0%
South	3800	0.055	162.8	840	0.42	0.32	0%
East	2480	0.055	96.3	730	0.42	0.32	0%
West	2480	0.055	96.3	730	0.42	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	0.032	188.5	0	-	-	0%
Floor	5890	0.033	163.3		(Btu/hr-°F)	**(Btu/hr)**	
Totals	24340		870	3,140	1,319	101,997	

Code cycle updates underlined in red

INTEGRATED DESIGN LAB University of Idaho

TEST - Loads Results

IDAHO POWER An IDACORP Company

PEAK LOAD RESULTS

Normalized Loads Table:

Component	Htg Load (Btu/hr-°F)	Cooling Load (Btu/hr-°F)
Envelope	870	870
Glazing (Cond)	1,319	1,319
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	101,997
People	n/a	47,000
Lights	n/a	65,749
Plug Loads	n/a	60,137

Peak Loads Summary (at Design Day Temps):

Component	Htg Load (Btu/hr)	Cooling Load (Btu/hr)
Envelope	53,931	16,527
Glazing	81,766	127,054
Ventilation	123,004	37,695
Infiltration	184,281	56,473
People	n/a	47,000
Lights	n/a	65,749
Plug Loads	n/a	60,137

Peak Heating Load:

Non-Coincident Peak Heating Breakdown:

442,982	btu/hr
18.85	btu/hr-sf
129.83	kw

Coincident Peak Heating:

297,474	btu/hr
12.66	btu/hr-sf
87.18	kw

Peak Cooling Load:

Non-Coincident Peak Cooling Breakdown:

410,635	btu/hr
17.47	btu/hr-sf
34.22	tons
686.74	sf/ton

Coincident Peak Cooling:

270,908	btu/hr
11.53	btu/hr-sf
22.58	tons
1040.94	sf/ton

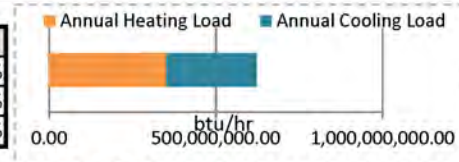
INTEGRATED DESIGN LAB
University of Idaho

TEST - Loads Results

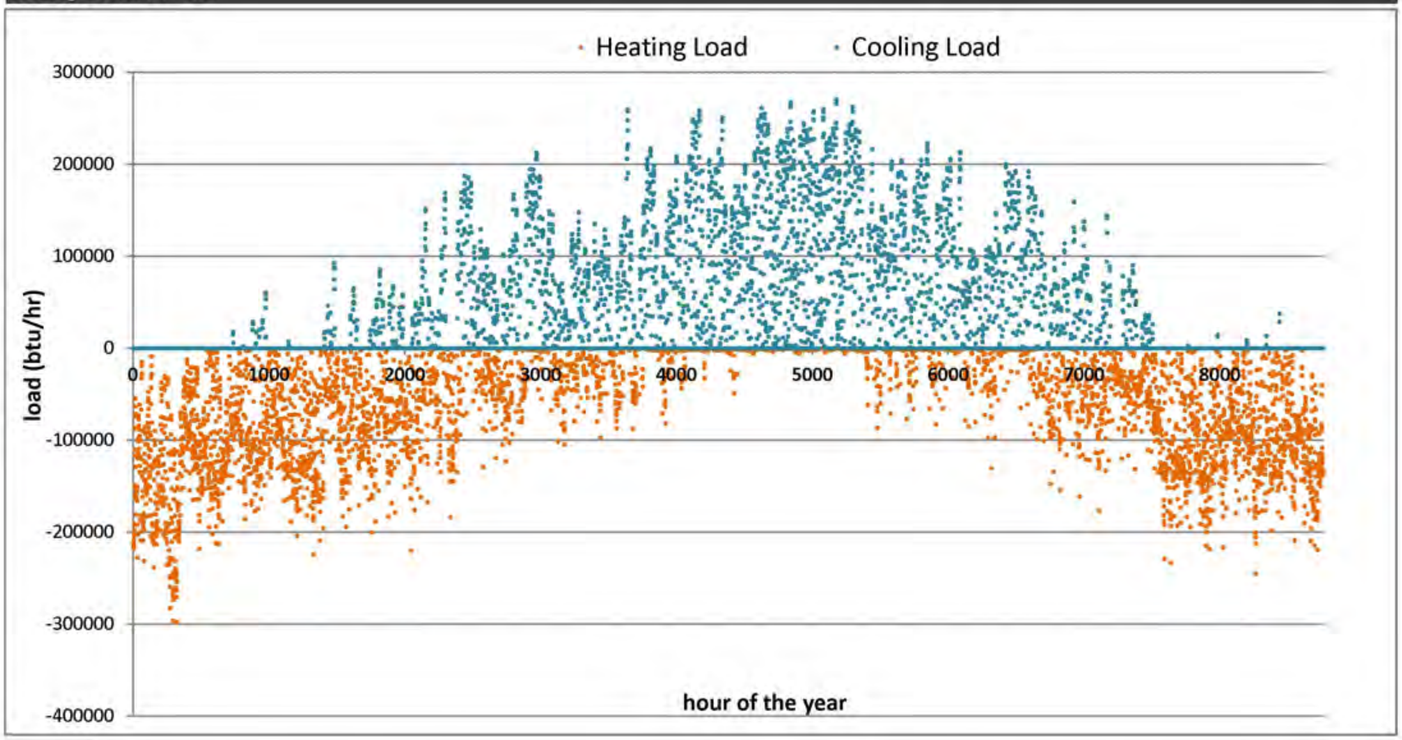
IDAHO POWER
An IDACORP Company

HOURLY LOADS:

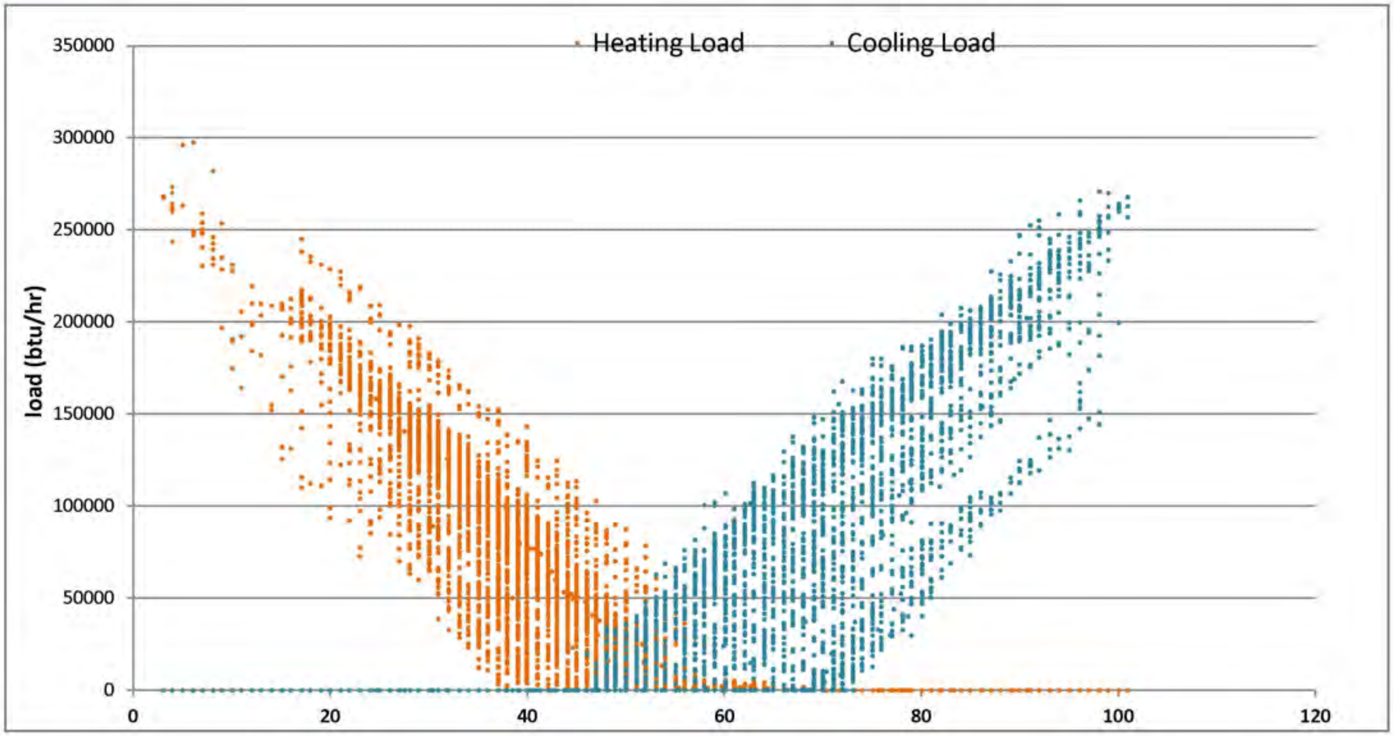
	btus	kBtu	kWh	Therms	%of total
Annual Heating Load	352,994,607	352,995	1,204,468	3,530	57%
Annual Cooling Load	269,939,258	269,939	921,071	2,699	43%
Total Annual Load	622,933,864	622,934	2,125,539	6,229	100%



Hourly Load Profile



TEST - Loads Results



INTEGRATED DESIGN LAB University of Idaho

TEST - Results Summary

IDAHO POWER® An IDACORP Company

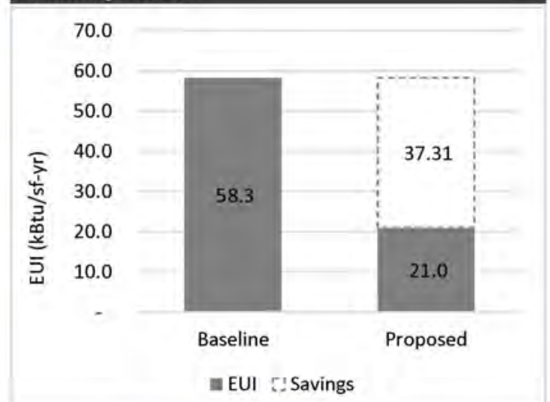
Final Comparison Stats

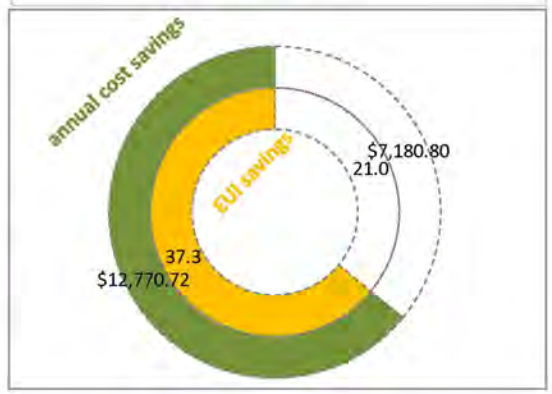
Syst	B+P	Baseline System = Heat Pump one speed	osed System = Heat Pump variable s	Iteration:

Item	Units	Baseline	Proposed	Savings Value	Savings %
EUI	kBtu/sf-yr	58.3	21.0	37.3	64.0%
Total Energy	kBtu	1,369,766	492,996	876,770	64.0%
Energy (by fuel)	kWh	401,439	144,483	256,956	64.0%
Energy (by fuel)	therms	0	0	0	N/A
Total Cost	$	$19,952	$7,181	$12,771	64.0%
Cost (by fuel)	kWh $	$19,952	$7,181	$12,771	64.0%
Cost (by fuel)	therm $	$0	$0	$0	N/A

Item	Units	Baseline	Proposed	Incr Cost	Smp Payback
Capital Cost	$	$38,554	$185,057	$146,504	13 years
LCCA Savings	$	$19,725			

Summary Charts





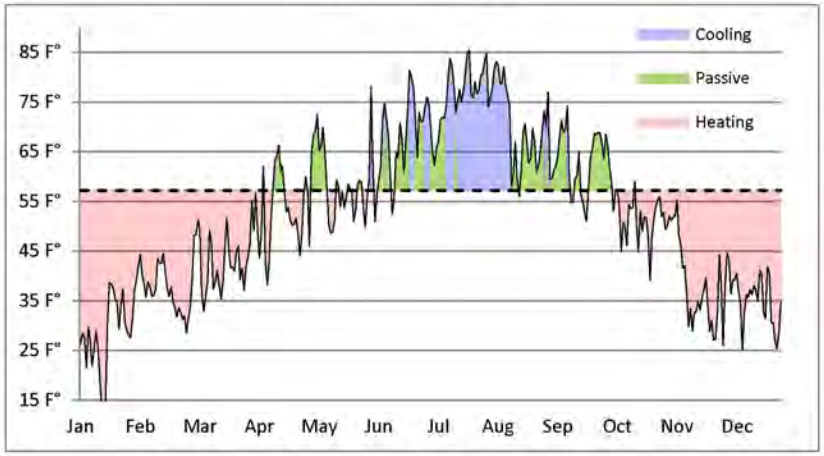
TEST - Advanced Design Strategies

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):	274,883
Qi (Btu/hr):	91,377
Heat Loss Rate (Btu/hr-°F):	7,145
Balance Point (°F):	57.2



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:

1,935	22%

# of Hours During Occupied Times:

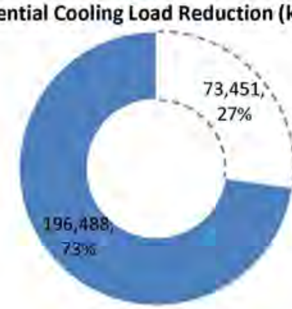
1,073	23%

Sum of Potential Cooling Load Reductions (kBtuh)

73,451	27%

Potential Hours

Potential Cooling Load Reduction (kBtuh)



INTEGRATED DESIGN LAB University of Idaho

TEST - Advanced Design Strategies

IDAHO POWER® An IDACORP Company

CROSS VENTILATION

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

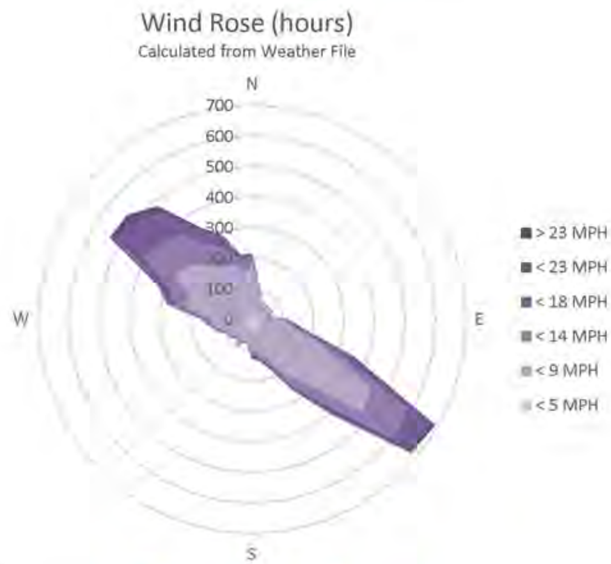
Benefits: Reduction in fan and cooling energy, longer equipment life, potential equipment downsizing or elimination, greater connection to the outdoors.

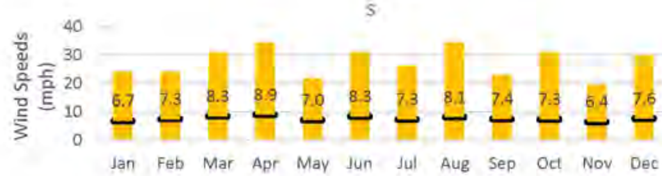
Inputs:

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:

465	5%

# of Hours During Occupied Times:

203	4%

Sum of Potential Cooling Load Reductions (kBtuh)

17,437	6%

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INTEGRATED DESIGN LAB
University of Idaho

2019 Task 7: BEMS Predictive Control Case Study

Summary of Work

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 1901_001-07

IDAHO POWER
An IDACORP Company

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Table of Contents

Acronyms and Abbreviations

API	Application Programming Interface
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
BACnet	Building Automation Control network
BAS	Building Automation System
BEMS	Building Energy Management System
BPA	Bonneville Power Administration
DDC	Direct Digital Control
DOAS	Dedicated Outdoor Air System
EMS	Energy Management System
HVAC	Heating Ventilation and Air Conditioning
IDL	Integrated Design Lab
IPC	Idaho Power Company
NEEA	Northwest Energy Efficiency Alliance
PBC	Predictive Building Controls
RTU	Rooftop Unit
UI	University of Idaho
UFAD	Under-Floor Air Distribution
VHE	Very High Efficiency

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) was introduced to a new technology that uses weather forecasting to improve building efficiency. Known as Predictive Building Control (PBC) this product integrates with a Building's Automation System (BAS) to reset thermostats to minimize HVAC energy consumption. This predictive management system is marketed as the next phase of building analytics. Building analytics receives data and notifies operators of potential issues within the building as an Energy Management System (EMS). Predictive control takes active measures without operator involvement to keep the building running in an efficient manner.

Predictive Building Controls are classified separately from "smart" thermostats in two main ways: they are predictive and they provide supervisory control for a whole building. Products such as the Google Nest or Honeywell T9 thermostat offer the ability to connect to a home's wifi network and receive commands by voice or mobile application. While these features are convenient, they can present security concerns to commercial businesses by having an open wifi access point. Many of these products are focused on the residential sector and can handle only a few zones. The Ecobee line of smart thermostats is the leading product in the commercial sector. They offer a SmartBuildings subscription-based thermostat management software that allows a building team to access a web portal for thermostat management. While the Ecobee line provides equipment and temperature alerts, it does not proactively manage setpoints based on weather forecasts or energy models nor does it use machine learning to adjust setpoints. The Ecobee commercial subscription will display usage patterns, but it is up to the facility team to implement those changes. Predictive building controls consider all thermostats within a building and use energy models, machine learning, and weather forecasts to actively manage setpoints – no actions are required of the building operator. The PBC is more comprehensive, active, and anticipatory than a smart thermostat.

The IDL sought out a building within Idaho Power (IPC) service territory where this technology could be applied and tested. IDL's scope of work includes identifying a case study, noting any barriers to implementation, and monitoring the energy savings after the predictive management system is installed. The goal of the project is to serve as a pilot study for potential utility incentives for this or similar technologies.

2. Work Summary

2.1 Literature Review

The IDL began the work with a short review of other building analytics systems that can take proactive measures to correct building operations. Building analytics provide recommendations to operators, but do not proactively regulate building controls. Examples of analytic software packages for buildings include BuildingIQ, SkySpark, and EnergyCap. These software overlay the current EMS by accessing their control signals. ASHRAE has standardized a Building Automation and Control network (BACnet) communication protocol that allows for system transparency and interoperability. Most building analytics software uses read-only capabilities of BACnet – they can assess what is happening in the building, but are not making active changes.

Predictive Building Control software such as the product reviewed by IDL uses BACnet to both read and *write* signals. It is designed to actively override the EMS and write a new set of control signals that according to its internal calculations will provide the most efficient operation. Analytics with write capabilities are a powerful tool, but they do require the BEMS to be open to such overrides and that accessibility can vary by manufacturer. While many control suppliers such as Siemens, Phillips, or Delta may technically have BACnet capabilities, their ease of access to such protocols is not always consistent.

The PBC framework uses a calibrated energy model of the building that is based on at least two years of utility data. This gives an estimate of how the building's energy use fluctuates in response to changes in outdoor conditions. The PBC software can be priced in one of two ways: either the client is charged a flat fee based on the building's square footage, or by means of a cost-sharing of utility savings. In the cost-sharing model, the building owner pays nothing up-front. Instead, the company uses the energy model to predict what typical energy consumption would look like without PBC. Each month, the owner pays back to the PBC company 50% of the calculated energy savings. This is similar to the structure of the Bullitt Center's agreement with Seattle City Light. The PBC company bears the risk if savings are less than anticipated, but is rewarded as the savings increase. Therefore this pricing model is most attractive for larger facilities where the potential savings are higher.

The IDL reached out to several engineers and building owners to locate a case-study for implementation of predictive controls. One facility manager in Boise expressed interest in applying this at one of their properties. After further discussion with the PBC a case study site was identified where this could be implemented. Coordination with the facility manager was modestly paced but continued throughout the year. The building selected for the case study uses Siemens controls that are set to be upgraded in December of 2019. At that point, they hope to integrate the predictive management system and start assessing savings. There is ongoing discussion between the company and the facility team over how PBC savings will be estimated so that they do not include the savings from the controls upgrade. Over the course of 2019, the IDL worked with the controls provider and the building manager to identify the specific requirements, functions, and barriers of this technology.

2.2 Building Requirements for PBC

In order for predictive building controls to be implemented at a facility, the following items must be in place:

1. Direct Digital Control and a Building Automation System
    a. The BAS must allow an open Application Programming Interface (API) port for an external account. This needs to be set up by the local controls vendor. Some vendors refuse to do this outright out of cyber-security concerns. With other vendors, there is more flexibility. Siemens is about middle of the road – not the worst to work with, not the easiest. A lot depends on the local team.
    b. A heartbeat function has to be written into the BAS by the local controls vendor. This is a simple routine to ensure that the predictive building control is active (if it detects that PBC is dead or non-responsive the controls default to the baseline sequence – i.e. what was in place before PBC).
2. Real-time electric meter

3. Real-time gas meter
4. Access to current utility bills
5. Two years of historical energy data
6. A set of building plans or drawings – Revit/Autocad etc.

2.3 How the PBC optimizes for efficiency

The PBC functions by providing BAS supervisory control of all of the building's thermostats. It does not control at the device level. Each HVAC device determines on its own how to meet the setpoint that is being called for. The thermostat control is segmented into 15 minute increments. For example, instead of having a 7:00 AM return from setback, the PBC might shift the thermostat start-up from setback to 6:45 AM, 7:15 AM, or 5:30 AM depending on the outdoor air temperature and forecast. While a smart thermostat can learn occupancy patterns, they do not anticipate weather forecasts or base their decisions on an energy model of the building the way that PBC does. The PBC runs three different optimizations:

1. **Start-up/return from setback** – maximizing setback times and accounting for lags from equipment such as heat pumps
2. **Occupied hours** – maintaining large deadbands between heating and cooling setpoints while accounting for any occupancy overrides through machine learning (similar to a nest thermostat)
3. **Shut-down/setbacks** – reducing equipment use as much as possible after occupants have left the facility

The optimization runs based on the energy model and weather forecasts. While long-term forecasts contain significant uncertainty, forecasts within a 24-hour window are generally accurate to within a few degrees. Occupants are always allowed temporary override of the setpoints. Should any comfort issues arise from an inaccurate estimation, occupants can raise or lower the setpoints as needed. The PBC will incorporate these overrides into its artificial intelligence-based optimizer over time to ensure comfort is always maintained when that space is occupied. The weather forecasting is done in-house by the PBC company. A weather station on the building can be used and added into the data stream if one is already present, but it is not necessary for the PBC to function.

The PBC can be very helpful depending on the dedication of the operator at the site. Some building operators are very proactive at looking at the weather and adjusting thermostats or outdoor air supply levels regularly. The current building operator at the case study site is very astute in that regard. However, many other building operators take a more laissez faire approach and stick to the default thermostat setpoints and rarely adjust those setpoints or schedules.

The PBC company IDL worked with has been in operation since the start of 2018. Currently their software has been installed in 7 buildings (5 that are currently operational and 2 that were in campus projects that served as beta testing). The example site the company uses is a 40,000ft^2 mixed-use facility (LEED Gold) that has a mix of natural gas and electricity for its utility. Two of the buildings they have applied PBC to are in the 100,000 ft^2 range (120k, and 90k). The implementation at their flagship property saved 40-50% of HVAC energy costs each month and reduced unmet temperature setpoints to 8% of occupied hours - down from 15%. The company currently advertises HVAC savings of 10% to 25% based on their projects to date.

2.4 Barriers to implementation

The sales representative from the PBC company had a skype call with the facility manager and building operators. On the call, the facility team identified several concerns that could pose a hurdle to implementation.

- There is remaining uncertainty about economizer control interactions and night-flush capability. Since the system only provides supervisory control of thermostats, would night-flushing during the summer still have to be done through manual control?
    - At the case study site, the building operator likes to use night-flush and cooling tower strategies to avoid using the chiller if possible.
- Would heating/cooling calls still have to be addressed by the building operator?
    - At the case study site, each occupant is given about a 3-4 degree of range on their individual thermostats.
- Would tenants approve of writing a check to a company that is separate from a traditional utility?
- The case study site is significantly larger than past PBC sites to date (250k vs 120k)
- How much feedback is required of building operators – will reporting on changes or overrides for things like conferences in certain rooms take up a lot of time – i.e. would these changes have to be sent back to the PBC company?

- At the case study site – some of the fire dampers are closed and it is a very unique building with an Under Floor Air Distribution (UFAD) system which can cause pressure imbalances within the building if not properly managed.
- The case study building uses geothermal for its heating source. PBC has not been used with geothermal before. There could be issues with tracking heating usage if there is not a real-time meter on the geothermal supply.
- GreenPower Labs has worked with the following companies: Siemens, Delta, Johnson, and is in discussion with Nest and Ecobee, but may not yet be compatible with other companies/systems.

2.5 Summary and next steps

The IDL was able to assess some of the requirements, capabilities and limitations of Predictive Building Controls. This technology is currently only capable of serving certain buildings that are limited by their size and controls vendor. While there is great potential for this technology, there are several software, cybersecurity, and operational hurdles to be overcome before it enters the mainstream market. The IDL will continue to monitor the implementation of the software in 2020 and track its performance.

2019 Task 8: RTU Control Retrofits for Small Commercial Facilities

Summary of Work

Idaho Power Company External Year-End Report

December 31, 2019

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 1901_001-08

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Acronyms and Abbreviations

ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
BPA	Bonneville Power Administration
DOAS	Dedicated Outdoor Air System
EMS	Energy Management System
HVAC	Heating Ventilation and Air Conditioning
IDL	Integrated Design Lab
IPC	Idaho Power Company
NEEA	Northwest Energy Efficiency Alliance
RTU	Rooftop Unit
UI	University of Idaho
VHE	Very High Efficiency

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) began a study of Rooftop Unit (RTU) control upgrades to assess potential savings. RTU's provide an all-in one Heating Ventilating and Air Conditioning (HVAC) system. They have heating coils, cooling coils, and a fan that supplies conditioned air to the space. RTU's are used in more than 40% of all commercial buildings (Hart et al. 2008). RTU's are also the most common HVAC system in small commercial buildings (<50,000ft^2) and 90% of the commercial buildings are in this category (Barnes and Parrish, 2016). The RTU's on these small commercial buildings are often operated until the end of their life and rarely receive maintenance attention except for filter changes (Cowen, 2004) (Breuker, Rossi, and Braun, 2000). Both Bonneville Power Administration (BPA) and ASHRAE have noted the advantages of retrofitting RTU's (Wang et al., 2013). The scope of IDL's study includes identifying a case study for a controls retrofit on an RTU. The focus is on reducing cooling power consumption through better scheduling and implementing night-flush ventilation. The IDL team is to monitor building energy performance, quantify weather-normalized energy savings, and recommend climate-specific ventilation and control strategies. The goal of the project is to serve as a pilot study for potential Idaho Power (IPC) incentives for small commercial RTU and Energy Management System (EMS) retrofits for business that do not have the immediate capital to replace their aging RTU's.

2. Work Summary

2.1 Literature Review

The IDL began the work with a short literature review of the current RTU market and potential control retrofits. RTU's are used in 90% of small commercial buildings as their main source for HVAC. A large majority of these RTU's (85%) have cooling capacities of 10 tons or less. The secondary research showed that a 2-point SEER upgrade saves an average of 2%-7% of HVAC energy, while advanced RTU controls can save 30% to 48% of HVAC energy (Hart et al., 2008).

Reviews of RTU's in the Pacific Northwest (Cowan, 2004) identified the five main faults aging RTU's experience including:

1. Inadequate refrigerant charge
    a. The commercial refrigerant has leaked out, increasing the compressor power to compensate for the lost pressure and mass flow.
2. Inadequate airflow
    a. The air intake or ductwork has been compromised, increasing static pressure and resulting in poor delivery of conditioned air to the zone.
3. Improper or malfunctioning economizer controls
    a. The economizer has been overridden by the facilities manager or never commissioned to a proper lockout temperature causing the compressor run even when free cooling is available from the outdoors.
4. Improper thermostat operation

   a. Thermostat faults included a lack of setbacks, overly tight setpoints, and poor placement within the facility leading to inadequate comfort and over-use of HVAC equipment.

5. Sensor degradation
   a. Sensors including thermocouples and damper position indicators have drifted from initial calibration over time or were otherwise compromised leading the RTU to run on faulty information.

Idaho Power offers the following incentives for improving the efficiency of RTUS:

- New economizer controls
- Economizer repair
- Optimum fan start and stop controls
- Demand controlled ventilation
- Supply air temperature reset

The Northwest Energy Efficiency Alliance (NEEA) recommends that aging RTUs be replaced with Very High Efficiency (VHE) Dedicated Outdoor Air Systems (DOAS). While replacement of an RTU with a DOAS has shown remarkable energy savings results, many small commercial facilities do not have the capital to invest in such a system and rely on their aging HVAC infrastructure for as long as possible.

2.2 IDL Research Scope

The IDL aims to address the needs of the small commercial RTU market for those businesses that do not have the capital to replace the full system with a VHE DOAS and are either ineligible for the IPC incentives or have already implemented these, but still have high cooling bills. Therefore, the IDL identified five research priorities for this task. These five research priorities include:

1. Estimating cooling savings from implementing night-flush during the summer.
2. Providing thermostat management guidelines to save energy and maximize comfort.
3. Investigating the cost of such sensor upgrades to existing equipment.
4. Identifying the current market and technical barriers to implementation.
5. Estimating the payback periods for RTU sensor upgrades for night flush controls and improved thermostat scheduling, which are beyond the scope of the current IPC RTU incentives.

The IDL worked to locate an appropriate facility that could serve as a case study. The facility had to be in IPC territory, be a small commercial client with RTU's, provide access for data collection, and be willing to implement potential control upgrades. Through the course of work under the Foundational Services Contract, the IDL identified two potential sites. The first potential site was a municipal facility that uses two main RTU's to condition the building. Utility bill history indicated that HVAC energy use had been uneven over the past few years. While the IDL was able to benchmark performance, the owner signed a contract with a new facility management company. While the company appreciated the interest, they indicated that they already had efforts underway to address some of the HVAC energy consumption issues and wished to keep any HVAC controls adjustment internal to their contract. As a result, this site is now unlikely to be open to participating in the study. The municipal contact proposed a second site for study, but that site was not representative of the small commercial RTU market.

The second site the IDL identified as a potential case study was a small commercial office for the Boise chapter of a national non-profit. This site is approximately 12,000 ft^2 and its HVAC consists of 8 RTU's. The facility manager was eager to learn how to improve the energy efficiency of his building and was willing to allow instrumentation and benchmarking and was open to new controls suggestions. This facility was identified later in the project after it became clear the initial municipal site was no longer an option for this study.

The IDL research team was able to install sensors within the facility and on several RTU's. HOBO data loggers were placed in the supply diffusers and return plenums within the building to track supply and return temperatures. Loggers were also placed next to several thermostats that corresponded to the RTU's. Current transformers were installed on the fan motor and compressor within the RTU to track ventilation and cooling operation. The loggers remained in place for over two weeks, during the summer.

The facility manager provided the IDL with a digital set of the building plans and two years of utility data. The team also recorded three weeks of RTU operation during the fall. While the outdoor conditions were much cooler during this time, the team did note occasional compressor operation. The team also researched the current RTU's based on their name-plate information and mechanical drawings were provided to the team. There is no EMS currently in the facility, but there are several thermostats that all control a single RTU and there is a control sequence associated with those signals that the facility manager provided to the team. The site information from the baselining study is available in the appendix. This information will be used in model calibration and benchmarking of current RTU performance.

Selection of the facility and coordination to install follow-up instrumentation took longer than initially anticipated – leaving a shortened window of the cooling season available for implementation and testing. Therefore, the majority of this project including sequencing new controls and estimating savings will occur in 2020. The team will also work to follow up on several leads to secure a second test site by March 1st of 2020.

Continuing this project next year will allow the team to complete the controls upgrade at both sites and allow for a full summer of testing and comparing various control sequences. An energy model of the initial building has been made in EnergyPlus and the IDL will use the first part of 2020 to do virtual testing of alternative control sequences including night-flush. The team will use the summer to implement and track the effects of the RTU controls retrofit at both sites to conclude this research task in 2020.

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4. Appendices

4.1 Case Study Baseline Information

Building Description

2 story office of approximately 12,000ft^2

Working hours
Monday to Friday 9:00 am - 5:00 pm
Thursday 9:00 am - 7:00 pm
Second Saturday of each month 10:00 am - 2:00 pm

Occupancy Approx. 25-35 people

Energy Data

- Outdoor measurement devices used on RTU 7 and RTU 8 conditioning second floor cube farm and private offices.
    - 4 CTV Hobo Data loggers- To check the current drawn from the compressors and supply fan motors.
    - 2 Track-it temperature loggers on the supply intake.
- Indoor measurement devices used on spaces conditioned by RTU-7 & RTU-8
    - 2 Data loggers with TC's in CEO's office on 2nd floor, one in supply diffuser and one in return grate
    - 1 data logger above the cube farm office thermostat.

HVAC systems

- 1st floor has 4 zones and 5 thermostats conditioned by RTU's 1 to 4.
- 2nd floor had 4 zones and 5 thermostats conditioned by RTU's 5 to 8.
- 7 Exhaust fans (have catalog)
- 8 RTU's (Heating by gas and DX cooling)
- YORK DCG076N079 – 4 units (2 upper floors and 2 lower floors)
    - Single package air conditioner with nominal cooling capacity of 22.2 KW and heating capacity of 23.1 KW.
    - Gas heat COP is 2.4, AFUE of 80%.
- YORK DCG048N060 – 4 units (2 upper floors and 2 lower floors)
    - Single package air conditioner with nominal cooling capacity of 14 KW and heating capacity of 17.6 KW.
    - Gas heat COP is 2.7, AFUE of 80%.

RTU features:

- Low Ambient – Can be programmed to lockout the compressors when the outdoor air temperature is low or free cooling is available.
- Anti-short cycle Prevention – To aid compressor life, minimum run times can be programmed.
- Fan Delays – On and off delays can be programmable into controls and are independent of each other.
- Safety monitoring: compressors lockouts, trips etc.
- Nuisance trip protection- High and low-pressure switches must trip 3 times before locking out the compressor
- On board Diagnostics: Alarm signal on the control board if equipped.
- Single input electronic enthalpy economizers: Capability of introducing 100% outdoor air with 1% leakage type dampers, contains a sensor that monitors the outdoor air is cool and dry enough to provide free cooling.
- POWER EXHAUST - Whenever the outdoor air intake dampers are opened for free cooling, the exhaust fan will be energized to prevent the conditioned space from being over-pressurized during economizer operation.

TZ-3 Total zone control panel:

Features

- Connects with Programmable/non-programmable thermostats.
- Connects with 5 dampers to each panel.
- Can connect discharge air temperature sensor
- Can be tested onsite
- LED indicators show damper and system status
- Has purge mode
- Single and multi-stage operations capability
- Zone Switch – Has occupied and unoccupied position settings
- Individual fan control

Operation

If calls from different zones occur, the first call is honored. Dampers close to the zone that is not calling and conditioning of the calling zone is satisfied. After all zones are satisfied, then the system enters purge mode (fan mode) to the last calling zone. It follows single and multi-stage operation.

RESEARCH/SURVEYS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2019 Flex Peak Program Survey	Commercial	Idaho Power	Idaho Power	Survey
2019 Idaho Power Shade Tree Survey	Residential	Idaho Power	Idaho Power	Survey
2019 Idaho Power Weatherization Assistance for Qualified Customers Program Survey Report	Residential	Idaho Power	Idaho Power	Survey
2019 Idaho Power Weatherization Solutions for Eligible Customers Program Survey Report	Residential	Idaho Power	Idaho Power	Survey
2019 Irrigation Peak Rewards Survey	Irrigation	Idaho Power	Idaho Power	Survey
2019–2016 Lighting Study Comparison	Residential	Idaho Power	Idaho Power	Survey
2019 Multifamily Energy Savings Program Survey	Residential	Idaho Power	Idaho Power	Survey

2019 Flex Peak Program Survey

1. What is your role at your company?

Answer Choices	Percent	Responses
Facilities Director/Manager/Supervisor	41.67%	10
Maintenance Director/Manager/Supervisor	16.67%	4
Operations Director/Manager/Supervisor	8.33%	2
Plant Director/Manager/Supervisor	16.67%	4
Other (please specify)	16.67%	4
	Answered	**24**

2. On a scale from 1 (very dissatisfied) to 5 (very satisfied), please rate the following steps in the Flex Peak Program?

Answer Choices	1	2	3	4	5	N/A	Total
Enrollment process	0.00%	0.00%	4.35%	17.39%	73.91%	4.35%	23
Notification process	0.00%	4.35%	8.70%	26.09%	60.87%	0.00%	23
Program support from Idaho Power	0.00%	0.00%	8.70%	13.04%	73.91%	4.35%	23
Post event performance data	0.00%	0.00%	13.04%	13.04%	73.91%	0.00%	23
Timeliness of receiving the incentive payment/bill credits	0.00%	0.00%	8.33%	8.33%	83.33%	0.00%	24
Incentive amount	0.00%	0.00%	17.39%	34.78%	47.83%	0.00%	23
						Answered	**24**

3. How satisfied were you with the ability to reduce demand in your facility during scheduled events?

Answer Choices	Percent	Responses
Very satisfied	37.50%	9
Somewhat satisfied	37.50%	9
Neither satisfied or dissatisfied	20.83%	5
Somewhat dissatisfied	4.17%	1
Very dissatisfied	0.00%	0
	Answered	**24**

4. How well do you understand how your load reduction is calculated during events?

Answer Choices	Percent	Responses
Very well	16.67%	4
Well	50.00%	12
Somewhat well	16.67%	4
Slightly well	0.00%	0
Not well at all	16.67%	4
	Answered	**24**

5. How satisfied are you with the number of notifications given when an event is called?

Answer Choices	Percent	Responses
Very satisfied	50.00%	12
Somewhat satisfied	25.00%	6
Neither satisfied or dissatisfied	16.67%	4
Somewhat dissatisfied	8.33%	2
Very dissatisfied	0.00%	0
	Answered	**24**

6. What would be your prefered number of notifications per event?

Answer Choices	Percent	Responses
One	25.00%	6
Two	70.83%	17
Three	4.17%	1
More than 3	0.00%	0
	Answered	**24**

7. How satisfied are you with the timing of the advanced notice prior to the start of an event?

Answer Choices	Percent	Responses
Very satisfied	41.67%	10
Somewhat satisfied	45.83%	11
Neither satisfied or dissatisfied	8.33%	2
Somewhat dissatisfied	0.00%	0
Very dissatisfied	4.17%	1
	Answered	**24**

8. How likely would you be to re-enroll in the Flex Peak Program in the future?

Answer Choices	Percent	Responses
Very likely	83.33%	20
Somewhat likely	12.50%	3
Neither likely or unlikely	4.17%	1
Somewhat unlikely	0.00%	0
Very unlikely	0.00%	0
	Answered	**24**

9. How satisfied are you with your overall experience with the Flex Peak Program?

Answer Choices	Percent	Responses
Very satisfied	79.17%	19
Somewhat satisfied	8.33%	2
Neither satisfied or dissatisfied	12.50%	3
Somewhat dissatisfied	0.00%	0
Very dissatisfied	0.00%	0
	Answered	**24**

10. Please provide any additional comments about Idaho Power's Flex Peak Program.

Answered: 11

11. May Idaho Power follow up with you regarding any questions from this survey?

Answer Choices	Percent	Responses
Yes	75.00%	18
No	25.00%	6
	Answered	**24**

2019 Shade Tree Project Survey

1. How did you hear about Idaho Power's Shade Tree Project? (Check all that apply)

Answer Choices	Percent	Responses
Letter from Idaho Power	59.08%	309
Friend or relative	27.53%	144
Neighbor	3.63%	19
Idaho Power employee	2.68%	14
Other (please specify)	12.05%	63
	Answered	**523**

2. What was the primary reason you participated in the program? (Mark one)

Answer Choices	Percent	Responses
Tree was free	16.41%	86
Home too warm in the summer	11.83%	62
Reduce energy bill	17.18%	90
Improve landscape/property value	19.85%	104
Wanted a tree	18.13%	95
Help the environment	11.45%	60
Other (please specify)	5.15%	27
	Answered	**524**

3. What kept you from planting a tree prior to the Shade Tree Project?

Answer Choices	Percent	Responses
Lack of knowledge	17.78%	93
Cost	47.61%	249
Time	12.43%	65
Other (please specify)	22.18%	116
	Answered	**523**

4. Where would you typically purchase a new tree? (Mark one)

Answer Choices	Percent	Responses
Garden section of a do-it-yourself/home improvement store	33.97%	177
Nursery/garden store	62.00%	323
Other (please specify)	4.03%	21
	Answered	**521**

5. How long did you spend on the online enrollment tool? (Mark one)

Answer Choices	Percent	Responses
10 minutes or less	61.57%	322
11-20 minutes	27.72%	145
21-30 minutes	6.88%	36
31 minutes or more	2.29%	12
Not applicable	1.53%	8
	Answered	**523**

6. Overall, how easy was it for you to use the online enrollment tool?

Answer Choices	Percent	Responses
Very easy	72.08%	377
Somewhat easy	23.71%	124
Somewhat difficult	1.91%	10
Very difficult	0.57%	3
Not applicable	1.72%	9
	Answered	**523**

7. How many trees did you pick up at the Shade Tree event?

Answer Choices	Percent	Responses
One	13.77%	72
Two	86.23%	451
	Answered	**523**

8. (For those who answered “One” in #7.) When did you plant your shade tree?

Answer Choices	Percent	Responses
Same day as the tree pickup	30.00%	21
1-3 days after the tree pickup	47.14%	33
4-7 days after the tree pickup	15.71%	11
More than 1 week after the tree pickup	4.29%	3
Did not plant the tree	2.86%	2
	Answered	**70**

9. (For those who answered “One” in #7.) On which side of your home did you plant your shade tree?

Answer Choices	Percent	Responses
North	1.47%	1
Northeast	0.00%	0
East	17.65%	12
Southeast	5.88%	4
South	10.29%	7
Southwest	16.18%	11
West	39.71%	27
Northwest	8.82%	6
	Answered	**68**

10. (For those who answered “One” in #7.) How far from the home did you plant your shade tree?

Answer Choices	Percent	Responses
20 feet or less	22.06%	15
21-40 feet	66.18%	45
41-60 feet	8.82%	6
More than 60 feet	2.94%	2
	Answered	**68**

11. How many shade trees did you plant?

Answer Choices	Percent	Responses
One tree	1.33%	6
Both trees	97.11%	437
Did not plant trees	1.56%	7
	Answered	**450**

12. (For those who answered "One tree" in #11.) When did you plant your shade tree?

Answer Choices	Percent	Responses
Same day as the tree pickup	16.67%	1
1-3 days after the tree pickup	50.00%	3
4-7 days after the tree pickup	16.67%	1
More than 1 week after the tree pickup	16.67%	1
	Answered	**6**

13. (For those who answered "One tree" in #11.) On which side of your home did you plant your shade tree?

Answer Choices	Percent	Responses
North	16.67%	1
Northeast	0.00%	0
East	16.67%	1
Southeast	16.67%	1
South	16.67%	1
Southwest	0.00%	0
West	16.67%	1
Northwest	16.67%	1
	Answered	**6**

14. (For those who answered "One tree" in #11.) How far from the home did you plant your shade tree?

Answer Choices	Percent	Responses
20 feet or less	33.33%	2
21-40 feet	66.67%	4
41-60 feet	0.00%	0
More than 60 feet	0.00%	0
	Answered	**6**

15. (For those who answered "Both trees" in #11.) When did you plant your shade trees?

Answer Choices	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	Total
Tree 1	27.48%	51.50%	13.86%	7.16%	433
Tree 2	27.34%	49.26%	15.02%	8.37%	406
				Answered	**434**

16. (For those who answered "Both trees" in #11.) On which side of your home did you plant your shade trees?

	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Total
Tree 1	4.57%	5.29%	12.74%	9.86%	9.38%	14.42%	36.54%	7.21%	416
Tree 2	5.34%	6.80%	11.65%	9.22%	8.01%	20.63%	31.80%	6.55%	412
								Answered	**418**

17. (For those who answered "Both trees" in #11.) How far from the home did you plant your shade trees?

	20 feet or less	21-40 feet	41-60 feet	More than 60 feet	Total
Tree 1	27.03%	50.00%	16.27%	6.70%	418
Tree 2	22.00%	48.66%	20.05%	9.29%	409
				Answered	**418**

18. How satisfied are you with the information you received on the planting and care of your shade tree?

Answer Choices	Percent	Responses
Very satisfied	80.32%	404
Somewhat satisfied	16.70%	84
Somewhat dissatisfied	1.39%	7
Very dissatisfied	0.99%	5
Not applicable	0.60%	3
	Answered	**503**

19. What information did you find most valuable?

Answer Choices	Percent	Responses
Planting depth	50.89%	256
Circling roots	12.92%	65
Staking	11.33%	57
Watering	11.93%	60
Not applicable	7.55%	38
Other (please specify)	5.37%	27
	Answered	**503**

20. How much do you agree with the following statements:

	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	NA	Total
I am satisfied with the Shade Tree Project pick up event	89.68%	8.73%	0.79%	0.60%	0.20%	504
It was easy to plant my shade tree	84.43%	13.37%	0.60%	0.00%	1.60%	501
I would recommend the Shade Tree Project to a friend or relative	95.43%	4.17%	0.40%	0.00%	0.00%	503
I am satisfied with my overall experience with the Shade Tree Project	92.84%	5.96%	0.99%	0.00%	0.20%	503
					Answered	**504**

21. If you have additional comments you would like to offer about the Shade Tree Project, please enter them in the space below.

Answered: 149

22. When was this residence originally built? (Select when the building was originally constructed, not when it was remodeled, added to, or converted.)

Answer Choices	Percent	Responses
Before 1950	9.69%	47
1950–1959	6.39%	31
1960–1969	4.33%	21
1970–1979	8.87%	43
1980–1989	4.12%	20
1990–1999	5.57%	27
2000–2006	9.69%	47
2007–2015	47.84%	232
Don't know	3.51%	17
	Answered	**485**

23. What one fuel is most often used to heat this residence? (Mark one)

Answer Choices	Percent	Responses
Electricity	32.33%	161
Natural gas	50.60%	252
Propane	8.23%	41
Fuel Oil	1.20%	6
Wood	4.42%	22
Other (please specify)	3.21%	16
	Answered	**498**

24. What type of air conditioning system is used at this residence?

Answer Choices	Percent	Responses
None	7.21%	36
Central air conditioner	66.93%	334
Heat pump	14.83%	74
Individual room or window air conditioner	12.02%	60
Evaporative/swamp cooler	3.21%	16
Other (please specify)	2.61%	13
	Answered	**499**

25. What is your gender?

Answer Choices	Percent	Responses
Female	62.88%	310
Male	37.12%	183
	Answered	**493**

26. Which of the following best describes your age?

Answer Choices	Percent	Responses
Under 18	0.00%	0
18-24	0.61%	3
25-34	20.00%	99
35-44	32.53%	161
45-60	27.88%	138
Over 60	18.99%	94
	Answered	**495**

27. What is the highest level of education you have completed?

Answer Choices	Percent	Responses
Less than high school	0.41%	2
High school or equivalent	9.55%	47
Some college/technical school	39.63%	195
4-year college degree	26.83%	132
Some graduate courses	5.69%	28
Graduate degree	17.89%	88
	Answered	**492**

2019 Idaho Power Weatherization Assistance for Qualified Customers Program Survey

1. Job number.

Answered 189

2. Agency name

Answer Choices	Percent	Responses
Metro Community Services	23.28%	44
Eastern Idaho Community Action Partnership	1.59%	3
El Ada Community Action Partnership	48.68%	92
South Central Community Action Partnership	13.23%	25
Southeastern Idaho Community Action Agency	11.11%	21
Community Connection of Northeast Oregon	0.53%	1
Community in Action	1.59%	3
	Answered	189

3. Idaho Power Program name.

Answer Choices	Percent	Responses
Weatherization Assistance for Qualified Customers	100.00%	189
Weatherization Solutions for Eligible Customers	0.00%	0
	Answered	189

4. How did you learn about the weatherization program(s)?

Answer Choices	Percent	Responses
Agency/Contractor flyer	17.32%	31
Idaho Power employee	5.59%	10
Idaho Power web site	13.97%	25
Friend or relative	35.75%	64
Letter in mail	11.73%	21
Other (please specify)	15.64%	28
	Answered	179

5. What was your primary reason for participating in the weatherization program?

Answer Choices	Percent	Responses
Reduce utility bills	75.82%	138
Improve comfort of home	40.66%	74
Furnace concerns	27.47%	50
Water heater concerns	8.79%	16
Improve insulation	14.84%	27
Other (please specify)	5.49%	10
	Answered	182

6. 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	Percent	Responses
Completely	93.92%	170
Somewhat	3.87%	7
Not at all	2.21%	4
	Answered	181

7. Which of the following did you learn about from the auditor or crew during the weatherization process? (Check all that apply)

Answer Choices	Percent	Responses
How air leaks affect energy usage	75.56%	136
How insulation affects energy usage	57.78%	104
How to program the new thermostat	46.11%	83
How to reduce the amount of hot water used	32.22%	58
How to use energy wisely	60.00%	108
How to understand what uses the most energy in my home	47.22%	85
Other (please specify)	4.44%	8
	Answered	180

8. 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	Percent	Responses
Very likely	88.83%	159
Somewhat likely	11.17%	20
Not very likely	0.00%	0
Not likely at all	0.00%	0
	Answered	179

9. How much of the information about energy use have you shared with other members of your household?

Answer Choices	Percent	Responses
All of it	76.80%	139
Some of it	11.05%	20
None of it	0.55%	1
N/A	11.60%	21
	Answered	181

10. 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	Percent	Responses
Very likely	62.57%	112
Somewhat likely	25.14%	45
Somewhat unlikely	0.56%	1
Very unlikely	0.56%	1
N/A	11.17%	20
	Answered	179

11. What habits are you and other members of your household most likely to change to save energy? (check all that apply)

Answer Choices	Percent	Responses
Washing full loads of clothes	66.85%	121
Washing full loads of dishes	45.86%	83
Turning off lights when not in use	79.01%	143
Unplugging electrical equipment when not in use	46.96%	85
Turning the thermostat up in the summer	54.14%	98
Turning the thermostat down in the winter	65.19%	118
Other (please specify)		5
	Answered	181

12. How much do you think the weatherization you received will affect the comfort of your home?

Answer Choices	Percent	Responses
Significantly	93.85%	168
Somewhat	6.15%	11
Very little	0.00%	0
Not at all	0.00%	0
	Answered	179

13. Rate the Agency/Contractor based on your interactions with them.

	Excellent	Good	Fair	Poor	Total
Courteousness	96.69%	3.31%	0.00%	0.00%	181
Professionalism	95.56%	3.33%	0.56%	0.56%	180
Explanation of work to be performed on your home	92.18%	6.15%	1.12%	0.56%	179
Overall experience with Agency/Contractor	94.41%	5.03%	0.00%	0.56%	179
				Answered	181

14. Were you aware of Idaho Power's role in the weatherization of your home?

Answer Choices	Percent	Responses
Yes	82.95%	146
No	17.05%	30
	Answered	176

15. Overall how satisfied are you with the weatherization program you participated in?

Answer Choices	Percent	Responses
Very satisfied	97.24%	176
Somewhat satisfied	2.76%	5
Somewhat dissatisfied	0.00%	0
Very dissatisfied	0.00%	0
	Answered	181

16. How has your opinion of Idaho Power changed as a result of its role in the weatherization program?

Answer Choices	Percent	Responses
Improved	90.66%	165
Stayed the same	9.34%	17
Decreased	0.00%	0
	Answered	182

17. How many people beside yourself live in your home year-round?

Answer Choices	Percent	Responses
0	22.65%	41
1	23.20%	42
2	14.92%	27
3	12.71%	23
4	9.39%	17
5	5.52%	10
6 or more	11.60%	21
	Answered	181

18. How long have you been an Idaho Power customer?

Answer Choices	Percent	Responses
Less than 1 year	2.23%	4
1 - 10 years	24.02%	43
11 - 25 years	29.61%	53
26 years or more	44.13%	79
	Answered	179

19. Please select the category below that best describes your age:

Answer Choices	Percent	Responses
Under 25	4.55%	8
25 - 34	9.66%	17
35 - 44	19.32%	34
45 - 54	11.36%	20
55 - 64	18.75%	33
65 - 74	26.14%	46
75 or older	10.23%	18
	Answered	176

20. Select the response below that best describes the highest level of education you have attained:

Answer Choices	Percent	Responses
Less than High School	15.06%	25
High School graduate or GED	42.17%	70
Some College or Technical School	30.12%	50
Associate Degree	6.02%	10
College Degree (including any graduate school or graduate degrees)	6.63%	11
	Answered	166

21. Please share any other comments you may have regarding Idaho Power's weatherization programs.

Answered: 67

2019 Idaho Power Weatherization Solutions for Eligible Customers Program Survey

1. Job number.

Answered: 119

2. Idaho Power program name:

Answer Choices	Percent	Responses
Weatherization Assistance for Qualified Customers	0.00%	0
Weatherization Solutions for Eligible Customers	100.00%	119
	Answered	**119**

3. How did you learn about the weatherization program(s)?

Answer Choices	Percent	Responses
Agency/Contractor flyer	12.82%	15
Idaho Power employee	5.98%	7
Idaho Power web site	11.11%	13
Friend or relative	10.26%	12
Letter in mail	54.70%	64
Other (please specify)	5.13%	6
	Answered	**117**

4. What was your primary reason for participating in the weatherization program?

Answer Choices	Percent	Responses
Reduce utility bills	76.52%	88
Improve comfort of home	33.91%	39
Furnace concerns	23.48%	27
Water heater concerns	4.35%	5
Improve insulation	25.22%	29
Other (please specify)	7.83%	9
	Answered	**115**

5. 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	Percent	Responses
Completely	77.78%	84
Somewhat	8.33%	9
Not at all	13.89%	15
	Answered	**108**

6. Which of the following did you learn about from the auditor or crew during the weatherization process? (Check all that apply)

Answer Choices	Percent	Responses
How air leaks affect energy usage	83.19%	94
How insulation affects energy usage	70.80%	80
How to program the new thermostat	43.36%	49
How to reduce the amount of hot water used	51.33%	58
How to use energy wisely	69.91%	79
How to understand what uses the most energy in my home	60.18%	68
Other (please specify)	3.54%	4
	Answered	**113**

7. 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	Percent	Responses
Very likely	67.54%	77
Somewhat likely	30.70%	35
Not very likely	1.75%	2
Not likely at all	0.00%	0
	Answered	**114**

8. How much of the information about energy use have you shared with other members of your household?

Answer Choices	Percent	Responses
All of it	62.28%	71
Some of it	16.67%	19
None of it	1.75%	2
N/A	19.30%	22
	Answered	**114**

9. 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	Percent	Responses
Very likely	41.59%	47
Somewhat likely	33.63%	38
Somewhat unlikely	0.00%	0
Very unlikely	1.77%	2
N/A	23.01%	26
	Answered	**113**

10. What habits are you and other members of your household most likely to change to save energy? (check all that apply)

Answer Choices	Percent	Responses
Washing full loads of clothes	48.57%	51
Washing full loads of dishes	37.14%	39
Turning off lights when not in use	66.67%	70
Unplugging electrical equipment when not in use	58.10%	61
Turning the thermostat up in the summer	49.52%	52
Turning the thermostat down in the winter	54.29%	57
Other (please specify)		17
	Answered	**105**

11. How much do you think the weatherization you received will affect the comfort of your home?

Answer Choices	Percent	Responses
Significantly	80.87%	93
Somewhat	19.13%	22
Very little	0.00%	0
Not at all	0.00%	0
	Answered	**115**

12. Rate the Agency/Contractor based on your interactions with them.

	Excellent	Good	Fair	Poor	Total
Courteousness	97.41%	2.59%	0.00%	0.00%	116
Professionalism	95.69%	4.31%	0.00%	0.00%	116
Explanation of work to be performed on your home	93.97%	6.03%	0.00%	0.00%	116
Overall experience with Agency/Contractor	95.69%	4.31%	0.00%	0.00%	116
				Answered	**116**

13. Were you aware of Idaho Power's role in the weatherization of your home?

Answer Choices	Percent	Responses
Yes	93.97%	109
No	6.03%	7
	Answered	**116**

14. Overall how satisfied are you with the weatherization program you participated in?

Answer Choices	Percent	Responses
Very satisfied	97.44%	114
Somewhat satisfied	2.56%	3
Somewhat dissatisfied	0.00%	0
Very dissatisfied	0.00%	0
	Answered	**117**

15. How has your opinion of Idaho Power changed as a result of its role in the weatherization program?

Answer Choices	Percent	Responses
Improved	81.90%	95
Stayed the same	18.10%	21
Decreased	0.00%	0
	Answered	**116**

16. How many people beside yourself live in your home year-round?

Answer Choices	Percent	Responses
0	32.76%	38
1	36.21%	42
2	16.38%	19
3	8.62%	10
4	5.17%	6
5	0.86%	1
6 or more	0.00%	0
	Answered	**116**

17. How long have you been an Idaho Power customer?

Answer Choices	Percent	Responses
Less than 1 year	2.78%	3
1 - 10 years	24.07%	26
11 - 25 years	30.56%	33
26 years or more	42.59%	46
	Answered	**108**

18. Please select the category below that best describes your age:

Answer Choices	Percent	Responses
Under 25	2.73%	3
25 - 34	13.64%	15
35 - 44	4.55%	5
45 - 54	9.09%	10
55 - 64	12.73%	14
65 - 74	30.91%	34
75 or older	26.36%	29
	Answered	**110**

19. Select the response below that best describes the highest level of education you have attained:

Answer Choices	Percent	Responses
Less than High School	2.73%	3
High School graduate or GED	30.91%	34
Some College or Technical School	33.64%	37
Associate Degree	14.55%	16
College Degree (including any graduate school or graduate degrees)	18.18%	20
	Answered	**110**

20. Please share any other comments you may have regarding Idaho Power's weatherization programs.

Answered: 43

2019 Irrigation Peak Rewards Survey

1. Are you an owner or employee of the farm, ranch, or business?

Answer Choices	Percent	Responses
Owner	78.79%	130
Employee	21.21%	35
	Answered	**165**

2. Are you satisfied with Idaho Power's responsiveness with regard to the Peak Rewards program?

Answer Choices	Percent	Responses
Yes	97.52%	157
No	2.48%	4
	Answered	**161**

3. Overall, are you satisfied with the Peak Rewards program?

Answer Choices	Percent	Responses
Yes	95.63%	153
No	4.38%	7
	Answered	**160**

4. Are you satisfied with the timeliness of messages on event days?

Answer Choices	Percent	Responses
Yes	91.77%	145
No	8.23%	13
	Answered	**158**

5. Are you satisfied with the content of messages on event days?

Answer Choices	Percent	Responses
Yes	99.37%	158
No	0.63%	1
	Answered	**159**

6. What is your zip code?

Answered: 164

7. Do you have any additional comments about the Peak Rewards program you would like to share?

Answer Choices	Percent	Responses
Yes	19.25%	31
No	80.75%	130
	Answered	**161**

8. Please provide any additional comments about Idaho Power's Peak Rewards Program.

Answered: 30

2019 Lighting Study Comparison to 2016 Study Results

The purpose of this study was to compare market trends in 2019 to trends from the 2016 Lighting Study conducted with Idaho Power Empowered Community members. The survey was sent to 2,363 Empowered Community members: 1,002 community members completed the survey for a 42% response rate.

Respondent Demographics

27% of respondents were from Idaho Power's Canyon West region, 46% from the Capital region and 27% from the South East region.

45% of respondents were male and 55% female.

11% of respondents were 34 or younger, 35% were between the ages of 35 and 54, 46% were between the ages of 55 and 74 and 8% were 75 or older.

33% of respondents had been an Idaho Power customer for 10 years or less when they registered for Empowered Community, 34% had been customers between 10 and 25 years and 33% had been customers for more than 25 years.

80% of respondents own their home and 12% rent.

Study Summary

The average number of lightbulbs per home as reported by survey respondents was 44 compared to 47 in the 2016 study. The 2019 study showed a much higher percentage of LED bulbs in high use areas in respondent homes (48%) than in the 2016 study (20%). Consequently the 2019 study showed lower percentages of incandescent and compact fluorescent bulbs in high use areas than in the 2016 study.

The 2019 study also showed a much higher percentage of LED bulbs in low use areas in respondent homes (45%) than in the 2016 study (17%). Consequently the 2019 study also showed lower percentages of incandescent and compact fluorescent bulbs in low use areas than in the 2016 study.

The 2019 study also showed a much higher percentage of LED bulbs in outside areas of use in respondent homes (43%) than in the 2016 study (15%). Consequently the 2019 study also showed lower percentages of incandescent and compact fluorescent bulbs in outside areas of use than in the 2016 study.

When asked what types of bulbs they would buy for their home today, 74% of respondents in the 2019 study said LED bulbs compared to 50% in the 2016 study.

When asked what type of spare bulbs they have in their home that aren't currently in a light fixture, 74% of respondents in the 2019 study said LED bulbs compared to only 33% in the 2016 study saying they had spare LED bulbs in their home. Additionally, 60% of respondents in the 2019 study said they had spare incandescent bulbs in their home compared to 95% of respondents in the 2016 study stating they had spare incandescent bulbs.

When asked what type of spare bulbs they have in their home that aren't currently in a light fixture, 74% of respondents in the 2019 study said LED bulbs compared to only 33% in the 2016 study saying they had spare LED bulbs in their home. Additionally, 60% of respondents in the 2019 study said they had spare incandescent bulbs in their home compared to 95% of respondents in the 2016 study stating they had spare incandescent bulbs.

New questions in 2019

A new question was added to the 2019 study asking where the respondent would most likely purchase bulbs for their home. Sixty-seven percent said they would purchase bulbs from a Big Box store. Another question that was added to the 2019 study asked how often the respondent looks for the ENERGY STAR® label when purchasing new bulbs. Thirty-two percent said "Always" and 32% said "Most of the time".

Results

1. Approximately how many light bulbs (of all types including fluorescent tubes) do you have in high-use areas of your home (e.g. kitchen, living room or family room), low-use areas of your home (e.g. bedroom, bathroom, hallway, garage), and outside of your home?

	2019	2016
Mean number of bulbs	44	47
Inside: High Use		
Incandescent / Halogen bulbs	25%	41%
Compact fluorescent bulbs (CFLs)	22%	34%
LED bulbs	48%	20%
Other	4%	5%
Inside: Low Use		
Incandescent / Halogen bulbs	28%	43%
Compact fluorescent bulbs (CFLs)	23%	36%
LED bulbs	45%	17%
Other	5%	5%
Outside		
Incandescent / Halogen bulbs	29%	50%
Compact fluorescent bulbs (CFLs)	23%	31%
LED bulbs	43%	15%
Other	6%	4%

2. If you needed to buy light bulbs for your home tomorrow, which of the following type of bulbs would you most likely buy?

	2019	2016
Total Responses	1002	619
Incandescent / Halogen bulbs	11%	19%
Compact fluorescent bulbs (CFLs)	13%	30%
LED bulbs	74%	50%
Other (please specify)	1%	1%

3. Where would you buy them?

	2019	2016
Total Responses	1002	NA
Big Box Store	67%	NA
Small Hardware Store	6%	NA
Grocery Store	12%	NA
Online	9%	NA
Other (please specify)	4%	NA

4. When purchasing bulbs for your home, how often do you look for the ENERGY STAR® label?

	2019	2016
Total Responses	1002	NA
Always	32%	NA
Most of the time	32%	NA
Some of the time	18%	NA
Never	18%	NA

5. Do you have any spare light bulbs in your home that are not currently in a light fixture or lamp?

	2019	2016
Total Responses	1002	619
Yes	95%	95%
No	4%	4%
Not sure	1%	1%

6. Which of the following types of spare bulbs do you have in your home that are not currently in a light fixture or lamp?

	2019	2016
Total Responses	948	587
Incandescent / Halogen bulbs	60%	95%
Compact fluorescent bulbs (CFLs)	54%	72%
LED bulbs	74%	33%
Other (please specify)	7%	7%

Conclusion

The general conclusion drawn from the response to the 2019 Lighting Study compared to the 2016 study is that the market has definitely shifted in favor of LED bulbs and that respondents to the 2019 survey have embraced the change to LED bulbs.

2019 Multifamily Energy Savings Program Customer Survey

1. Please select the 2019 project location.

Answer Choices	Percent	Responses
Benchmark Apartments (Boise)	16.67%	6
Clover Creek I (Jerome)	8.33%	3
Clover Creek II (Bliss)	8.33%	3
Eagle Manor (Eagle)	11.11%	4
Grand Cascade (American Falls)	2.78%	1
Hagerman Country Homes (Hagerman)	8.33%	3
Vineyard Suites at Indian Creek (Caldwell)	44.44%	16
	Answered	**36**

2. Please select the 2018 project location.

Answer Choices	Percent	Responses
Sister's Villa Eagle Senior Living (Eagle)	100.00%	2
	Answered	**2**

3. On a scale from 1 (very dissatisfied) to 5 (very satisfied), please rate the following:

	1	2	3	4	5	Total
LED Bulbs	0.00%	0.00%	10.81%	0.00%	89.19%	37
High-Efficiency Showerhead	4.17%	12.50%	12.50%	12.50%	58.33%	24
Kitchen and bathroom faucet aerators	2.94%	2.94%	5.88%	8.82%	79.41%	34
Overall satisfaction with the quality of the products	2.63%	0.00%	7.89%	10.53%	78.95%	38
Overall satisfaction with the Idaho Power energy-saving project	2.63%	5.26%	2.63%	2.63%	86.84%	38
					Answered	**38**

4. How would you describe the brightness of the LED light bulbs?

Answer Choices	Percent	Responses
Too Bright	7.89%	3
Somewhat Bright	18.42%	7
Just Right	60.53%	23
Somewhat Dim	5.26%	2
Too Dim	7.89%	3
	Answered	**38**

5. Do you have any comments or feedback to share with us?

Answered: 27

EVALUATIONS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
A/C Cool Credit Impact Evaluation Report	Residential	DNV-GL	Idaho Power	Impact
Idaho Power Commercial and Industrial Energy Efficiency—Retrofits Impact Evaluation PY 2018	Commercial/Industrial	DNV-GL	Idaho Power	Impact
Idaho Power Commercial and Industrial New Construction Impact Evaluation PY 2018	Commercial/Industrial	DNV-GL	Idaho Power	Impact
Idaho Power Energy House Calls PY 2018 Impact and Process Evaluation	Residential	DNV-GL	Idaho Power	Impact and Process
Idaho Power Residential New Construction Pilot Program Evaluation PY2018	Residential	DNV-GL	Idaho Power	Impact and Process

DNV·GL

FINAL REPORT

A/C Cool Credit Impact Evaluation Report

Date: December 30, 2019

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1 EXECUTIVE SUMMARY

This report presents the impact estimates associated with the three A/C Cool Credit event days called in the summer of 2019. Savings were calculated by comparing the actual average load for participating customers on each of the three event days with their corresponding baselines. The baselines were the average of the three highest non-event weekdays from the prior ten non-event weekdays, adjusted to match the event day in the hour before the start of the event.

1.1 Results

The peak demand savings per participant for the three event days, July 12, July 22, and August 6, were 0.90 kW, 0.57 kW, and 0.70 kW, respectively. Based on the maximum load reduction during the first event, using the total number of accounts participating for that event, the maximum total peak demand savings is 21,463 kW.

2 ANALYSIS METHOD

2.1 Data Cleaning and Selection

After receiving interval data, billing data, and participation data from Idaho Power, DNV GL reviewed and cleaned the data. Consistency and reasonableness checks were completed, and interval data that did not approximately match the associated customer billing data and interval data with extreme values were excluded from the analysis. Because of the unpredictability of the effect of net metered customers' solar generation, those customers were also excluded.[1] Table 2-1 shows the number of customers excluded at each step, and the number used in the estimation of impacts for each of the three events.

Table 2-1. Data Cleaning Summary

Data Cleaning Step	Customer Count
Original Billing Data (all participants, all events)	23,951
Available Interval Data Matched to Billing Data	23,950
Validated and Cleaned Interval Data	23,860
Excluding Solar Customers	23,445
Data Used by Event Participation	
July 12, 2019	20,305
July 22, 2019	20,754
August 6, 2019	22,115

2.2 Baseline

The A/C Cool Credit impact evaluation was done consistently with the impact estimation from the last several years. The actual average load for participants with good interval data on each event day was compared with a baseline. The baseline for each event day was calculated as the average of the loads from the three days with the highest demands from the previous ten non-event weekdays immediately preceding the event day. This baseline for each event day was then adjusted to better match the event day by increasing or decreasing the load on that day by applying an offset factor. The offset factor was based on the difference between the baseline load and the event day load during the hour immediately preceding the event. This corrected for any difference in magnitude of load between the event day and the baseline.

The analysis was based only on participating customers without solar generation. Including those with solar generation can cause unstable results, since the solar generation on non-event days is not always a good proxy for solar generation on event days. Including those customers would add significant variability to the

[1] We ran the analysis both with and without the solar customers included, and the results were very close. However, it was still prudent to leave those customers out of the analysis, but include them in the participation counts for each event.

impact estimates. It is a reasonable assumption that the load reduction from an A/C Cycling program should not be dependent on whether the customer has solar or not.

The impact for each event day was then calculated as the difference between the actual event day load and the adjusted baseline load.

3 RESULTS

This section provides detailed results for the A/C Cool Credit program for 2019.

1.1 Impacts

The impacts for the three events, calculated as described above, are shown in Table 3-1.

Table 3-1. Impact by Event Day

	July 12, 2019	July 22, 2019	August 6, 2019
Peak demand reduction per account during event	0.90	0.57	0.70
Average demand reduction per account during event	0.84	0.55	0.67
Number of participants (accounts) for each event	23,848	23,796	23,649
Total peak demand reduction for all participants	21,463	13,564	16,554
Total average demand for all participants	18,029	7,460	11,091

1.2 Load Impact Graphs

This section includes the load graphs showing the impacts for each of the event days, including the baseline load and average temperature, as well as the event day load and temperature for each event. Figure 3-1 shows the adjusted baseline and the event day load for the average participant for the July 12 event. Figure 3-2 shows the same data for the July 22 event, and Figure 3-3 show the loads for the August 6 event.

Figure 3-1 - Load Impact for July 12, 2019 Event

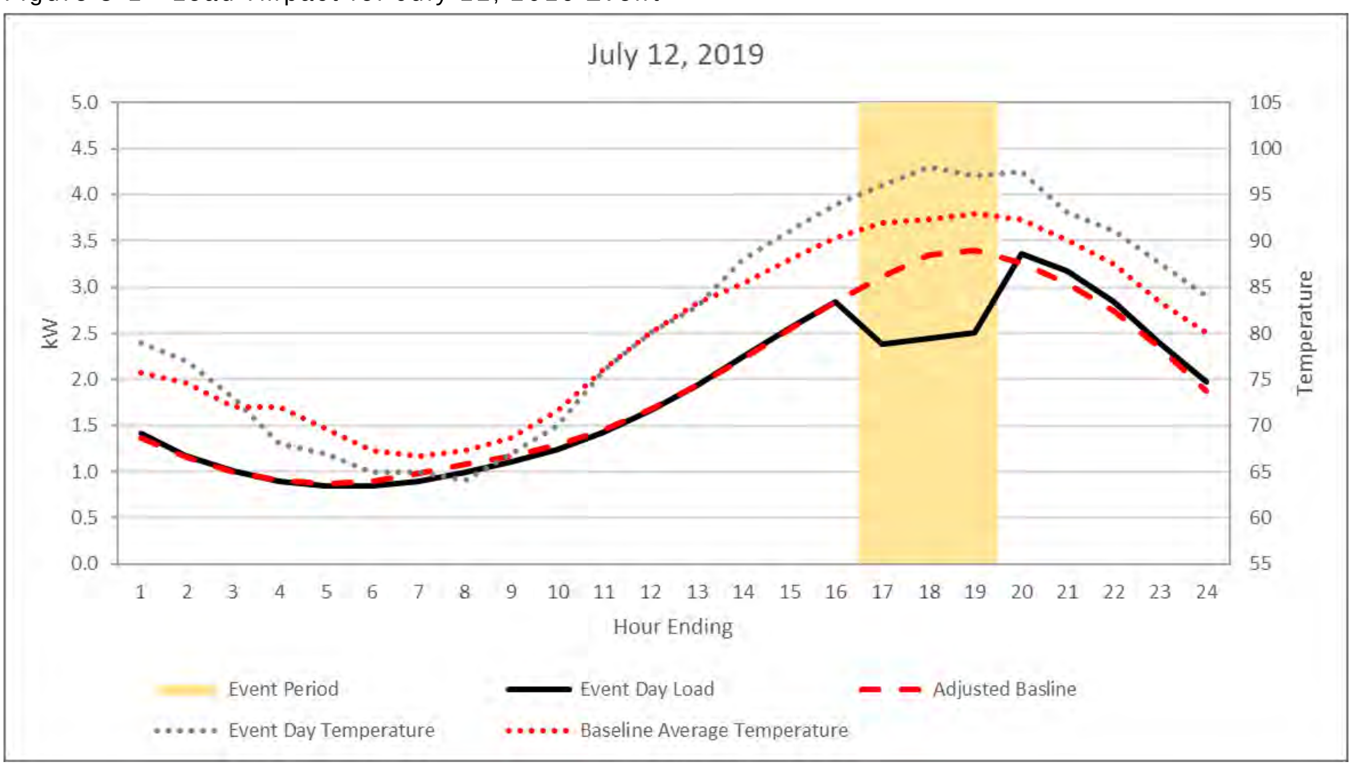


Figure 3-2 - Load Impact for July 22, 2019 Event

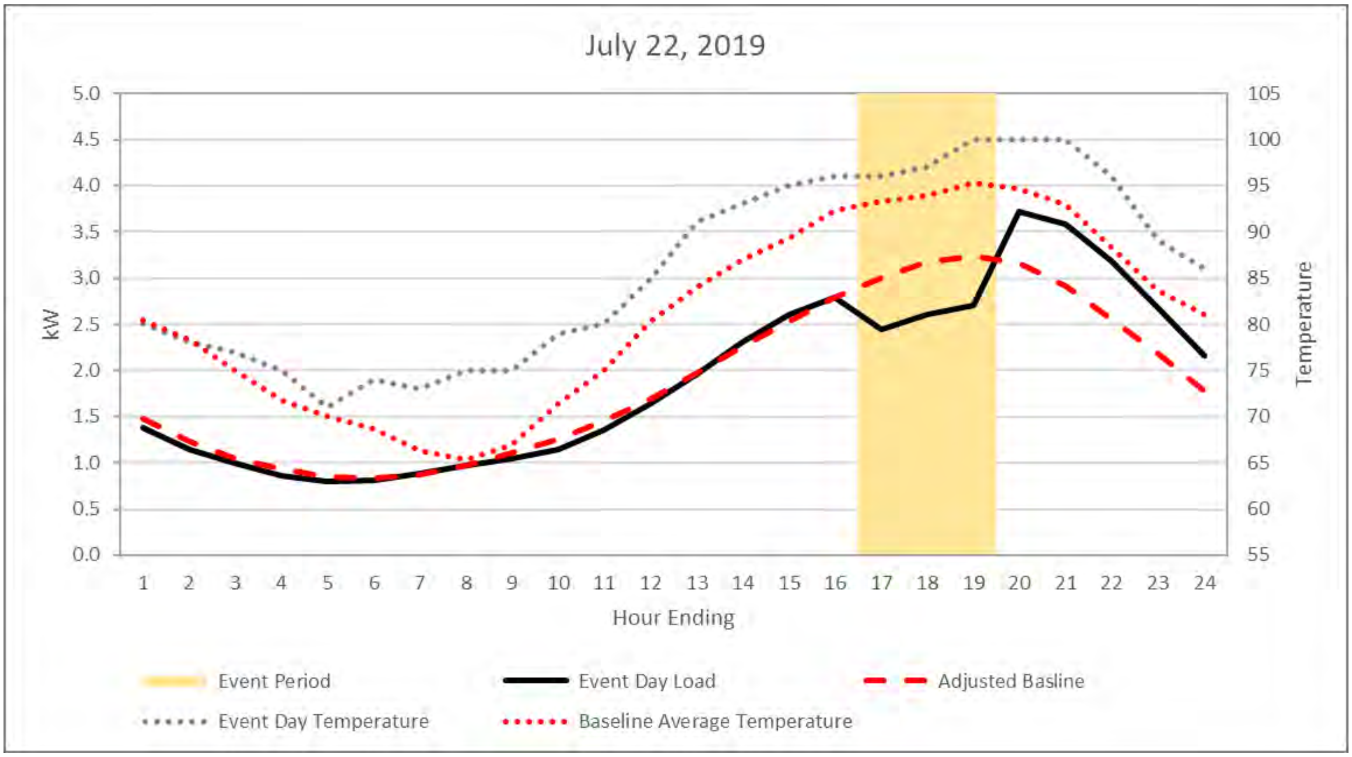
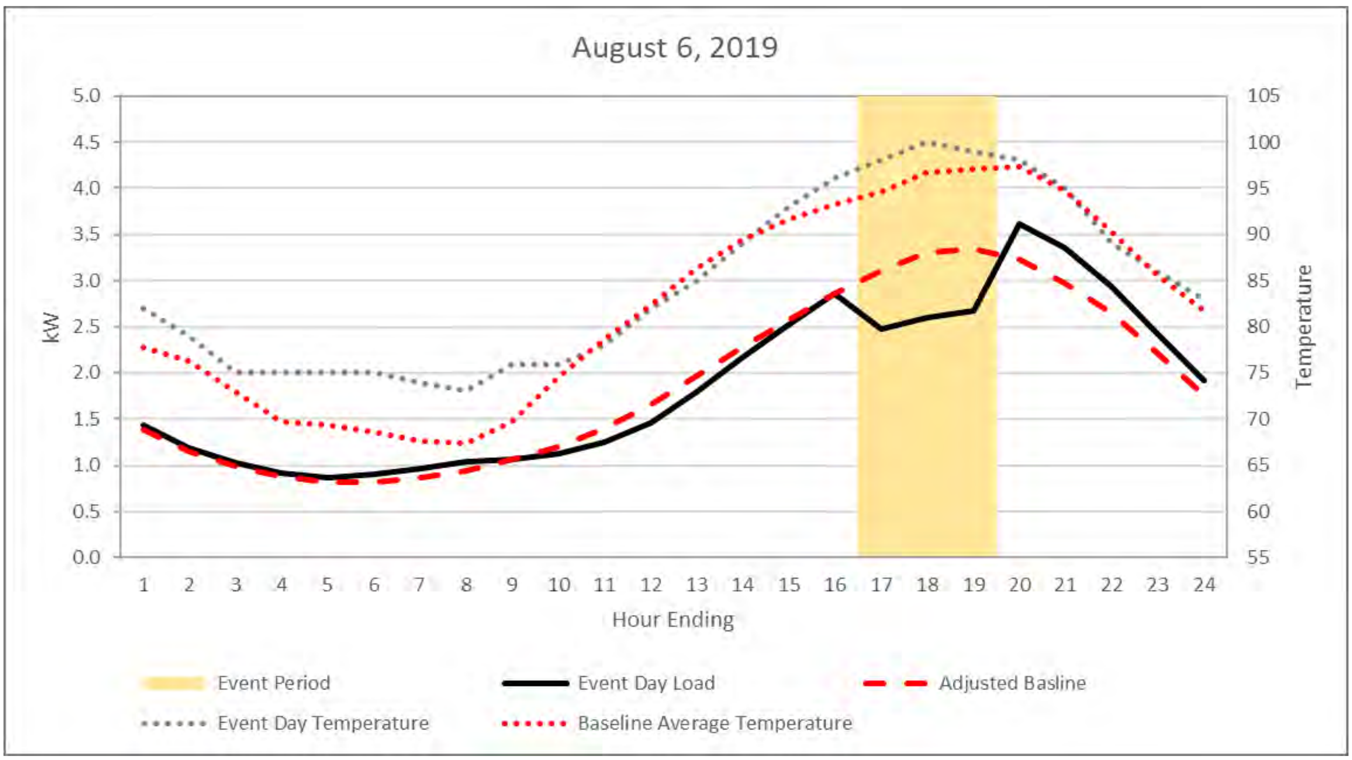


Figure 3-3 - Load Impact for August 6, 2019 Event



FINAL REPORT

Idaho Power Commercial and Industrial Energy Efficiency - Retrofits Impact Evaluation PY 2018

Date: November 25, 2019

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1 EXECUTIVE SUMMARY

This report presents findings and recommendations from an impact evaluation of the Retrofits offering within Idaho Power's Commercial and Industrial Energy Efficiency program. The evaluation, conducted by DNV GL from March to October 2019, covers projects funded in 2018.

1.1 Study objectives

DNV GL's objectives in the impact evaluation were to:

- Determine and verify the energy (kWh) impacts attributable to the 2018 program
- Provide credible and reliable ex-post realization rates
- Offer recommendations to enhance the effectiveness of future ex-ante savings analysis and the accuracy and transparency of program savings

1.2 Findings

DNV GL computes an overall realization rate for the program of 99.4%. The reason for this difference is that DNV GL made adjustments to three projects: we found a calculation error in the lighting controls for one project, found an error in the per unit savings for the VFDs installed on potato or onion storage shed ventilation for a second project, and adjusted operating hours for the lighting of one of the sites visited (a third project).

Overall, the tracking database for the Retrofits offering is well-organized and the details about assumptions and sources are well-documented. Program staff proactively adjusts savings for special cases such as equipment being taken out of service.

DNV GL estimates the total annual NEIs for this program to be approximately $764,000.

1.3 Recommendations

1.3.1 Consider requiring pictures of the motor nameplate for the connected motor to VFD measures.

The application specifies that the quantity is the lesser of the VFD or connected motor horsepower (hp), it does not collect the motor hp. Motors are often in difficult to access locations, so a picture of the nameplate would help verify the motor hp.

1.4 Methodology overview

To perform this impact evaluation, DNV GL performed the following tasks:

- Conducted interviews with program staff
- Reviewed the tracking system and a sample of application files
- Reviewed savings algorithms
- Conducted site visits with a sample of the largest projects
- Expanded the sample results to the population

A detailed description of our methodology is provided in Section 3.

2 INTRODUCTION

2.1 Study purpose, objectives, and research questions

DNV GL conducted an impact evaluation of the Retrofits offering within Idaho Power's Commercial and Industrial Energy Efficiency program, covering projects funded in 2018.

The objectives of this impact evaluation included:

- Determine and verify the energy (kWh, kW) impacts attributable to the 2018 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:

- Conducted interviews with program staff
- Tracking system review
- Review of a sample of program applications
- Review of savings algorithms
- Onsite inspections of a sample of the larger projects

DNV GL did not conduct a process evaluation for this program, as it was outside the scope of work for this project.

2.2 Organization of report

The remainder of this report is organized as follows:

- Section 3 Methodology and approach – describes the evaluation activities in detail
- Section 4 Impact findings – reports the findings relevant to verifying program savings
- Section 5 Conclusions and recommendations – presents the key findings and offers recommendations for program improvement

3 METHODOLOGY AND APPROACH

This section provides detailed descriptions of the methods DNV GL used to evaluate the program.

1.1 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 interviews with Idaho Power staff. These interviews were conducted over the phone and lasted about an hour.

1.2 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 verify the accuracy and appropriateness of the savings claimed for each measure. Specifically, we reviewed each measure to confirm the following:

1. The database savings match program reporting
2. The database includes all variables needed to calculate and evaluate program savings
3. The required variables contain usable data in consistent formats
4. Any programmed formulas used to calculate savings and incentives are accurate
5. The line-by-line records match specifications from the reference material such as the Regional Technical Forum (RTF) and the relevant Technical Reference Manual (TRM).

DNV GL also conducted a file review of a sample of the program application files. The file review provided a more in-depth verification of a statistical sample of projects. We verified the accuracy of data entry by comparing the application, the invoice, and database for key elements of the savings calculation such as quantity, size, efficiency level, and units of measure. We also verified specific calculations and algorithms used in these applications.

DNV GL selected a stratified random sample with enough projects to achieve a 90/10 statistical precision[1] for our realization rate estimate on the sampled projects, using conservative assumptions about the eventual realization rate achieved and the correlation between the reported savings and the verified savings. The sample was stratified based on the reported savings, and random samples were selected within each stratum. The fourth stratum, which included the projects with the largest savings and represents over 15% of the total savings, was treated as a census, with all projects included in the sample. DNV GL selected a total sample of 38 projects. The stratification and sample design are shown in Table 3-1 below.

[1] a relative error of no more than 10%, with 90% confidence

Table 3-1. Stratified sample design

Stratum – savings range	Total savings	Population	Sample
1 – Less than 15,000 kWh	5,030,792	864	6
2 – Between 15,000 and 60,000 kWh	11,504,313	369	8
3 – Between 60,000 and 250,000 kWh	12,815,781	109	9
4 – Over 250,000 kWh	5,559,736	15	15
Total	34,910,622	1,357	38

Finally, we conducted site visits with a limited subsample of the projects for which we reviewed application files. These site visits targeted the largest of the sampled projects. The purpose of the site visits was to verify measure installation and operating conditions.

4 IMPACT FINDINGS

4.1 Verified savings

1. *The program realization rate is 99.4%*
2. *Three projects received adjustments*

The ex-post savings values for all measures applied the same deemed per-unit savings sources. The overall realization rate is 99.4% (Table 4-1).

Table 4-1. Impact evaluation savings summary

Measure Type	Tracking, kWh	Verified, kWh	Realization Rate
Lighting	29,910,737	29,870,258	99.9%
Lighting controls	261,387	260,927	99.8%
Non-lighting	4,738,504	4,578,504	96.6%
Total	34,910,628[2]	34,709,683	99.4%

There were three projects with adjusted savings. These adjustments are summarized in Table 4-2. These adjustments are discussed furthur in the following sections.

Table 4-2. Projects with adjusted savings

Project ID	Tracking, kWh	Verified, kWh	Realization Rate	Adjustment
181462	12,400	11,940	96.3%	calculation error in lighting control measure
171275	550,889	510,410	92.7%	lighting operating hours found onsite differ from tracking, sampled project expanded to population
180160	398,600	238,600	59.9%	incorrect per-unit savings for non-lighting measure

4.2 Review of savings algorithms

Most lighting and lighting controls savings are calculated using the lighting tool, which is an Excel workbook. DNV GL verified the savings calculated by the lighting tool by using relevant tracking data fields (existing and new lamp types, watts, quantities, hours). Cooler case lighting measures rely on RTF savings for the first half of 2018. These measures were transitioned to calculated savings in the lighting tool for the second half of 2018.

We were able to verify the lighting measure savings for most entries with the exception of the cooler case ligting measures that utilize the RTF savings. We did not have enough information in the tracking data to reproduce these savings. These measures calculate savings on a per foot basis. However, the tracking data did not provide the fixture wattage on a per foot basis. Without such information, we could not reproduce the savings calculations. However, moving forward this will not be an issue as the program now uses the lighting tool to calculate savings and all of the parameters needed to reproduce savings are provided in tracking data.

2 The 2018 Demand Side Management (DSM) Report savings are 34,910,707. Ex ante savings in this table are directly from tracking data. The discrepancy between the savings in Table 1 and Supplement 1 are likely due to rounding errors and are negligible.

Lighting controls savings were verified for all entries in the tracking data. However, savings for one entry could not be reproduced. This resulted from a calculation error in the lighting tool, identified by program staff, as follows:

- The calculation error was introduced on the August 2018 version of the lighting tool. August 2018 is Version 25 of the lighting tool.
- The error does not occur on all ceiling mount occupancy sensor projects, only those where the fixture quantity exceeds the sensor quantity (one-for-one scenarios calculate correctly).
- The error only affected one project.
- As a result of this finding, program staff said they will review all projects paid in 2019 to determine if any have this calculation error. Those projects identified with the error will be corrected before year-end so that 2019 kWh savings will be accurate.
- An updated lighting tool to be rolled out January 1, 2020 (V26) will have the error corrected.

For both lighting and lighting controls measures, the tracking data includes whole wattages for fixture power. However, the lighting tool uses power to the tenth of a watt. For some entries, this rounding creates a discrepancy between the tracking savings and the savings reproduced from the tracking parameters. Program staff are resolving this issue for future program cycles.

We found one lighting project with trackings savings that were manually adjusted by program staff. This proactive adjustment was for a very unusual case to account for equipment being taken out of service due to a building being torn down. The adjustment was noted in the tracking data.

For non-lighting measures, most measures use deemed savings from the Idaho Power TRM. One of two versions of the TRM[3] are used, depending on the application date.

There are several measures that were added to the program in 2016 and not included in Version 1.7 of the TRM. Idaho Power estimated prescriptive savings for these measures based on internal calucations. For these measures, ex ante savings were calculated using internal program calculations. The new measures are VFDs on kitchen exhaust and makeup air fans, notched V-belts, stationary pump-driven circulating block heaters, implement 3 control strategies, implement 5 control strategies[4] and VFDs on potato and onion storage ventilation. For the purposes of the evaluation, we confirmed that the savings in the tracking data matched the savings documentation calculating the savings[5]. The new measures were officially added to Version 2.2 of the TRM.

There are two non-lighting measures that were implemented in 2018 that rely on RTF savings. These are measures ENERGY STAR electric ovens and residential-type Electric Water Heater - EF 0.95 or higher, 45–54 gallon, respectively. The water heater measure has been removed from the program going forward. The savings for these measures were verified in the RTF files[6].

All of the non-lighting measures matched the calculated savings (using quantity and the tracking per-unit savings values). One measure was found to have the incorrect per-unit savings. This measure is the VFD

[3] Idaho Power Company Technical Reference Manual 1.7, ADM is used for project in 2018 until version 2.2 became effective October 15, 2018.

[4] Version 1.7 of the TRM included the other control strategies combinations, but not three and five control strategies.

[5] We did not review the savings calculations and methodologies for the internal calculations. These values were only used for a short period of time, as Version 2.2 of the TRM added these measures.

[6] 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.

potato or onion storage shed ventilation. The TRM Version 2.2 savings is 1,193 kWh/hp, the tracking savings appeared to transpose this value to 1,993 kWh. The TRM savings were used in the ex post savings.

4.3 File review and site visits

For a sample of 38 projects, we reviewed the program documentation. Documentation included: applications, manufacture specification, post inspection reports, and invoices. The application measures and quantities were compared to the tracking values. We did not find any discrepancies between the tracking data and the program documentation.

We conducted onsite verifications for a subset of six of the projects for which we conducted file reviews. All measures were found to be installed and operational. The following summarizes the onsite findings:

- We found minor discrepancies in lighting quantities at a few sites. However, these were within a few percent of the tracking values. We did not adjust the quantities for the evaluated savings.
- One site had different operating hours for lighting than the tracking value. The project applied the same operating hours to all fixtures. However, we found that 25% of fixtures were on 24/7. The remainder of the lighting were on timer controls and had a shorter schedule than indicated in the tracking hours. We adjusted the operating hours for the ex ante savings calculations to reflect this finding.
- We verified the VFDs installed on potato or onion storage shed ventilation at a facility. The application quantity was for (7) 20 hp VFDs and (4) 15 hp VFDs. The application was consistent with the invoices. We found all (11) of the VFDs to be rated to 20 hp. However, we were unable to determine if the connected motor hp was 15 hp or 20 hp. Without confirming the connected motor hp, we used the original quantities for the evaluated savings.

4.4 Sample expansion

We expanded the sample to the population using a two-step process. For the differences found in the tracking review, the difference in the total is the same as the sum of the differences in the two projects with changes to savings, because the tracking review was done for every project in the database. There was no sampling error or expansion required because of this. The realization rate from the tracking review was 99.5%.

Based on the sample, there was one correction discovered during the onsite visit, which was for a project that was part of the census stratum (the lighting hours adjustment described in the previous section). The projects in the census stratum represented only itself, and so there was no sampling error as a result of this change. The realization rate from the file review was 99.9%. All of the sampled (non-census) projects were correct, so there was no way to calculate sampling error, because it is zero.

The overall realization rate from the tracking review and file review is 99.4%. Because there is no sampling error, we cannot calculate the confidence interval associated with the ex post savings or the realization rate.

4.5 Non-energy Impacts

DNV GL maintains a database of non-energy impacts (NEI) by measure type based on a meta-analysis of publically available NEI research from across the country. Through this database, we can assign an approximately NEI dollar value per kWh for major measure types. We averaged the $/kWh NEI value per measure category for all commercial business types. We then applied these averages to the total evaluated kWh in the Idaho Power tracking data to estimate NEI dollars for this program (Table 4-3). DNV GL estimates the total annual NEIs for this program to be approximately $764,000.

Table 4-3. Estimated NEIs by measure type

Measure type	Evaluated kWh	Average NEI $/kWh	NEI $
HVAC	555,018	-0.002833	-1,572.55
Lighting	34,769,682	0.021973	763,984.74
Other	3,464,787	-0.000067	-230.99
VSD	470,359	0.005475	2,575.21
Motor	88,340	-0.004800	-424.03
Total	39,348,186		764,332.39

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

DNV GL computes an overall realization rate for the program of 99.4%. The reason for this difference is that DNV GL made adjustments to three projects: we found a calculation error in the lighting controls for one project, found an error in the per unit savings for the VFDs installed on potato or onion storage shed ventilation for a second project, and adjusted operating hours for the lighting of one of the sites visited (a third project).

Overall, the tracking database for the Retrofits program is well-organized and the details about assumptions and sources are well-documented. Program staff proactively adjusts savings for for special cases such as equipment being removed.

DNV GL estimates the total annual NEIs for this program to be approximately $764,000.

5.2 Recommendations

5.2.1 Consider requiring pictures of the motor nameplate for the connected motor to VFD measures.

The application specifies that the quantity is the lesser of the VFD or connected motor horsepower (hp), it does not collect the motor hp. Motors are often in difficult to access locations, so a picture of the nameplate would help verify the motor hp.

FINAL REPORT

Idaho Power Commercial and Industrial New Construction Impact Evaluation PY 2018

Date: November 22, 2019

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1 EXECUTIVE SUMMARY

This report presents findings and recommendations from an impact evaluation of the new construction portion of Idaho Power's Commercial and Industrial (C&I) Energy Efficiency program. The evaluation, conducted by DNV GL from March to October 2019, covers projects funded in 2018.

1.1 Study objectives

DNV GL's objectives in the impact evaluation were to:

- Determine and verify the energy (kWh) impacts attributable to the 2018 program
- Provide credible and reliable ex-post realization rates
- Offer recommendations to enhance the effectiveness of future ex-ante savings analysis and the accuracy and transparency of program savings

1.2 Findings

DNV GL computes an overall realization rate for the program of 100%. DNV GL confirmed that all the energy savings formulas in the project documentation were utilized accurately. The DNV GL team reviewed the tracking data received for accuracy, completeness, and intelligibility. While the data was mostly accurate, complete, and intelligible, we identified some data issues, as detailed in the Recommendations Section 1.3. During the review, we discovered that the hours-of-use (HOU) values used in calculations for lighting and HVAC measures come from an uncitable Department of Energy (DOE) source. DNV GL believes it is best practice to utilize the TRM as detailed in Section 1.3.

DNV GL estimates the program resulted in approximately $223,000 in non-energy benefits.

1.3 Recommendations

1.3.1 Utilize HOUs from the TRM for lighting and HVAC projects started after the TRM was implemented.

The TRM is the best source for HOUs because its values are more recent and more accurate than the DOE source currently used. Also, the sources for the TRMs data are clearly cited and can be traced back to original research.

1.3.2 Tracking data should include the version of the TRM utilized for each project.

Although IPC provided this information when it was requested, it would increase transparency and expedite the evaluation process if the information were incorporated into the tracking data. Because new construction projects have a potential period of years, tracking the source of savings for each project is important to increase transparency, ensure accuracy, and expedite the program's evaluation.

1.4 Methodology overview

To perform this impact evaluation. DNV GL performed the following tasks:

- Conducted interviews with program staff
- Reviewed the tracking system and a sample of application files

- Reviewed savings algorithms
- Conducted site visits with a sample of the largest projects

A detailed description of our methodology is provided in Section 3.

2 INTRODUCTION

2.1 Study purpose, objectives, and research questions

DNV GL conducted an impact evaluation of the new construction portion of Idaho Power's Commercial and Industrial (C&I) Energy Efficiency program, covering projects funded in 2018.

The objectives of this impact evaluation included:

- Determine and verify the energy (kWh, kW) impacts attributable to the 2018 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 a sample of program applications
- Review of savings algorithms
- Onsite inspections of a sample of the larger projects

DNV GL did not conduct a process evaluation for this program, as it was outside the scope of work for this project.

2.2 Organization of report

The remainder of this report is organized as follows:

- Section 3 Methodology and approach – describes the evaluation activities in detail
- Section 4 Impact findings – reports the findings relevant to verifying program savings
- Section 5 Conclusions and recommendations – presents the key findings and offers recommendations for program improvement

3 METHODOLOGY AND APPROACH

This section provides detailed descriptions of the methods DNV GL used to evaluate the program.

1.1 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 conducted over the phone and lasted about an hour.

1.2 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 verify the accuracy and appropriateness of the savings claimed for each measure. Specifically, we reviewed each measure to confirm the following:

1. The database savings match program reporting
2. The database includes all variables needed to calculate and evaluate program savings
3. The required variables contain usable data in consistent formats
4. Any programmed formulas used to calculate savings and incentives are accurate
5. The line-by-line records match specifications from the reference material such as the Regional Technical Forum (RTF) and the relevant Technical Reference Manual (TRM).

DNV GL also conducted a file review of a sample of the program application files. The file review provided a more in-depth verification of a statistical sample of projects. We verified the accuracy of data entry by comparing the application, the invoice, and database for key elements of the savings calculation such as quantity, size, efficiency level, and units of measure. We also verified specific calculations and algorithms used in these applications.

DNV GL selected a stratified random sample with enough projects to achieve a 90/10 statistical precision[1] for our realization rate estimate on the sampled projects, using conservative assumptions about the eventual realization rate achieved and the correlation between the reported savings and the verified savings. The sample was stratified based on the reported savings, and random samples were selected within each stratum. The fourth stratum, which included the projects with the largest savings and represents over 55% of the total savings, was treated as a census, with all projects included in the sample. DNV GL selected a total sample of 30 projects. The stratification and sample design are shown in Table 3-1 below.

[1] a relative error of no more than 10%, with 90% confidence

Table 3-1. Stratified sample design

Stratum – savings range	Total savings	Population	Sample
1 – Less than 45,000 kWh	892,898	58	7
2 – Between 45,000 and 150,000 kWh	1,957,592	25	9
3 – Between 150,000 and 300,000 kWh	3,088,834	14	7
4 – Over 300,000 kWh	7,438,931	7	7
Total	13,378,255	104	30

Finally, we conducted site visits with a limited subsample of the projects for which we reviewed application files. These site visits targeted the largest of the sampled projects. The purpose of the site visits was to verify measure installation and operating conditions.

4 IMPACT FINDINGS

DNV GL reviewed the tracking database of all the measures for the C&I New Construction program. Some of these measures include:

- Daylight photo controls
- Direct evaporative coolers
- Efficient air conditioning (AC) or heat pump (HP) units, variable refrigerant flow (VRF) units, chillers, condensers, and variable speed drives (VSD) for heating ventilation and cooling (HVAC)
- VSD for kitchen hoods and other non-HVAC applications
- Efficient laundry machines and dishwashers
- HVAC energy management systems (EMS) and occupancy sensors
- Floating suction controls and head pressure controls
- High-efficiency exit-signs and interior or exterior light load reduction
- Reflective roofs

The tracking database rigorously documents project-related information such as customers, locations, completion and incentive payment dates, measure types, and electric savings. However, the database does not track all the inputs used to calculate energy savings and does not contain the formulas used to determine energy savings. The energy savings calculations are contained in the application files separate from the tracking database.

4.1 Verified savings

1. Realization rates for all measures are 100%

2. DNV GL recommends improvements for the hours-of-use utilized in lighting and HVAC calculations.

DNV GL selected a sample of tracked projects for a more in-depth review and requested project documentation. The project documentation we received included application files containing the energy savings calculations. An examination of documentation confirmed that all the energy savings were calculated correctly. We conducted onsite verifications for a portion of the sampled projects and verified that all incentivized measures were installed. Table 4-1 provides the program ex-post savings summary.

Table 4-1. Impact evaluation savings summary

Measures	Ex-ante savings	Ex-post savings	Realization rate
Daylight photo controls	169,671	169,671	100%
Direct evaporative coolers	4,548	4,548	100%
Efficient AC or HP units (air cooled)	162,960	162,960	100%
Efficient chillers	244,629	244,629	100%
Efficient condensers	26,976	26,976	100%
Efficient laundry machines	3,213	3,213	100%
Efficient VRF units (air cooled)	5,446	5,446	100%
Energy management control systems	767,607	767,607	100%
Energy Star commercial dishwasher	15,237	15,237	100%
Energy Star U/C dishwasher	13,260	13,260	100%
Exterior light load reduction	4,678,389	4,678,389	100%
Floating suction controls	27,620	27,620	100%
Head pressure controls	80,707	80,707	100%
High efficiency exit signs	25,716	25,716	100%
High volume low speed fans	33,466	33,466	100%
HVAC VSD	911,415	911,415	100%
Interior light load reduction	4,966,584	4,966,584	100%
Kitchen Hood VSD	138,168	138,168	100%
Occupancy sensors	539,955	539,955	100%
Onion/potato shed VSD	478,320	478,320	100%
Reflective roof treatment	84,368	84,368	100%
Total	**13,378,255**	**13,378,255**	**100%**

4.2 Tracking data review

The evaluation team reviewed the tracking data received for accuracy, completeness, and intelligibility. While the data was mostly accurate, complete, and intelligible, we identified some problems, as detailed in the following sections.

4.2.1 Tracked electric savings versus DSM report savings

The tracked electric savings for the program were compared to the values in the 2018 Demand Side Management (DSM) Report. The total kWh savings in the tracking data were 60 kWh lower than the DSM report total, a difference of less than 0.1%. This difference was caused by disparities in rounding between the two sources; see Table 4-2.

Table 4-2. Tracked electric savings compared to DSM report total

Source	Total projects	total kWh	%
Tracking data totals	104	13,378,255	-
DSM 2018 report (C&I new construction)	104	13,378,315	-
Difference between tracking and DSM report	**-**	**(60)**	**99.9%**

4.2.2 Parameters with blank values

There were several parameters in the tracking data with missing values; the most important of these were the MSMT and UNIT parameters. The MSMT parameter is the measure's quantity used in savings calculations; the UNIT parameter defines the dimension for the quantity, e.g., floor area, number of units, etc. These parameters were blank because the tracking database provided to us reported at the project level and not at the individual measure level. Therefore, if a project had multiple kitchen hood VSD measures and one of the records had a blank value for any parameter, the resultant aggregated (project level) value for that parameter was blank. This issue appears to have occurred because the original data were provided to the evaluator at an aggregated level.

4.3 Review of savings

The program uses deemed savings from the Idaho TRM for most measures. The deemed savings values for evaporative coolers, reflective roof, HVAC EMS, VFDs, laundry machines, dishwashers, head pressure controls, floating suction controls, and condenser measures all matched the savings values listed in the TRM.[2] Because the evaluation covers projects from the program's inception in 2011 through the 2018 program year, it was difficult to determine the appropriate TRM version for each project. Although IPC provided this information when it was requested, it would increase transparency and expedite the evaluation process if the information were incorporated into the tracking data.

Savings for lighting and HVAC measures (AC, VRF, chillers, and HPs) were not deemed values; instead, custom formulas and inputs based on manufacturer performance ratings were used. The formulas were verified as correct, and all of the inputs were determined to be accurate, except the default lighting and HVAC HOUs, which can be improved.

The default HOUs used in calculations for lighting and HVAC measures (AC, VRF, chillers, and HPs) did not match the values in the TRMs. The HOUs used in the calculations are based on DOE data that can no longer be found online and whose source cannot be cited. The DOE data has been used since before the TRM existed. Once the TRM was implemented, the DOE data continued to be used because the TRM did not provide average HOUs for IPC's service territory.

The TRM states that the lighting HOUs come from the Regional Technical Forum's (RTF) Standard Protocol for Non-Residential Lighting Improvements. HVAC HOUs are based on TMY3 data for Idaho stations in ASHRAE climate zones 5 & 6 and the typical energy savings (weather-dependent measures are based on an 80%-20% weighted average of TMY3 data for zones 5 & 6, respectively). Because the TRM has been available since April 2014, DNV GL believes that best practice is to utilize HOUs from the TRM for lighting and HVAC projects started after the TRM was implemented.

4.4 Non-energy Impacts

DNV GL maintains a database of non-energy impacts (NEI) by measure type based on a meta-analysis of publically available NEI research from across the country. Through this database, we can assign an approximately NEI dollar value per kWh for major measure types. We averaged the $/kWh NEI value per measure category for all commercial business types. We then applied these averages to the total evaluated kWh in the Idaho Power tracking data to estimate NEI dollars for this program (Table 4-3). DNV GL estimates the total annual NEIs for this program to be approximately $223,000.

[2] In accordance with the project scope, DNV GL did *not* review how TRM derived its deemed savings, under the assumption that those results are already fully validated.

Table 4-3. Estimated NEIs per measure type

Measures	Ex-post savings	NEI Measure Type	$ NEI/kwh	$ NEI
Daylight Photo Controls	169,671	Lighting	0.02197	3,728.13
Direct Evaporative Coolers	4,548	HVAC	-0.00283	(12.89)
Efficient AC or HP Units (air cooled)	162,960	HVAC	-0.00283	(461.72)
Efficient Chillers	244,629	HVAC	-0.00283	(693.12)
Efficient Condensers	26,976	HVAC	-0.00283	(76.43)
Efficient Laundry Machines	3,213	Other	-0.00007	(0.21)
Efficient VRF Units (air cooled)	5,446	HVAC	-0.00283	(15.43)
Energy Management Control Systems	767,607	Other	-0.00007	(51.17)
Energy Star Commercial Dishwasher	15,237	Other	-0.00007	(1.02)
Energy Star U/C Dishwasher	13,260	Other	-0.00007	(0.88)
Exterior Light Load Reduction	4,678,389	Lighting	0.02197	102,796.97
Floating Suction Controls	27,620	Other	-0.00007	(1.84)
Head Pressure Controls	80,707	Other	-0.00007	(5.38)
High Efficiency Exit Signs	25,716	Lighting	0.02197	565.05
High Volume Low Speed Fans	33,466	Other	-0.00007	(2.23)
HVAC Variable Speed Drives	911,415	VSD	0.00548	4,990.00
Interior Light Load Reduction	4,966,584	Lighting	0.02197	109,129.40
Kitchen Hood VSD	138,168	VSD	0.00548	756.47
Occupancy Sensors	539,955	Other	-0.00007	(36.00)
Onion/Potato Shed VSD	478,320	VSD	0.00548	2,618.80
Reflective Roof Treatment	84,368	Other	-0.00007	(5.62)
Total	13,378,255			223,220.87

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

DNV GL computes an overall realization rate for the program of 100%. Overall, while the tracking database and project documentation for the C&I New Construction program are well-organized and intelligible, the project documentation could improve in the level of details it provides for the algorithms and inputs, and their sources.

DNV GL estimates the program resulted in approximately $223,000 in non-energy benefits.

5.2 Recommendations

5.2.1 Utilize HOUs from the TRM for lighting and HVAC projects started after the TRM was implemented.

The TRM is the best source for HOUs because its values are more recent and more accurate than the DOE source currently used. Also, the sources for the TRMs data are clearly cited and can be traced back to original research.

5.2.2 Tracking data should include the version of the TRM utilized for each project.

Although IPC provided this information when it was requested, it would increase transparency and expedite the evaluation process if the information were incorporated into the tracking data. Because new construction projects have a potential period of years, tracking the source of savings for each project is important to increase transparency, ensure accuracy, and expedite the program’s evaluation.

FINAL REPORT

Idaho Power Energy House Calls PY2018 Impact and Process Evaluation

Date: November 25, 2019

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1 EXECUTIVE SUMMARY

This report presents findings and recommendations from an impact and process evaluation of Idaho Power's Energy House Calls program. The evaluation covers the program's operations in 2018.

DNV GL's objectives for the impact portion of the evaluation were to determine and verify the energy (kWh) impacts attributable to the 2018 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 for several projects.

Our objectives for the process portion of the evaluation were to assess program design, logic, and operations and compare to industry best practices, and offer recommendations to improve the delivery of the 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

1.1 Key findings

The total reported savings for the program were 374,484 kWh. DNV GL verified total savings of 372,207 kWh, for a realization rate of 0.99. Differences in savings were due to two measures. First, the evaluation used the updated Regional Technical Forum (RTF) heating zones based on zip codes instead of program values for PTCS duct sealing which were based on the RTF heating zones based on cities. This changed the climate zones and savings for several sites. Second, the evaluation used a household value instead of a per faucet savings value when more than 2 aerators were installed. Other key findings included:

1. Ex-ante savings calculations were verified accurate.
2. There were some minor anomalies on the field worksheets, but tracking data contained the correct values.

DNV GL's key process findings included:

3. Trade allies are a key means of implementing the program
4. Print collateral and websites are well-done.
5. The program is nearing realistic saturation of the market. There are approximately 4,000 potential participants left in Idaho Power territory.
6. The program processes work well and conform to industry best practices.

1.2 Recommendations

Add "primary" in front of "heating system" on the field worksheets. This will avoid the field worksheet from having both electric furnace and heat pump selected for homes with a heat pump. While the field worksheet review did not find any discrepancies between the tracking data and the field worksheets, implementing this change will decrease the likelihood of an electric furnace being selected for a heat pump.

Do not populate 100% leakage reduction in the tracking data for test only field worksheets. This parameter is not used directly in the savings calculations; however, this inconsistency may cause some confusion about what work was completed.

Use the latest version of RTF 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.

Consider a means of encouraging households that participated in the program years ago to install LED lighting. Participants up to a few years ago would have received CFLs instead of LED lighting. The measure life of some of those CFLs has expired at this point and converting those homes to LEDs would generate some additional savings. It may not be cost-effective to revisit homes only to install LEDs, so some other form of outreach that funnels past participants into other programs that sponsor LEDs might be the most effective way to realize these savings.

When possible, program marketing materials should emphasize energy bill and monthly cost reductions that could result from participation. According to both the 2014 Program Participant Survey and our own participant survey, the most prominent reason for customers to participate in the program is to reduce their energy bills/costs. This is also likely to be a strong selling point for potential participants.

Make some modifications to the program handbook. Add a revision history of the document, a logic model like the draft that DNV GL created, and move the SWOT analysis to a more prominent location.

Consider making a few slight changes to the program marketing collateral. Visual appeal could be increased by adding pictures, particularly those of people. Additionally, the capabilities of the medium could be better leveraged by linking to videos of success stories if any are available.

Include a map on the program website that visually illustrates each contractor's geographical range. As it stands, customers may be confused about which contractor to contact if they do not consider their home to be located in any of the listed regions.

2 INTRODUCTION

2.1 Program overview

Initiated in 2002, the Energy House Calls program gives homeowners of electrically heated manufactured homes an opportunity to reduce electricity use by improving the home’s efficiency. Specifically, this program provides free duct-sealing and additional efficiency measures to Idaho Power customers living in Idaho or Oregon who use an electric furnace or heat pump. Participation is limited to one service call per residence for the lifetime of the program.

Services and products offered through the Energy House Calls program include duct testing and sealing according to Performance Tested Comfort System (PTCS) standards set and maintained by the Bonneville Power Association; installing up to eight LED lightbulbs; testing the temperature set on the water heater; installing water heater pipe covers when applicable; installing up to two low-flow showerheads, two bathroom faucet aerators, and one kitchen faucet aerator; and leaving two replacement furnace filters with installation instructions and energy efficiency educational materials appropriate for manufactured-home occupants.

Idaho Power provides contractor contact information on its website and marketing materials. The customer schedules an appointment directly with one of the certified contractors in their region. The contractor verifies the customer’s initial eligibility by testing the home to determine if it qualifies for duct-sealing. Additionally, contractors have been instructed to install LED lightbulbs only in high-use areas of the home, to replace only incandescent lightbulbs, and to install aerators and showerheads only if the upgrade can be performed without damage to a customer’s existing fixtures.

The actual energy savings and benefits realized by each customer depend on the measures installed and the repairs and/or adjustments made. Although participation in the program is free, a typical cost for a similar service call would be $400 to $600, depending on the complexity of the repair and the specific measures installed. In 2018, 280 homes received products and/or services through this program, resulting in 374,484 kWh savings claimed.

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 2018 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 2018 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
- Project file review
- Program materials review
- 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 and trade ally interviews

DNV GL conducted in-depth interviews (IDIs) with Idaho Power program staff and the two trade allies that perform the house calls, 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 and APPENDIX B). Senior DNV GL staff conducted the IDIs over the phone in June and September 2019.

3.2 Tracking system and project file review

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 verify the accuracy and appropriateness of the savings claimed for each measure. Specifically, we reviewed each measure to confirm the following:

1. The database savings match program reporting
2. The database includes all variables needed to calculate and evaluate program savings
3. The required variables contain usable data in consistent formats
4. Any formulas used to calculate savings and incentives are accurate

DNV GL also conducted a file review of a sample of the program application files. The file review provided a more in-depth verification of a statistical sample of projects. We verified the accuracy of data entry by comparing the field worksheet and database for key elements of the savings calculation such as quantity, size, efficiency level, and units of measure. We also verified specific calculations and algorithms used in these applications.

DNV GL selected a stratified random sample with enough projects to achieve a 90/10 statistical precision[1] for our realization rate estimate on the sampled projects, using conservative assumptions about the eventual realization rate achieved and the correlation between the reported savings and the verified savings. The sample was stratified first by heating system (heat pump or electric furnace). Then within each heating system type, we created two strata based on the reported savings. We selected random samples from each stratum. The stratification and sample design are shown in Table 3-1 below.

[1] a relative error of no more than 10%, with 90% confidence

Table 3-1. Sample summary

Stratum	Heating System	Size	Sampled Projects	Sampled kWh	Total Projects	Total kWh
1	Heat pump	Small (<900 kWh)	4	1,758	28	16,381
2	Heat pump	Large (≥900 kWh)	4	4,822	41	50,984
3	Ele. furnace	Small (<1,300 kWH)	5	4,809	71	68,862
4	Ele. furnace	Large (≥1,300 kWh)	5	8,707	140	238,257
Total			18	20,096	280	374,484

3.3 Program logic review

Based on the program staff interviews and the review of the program materials, DNV GL developed a logic model for the program.

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 3-2 lists the program materials we reviewed and the core issues associated with each.

Table 3-2. Materials reviewed and core issues considered

Program material	Core issues
Program plan	Is program theory clearly articulated? Are program objectives articulated; are goals recorded and SMART[2]? Are program roles and responsibilities clearly recorded? Are risks and contingencies recorded? Are program measures and operations clearly articulated?
Marketing materials and websites	Are materials visually appealing? Are they easy to understand and convey the intended information? Do they provide a follow-up activity and means to do it? Do all hyperlinks work?
Trade ally / subcontractor instructions, tools/worksheets	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?

[2] Specific, Measurable, Attainable, Realistic, Time-delineated

3.5 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 field data collection sheets and inspection reports.

3.6 Program participant surveys

DNV GL conducted surveys with recent program participants. Although this program evaluation covers the program's operations in 2018, Idaho Power preferred that we use a more "up to date" participant list for the survey. The provided list included 241 customers participating from the period from July 2018 through June 2019. DNV GL attempted a census of these participants using a mixed-mode approach that included a web-based and phone-based component. All participants with emails received three invitations. All participants without email addresses, or who did not respond to the email invitations were called 1 or 2 times each. We completed surveys with 24 customers that participated in the program during this period of time, for a response rate of 9.5%.

DNV GL developed an instrument to survey (APPENDIX C). DNV GL conducted the surveys online and over the phone in October 2019. Surveys included questions about program awareness, measure verification, program experience, energy attitudes, and demographics.

3.7 Market saturation assessment

Program participation has steadily declined in recent years and participation is limited to one service call per residence for the lifetime of the program. This has led program staff to question whether participation can be increased going forward. In response to interest from Idaho Power staff, DNV GL investigated the possibility that the program is reaching saturation.

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.

Key impact findings

1. *The total reported savings for the program were 374,484 kWh with total verified savings of 372,207 kWh, for a realization rate of 0.99.*
2. *Ex-ante savings calculations were verified accurate.*
3. *There were some minor anomalies on the field worksheets, but tracking data contained the correct values.*

4.1 Tracking system review

The tracking system savings matched the reported savings[3] of 374,484 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.

There are 5 measure types in the Residential House Calls program database. The savings basis for each measure is listed in Table 4-1.

Table 4-1: Measure type and savings basis

Measure	Tracking savings basis
PTCS duct sealing	RTF: ResMHHeatingCoolingPrescriptiveDuctSeal_v2_0.xlsm, 2015
General purpose LED direct install	RTF: ResLighting_Bulbs_v5_2.xlsm, 2017
Low-flow faucet aerator	2016 Idaho Power Company Energy Efficiency Potential Study, AEG
Low-flow showerheads	RTF, Showerheads_v3_1.xlsm, 2016
Water heater pipe covers	2016 Idaho Power Company Energy Efficiency Potential Study, AEG

DNV GL reviewed the savings algorithms for all the measures. The findings for each measure are listed in Table 4-2.

[3] Reported savings were provided in Supplement 1: Cost-Effectiveness Report, Demand-Side Management 2016 Annual Report, Idaho Power Company, March 15, 2017

Table 4-2. Savings algorithm review by measure

Measure	Findings
PTCS duct sealing	The savings values are consistent with the source. However, the program used internal definitions for assigning heating zones. The evaluation used the RTF zones[4] based on the daily TMY 3 data. This resulted in 8 projects having a different heating zone than the tracking value.[5] There are 7 projects that are heating zone 1 in the tracking data but heating zone 2 or 3 in the adjusted savings. Additionally, there is 1 project that was adjusted from heating zone 2 or 3 to heating zone 1. Heating zone 1 has lower savings than 2 and 3 for both electric furnace and heat pump heating systems. The net result of this discrepancy was a minor increase in savings.
General purpose LED direct install	Savings match the source value
Low-flow faucet aerator	The referenced savings are based on a per household basis. The program divided the household savings by 2 to determine the per faucet savings. This approach is reasonable. However, one household received 6 faucet aerators and several received 3. For the evaluation, savings were capped at the household savings levels in the source, regardless of the total number of faucet aerators installed. There are 35 projects with over 2 faucet aerators. It should be noted that the 2019 program cycle cites savings from the RTF[6] aerators measure. This source documents savings per aerator and does not specify household-savings. Therefore, this adjustment will not be applicable going forward.
Low-flow showerheads	Savings match the source value
Water heater pipe covers	Savings match the source value

4.2 Project file review

DNV GL received 18 sampled project files for file review and to perform impact savings calculations. For all the projects, the savings evaluated were the same as the claimed savings.

Findings from the project files review are:

1. The tracking data and the field worksheets were consistent for all fields that were reviewed, with a few exceptions that could be explained or did not impact the savings.

2. Two field worksheets (ID 2907 and 3013) had showerheads installed but blank showerhead GPM. Program staff indicated that the trade allies always install the same capacity showerheads. Therefore, this value could be implied by the trade ally.

3. All field worksheets with heat pump heating systems also had an electric furnace indicated. In these cases, the primary heating system is heat pump and "furnace" likely referred to electric resistance emergency heaters. The tracking data correctly indicated that the primary heating system is a heat pump.

[4] We reviewed earlier versions of RTF climate zones based on zip codes are were not able to match them to the IPC climate zone values. For the evaluation we used the most recent version, RTF_ClimateZoneCalculation_v2_0.xlsm, available at: https://rtf.nwcouncil.org/work-products/supporting-documents/climate-zones

[5] There is an alternative source for heating zone values published on the same day as the RTF source: https://nwcouncil.app.box.com/v/ClimateZnCristicsTMY3v1-0. If this source is used to confirm heating zones, 25 sites (some overlapping with the 8 from the other source) would change. This would result in slightly different verified savings and realization rates than those currently reported.

[6] RTF Aerators savings used for 2019 savings can be found here: https://rtf.nwcouncil.org/measure/aerators

4. For most of the field worksheets for ducts that were not sealed (test only), the reduction in flow in the tracking data is 100% (except one for one blank). This is likely a result of the values being calculated in the tracking data, rather than input from the field worksheet. While savings were not claimed for these tests only field worksheets, it might avoid confusion to leave this field blank or fill in with a value that denotes "no change" in the databases, for homes where no sealing occurred.
5. There were a few other places where omitted fields were populated in the tracking data. This occurred in the fan pressure and ring size fields which could be assumed to be the test pressure and the ring size 1 or A ring, respectively.

Given that the inconstancies between the field worksheets and tracking data could all be explained, the tracking data does not need any additional adjustments based on the project file review for the sample.

After making the adjustments for climate zones for PCTS Duct Sealing, and household savings for faucet aerators, the total verified savings for the program were 374,484 kWh. The total verified savings is 372,207 kWh, for a realization rate (RR) of 0.99. Because the adjustments were made as part of the tracking system review, all projects were checked, so there is no sampling error in the total verified savings. The adjustments are summarized in Table 4-3.

Table 4-3. Evaluated savings adjustments by measure[7]

Measure Name	Detailed Measure	Tracking			Evaluated	
		kWh/ unit	Count	Total Savings, kWh	Count	Total Savings, kWh
PTCS Duct Sealing	Electric FAF; Zone 1	972.81	93	90,471	88	85,624
PTCS Duct Sealing	Electric FAF; Zone 2 or 3	1,248.19	96	119,826	101	126,048
PTCS Duct Sealing	Heat Pump; Zone 1	615.06	35	21,527	34	20,910
PTCS Duct Sealing	Heat Pump; Zone2 or 3	875.72	18	15,763	19	16,644
General Purpose LED	Direct install	25.3	2,357	59,632	2,357	59,632
Faucet aerator	1.0-1.5 gpm	105.83	300	31,749	264	27,833
Showerheads	2.00 gpm	176.44	66	11,645	66	11,645
Showerheads	1.75 gpm	232.42	48	11,156	48	11,156
Pipe covers	Up to 6 ft	127.14	100	12,714	100	12,714
Total				374,484		372,207

[7] The total count of PTCS Duct Sealing records that changed zones appears to be 6 in this table, rather than the 8 reported in Table 4-2. This difference was caused by two switches cancelling each other out.

5 PROCESS FINDINGS AND TARGETED RECOMMENDATIONS

This section provides detailed findings on program operations and materials. The process evaluation included interviews with program staff, program logic review, reviewing program documentation, reviewing the program's QA/QC procedures, assessing program marketing materials, surveys with program participants, and interviews with the contractors implementing the program. 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. *Print collateral was well-done.*
3. *The program is nearing realistic saturation of the market.*

5.1 Program staff and trade ally interviews

The staff IDIs revealed that the program is approximately 17 years old. It started as a pilot in 2002, attaining full program status in 2003. Program marketing is done primarily by Idaho Power, and consists of mailers like postcards and targeted digital advertisements (including on Facebook).

The program utilizes two trade allies to perform all of the house calls. Both of these trade allies have been involved with the program since its inception, and each has their own assigned regions of Idaho Power's service territory. Any feedback that program staff have received about these trade allies in the recent past has been positive. The trade allies themselves were satisfied with the program overall and had no substantive suggestions for improving the process, delivery, or their communication with Idaho Power.

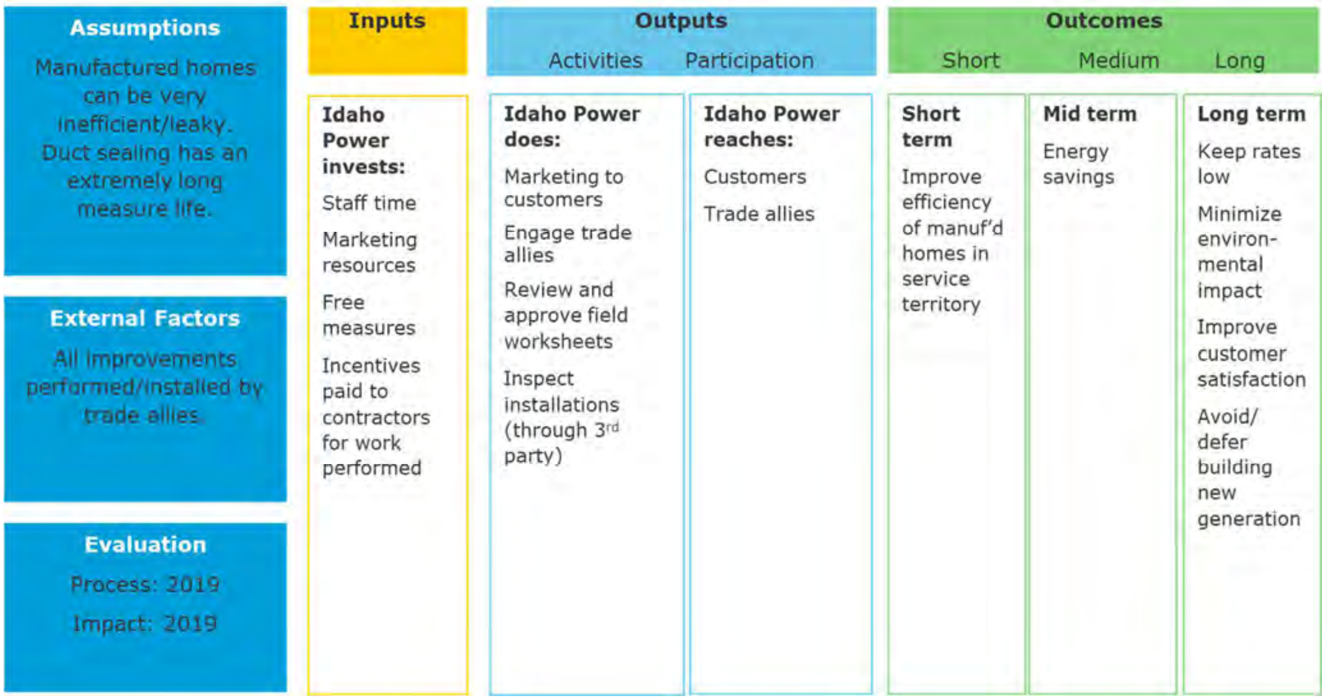
Program participation has declined over the past few years. Both program staff and the trade allies speculated that this could be due to market saturation, particularly since participation is limited to one service call per residence for the lifetime of the program.[8]

5.2 Program logic review

The program files did not contain a formal logic model. DNV GL generated a draft logic model (Figure 5-1) based on information found in the program files and the program staff interview.

[8] See Section 5.6 for more discussion of market saturation.

Figure 5-1. Residential Energy House Calls logic model



5.3 Program materials review

5.3.1 Program plan

The EHC Program Handbook contains a high-level description of the program. The handbook contains a list of the personnel related to the program as well as their responsibilities. Measures provided by the program are listed. Important program processes and operations are outlined in detail, including checking for previous participation, performing the actual house call, and processing invoices. The handbook also contains SMART program goals with specific metrics. Finally, the marketing plan within the handbook includes a SWOT (strengths, weaknesses, opportunities, and threats) analysis. DNV GL believes this is an especially effective tool for the program to employ.

The EHC Program Handbook contains most of the basic information DNV GL looks for in this type of document. However, it does not include a logic model.

Recommendations: DNV GL recommends the following improvements:

- Include a table at the beginning or end that lists the revision history of the document.
- In addition to the process flow diagram, add a graphic that shows a program logic model like the draft logic model provided by DNV GL.
- Move the SWOT analysis out of the program marketing plan and into a more prominent location within the handbook.

5.3.2 Marketing materials and websites

Print collateral

DNV GL reviewed the direct mail postcards provided by Idaho Power. These postcards 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 information including valid web URLs and contractor phone numbers. Materials were printed in both English and Spanish.

Recommendations: DNV GL has one recommendation for these materials:

- According to both the 2014 Program Participant Survey and our own participant survey, the most prominent reason for participating is to reduce energy bills/costs. Marketing materials should address these concepts when possible. For example, in addition to emphasizing the dollar value of the free assessment, stress that participating could save customers significantly on their energy bills in an ongoing fashion.

Website and digital advertisements

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. The website provides information for customers about how to apply.

Recommendations: DNV GL has a couple of recommendations for the website:

- 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.
- The program website instructs interested customers to contact the certified contractor in their region to schedule an appointment and includes a list of regions for each contractor. However, customers may be confused about which contractor to contact if they are on the edge of these regions or do not consider their home to be located in any of these regions. This potential issue would be alleviated by including a map of Idaho Power's service territory and visually illustrating each contractor's geographical range.

Similar to the print advertisements, the digital ads are likewise well done. The same recommendations apply to both.

5.3.3 Trade ally / subcontractor instructions, tools/worksheets

The Field Worksheet, a paper form filled out by the contractor during the house call, serves as a checklist of all necessary information to collect from the homeowner and all required testing and energy efficiency improvements to make. In addition to this worksheet, the Renter/Owner permission form, Backdraft Letter, "Thank You" Letter, and Waiting List Letter are all provided to the contractors. All of these forms and letters are consistent across subcontractors.

Collected data from the house calls is transferred to Idaho Power through the field worksheets via email, so there is a "paper trail."

The program does not have a formal plan for communication between the contractors and the utility. However, this seems unnecessary given that only two contactors perform the house calls and each contractor has been involved in the program since its inception.

Recommendations: DNV GL has one recommendation for the field worksheet:

- To avoid potential confusion, add "primary" in front of "heating system" on the field worksheets. The current labeling of simply "heating system" increases the likelihood of an electric furnace being selected for a heat pump.

5.4 QA/QC review

Idaho Power performs QA/QC in several ways and at several stages in the program. The program handbook contains a highly-detailed QA/QC protocol for verifying that homes have not participated in the program before. It also includes a highly-detailed step-by-step procedure for processing completed field worksheets into the program tracking data.

Additionally, Idaho Power employs a third-party inspector to inspect 5% of participating homes on an annual basis for each of the two contractors performing the house calls.[9] Program staff do not prescribe which participating homes are inspected and which are not. The inspection form used by the inspector lists all of the ways in which the contractors' work is checked, including additional blower door tests and checking the number of direct install measures. These inspection forms are then sent to Idaho Power for processing.

5.5 Program participant surveys

This section details findings from the survey of program participants. Idaho Power provided a list of 241 customer participating in the program from July 2018 through June 2019. DNV GL attempted a census of these participants using a mixed-mode approach that included a web-based and phone-based component. We completed surveys with 24 customers that participated in the program during this period of time, for a response rate of 9.5%.

5.5.1 Demographics

We asked a few demographic questions to help Idaho Power characterize the program participants. It should be noted that these demographics come from only about 10% of program participants, so it is somewhat difficult to extrapolate these results to the whole population. Results are distributed as follows:

- The participating address was the primary residence for 88% of respondents.
- Household size: one person (22%), two people (43%), three or four (13%), five or more (9%), did not answer (13%).
- Age of respondents: over 60 (50%), 45-60 (29%), 35-44 (17%), and under 35 (4%). This largely followed the results from the 2014 Program Participant Survey.
- Education: High school or equivalent (21%), some college (50%), college degree (17%), graduate degree (13%). This largely followed the results from the 2014 Program Participant Survey.

Additionally, the survey respondents were relatively conscious of their household energy use. When asked how often they check the usage when receiving their bill, 63% said they do so every time, 25% said they do so at least half of the time, and only 4% said they never do so.

[9] Idaho Power provided DNV GL with a number of inspection forms that was greater than 5% of the total number of participants in program year 2018 for both contractors.

5.5.2 Program awareness

When asked where they learned about the Energy House Calls program, most respondents either said they heard about it from a postcard or letter in the mail (38%) or via information in their energy bill (33%). Most of the remainder said they did not know where they first heard about the program.

Respondents were hoping to realize numerous benefits from participating in the program. Chief among these benefits was reducing their energy usage or bills, with nearly all (88%) of the respondents saying they hoped to get this benefit. Others included improving the comfort of their home (42%), receiving the free duct sealing (33%), and receiving the free energy-saving direct install equipment (25%).

During our interview, program staff said they suspected that the number of direct install (DI) measures installed per participant had declined in recent years at least in part due to Idaho Power giving away free energy-saving kits to its customers. A little more than half (58%) of respondents said they received a free energy-saving kit from Idaho Power before their participation. However, respondents receiving the kits before participating did not have fewer DI measures installed than the other respondents.

5.5.3 Program experience

While onsite, Energy House Calls contractors install energy-saving measures such as LED light bulbs, showerheads, and faucet aerators. DNV GL presented the particular set of measures that each survey respondent received and asked whether any of those measures had been removed. Among the 24 survey respondents, just one (4%) said they removed any of the items. That participant had removed a kitchen faucet aerator, saying they did so because it malfunctioned.

After the contractor finishes the energy efficiency improvements, participants receive paperwork detailing the improvements made. When we asked about this paperwork, two-thirds (67%) of respondents said they recalled receiving it. Among those that did recall receiving the paperwork, most (88%) said it was easy to understand and informative regarding the energy performance of their home.

Next, we asked the participants, “Since participating in the Energy House Calls program, have you noticed a change in the comfort of your home?” Exactly half of the respondents said they had noticed a change. Among those, one-third said the comfort of their home was “much better than before” and two-thirds said it was “somewhat better than before.”

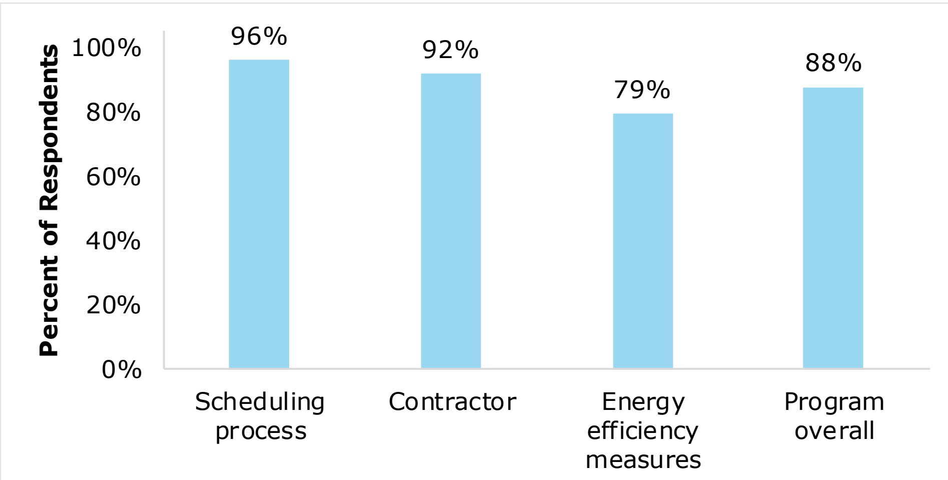
In addition to the overall comfort of their home, we asked a multi-response question about the changes the participants had experienced in their home since participating. The most common response was a reduction in their energy bill (42%) followed by a noticeable improvement in the temperature regulation of their home (33%).

5.5.4 Satisfaction

The survey asked all respondents how satisfied they were with a few different aspects of the program including the scheduling process, the contractor, the free energy-saving improvements they received, and the program as a whole. Respondents rated their satisfaction on a five-point scale in which 5 meant “very satisfied” and 1 meant “not at all satisfied.”

Figure 5-2 shows the percent of respondents that were satisfied (defined as a 4 or 5 on the five-point scale) with each aspect of the program. Results were generally positive, as satisfaction with the scheduling process and the contractors were above 90%, and satisfaction with the program overall was 88%. A slightly lower percentage were satisfied with the free energy-saving improvements themselves. It is worth noting that all that only one respondent gave a rating less than three to indicate *dis*satisfaction with the program.

Figure 5-2. Percent of Respondents Satisfied (4 or 5 on Five-Point Scale)



5.5.5 After program

Finally, we asked a few questions about what has happened since respondents participated in the EHC program. Only a small minority (21%) said they had taken additional energy efficiency actions since participating. All 5 of those respondents said they completed more building shell-type measures such as sealing more leaks and replacing old windows and doors. These actions were motivated by further reducing energy consumption/bills (4 of 5 respondents) and improving the comfort of their home (3 of 5 respondents).

A higher proportion (46%) of the survey respondents said they planned to make more energy efficiency improvements over the next year or so. Measures they intended to complete included windows (4 respondents), roofs (3), insulation (2), doors (2), furnaces (1), and appliances (1). All 11 respondents who planned to take more energy efficiency actions over the next 12 months said that initial costs of those measures had prevented them from making these improvements so far.

5.6 Market saturation assessment

The program staff and the program trade allies suspected that the program is reaching market saturation. DNV GL investigated a means of assessing program saturation.

The program had approximately 12,000 participants from 2004 to 2018, and homes are only allowed to participate once. The level of market saturation represented by this participation depends on the total number of qualifying homes in Idaho Power’s territory. We used two different approaches to estimate the number of qualifying homes:

- Based on the US Census[10],
    - Idaho has about 700,000 housing units.
    - Idaho Power serves approximately 475,000 residential customers, so it serves approximately 5/7ths of the homes in Idaho.
    - The US Census[11] estimates 54,000 "mobile homes and RVs" in Idaho. This category does not include some types of manufactured homes. The Census[12] further estimates shipments of approximately 1,750 manufactured homes to Idaho between 2014 and 2018. This figure is consistent with a recent survey of Idaho Power's customer base, which showed that approximately 11% of Idaho Power's customers live in mobile or manufactured homes.
    - The US Census estimates approximately 33% of homes in Idaho have electric heat.[13]
    - Thus, using the US Census estimates, results in approximately 13,000 qualifying homes. Saturation is approximately 92%.
- Based on Idaho Power's 2016 Residential End-Use Survey,
    - 30% of homes in Idaho Power's service area have electric heat as the primary heat source.
    - Of those that listed electricity as their primary heating source, 6% have a mobile home and 14% have a manufactured home.
    - Using these numbers would result in an estimated 22,800 to 28,500 qualified customers. Saturation is approximately 50%.

The 2016 Residential End-Use Survey utilized a direct, statistically representative sample of Idaho Power's customer base. Therefore, the estimates from that survey are probably more accurate than those derived from the more general US Census numbers.

Using Rogers' Diffusion of Innovation theory as a model of market saturation[14], 50% market share is attained after the Innovators, Early Adopters, and Early Majority have participated. The next 34% of the market are considered "Late Majority" who are described as approaching innovation with skepticism. The final 16% of the market are "Laggards", who are described as having aversion to change. Thus, the full, realistic market saturation point for this program is probably somewhere within the "Late Majority" group that represents the next 34% of the market. Arbitrarily using the halfway point, this suggests that Idaho Power might expect to recruit approximately 4,000 more participants. Participants will become increasingly difficult to recruit as later adopters usually have less positive attitudes towards this kind of program.

[10] https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_B25001&prodType=table; retrieved 10/15/2019
[11] https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_1YR_B25024&prodType=table; retrieved 10/08/2019
[12] https://www.census.gov/data/tables/time-series/econ/mhs/annual-data.html; retrieved 10/08/2019
[13] https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_B25040&prodType=table; retrieved 10/17/2019
[14] Rogers, Everett (2003). *Diffusion of Innovations, 5th Edition*. Simon and Schuster. ISBN 978-0-7432-5823-4.

6 CONCLUSIONS AND RECOMMENDATIONS

This is a mature program (over 15 years old) with a high realization rate (99%). The program processes are working well and conform to industry best practices. There is evidence to suggest that the decreased participation rates over the last few years is due to market saturation. This saturation is in part caused by the restriction that a home can only participate a single time. Key findings included:

1. The total reported savings for the program were 374,484 kWh. DNV GL verified total savings of 372,207 kWh, for a realization rate of 0.99. Differences in savings were due to two measures: one used the Regional Technical Forum (RTF) heating zones instead of program values for PTCS duct sealing; the other used household value instead of a per faucet savings beyond 2 faucets.
2. Ex-ante savings calculations were verified accurate.
3. There were some minor anomalies on the field worksheets, but tracking data contained the correct values for the sampled projects.
4. Trade allies are a key means of implementing the program
5. Print collateral and websites are well-done.
6. The program is nearing realistic saturation of the market. There are approximately 4,000 potential participants left in Idaho Power territory.
7. The program processes work well and conform to industry best practices.

6.1 Recommendations

Add "primary" in front of "heating system" on the field worksheets. This will avoid the field worksheet from having both electric furnace and heat pump selected for homes with a heat pump. While the field worksheet review did not find any discrepancies between the tracking data and the field worksheets, implementing this change will decrease the likelihood of an electric furnace being selected for a heat pump.

Do not populate 100% leakage reduction in the tracking data for test only field worksheets. This parameter is not used directly in the savings calculations; however, this inconsistency may cause some confusion about what work was completed.

Use the latest version of RTF 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.

Consider a means of encouraging households that participated in the program years ago to install LED lighting. Participants up to a few years ago would have received CFLs instead of LED lighting. The measure life of some of those CFLs has expired at this point and converting those homes to LEDs would generate some additional savings. It may not be cost-effective to revisit homes only to install LEDs, so some other form of outreach that funnels past participants into other programs that sponsor LEDs might be the most effective way to realize these savings.

When possible, program marketing materials should emphasize energy bill and monthly cost reductions that could result from participation. According to both the 2014 Program Participant Survey and our own participant survey, the most prominent reason for customers to participate in the program is to reduce their energy bills/costs. This is also likely to be a strong selling point for potential participants.

Make some modifications to the program handbook. Add a revision history of the document, a logic model like the draft that DNV GL created, and move the SWOT analysis to a more prominent location.

Consider making a few slight changes to the program marketing collateral. Visual appeal could be increased by adding pictures, particularly those of people. Additionally, the capabilities of the medium could be better leveraged by linking to videos of success stories if any are available.

Include a map on the program website that visually illustrates each contractor's geographical range. As it stands, customers may be confused about which contractor to contact if they do not consider their home to be located in any of the listed regions.

APPENDIX A. PROGRAM STAFF INTERVIEW GUIDE

Program Design

1. How are program energy savings goals determined?

Program Delivery

2. Walk us through program delivery.
3. What kind of QA/QC procedures are in place?
4. Who are the trade allies involved with delivery?
5. What (if any) training or education do you provide to trade allies?

Marketing and Outreach

6. The Annual Report is extremely detailed when it comes to marketing. Were there any marketing activities in 2018 that are not covered in that document?

Measures and Incentives

7. The TRM was updated in August of 2018. How will this affect our evaluation?
8. Other delivery-related things?

Processing, Paperwork, and Barriers

9. Talk about paperwork aspect of the program – how is that going?
10. Are you aware of, or planning, any paperwork or other requirement changes?

Overall Program Assessment

11. What challenges do you face in delivering this program?
12. Are there any other comments or observations you would like to make about the program that haven't already been mentioned? Anything that we should know for our evaluation?
13. Are there any particular things you are hoping to learn from our program evaluation?
14. Are there any particular questions you would like us to ask the program participants or trade allies?

APPENDIX B. TRADE ALLY INTERVIEW GUIDE

Program Delivery

1) How do you know when it is time to do a "house call"?
    a. Do you do any direct marketing/advertising?
    b. Do participants contact you directly?
    c. Do you get assignments from Idaho Power?
    d. Do you have any suggestions for how to make this process work better?
2) You get a call and schedule a time to go visit the home… what do you do when you're there?
    a. Do you do all the work during that initial visit, or do you sometimes have to make more than one visit?
    b. Do you have any ideas for how the onsite process could work better?
    c. What are your thoughts on the direct install items that are currently in the program? These are the light bulbs, showerheads, kitchen and bathroom aerators, and pipe wrap. Do you think more of these items should be installed or are they unnecessary?
    d. Are there any additional energy-saving items you think the program could cost-effectively add?
3) After you complete the house call, what happens next?
    a. What, if any, information do you send back to Idaho Power?
        i. How is data recorded? Are any fields pre-filled?
        ii. How is the data transferred to Idaho Power?
        iii. How satisfied are you with the Field Worksheet?
        iv. In your opinion, how could the Field Worksheet or this process be improved?
    b. What, if any, follow up do you do with participants?
        i. How do participants contact you after the services are performed?
        ii. What is the typical nature of these calls?
    c. What is the quality assurance process?
        i. Do you have any suggestions regarding the QA process?
    d. Is there anything else in these post house call activities that you think could go better?
4) I understand the program is only available once, per home, per the lifetime of the program. How often are you contacted by a home that has already participated and have to refuse servicing the home?
    a. Do you, or does Idaho Power, notify the person that they are ineligible?

b. Has the frequency of these situations increased in recent years?

General/Communication

5) Who from Idaho Power do you interact with most frequently?
    a. What is the frequency and nature of those interactions?
6) Are you satisfied with the level of communication with Idaho Power?
    a. If not, how could it be improved?

Wrap-up

7) In your opinion, what aspects of the program are going well?
8) In your opinion, what aspects of the program show room for improvement?
9) Overall, how satisfied are you with the Energy House Calls program?

APPENDIX C. PROGRAM PARTICIPANT SURVEY INSTRUMENT

INTRODUCTION

Hello, this is _________ calling on behalf of Idaho Power Company. I'm calling because your household participated in Idaho Power's Energy House Calls program, which included a certified contractor visiting your home, sealing leaks, and installing some energy-saving products. I'd like to ask some questions about your experience with the program. This should only take about 10 minutes.

[IF ASKED **Your responses will be kept confidential and only reported in aggregate.**]

[TO CONFIRM LEGITIMACY OF SURVEY, THEY CAN CONTACT **Mindi Shodeen** AT **(208) 388-5648**]

1	[AGREES TO PARTCIPATE]	IN1
2	[DOES NOT AGREE TO PARTCIPATE]	END

IN1. What is your name?

	[RECORD FIRST and LAST NAME]	A1

PROGRAM AWARENESS

A1. How did you learn about the Energy House Calls program provided by Idaho Power?
[ALLOW MULTIPLE RESPONSES]

1	[Postcard/Letter in the mail]	A2
2	[Information in energy bill]	
3	[Friends/Family]	
4	[Door Hanger]	
5	[Contractor]	
6	[Facebook advertisement]	
7	[Other online advertisement]	
8	[Idaho Power Company staff]	
9	[Landlord suggestion]	
77	[Other, specify_______________]	
-97	[Don't know]	

A2. What benefits were you hoping to get from your participation in the Energy House Calls program?
[ALLOW MULTIPLE RESPONSES]

1	[Reduce your energy usage / bills]	A3
2	[Receive free duct sealing]	
3	[Receive free energy-saving equipment]	
4	[Improve comfort in your home]	
77	[Other, specify_______________]	
-97	[Don't know]	

A3. Prior to your participation in the Energy House Calls program, did you receive a free energy-savings kit from Idaho Power that included some energy-saving measures?

1	[Yes]	MEASURE VERIFICATION
2	[No]	
-97	[Don't know]	

MEASURE VERIFICATION

V1. **As part of the Energy House Calls program, the following energy-saving equipment was installed in your home:**

[LIST OF EQUIPMENT]

Since the time they were installed, did you remove any of these items?

1	[Yes]	V2
2	[No]	PROGRAM EXPERIENCE
-97	[Don't know]	

[V2 WILL ONLY BE ASKED IF THEY HAVE MORE THAN JUST LEDS, AND ONLY MEAURES IN THE TRACKING DATA FOR EACH SPECIFIC PARTICIPANT WILL SHOW UP FOR THIS QUESTION]

V2. **Which item(s) did you remove?**

1	[LED light bulb(s)]	V3
2	[Showerhead(s)]	
3	[Bathroom faucet aerator(s)]	
4	[Kitchen faucet aerator]	
-97	[Don't know]	PROGRAM EXPERIENCE

[V3 AND V4 WILL REPEAT FOR EVERY MEASURE TYPE INDICATED IN V2]

V3. **How many [MEASURE TYPE] did you remove?**

	[RECORD VERBATIM]	V4

V4. **Is there a specific reason why the [MEASURE TYPE] was/were removed?**

	[RECORD VERBATIM]	PROGRAM EXPERIENCE

PROGRAM EXPERIENCE

P1. **After the certified contractor finished with the energy efficiency testing and energy-saving measures, did you receive a letter with the test results?**

1	[Yes]	P1a
2	[No]	P2
-97	[Don't know]	

P1a. **Were the letter and test results easy to understand and informative regarding the energy performance of your home?**

1	[Yes]	P2
2	[No]	P1b
-97	[Don't know]	P2

P1b. **How could the letter have been more informative or easier to understand?**

	[RECORD VERBATIM]	P2
-97	[Don't know]	

P2. **Since participating in the Energy House Calls program, have you noticed a change in the comfort of your home?**

1	[Yes]	P2a
2	[No]	P3
-97	[Don't know]	

P2a. Is the comfort of your home…

4	Much better than before	P3
3	Somewhat better than before	
2	Somewhat worse than before	
1	Much worse than before	
-97	[Don't know]	

P3. Have you experienced any of the following in your home since participating in the program?
[ALLOW MULTIPLE RESPONSES. DO NOT READ.]

1	[Air quality improvements]	P4
2	[Reduced allergies]	
3	[Better temperature regulation]	
4	[Reduced energy bill]	
77	[Other impacts, please specify______________]	
-97	[Don't know]	

P4. After participating in the program, did you make any additional energy efficiency improvements to your home?

1	[Yes]	P4a
2	[No]	SATISFACTION
-97	[Don't know]	

P4a. What energy efficiency improvements did you make?

	[RECORD VERBATIM]	P4b
-97	[Don't know]	

P4b. What prompted you to make these additional energy efficiency improvements?
[ALLOW MULTIPLE RESPONSES. DO NOT READ]

1	[Equipment aging/failure]	P4
2	[Reducing energy consumption/bills]	
3	[Improving the comfort of your home]	
4	[Participating in the Energy House Calls program]	
77	[Other, specify______________]	
-97	[Don't know]	

SATISFACTION

Next, I have a few questions about how satisfied you were with different aspects of the program. For all of these questions, use a 5-point scale where 5 means 'very satisfied' and 1 means 'very dissatisfied.'

S1. How satisfied or dissatisfied were you with the…?

- **a. Process for scheduling the Energy House Call**
- **b. Certified contractor that made the energy efficiency improvements**
- **c. Energy-saving measures that were performed and installed in your home**
- **d. Energy House Calls program as a whole**

1	Very dissatisfied	S2
2	Somewhat dissatisfied	
3	Neither satisfied nor dissatisfied	
4	Somewhat satisfied	
5	Very satisfied	
-97	[Don't know]	

[S2 IS ONLY ASKED FOR ANY PROGRAM ASPECT THAT THE RESPONDENT RATES AS LESS THAN A 3]

S2. **Why do you say that?**

	[RECORD VERBATIM]	ENERGY ATTITUDES
-97	[Don't know]	

ENERGY ATTITUDES

E1. **How often do you look at your home's total energy use when you receive a bill?**

1	[Every time]	E2
2	[Most of the time]	
3	[About half of the time]	
4	[Less than half of the time]	
5	[Rarely]	
6	[Never]	
77	[Other, Specify _______]	
97	[Don't know]	

E2. **Do you plan to make new energy efficient improvements in your home in the near future (in the next 12 months)?**

1	[Yes]	E2a
2	[No]	DEMOGRAPHICS
97	[Don't know]	

E2a. **What improvements do you plan to make?**

	[RECORD VERBATIM]	E2b
-97	[Don't know]	DEMOGRAPHICS

E2c. **What barriers have prevented you from making these improvements?**

	[RECORD VERBATIM]	DEMOGRAPHICS
-97	[Don't know]	

DEMOGRAPHICS

We're almost done. I just have a few more questions about the address where the work was done.

D1. **Is <address> your primary residence?**

1	[Yes]	D1a
2	[No]	D2
-98	[Prefer not to answer]	

D1a. **Including yourself and children, how many people live at <address>?**

1	[RECORD #]	D2
-98	[Prefer not to answer]	

D2. **What is your age?**

1	[RECORD #]	D3
-98	[Prefer not to answer]	

D3. What is the highest level of education you have completed?

1	No schooling	D4
2	Less than high school	
3	Some high school	
4	High school graduate or equivalent (e.g., GED)	
5	Trade or technical school	
6	Some college	
7	College degree	
8	Some graduate school	
9	Graduate degree	
77	[Other, specify________________]	
-98	[Prefer not to answer]	

D4. Do you have any additional comments about your experience with the program?

	[RECORD VERBATIM]	END
-97	[Don't know]	

THANK & TERMINATE

END. Those are all of the questions I have for you today. Thank you for your time.

About DNV GL

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter, and greener.

FINAL REPORT

Idaho Power Residential New Construction Pilot Program Evaluation PY2018

Date: December 30, 2019

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1 EXECUTIVE SUMMARY

This report presents findings and recommendations from an impact and process evaluation of Idaho Power's Residential New Construction pilot program. The evaluation covers the program's operations in 2018.

DNV GL's objectives for the impact portion of the evaluation were to determine and verify the energy (kWh) impacts attributable to the 2018 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.

Our objectives for the process portion of the evaluation were to assess program design, logic, and operations and compare to industry best practices, and offer recommendations to improve the delivery of the 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

1.1 Key findings

The total reported savings for the program were 777,369 kWh with total verified savings of 777,369 kWh, for a realization rate of 100%. With two minor exceptions, the tracking system contained the information necessary to perform the evaluation. Additional findings from the impact evaluation included the following:

The database provided to us was missing some critical, and non-critical, parameters from the implementer's internal tracking systems (AXIS) which would have increased transparency and expedited the evaluation. Discussions with IPC confirmed that this situation affected some of the projects specifically reviewed by evaluators. The AXIS database creator had updated the database software before the evaluation commenced. The update included the addition of all of the parameters requested by evaluators. Some of the projects requested for the evaluation were among the first homes certified and were certified before the AXIS software update, which is why some projects were lacking the parameters.

The key process findings include:

1. Trade allies (raters) are a key means of implementing the program.
2. Program documentation was good and should be converted into a fully-fledged program handbook if the program moves from pilot to fully-fledged program.
3. Marketing collateral was well-done, but minor improvements are possible.
4. Raters and builders are satisfied with the program administration.

1.1 Recommendations

Review the tracking database regularly to ensure that all parameters have reasonable and accurate values. This will improve program transparency and increase the accuracy and speed of evaluations.

Clearly document the sources for the program's baseline energy standards. This will also increase transparency and expedite future evaluations.

If the pilot becomes a fully-fledged program, add to the program marketing plan document to make it a true program handbook. The handbook should include all of the information in the 2019 Marketing Plan document, plus a logic model, description of program activities, and a listing of the stakeholders involved.

DNV GL has two recommendations for the marketing materials:

- Ensure all hyperlinks on marketing materials work.
- If possible, track the number of clicks for each digital advertisement. Especially for a program such as this in the pilot stage, this would yield valuable information that would help guide effective graphics and messaging for future marketing materials.

Add content to the program website. A "success stories" section of the website that includes testimonials and endorsements by participating builders and current residents could help sell the program. Idaho Power already has some of this content in other marketing materials.

Add a URL to the program brochure that links builders with specific contact information for the raters. The instructions in the program brochure say to hire a RESNET-certified HERS Rater recognized by Idaho Power without specifically listing which raters are recognized or how to contact them. Because the list of approved HERS Raters may change over time, future iterations of the brochure could include a footnote or other note indicating that builders should visit the program website (which can be changed much more easily) for a list of approved raters along with contact information.

A few changes could improve the application form:

- Be more specific about program requirements on the website and application form by clarifying that builders with multiple units may submit only one application with an attached list of homes and by using language such as "at least 20 percent more energy efficient than homes built to standard state energy code."
- Modify the name of the application form PDF on the program website from "termsConditions.pdf" to something more specific such as "IdahoPowerResNCApplication".

2 INTRODUCTION

2.1 Program overview

The Residential New Construction Pilot Program began in March 2018, having replaced the ENERGY STAR® Northwest Homes Program (which was initiated in 2003). The program objective is to increase the efficiency of newly-constructed residential single-family homes, offering a $1,500 incentive for home builders for each qualifying home (or unit) constructed.[1]

Qualifying homes must meet strict requirements, including the use of heat pump technology, that make their energy performance at least 20% better than homes built to the state energy code.[2] These homes additionally may feature high-efficiency windows, increased insulation values, and tighter building shells to improve comfort and save energy. Idaho Power claims energy savings based on each home's individual modeled savings.

Builders must work with a Residential Energy Services Network (RESNET)-certified Home Energy Rating System (HERS) Rater to ensure program qualification. These raters work with the builders, perform the required energy modeling using REM/Rate modeling software, perform site inspections and tests, and submit all required technical documentation in the REM/Rate modeling software and the AXIS database. This database, which is maintained by Northwest Energy Efficiency Alliance (NEEA), allows Idaho Power to track and review project information to determine if program requirements are met.

Homes for which construction was started prior to January 31, 2018 and finished by the end of the year qualified for the ENERGY STAR® Northwest Homes Program and incentive. Homes which started construction on March 1, 2018 or later qualified for the Residential New Construction Pilot. Altogether, these programs claimed 307 participants (homes) resulting in 777,369 kWh savings in 2018.

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 2018 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 2018 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.

[1] The incentive offered through the ENERGY STAR® Northwest Homes Program was $1,000.

[2] The energy performance criteria for the ENERGY STAR® Northwest Homes Program was 15% better than state energy code.

To achieve these objectives, DNV GL conducted:

- Semi-structured interviews with program staff
- Tracking system review
- Project 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 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 (0). Senior DNV GL staff conducted the IDIs over the phone in June 2019.

3.2 Tracking system and tracking data 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 Project file review

DNV GL also conducted a file review of a sample of the program application files. The file review provided a more in-depth verification of a statistical sample of projects. We verified the accuracy of data entry by comparing the field worksheet and database for key elements of the savings calculation such as quantity, size, efficiency level, and units of measure. We also verified specific calculations and algorithms used in these applications.

For the Residential New Construction program, the year was split between the legacy program and the new pilot. Because the evaluation was focused on the program as it will be operated going forward, we sampled only from the pilot participants. From those participants, DNV GL selected a stratified random sample with enough projects to achieve a 90/10 statistical precision[3] for the realization rate estimate on the sampled projects, using conservative assumptions about the eventual realization rate achieved and the correlation between the reported savings and the verified savings. Because there were participants from only three

[3] a relative error of no more than 10%, with 90% confidence

housing developments, the sample was stratified by development, with random samples selected approximately proportionally from each development. The stratification and sample design are shown in Table 3-1 below.

Table 3-1. Sample summary

Stratum	Development	Sampled Projects	Sampled kWh	Total Projects	Total kWh
1	Idaho Street Townhomes	2	4,348	5	11,560
2	40th Street Cottages	3	12,004	7	30,054
3	Village Oaks	2	14,560	3	23,275
Total		7	30,912	15	64,889

3.4 Program logic review

Based on the program staff interviews and the review of the program materials, DNV GL developed a logic model for the program.

3.5 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 3-2 lists the program materials we reviewed and the core questions associated with each.

Table 3-2. Materials reviewed and core issues considered

Program material	Core questions
Program plan	Is program theory clearly articulated? Are program objectives articulated; are goals recorded and SMART[4]? Are program roles and responsibilities clearly recorded? Are risks and contingencies recorded? Are program measures and operations clearly articulated?
Marketing materials and websites	Are materials visually appealing? Are they easy to understand and convey the intended information? Do they provide a follow-up activity and means to do it? Do all hyperlinks work?
Trade ally / subcontractor instructions, tools/worksheets	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 minimal information necessary? Are instructions available and clear? Are they easy to follow and fill out?

[4] Specific, Measurable, Attainable, Realistic, Time-delineated

3.6 QA/QC review

DNV GL assessed the adequacy of Idaho Power's savings verification procedures. The goal of the assessment was to ensure that adequate resources are dedicated to quality assurance and quality control and that the most effective policies are in place.

3.7 Program participant and trade ally interviews

DNV GL completed IDIs with five of the six builders that had participated in the program as of June 2019 in addition to all three RESNET-certified HERS Raters recognized by Idaho Power. These interviews were intended to cover the following topics:

- Program delivery
- Communication and interaction with the program
- Satisfaction
- Recommendations for improvement

DNV GL developed instruments to guide the IDIs (APPENDIX B and APPENDIX C). DNV GL staff conducted the IDIs over the phone in September 2019.

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, and reviewing a sample of project files to verify that calculations and assumptions are accurate.

4.1 Tracking system review

Key impact findings

1. *The total reported savings for the program were 777,369 kWh with total verified savings of 777,369 kWh, for a realization rate of 100%.*
2. *The tracking system contained the information necessary to perform the evaluation.*

The tracking system savings matched the reported savings[5] of 777,369 kWh.

We assessed the tracking data to determine if it contained the necessary data to verify the DSM report's total program savings and to determine if the data included was intelligible, reasonable, and complete. There were no savings algorithms nor inputs utilized in energy savings algorithms found in the database. We found the database to be fairly complete and well-organized, with project costs, measure description, and energy savings information filled in for all projects. The database provided to us was missing some critical, and non-critical, parameters from the implementer's internal tracking systems (AXIS) which would have increased transparency and expedited the evaluation. The AXIS database creator had updated the database software before the evaluation commenced. The update included the addition of all of the parameters referred to below. Some of the projects requested for the evaluation were among the first homes certified and were certified before the AXIS software update, which is why some of the projects were lacking the parameters. The critical parameters were:

- As-built total consumption: Energy consumption (MMBtu) of the built home
- Reference total consumption: Energy consumption (MMBtu) of the reference baseline home
- Percent improvement: Percent difference between as-built and reference consumption.

Non-critical, but useful, parameters were:

- Style: Type of residence (single-family stand-alone, multifamily, etc.)
- Foundation type: Style of the residence's base construction (basement, slab, etc.)
- Conditioned area (ft^2): The residence's climate controlled
- Primary heating: The main heating source for occupant comfort (electric air-source heat pump, etc.)

4.2 Tracking data review

The program database covers two distinct programs, a legacy Residential ENERGY STAR program that was discontinued, and its replacement the Residential New Construction program that is currently operational. The savings for the projects under these programs are not deemed savings from the Regional Technical

5 Reported savings were provided in Appendix 3. 2018 DSM program activity, Demand-Side Management 2019 Annual Report, Idaho Power Company, March 15, 2019

Forum's (RTF) Unit Energy Savings (UES) library[6] or Idaho Power's Technical Reference Manual[7] (TRM) but instead calculated with REM/Rate™ software[8] which is an industry standard tool for home performance rating. The tracking data contained the necessary data to verify the DSM report's total program savings and it was intelligible and reasonable.

4.3 Project file review

DNV GL received 7 sampled project files for file review. Because the program uses a third party's proprietary software DNV GL was unable to review the savings algorithms utilized in the REM/Rate™ software. The documentation received included: Project Location, Dates, Building Characteristics such as dimensions, HVAC, lighting, DHW, etc. The documentation received was compared against the data in the tracking databases, and no discrepancies were found.

Review of site documents revealed two sites with as-built and reference energy consumption values of 0 MMBtu; these values were illogical as neither site had renewable generation (solar, wind, etc.) off-setting their usage. The reason for these erroneous values is that the "as-built consumption" and "reference consumption" parameters were added to the program's AXIS database after the projects were submitted. Calculations for older projects are locked during updates to the AXIS database so they are not accidently changed, but when new parameters are added to the database, they receive a zero value for locked projects. DNV GL recommends that the database be reviewed regularly to ensure that all parameters have reasonable and accurate values, which will improve program transparency and increase the accuracy and speed of evaluations.

All other sampled sites qualified for program incentives based upon the documentation received because their as-built energy consumption was 20% (or lower) than the reference baseline consumption. However, the program's baseline energy standard was not clearly defined in any of the documentation provided to the evaluators. After a discussion with IPC about Idaho's regulatory environment it was determined that the program's baseline is the residential new construction standards[9] set forth by the Regional Technical Forum (RTF). It was also unclear whether the documented consumption values represented site-energy, the electrical energy consumed by the end-user, or source-energy, the energy consumed by the generation facility to create electricity. IPC was able to confirm that the values are for site-energy consumption. Review of the RTF standard revealed that the RTF standard has two different heating system baselines:

- Homes with ducted central heating utilize an 80/20 mix of ASHP and electric furnaces.
- Homes with non-ducted zone heating utilize electric resistance heaters.

The specifics of the baseline heating systems (capacities, efficiencies, etc.) were not detailed in either the program supplied documentation nor the RTF standard for new homes. DNV GL recommends that information concerning the programs' baseline energy standards be clearly documented for increased transparency and to expedite future evaluations.

6 The standard used to verify and evaluate energy efficiency savings created by The Regional Technical Forum; https://rtf.nwcouncil.org/

7 The TRM is created by a third party for Idaho Power to evaluate energy efficiency measures' savings and costs; https://www.idahopower.com/energy-environment/ways-to-save/energy-efficiency-program-reports/

8 REM/Rate™ and REM/Design™ desktop applications have been the industry standard for the Home Energy Rating System (HERS®) and home energy analysis/weatherization; http://www.remrate.com/

9 Regional Technical Forum. (2016, December 6). Standard Savings Estimation Protocol: New Homes Standard Protocol. Retrieved October 6, 2019 from "https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fnwcouncil.app.box.com%2Fv%2FNewHomesProtocol-v1-1&data=02%7C01%7CEdilson.Abreu%40dnvgl.com%7C6ef1d192486d45171c9508d74cfbf2be%7Cadf10e2bb6e941d6be2fc12bb566019c%7C1%7C0%7C637062517307401973"

The International Energy Conservation Code® (IECC®) 2009 edition was determined to be minimum energy standard in Idaho. Residential Prototype Building Models created by The Pacific Northwest National Laboratory (PNNL), under the U.S. Department of Energy (DOE), for single-family residences in Boise Idaho were used to check the sensibility of the program's RTF baseline.

4.4 Impact Results

After selecting DOE models with appropriate heating systems all but one of the sampled sites (Site 14) have as-built consumption that were 20% (or better) than the DOE baseline model. The DOE models were used only as references to check the reasonability of the programs' reference baselines. Seven out of eight of the sampled sites met or exceeded the DOE baseline evaluators used for the reasonableness check. Table 4-1 shows the as-built, ex-ante baseline, and ex-post baseline for each site, and shows the performance of each sample site over the various baselines. The median as-built consumption is 58% better than the ex-post baseline, and 31% better than the ex-ante baselines. The as-built consumption out-performs both baselines by more than the 20% minimum set by the program, therefore the ex-ante baselines and ex-ante savings are deemed reasonable, and the realization rate for sampled sites is 100%. Table 4-2 lists the characteristics of the sampled homes.

Table 4-1. Sampled Homes' Consumption vs. Baselines

NHID	Tracked Savings (kWh)	As-Built (MMBtu/Sq. ft.)	Ex-Ante Baseline (MMBtu/Sq. ft.)	Ex-Post Baseline (MMBtu/Sq. ft.)	As-Built vs Ex-Ante Baseline	As-Built vs Ex-Post Baseline
14	2,810	0.0388	0.0540	0.044	28%	12%
7	4,430	0.0352	0.0512	0.044	31%	20%
20	4,764	0.0354	0.0530	0.044	33%	20%
1	2,174	0.0204	0.0257	0.048	21%	58%
2	2,174	0.0204	0.0257	0.048	21%	58%
12	5,996	0.0185	0.0300	0.044	38%	58%
11	8,564	0.0185	0.0365	0.044	49%	58%
Total or *Median*	**30,912**	***0.0204***	***0.0365***	***0.044***	***31%***	***58%***

Table 4-2. Sampled Homes' Characteristics

NHID	Conditioned Area (sq. ft.)	Foundation Type	Heating System	Baseline Heating System
14	678	Slab	Electric ASHP	Ductless Zonal - Electric Resistance
7	938	Slab	Electric ASHP	Ductless Zonal - Electric Resistance
20	938	Slab	Electric ASHP	Ductless Zonal - Electric Resistance
1	1,524	Enclosed crawl space	Electric ASHP	Ducted Central Heating - 80/20 ASHP and Electric Furnace
2	1,524	Enclosed crawl space	Electric ASHP	Ducted Central Heating - 80/20 ASHP and Electric Furnace
12	1,870	Slab	Electric ASHP	Ductless Zonal - Electric Resistance
11	1,927	Slab	Electric ASHP	Ductless Zonal - Electric Resistance
Total *(Median)*	***(1,524)***	**-**	-	-

5 PROCESS FINDINGS AND TARGETED RECOMMENDATIONS

This section provides detailed findings on program operations and materials. The process evaluation included interviews with program staff, review of program logic, review of program documentation, review of the program's QA/QC procedures, assessing program marketing materials, and interviews with trade allies and program participants. In this section, we also offer targeted recommendations for improving the program.

5.1 Program staff interview

Key process findings

1. *Trade allies (raters) are a key means of implementing the program*
2. *Program documentation was good but should be increased if the program moves from pilot to fully-fledged program*
3. *Marketing collateral was well-done, but minor improvements are possible.*
4. *Raters and builders are satisfied with the program administration.*

The program staff interview revealed that the Residential New Construction Pilot program was created as a result of the ENERGY STAR® Northwest Homes Program ending. While the previous program utilized a "checkbox" approach in which instituting each measure produced deemed savings, the new pilot program utilizes a more open-ended, whole-home approach that allows builders more leeway in design and construction of homes to meet the overall target of 20% energy performance above code. The incentive for each qualifying home constructed is $1,500, which was set strategically by Idaho Power to be both low enough to meet cost-effectiveness and high enough to "get builders' attention."

Idaho Power markets the program through the Idaho Building Contractors Association (IBCA) and several of its local affiliates throughout its service area while also participating in builder's expos. It also sponsors Parade of Homes through customer bill inserts, puts print and digital advertisements in the Idaho Business Review, and offers program brochures on their website.

While Idaho Power's marketing is important in bringing in builders, the utility recognizes that trade allies (namely, the 3 HERS Raters involved in the program as of June 2019) are crucial in both increasing participation and achieving the desired energy savings. Raters each bring along with them longstanding relationships with several builders. They guide builders through the construction process, ensure the homes meet program requirements, and submit the modeling and testing data to Idaho Power.

According to program staff, the biggest challenge to program success is a housing boom that is underway in parts of Idaho is encouraging high-volume homebuilders to produce and sell "cookie-cutter" homes as quickly as possible and not strongly consider the energy efficiency or fuel source of those homes. The perception by program staff was that builders that did not already have a disposition or philosophy towards "green" building were not yet participating in the pilot.

5.2 Program logic review

The program files did not contain a formal logic model. DNV GL generated a draft logic model (Figure 5-1) based on information found in the program files and the program staff interview.

Figure 5-1. Residential New Construction program logic model

Assumptions

Homebuilders generally do not prioritize energy efficiency. Electrically-heated home construction is not common, especially with low gas prices.

External Factors

All high-efficiency design and construction decisions made by builders and raters.

Evaluation

Process: 2019

Impact: 2019

Inputs	Outputs		Outcomes		
	Activities	Participation	Short	Medium	Long
Idaho Power invests:	**Idaho Power does:**	**Idaho Power reaches:**	**Short term**	**Mid term**	**Long term**
Staff time Marketing resources Incentives paid to builders	Marketing to builders and residential customers Engage trade allies (raters) Review and approve savings estimates Inspect some participating homes (through 3rd party)	Builders Customers Trade allies	Improve efficiency of newly-construct'd electrically-heated homes in service territory	Energy savings Summer peak demand reduction	Keep rates low Minimize environ-mental impact Improve customer satisfaction Avoid/ defer building new generation

5.3 Program materials review

Program plan

As the Residential New Construction program is still in the pilot stage, it does not yet have a formal or official written program handbook. Idaho Power's 2019 Marketing Plan document serves as the closest thing to a de facto program plan, as it contains some of the types of information that DNV GL looks for in this type of document. These include metrics for success, research background, a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, and marketing and messaging strategies. However, it does not include a detailed description of program operations or a clearly-delineated description of program roles and responsibilities, which we would expect in a formal program handbook.

Recommendations: DNV GL recommends the following:

- Particularly if the pilot becomes a fully-fledged program, Idaho Power should make a program handbook. It would include all of the information in the 2019 Marketing Plan document, plus a logic model, description of program activities, and a listing of the stakeholders involved.

Marketing materials and websites

Marketing materials

DNV GL reviewed marketing materials that covered the Residential New Construction program in 2018 and 2019, including a feature in one edition of the Connections publication, a column in one edition of the weekly News Scans publication, a bill insert, and other web advertisements. As a whole, these advertisements are well done: they are visually appealing, effectively communicate the intended information, are easy to understand, have utility branding and logos, and provide web URLs to learn more about the program. The Connections and News Scans advertisements are particularly effective, offering testimonials from participating builders and pictures of those builders smiling in front of homes being constructed. Several of the advertisements use the same home outline graphic (Figure 5-2), which allows for brand recognition among customers and builders.

Figure 5-2. Home outline graphic used in digital ads

Recommendations: DNV GL has two recommendations for the marketing materials:

- Ensure all hyperlinks on marketing materials work.
- If possible, track the number of clicks for each digital advertisement. Especially for a program such as this in the pilot stage, this would yield valuable information that would help guide effective graphics and messaging for future marketing materials.

Program website

The program's website is in good condition. It is visually appealing and conveys all of the necessary information including: incentives, qualifications, eligibility, and how to apply. All of the hyperlinks, including links to the websites of each of the recognized HERS Raters, work.

Recommendation: While the program website is completely functional, its effectiveness could be improved by leveraging the testimonials included in marketing materials (described above). This could be included under a heading called "success stories," and could include endorsements by the participating builders and as well as testimonials from residents that now live in participating homes.

Trade ally / subcontractor instructions, tools/worksheets

DNV GL reviewed the 2018 program brochure that is targeted towards builders. It is a very comprehensive document, essentially providing the exact same information as the main program website. Program steps, requirements, and who builders should communicate with are clearly laid out in this document.

Recommendation: In the "How to Apply" section of the brochure (page 3), the instructions say to hire a RESNET-certified HERS Rater recognized by Idaho Power. However, the brochure does not specifically call out which raters are recognized or how to contact them. Since the list of approved HERS Raters may change over time, future iterations of the brochure should include a footnote or other note indicating that builders should visit the program website (which can be changed much more easily) for a list of approved raters.

All HERS Raters working with the program are required to use the REM/Rate modeling tool. This is a very commonly-used software tool for this purpose.

Application forms

DNV GL reviewed the Residential New Construction application form[10], which is available on the program website. The application is simple, covering the information necessary for program functioning. The form is easy to fill out and can be done either electronically or on paper. Instructions for filling out and transmitting the form to Idaho Power (via email and traditional mail) are clear. A separate application form must be filled out for each qualifying home that builders construct.

Recommendations: DNV GL has some recommendations for the application form:

- Be more specific about program requirements on the program website and the application form.
  - Currently, the website states that, "An application is required for each home you are applying for an incentive on." This language could be misconstrued such that builders of side-by-side townhomes or condos may think they would have to submit a separate application for each individual residence. According to Idaho Power, builders with multiple homes are allowed to fill out one application and simply attach a list of those homes in these situations. This could be made clearer on the website.
  - Currently, the application form simply states that homes must be "20% above Idaho energy code." This is less clear than stated in other places like the program website and the builder brochure, the latter of which states that homes must be "at least 20 percent more energy efficient than homes built to standard state energy code." If the current application is a builder's first introduction to the program, there may be confusion about the exact requirement.
- Modify the name of the application form PDF on the program website. The application form is currently titled "termsConditions.pdf". When builders or raters download the PDF application form, it would be easier to track and locate if it were titled something more specific such as "IdahoPowerResNCApplication".

5.4 QA/QC review

HERS Raters upload the REM/Rate data for each participating home into the regional AXIS database, which is managed by CLEAResult. A technical resource within CLEAResult checks the data input from the raters. As of our June 2019 interview with program staff, the program performed QA/QC on the first five completed files that each rater turned in, and 20% of the files for each rater thereafter. A third-party conducts physical QA/QC on the first three built homes for each builder and 10% of the homes after that. These 20% and 10% numbers are subject to increase for raters and builders for which the inspectors uncover recurring issues. These protocols confirm to industry best practices.

5.5 Program participant and trade ally interviews

This section details findings from the IDIs with participating builders and HERS Raters.

Program awareness and recruiting

The program leverages its relationship with the approved HERS Raters to spread awareness of program incentives through their network of builders. Unsurprisingly, four of the five participating builders said they heard about the program from the raters they work with. The other builder heard about the program directly

[10] According to program staff, the application form from the 2018 program year was modified slightly for the 2019 program year. In this section, we review the 2019 application.

from Idaho Power. Raters said they typically only "pitch" the program and incentives to builders if they are actively considering or have already decided to heat the home(s) with electric heat.

We asked the builders what motivated them to participate and build homes that would meet the program requirements. We also inquired about whether the program or the financial incentives drove their decisions to build these homes with electric heat. The builders' responses to these questions helped uncover the fact that all five were already inclined to participate in a program like this. Four of the five said that these homes or developments were going to be electrically-heated regardless of the program, and all five gave some version of the same story: their company cares about constructing energy-efficient homes, they are generally environmentally-motivated, or their philosophies align with program goals.

Program delivery and communication

As mentioned previously, once a builder agrees to participate, they work closely with and rely heavily on the HERS Rater to ensure the home will meet the minimum energy performance. All five of the builders described this as a smooth process in which their rater did all of the "heavy lifting" as it relates to the program. All were satisfied with this arrangement and their individual raters.

As for the three HERS raters themselves, they were generally satisfied with the program processes and the tools and software used. Two of the three raters mentioned (as relatively minor annoyances) some glitches with uploading data from the REM/Rate software to the AXIS database. One HERS Rater said that they wished they had more training or assistance with the REM/Rate software. As the pilot grows, and especially if Idaho Power intends to make it a fully-fledged program, it may want to consider offering more training or resources for HERS Raters that may be less familiar with this specific software option.

Asked about their interactions and communication with Idaho Power, all three HERS Raters said they interact with the same program manager. They generally spoke highly of their communication with Idaho Power. "You get answers within a small amount of time. Everybody seems friendly and nice," said one. Another said, "When I do have problems, they give me the information I need immediately."

Program requirements and incentives

We asked all of the builders and HERS Raters the same question: "How difficult is it for builders to attain the program requirement of 20% more energy efficient than state building code?" All eight of the program actors said that reaching this threshold was not very difficult. Most importantly, all of the builders said they already build energy-efficient homes, and meeting this requirement only involves some incremental changes to the typical home they construct.

Interestingly, however, four of the five builders said the homes they constructed that were incentivized by the pilot were more energy-efficient than those same homes would have been in the absence of the program. So while the program requirements were relatively easy to attain, those incremental improvements would likely not have been completed if not for the pilot.

We also asked the builders whether the current financial incentive - $1,500 for each qualifying home – was adequate to encourage builders to construct homes to the higher program requirement. Most (four of the five) builders thought the incentive was a good start, but that a slight increase would more strongly make the financial case to builders. One said they thought $2,000 was a more adequate level, two said that around $2,500 was more in line, and one thought $3,000 was adequate. The rationale among a couple of these builders was that the additional work done by the HERS Raters for meeting this standard cut into the value of the incentive, and pushing it up would better cover these costs.

Barriers and motivation

Participating builders discussed a variety of barriers for other builders to participate in the program, but most agreed on the biggest issue. Four of the five builders said that the biggest issue is other builders (as well as subcontractors that perform much of the work) being "stuck in their ways" and desiring to stay in their "comfort zone." According to participating builders, learning new ways of performing their work (such as HVAC contractors learning how to install ductless systems) requires an investment of time and resources that most are not willing to make. The fifth builder pointed towards a perception in the market that electrically-heated homes are not as efficient and cost more.

We asked the participating builders what, if anything, could increase builders' prioritizing of energy efficiency. Respondents were split across two answers. Two said that better education of the homebuilding community would be most effective, two said that more money or higher incentives would help motivate builders to prioritize energy efficiency, and one cited both of those factors. It should be noted these are the perspectives of builders who are already building energy efficient, electrically heated homes.

We also asked the HERS Raters about the barriers that make it difficult for builders to participate. All three mentioned that the vast majority of homes built in the area use gas heating, which is relatively cheap compared to traditional (non-heat pump) electric heating. One rater each also said that the extra energy modeling and testing required for this kind of program are seen in the broader market as a hindrance, that the current building boom in Idaho makes taking extra time to deal with the program a more difficult "sell," and that the program financial incentive is trivial for higher-end builders constructing more expensive homes. These responses came from the raters and in reference to the broader market, so might be more representative of the larger builder market than the responses directly from the builders (in the previous paragraph).

Satisfaction and Recommendations

Overall, the participating builders and HERS Raters were satisfied with the program. One builder summed up the sentiment as:

> *"I like that it is easy to comply with, not a ton of paperwork, not hard for homeowners or builders to get the incentive. If it's extra work for them, they are not going to do it. And it might push builders to do something a little better."*

Respondents did provide some recommendations. These included:

- Increase the program incentive. All three of the HERS Raters and four of the five participating builders suggested this. One rater said this is particularly relevant during the current building boom.
- Improve customer awareness of the program.
- Allow stacked units to qualify for program incentives.
- Offer a different type of incentives to builders, such as reduced fees for bringing in electrical lines, if builders commit to meet these standards for a whole development.

Lastly, we asked the builders directly whether they would support a tiered incentive system for the program in which builders would receive differing incentive amounts for achieving different levels of energy performance above Idaho state energy code (10%, 20%, 30%, etc.). Four of the five builders said they would be in favor of such a system, with the other builder saying this alternative system would introduce uncertainty in budgeting for their developments.

6 CONCLUSIONS AND RECOMMENDATIONS

The total reported savings for the program were 777,369 kWh with total verified savings of 777,369 kWh, for a realization rate of 100%. The tracking database was complete except for two minor exceptions.

The database provided to us was missing some critical, and non-critical, parameters from the implementer's internal tracking systems (AXIS) which would have increased transparency and expedited the evaluation. Discussions with IPC confirmed that this situation affected some of the projects specifically reviewed by evaluators. The AXIS database creator had updated the database software before the evaluation commenced. The update included the addition of all of the parameters referred to below. Some of the projects requested for the evaluation were among the first homes certified and were certified before the AXIS software update, which is why some projects were lacking the parameters. Critical variables included:

1. As-built total consumption: Energy consumption (MMBtu) of the built home
2. Reference total consumption: Energy consumption (MMBtu) of the reference baseline home
3. Percent improvement: Percent difference between as-built and reference consumption.

Non-critical, but useful, parameters included:

4. Style: Type of residence (e.g.: single-family stand-alone, multifamily)
5. Foundation type: Style of the residence's base construction (e.g.: basement, slab)
6. Conditioned area (ft^2): The residence's climate controlled
7. Primary heating: The main heating source for occupant comfort (e.g.: electric air-source heat pump, baseboard heat)

The key process findings include:

1. Trade allies (raters) are a key means of implementing the program.
2. Program documentation was good and should be converted into a full-fledged program handbook if the program moves from pilot to fully-fledged program.
3. Marketing collateral was well-done, but minor improvements are possible.
4. Raters and builders are satisfied with the program administration.

6.1 Recommendations

Review the tracking database regularly to ensure that all parameters have reasonable and accurate values. This will improve program transparency and increase the accuracy and speed of evaluations.

Clearly document the sources for the program's baseline energy standards. This will also increase transparency and expedite future evaluations.

If the pilot becomes a fully-fledged program, add to the program marketing plan document to make it a true program handbook. The handbook should include all of the information in the 2019 Marketing Plan document, plus a logic model, description of program activities, and a listing of the stakeholders involved.

DNV GL has two recommendations for the marketing materials:

- Ensure all hyperlinks on marketing materials work.
- If possible, track the number of clicks for each digital advertisement. Especially for a program such as this in the pilot stage, this would yield valuable information that would help guide effective graphics and messaging for future marketing materials.

Add content to the program website. A "success stories" section of the website that includes testimonials and endorsements by participating builders and current residents could help sell the program. Idaho Power already has some of this content in other marketing materials.

Add a URL to the program brochure that links builders with specific contact information for the raters. The instructions in the program brochure say to hire a RESNET-certified HERS Rater recognized by Idaho Power without specifically listing which raters are recognized or how to contact them. Because the list of approved HERS Raters may change over time, future iterations of the brochure could include a footnote or other note indicating that builders should visit the program website (which can be changed much more easily) for a list of approved raters along with contact information.

A few changes could improve the application form

- Be more specific about program requirements on the website and application form by clarifying that builders with multiple units may submit only one application with an attached list of homes and by using language such as "at least 20 percent more energy efficient than homes built to standard state energy code."
- Modify the name of the application form PDF on the program website from "termsConditions.pdf" to something more specific such as "IdahoPowerResNCApplication".

APPENDIX A. PROGRAM STAFF INTERVIEW GUIDE

Program Design

1. How are program energy savings goals determined?

Program Delivery

2. Walk us through program delivery.
3. What kind of QA/QC procedures are in place?
4. Who are the trade allies involved with delivery?
5. What (if any) training or education do you provide to trade allies?

Marketing and Outreach

6. The Annual Report is extremely detailed when it comes to marketing. Were there any marketing activities in 2018 that are not covered in that document?

Measures and Incentives

7. The TRM was updated in August of 2018. How will this affect our evaluation?
8. Other delivery-related things?

Processing, Paperwork, and Barriers

9. Talk about paperwork aspect of the program – how is that going?
10. Are you aware of, or planning, any paperwork or other requirement changes?

Overall Program Assessment

11. What challenges do you face in delivering this program?
12. Are there any other comments or observations you would like to make about the program that haven't already been mentioned? Anything that we should know for our evaluation?
13. Are there any particular things you are hoping to learn from our program evaluation?
14. Are there any particular questions you would like us to ask the program participants or trade allies?

APPENDIX B. TRADE ALLY INTERVIEW GUIDE

Program Delivery

1) How do you go about recruiting builders into participating in the Residential New Construction Program?
   a. What have you found to be the most effective way(s) to get builders interested?
   b. Have builders initiated and gotten in touch with you about participating?
   c. What barriers exist that make it difficult for builders to participate?
      i. What other competing priorities do builders have?
   d. What, if anything, do you think could increase builders' priority regarding energy efficiency?
   e. Currently, the performance level necessary to qualify for program incentives is 20% more energy efficient than state building code. In your opinion, how difficult is it for builders to attain this standard?
   f. Currently, the financial incentive for participating builders is $1,500 per home constructed. Do you think this is adequate to encourage builders to build to the higher standard?
      i. [IF NOT] What incentive level do you think would be more appropriate?
2) After you get a builder to commit to meeting the program requirements, what happens next?
   a. How often do you meet or have discussions with the builder?
      i. Describe these meetings. How are the meetings conducted and how is information presented?
      ii. Do you get into the specific details with builders, or are you mostly discussing things at a higher level?
   b. How is data recorded and transferred to Idaho Power?
      i. Do you have any ideas for how this process could work better?
   c. It is my understanding that the program uses REM/Rate energy modelling software. What is your opinion of this software tool as it is used for the program?
   d. It is my understanding that the program uses the AXIS database for savings calculations. What is your opinion of this software tool as it is used for the program?
3) What is the quality assurance process?
   a. Do you have any suggestions regarding the QA process?
4) The New Construction Program replaced the ENERGY STAR Northwest Homes program. Did you participate in that program?
   a. [IF YES] How would you compare the new pilot program to the previous program?
   b. [IF YES] Do you prefer certain aspects of this pilot to the previous program?

General/Communication

5) Who from Idaho Power do you interact with most frequently?

    a. What is the frequency and nature of those interactions?

6) Are you satisfied with the level of communication with Idaho Power?

    b. If not, how could it be improved?

Wrap-up

7) In your opinion, what aspects of the program are going well?

8) In your opinion, what aspects of the program show room for improvement?

9) Overall, how satisfied are you with the Residential New Construction program?

10) Idaho Power is interested in expanding this program in the future. Based on your experience with these programs and the new construction market in general, do you have any insight into how Idaho Power could best encourage builders to participate?

    a. One idea is to institute a tiered incentive system – for example, one incentive for achieving 10% above code, a higher incentive for 15% above code, a higher incentive for 20%, etc. Do you think builders would be more interested or less interested in participating in the New Construction program under this alternative system?

APPENDIX C. PROGRAM PARTICIPANT INTERVIEW GUIDE

Program Awareness

1) How did you first hear about Idaho Power's Residential New Construction program?
2) What motivated you to participate and build homes that would meet the program requirements?
    a. Did this program or the incentive that it provides cause any of your participating homes to be built with electric heating, or were they all going to be heated electrically anyway?

Program Participation

3) Please describe the process for "signing up" or committing to meet the program requirements.
    a. Did you "sign up" through IPC or through a rater?
    b. Do you have any recommendations for improving this process?
4) Please describe, during the building process, your interactions related to the program with the rater.
    a. How often did you communicate, and what was the typical nature of those interactions?
    b. Was the rater helpful throughout the design/construction process?
    c. Did the rater communicate effectively throughout this process?
    d. Do you have any recommendations for improving the process during construction?
5) The performance level of the homes necessary to qualify for program incentives in 2018 was 20% more energy efficient than state building code. In your opinion, how difficult was it to attain this standard?
    a. Do you think the homes you built that received the incentive through the program were significantly more energy-efficient than those same homes otherwise would have been (without the program)?

Barriers and Motivation

6) What barriers exist that make it difficult for builders to participate? This could be both program-related barriers and external (market) barriers.
    a. What other competing priorities do builders like yourself have?
    b. What, if anything, could increase builders' priority regarding energy efficiency? This could be things IPC or the program could do or external factors.
7) The financial incentive for participating builders in 2018 was $1,500 per home constructed. Do you think this is adequate to encourage builders to build to the higher energy performance standard?
    a. [IF NO] What level do you think would be more adequate to encourage this?
8) What are the non-energy benefits to building a home or a community that meet these program standards? For example, not having to build out a gas line.

Wrap-up

9) In your opinion, what aspects of the program worked well?

10) In your opinion, what aspects of the program showed room for improvement?

11) Overall, how satisfied are you with the Residential New Construction program?

12) Do you have any other recommendations for program improvement?

13) Idaho Power is interested in expanding this program in the future. Based on your experience with these programs and the new construction market in general, do you have any insight into how Idaho Power could best encourage builders to participate?

    a. One idea is to institute a tiered incentive system – for example, one incentive for achieving 10% above code, a higher incentive for 15% above code, a higher incentive for 20%, etc. Would you be more interested or less interested in participating in the New Construction program under an alternative system like this?

About DNV GL

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter, and greener.

OTHER REPORTS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2019 Flex Peak Program End-of-Season Annual Report	Commercial	Idaho Power	Idaho Power	Other
Historical DSM Expense and Performance, 2002–2019	Residential, Commercial/Industrial, Irrigation	Idaho Power	Idaho Power	Other
Home Energy Report Year 2 Public Program Summary Report	Residential	Aclara	Idaho Power	Summary
Idaho Power Energy Wise® Program Summary Report, 2018-2019	Residential	Resource Action Programs	Idaho Power	Summary
Irrigation Peak Rewards Program Report	Irrigation	Idaho Power	Idaho Power	Other
Regional Technical Forum 2020–2024 Business Plan	Residential, Commercial/Industrial, Irrigation	RTF	RTF	Business Plan
Residential Energy-Savings Kit Program Summary Report	Residential	RAP	Idaho Power	Summary

2019 Flex Peak Program
End-of-Season Annual Report

November 1, 2019

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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 A/C Cool Credit Program, have helped delay the need to build supply-side resources.

The results presented in this report are from the 2019 Program season, the Company's fifth year of operating the Program. In its fifth year, the Program maintained similar load reduction and realization rates as the prior year (2018). There were ten new sites added, and overall participation resulted in the highest hourly load reduction for the season of 31 megawatts ("MW"). The average realization rate for the three load reduction events that occurred in the 2019 Program season was 77 percent. Enrollment in the Program increased slightly for the 2019 Program season and 96 percent of previously participating sites re-enrolled in the Program. The total Program costs through October 1, 2019 were $606,129. The cost of having this resource available was $19.55 per kilowatt ("kW") based on the maximum demand reduction of 31 MW achieved on July 22, 2019.

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,[1] and the Public Utility Commission of Oregon ("OPUC") accepted the proposal from Advice No. 15-03.[2] 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

[1] *In the Matter of Idaho Power's Company's Application for Approval of New Tariff Schedule 82, A Commercial and Industrial Demand-Response Program (Flex Peak Program),* Case No. IPC-E-15-03, Order No. 33292 (May 7, 2015).

[2] Schedule 76, Flex Peak Program, Docket No. ADV 7/Advice No. 15-03 (approved April 28, 2015).

- 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[3] in Oregon and Schedule 82[4] 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.

[3] Idaho Power Company, P.U.C. ORE. No. E-27, Schedule 76.

[4] Idaho Power Company, I.P.U.C. No. 29, Tariff No. 101, Schedule 82.

- 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.

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 were issued the incentives within 30 days of the end of the Program season. Participants can elect to have their incentive checks mailed or their Idaho Power account credited within the 30 days. The incentive structure offered for the 2019 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 2019. The first event occurred on July 12, the second on July 22, and the third on August 6. The maximum realization rate achieved during the season was 86 percent during the event on August 6 and the average for all three events combined was 77 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 July 22 event at 31 MW.

Participants had a committed load reduction of 36.3 MW in the first week of the Program which was the peak committed load reduction for the season. This was an increase from the 2018 season at 29.4 MW. This weekly commitment, or “nomination”, was comprised of customers participating in the Program totaling 145 sites. Out of the total number of sites, 135 participated in the 2018 season, and ten sites were newly added in 2019. The committed load reduction at the end of the season was 35.5 MW.

The first event was called on Friday, July 12. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 36.3 MW. The average load reduction was 24 MW. The highest hourly load reduction was 25 MW during hour four. The realization rate for this event was 66 percent. The lower realization rate for this event was partially due to many sites not being able to curtail energy use on a Friday afternoon heading into the weekend due to operational and staffing constraints.

The second event was called on Monday, July 22. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 35.7 MW. The average load reduction was 28.5 MW. The highest hourly load reduction was 31 MW during hour one. The realization rate for this event was 80 percent.

The third event was called on Tuesday, August 6. 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 MW. The average load reduction was 30 MW. The highest hourly load reduction was 30.5 MW during hour three. The realization rate for this event was 86 percent.

Enrollment specific to the Oregon service area included six participants totaling nine sites enrolled. These nine sites had an average nominated capacity for the season of 10.6 MW and achieved a maximum reduction during the season of 10.9 MW during hour four on the July 22 event.

Participation

The number of sites enrolled in the Program for 2019 was 145 from 64 participants, with ten new sites enrolling for the Program season. The average number of sites enrolled per participating customer was 2.3. The Program did not experience significant attrition and re-enrollment in the Program was high as 135 of the 140 sites participating from the prior season re-enrolled. Four sites from one participant did not re-enroll from the 2018 season because their businesses closed, and the other one site reduced its operating hours significantly which no longer made it a good program candidate.

This past season Idaho Power continued the auto-enrollment option where existing participants were re-enrolled in the Program automatically and mailed a confirmation packet early in March based on the prior year’s enrollment information. Participants notified the Company in writing if they no longer wanted to participate as well as to change their nomination amount or update/change contact information regarding personnel for event notification. The auto-enrollment implementation was successful, and the Company anticipates utilizing this process in the future.

Pursuant to the Settlement Agreement approved in IPUC Case No. IPC-E-13-14[5] and OPUC UM 1653[6] ("Settlement"), Idaho Power did not actively seek to expand the agreed upon 35 MW enrollment capacity but did recruit nominated capacity slightly above 35 MW in case any customers would again need to reduce their nomination before the season started. The Company has continued to strive to maintain the number and size diversity (in terms of nominated load reduction) of sites enrolled. The breakout of nomination groups among the sites has stayed very consistent from the 2018 season with the largest quantity of sites falling within the 0-50 kW segment followed by 51-200 kW. The Company did not deny any Program applications in 2019.

Below is list of what was conducted in addition to the normal Energy Advisor visits with existing participants and potential future enrollees.

- February: New brochures and reduction tip sheets were created for distribution
- April: Article in *Energy@Work* print newsletter to over 24,700 customers
- April: Article in *Energy@Work* email newsletter to over 11,400 customers
- April: LinkedIn post
- April: LinkedIn ad
  - 143,673 impressions
  - 1,215 clicks to the Flex Peak web page
- August: LinkedIn post thanking participants

[5] *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.

[6] *In the Matter of Idaho Power Company, Staff Evaluation of the Demand Response Programs*, UM 1653, Order No. 13-482.

Figure 1 represents Idaho Power's service area divided into three regional areas with two sub areas: Canyon, (Canyon West) Capital and Southern (South East).

Figure 1.

Figure 2 represents the enrolled capacity (total nominations) that were enrolled in 2019 and the distribution by Idaho Power's regional service areas.

Figure 2.

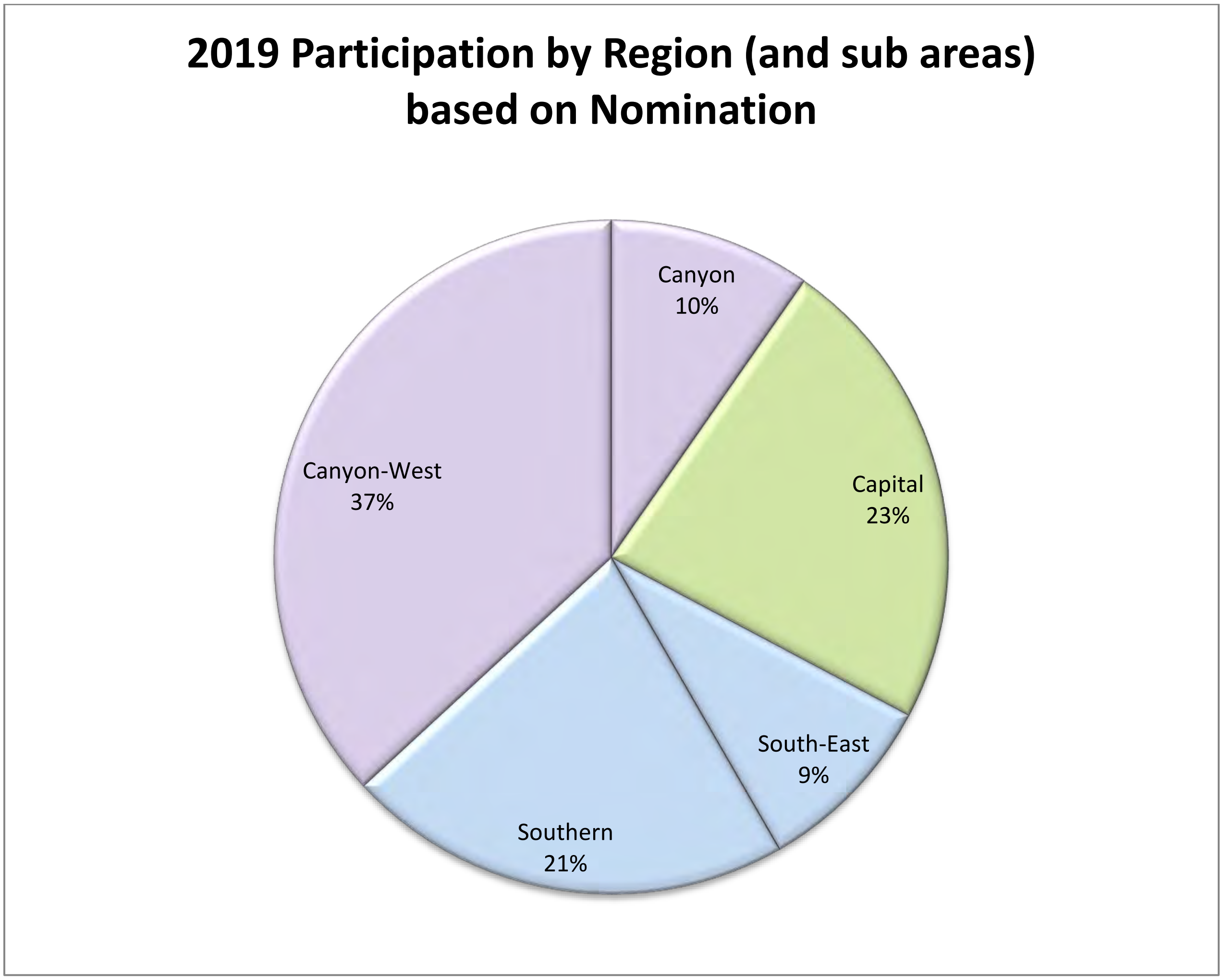
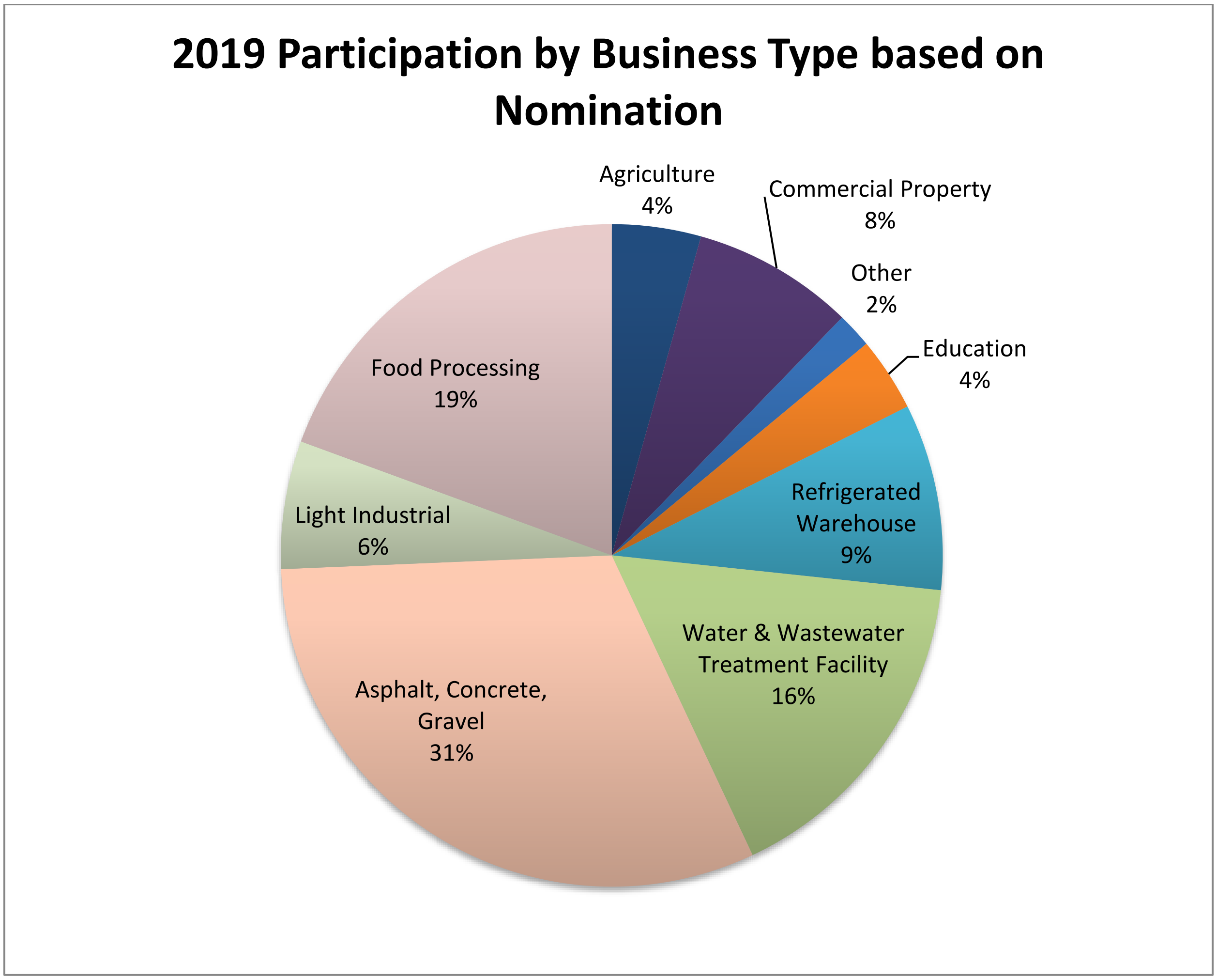


Figure 3 represents the enrolled capacity in 2019 and the diversity based on business type.

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. This data is provided to assist 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 2019 was 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 2019 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.

As Figure 4 below depicts, the most commonly nominated load reduction was in the 0-50 kW range, accounting for approximately 39 percent of the sites.

Figure 4.

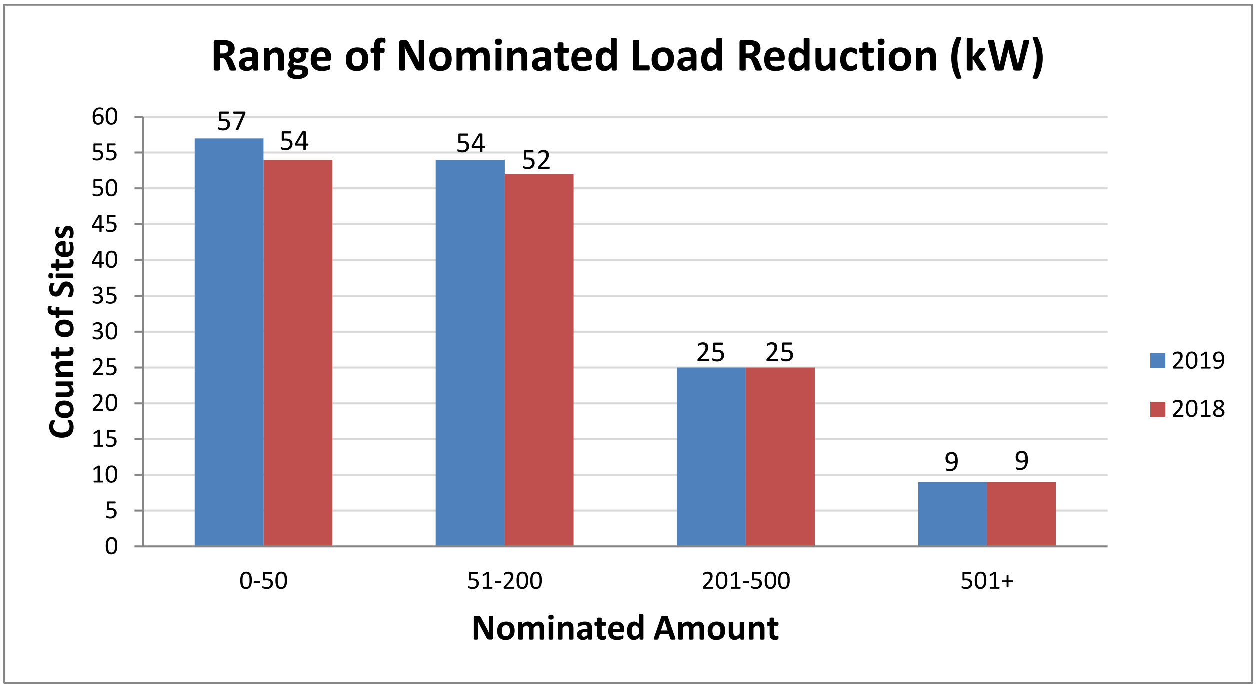


Table 2 shows the Program realization rates for 2019 based on average load reduction per event.

Table 2.

Curtailment Event	Event Timeframe	Nominated Demand Reduction	Average Demand Reduction (MW)	Max Demand Reduction (MW)	Realization Rate*
July 12	4-8 pm	36.3	24	25	66%
July 22	4-8 pm	35.7	28.5	31	80%
August 6	4-8 pm	35	30	30.5	86%
Average		35.6	27.5	28.8	77%

** 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 MW for the July 12 event to a high of 31 MW for the July 22 event. The July 12 event's average of 24 MW reduction achieved a realization rate of 66 percent, while the August 6 event's average of 30 MW reduction achieved a realization rate of 86 percent. Combined, the three events had an average realization rate of 77 percent.

Figure 5.

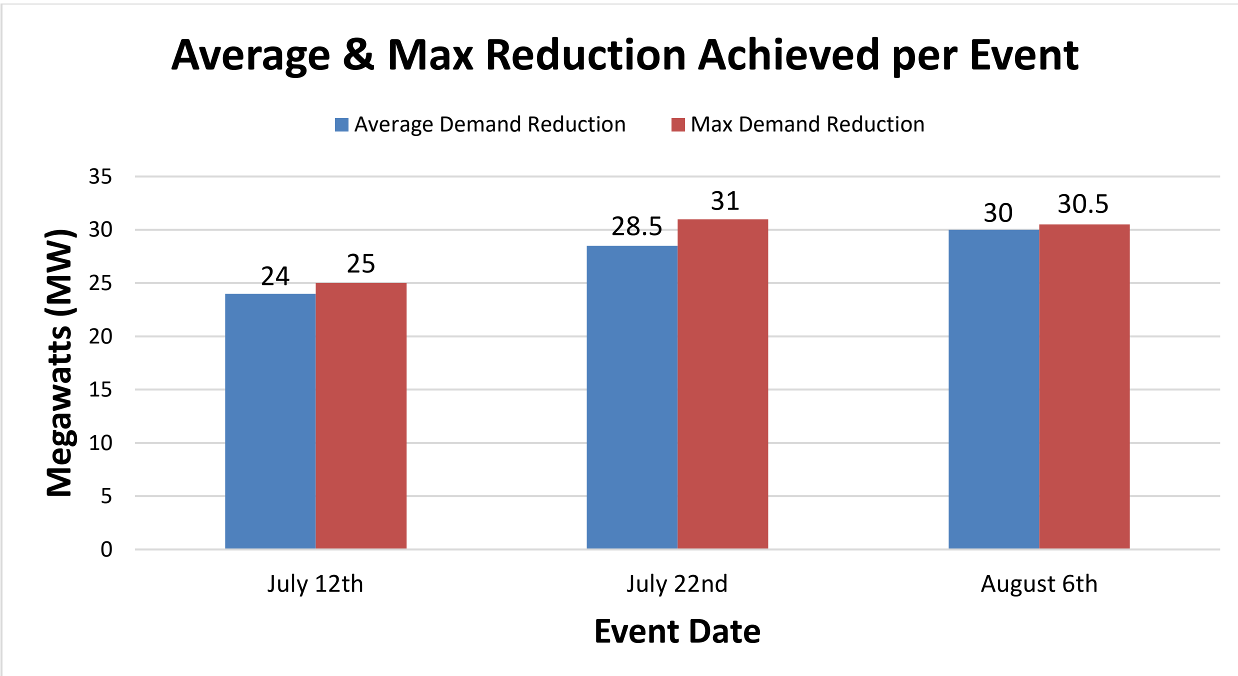


Table 3 shows the realization rate for each participant in the Program for 2019.

Table 3.

Participant Number	July 12 Event Realization	July 22 Event Realization	August 6 Event Realization	Season Realization
1	0%	103%	86%	63%
2	4%	4%	2%	3%
3	88%	110%	111%	103%
4	10%	76%	19%	35%
5	184%	135%	0%	106%
6	71%	112%	100%	94%
7	54%	69%	30%	51%
8	137%	134%	NA	135%
9	82%	111%	107%	100%
10	7%	28%	91%	42%
11	1%	1%	1%	1%
12	55%	53%	9%	39%
13	83%	92%	28%	68%
14	68%	132%	130%	110%
15	21%	35%	74%	43%
16	35%	6%	4%	15%
17	0%	2%	56%	19%
18	173%	85%	89%	116%
19	79%	109%	154%	114%
20	147%	132%	104%	126%
21	82%	323%	191%	199%
22	72%	37%	37%	49%
23	129%	97%	129%	118%
24	5%	10%	0%	5%
25	62%	74%	82%	73%
26	0%	125%	70%	65%
27	16%	105%	85%	69%
28	23%	30%	31%	28%
29	180%	214%	61%	152%
30	290%	126%	713%	377%
31	218%	179%	217%	205%
32	77%	157%	95%	110%
33	1%	41%	132%	58%
34	9%	260%	249%	173%
35	14%	4%	23%	14%

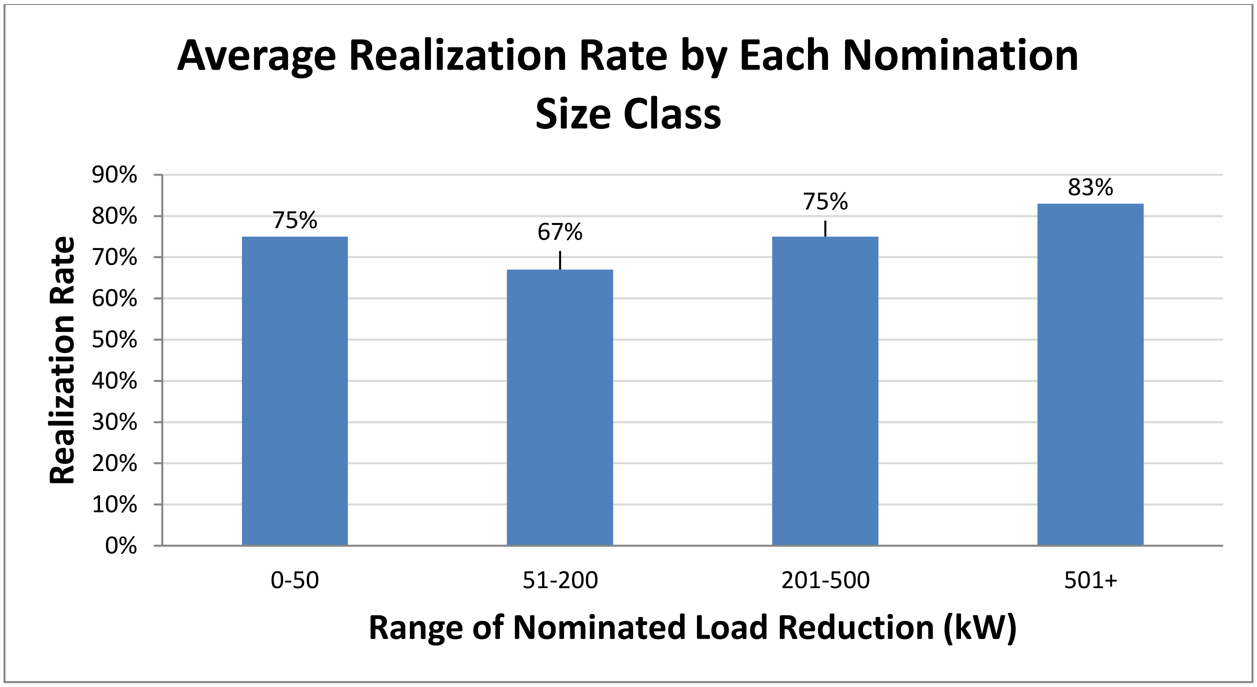
36	82%	82%	70%	78%
37	139%	99%	101%	113%
38	153%	14%	0%	55%
39	0%	87%	70%	52%
40	158%	0%	39%	66%
41	85%	25%	64%	58%
42	98%	64%	169%	111%
43	14%	10%	8%	11%
44	9%	11%	15%	12%
45	4%	0%	110%	38%
46	0%	74%	198%	90%
47	85%	182%	34%	100%
48	122%	0%	0%	41%
49	0%	14%	36%	17%
50	2%	NA	NA	2%
51	20%	3%	37%	20%
52	259%	0%	0%	86%
53	12%	NA	NA	12%
54	45%	7%	18%	23%
55	14%	56%	66%	45%
56	16%	30%	37%	28%
57	109%	122%	58%	96%
58	87%	122%	107%	105%
59	83%	28%	80%	64%
60	276%	0%	200%	135%
61	26%	0%	5%	10%
62	66%	52%	72%	63%
63	76%	147%	60%	94%
64	29%	6%	NA	18%

NA- signifies participants that opted out for that specific event or disenrolled mid-way through the 2019 season.

Broken out across four size segments, the sites with the smallest nominated load reduction, 0–50 kW, achieved a realization rate across the three events at 75 percent. The 0-50 kW group had the largest portion of sites enrolled in the Program, totaling 57 sites which accounted for 39 percent of total enrolled sites. The second smallest size class, 51–200 kW, had 54 sites enrolled and achieved the lowest average realization rate at 67 percent. The 201-500 kW group had 25 sites enrolled and achieved a realization rate of 75 percent. The largest size class, 501+ kW, had nine sites enrolled and achieved the highest average realization rate across the three events at 83 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 $606,129 through October 1, 2019. Incentive payments were the largest expenditure comprising approximately 90 percent of total costs.

The incentive payments from the three events called during the 2019 Program season were broken down as follows: the fixed capacity payments total was $547,527 and the variable energy payment 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,[7] the total Program costs for 2019 are estimated to be $19.55 per kW based on the maximum demand reduction of 31 MW, or $22.00 per kW, based on average load reduction for the season of 27.5 MW.

[7] Final Program costs for 2019 will be available after the close of the Company's 2019 financial reporting year, December 31, 2019.

Table 4 below displays the 2019 year-to-date ("YTD") Program costs by expense category.

Table 4.

Expense Category	2019 YTD Program Costs
Materials & Equipment	$1,113
Marketing & Administration	$57,489
Incentive payments	$547,527
Total	**$606,129**

Benefit-Cost Analysis

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 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 *2017 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.

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 2017 IRP to be $19.8 million.

In 2019, the preliminary cost estimate of operating all three of Idaho Power's DR programs was $8.1 million through October 1, 2019. It is estimated that if the three programs were dispatched for the full 60 hours, the total costs would have been approximately $11.3 million, which is below the total annual costs agreed upon in the Settlement as revised in the 2017 IRP.

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 2019 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 Load Serving Operators balancing the forecast when it did not align with actual peak load, as well as potentially avoid additional market purchases. Based on market prices for each of the days in 2019 the Program was dispatched, Idaho Power estimates the Program saved a total of $13,000 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.

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 2019 Annual Report when all the data will be available.

Customer Satisfaction Results

Idaho Power conducted a post-season online survey this year which was sent to all participants. The survey questions were based on a five-point rating scale. Idaho Power received feedback from 24 of 63 (excluding the Idaho Power facility that participates) participants enrolled for a response rate of 38 percent. Overall, the results from the survey were favorable with roughly 96 percent of respondents stating they would likely re-enroll in the Program in the future and about 88 percent of respondents stating they were satisfied with their overall experience with the Program. The results from the 2019 survey will be discussed in more detail in Supplement Two of the 2019 Demand-Side Management Annual Report.

In addition to the survey, the Company engaged customers at the end of the season by sending thank you cards to all participants with an average realization rate of 60 percent or greater across all three events during the 2019 season.

Program Activities for 2020

The primary improvement Idaho Power and the Program could benefit from is more consistent load reduction when events are called to achieve a higher realization rate. The Company will continue to communicate the value proposition with enrolled participants and the importance of active participation when events are called. Recruitment efforts for the 2020 season will begin the fourth quarter of 2019 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 Specialist has already started working with potential candidates for the 2020 season with an increased focus on enrolling national chain stores within our service area. This customer type makes a good candidate for the program due to extended operating hours, non-production load types and consistent energy usage profiles.

The Program will be jointly marketed along with Idaho Power's applicable energy efficiency programs as needed. The Company will utilize its Energy Advisors 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 participants and will more pro-actively work with the Marketing Specialist to promote the Program at Company sponsored events and trainings. The Company recognizes there is attrition over time and many participants may reduce their nomination based on operational and business needs, so it is important to consistently have approximately 37 MW of nominated capacity available. This level of nominated capacity will allow events to achieve 35 MW of load reduction considering the typical realization rate of nominated capacity ranging from 85-95 percent.

Conclusion

The Program currently contributes approximately ten 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 cost of having this resource available was $22.00 per kW based on average reduction (27.5 MW) for the season.

Historical DSM Expense and Performance

2002–2019

An IDACORP Company

Historical DSM Expense and Performance, 2002–2019

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
Demand Response								
A/C Cool Credit								
2003	204	$ 275,645	$ 275,645		0.0			
2004	420	287,253	287,253		0.5			
2005	2,369	754,062	754,062		3			
2006	5,369	1,235,476	1,235,476		6			
2007	13,692	2,426,154	2,426,154		12			
2008	20,195	2,969,377	2,969,377		26			
2009	30,391	3,451,988	3,451,988		39			
2010	30,803	2,002,546	2,002,546		39			
2011	37,728	2,896,542	2,896,542		24			
2012	36,454	5,727,994	5,727,994		45			
2013	n/a	663,858	663,858		n/a			
2014	29,642	1,465,646	1,465,646		44			
2015	29,000	1,148,935	1,148,935		36			
2016	28,315	1,103,295	1,103,295		34			
2017	28,214	936,272	936,272		29			
2018	26,182	844,369	844,369		29			
2019	23,802	877,665	877,665		24			
Total		**$ 29,067,077**	**$ 29,067,077**					
Flex Peak Program								
2009	33	528,681	528,681		19			
2010	60	1,902,680	1,902,680		48			
2011	111	2,057,730	2,057,730		59			
2012	102	3,009,822	3,009,822		53			
2013	100	2,743,615	2,743,615		48			
2014	93	1,563,211	1,563,211		40			
2015	72	592,872	592,872		26			
2016	137	767,997	767,997		42			
2017	141	658,156	658,156		36			

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2018	140	433,313	433,313		33			
2019	145	626,823	626,823		31			
Total		**$ 14,884,898**	**$ 14,884,899**					
Irrigation Peak Rewards								
2004	58	344,714	344,714		6			
2005	894	1,468,282	1,468,282		40			
2006	906	1,324,418	1,324,418		32			
2007	947	1,615,881	1,615,881		37			
2008	897	1,431,840	1,431,840		35			
2009	1,512	9,655,283	9,655,283		160			
2010	2,038	13,330,826	13,330,826		250			
2011	2,342	12,086,222	12,086,222		320			
2012	2,433	12,423,364	12,423,364		340			
2013	n/a	2,072,107	2,072,107		n/a			
2014	2,225	7,597,213	7,597,213		295			
2015	2,259	7,258,831	7,258,831		305			
2016	2,286	7,600,076	7,600,076		303			
2017	2,307	7,223,101	7,223,101		318			
2018	2,335	6,891,737	6,891,737		297			
2019	2,332	6,771,708	6,771,708		278			
Total		**$ 99,095,603**	**$ 99,095,603**					
Residential Efficiency								
Ductless Heat Pump Pilot								
2009	96	202,005	451,605	409,180		18	0.031	0.086
2010	104	189,231	439,559	364,000		20	0.044	0.103
2011	131	191,183	550,033	458,500		20	0.028	0.081
2012	127	159,867	617,833	444,500		20	0.024	0.094
2013	215	237,575	992,440	589,142		15	0.032	0.132
2014	179	251,446	884,211	462,747		15	0.042	0.148
Total	**852**	**$ 1,231,307**	**$ 3,935,681**	**2,728,069**		15	**$ 0.044**	**$ 0.138**

Program/Year	Participants		Total Costs: Utility Cost [b]		Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)		Levelized Costs [a]: Total Utility ($/kWh)		Levelized Costs [a]: Total Resource ($/kWh)
2015	2,068		127,477		127,477	624,536		10		0.021		0.021
2016	2,001		127,587		127,587	402,961		9		0.035		0.035
2017	2,470		149,813		149,813	280,049		8		0.064		0.064
2018	282		147,936		147,936	29,610		3		1.370		1.370
2019	430		145,494		145,494	45,150		3		0.885		0.885
Total	**7,251**	**$**	**698,306**	**$**	**698,306**	**1,382,306**		**9**	**$**	**0.068**	**$**	**0.068**
Educational Distributions												
2015	28,197		432,185		432,185	1,669,495		10		0.026		0.026
2016	67,065		2,392,884		2,392,884	15,149,605		10		0.016		0.016
2017	84,399		3,466,027		3,466,027	21,187,261		11		0.016		0.016
2018	94,717		3,180,380		3,180,380	16,051,888		11		0.019		0.019
2019	95,528		2,880,467		2,880,467	10,805,474		11		0.025		0.025
Total	**369,906**	**$**	**12,351,943**	**$**	**$12,351,943**	**64,863,723**		**11**	**$**	**0.022**	**$**	**0.022**
2002	2,925		755		755	155,757		7		0.001		0.001
Total	**2,925**	**$**	**755**	**$**	**755**	**155,757**		**7**	**$**	**0.001**	**$**	**0.001**
2002	11,618		243,033		310,643	3,299,654		7		0.012		0.015
2003	12,662		314,641		464,059	3,596,150		7		0.014		0.021
2004	n/a		n/a		n/a	n/a				n/a		n/a
2005	43,760		73,152		107,810	1,734,646		7		0.007		0.010
2006	178,514		298,754		539,877	6,302,794		7		0.008		0.014
2007	219,739		557,646		433,626	7,207,439		7		0.012		0.017
2008	436,234		1,018,292		793,265	14,309,444		7		0.011		0.013
2009	549,846		1,207,366		1,456,796	13,410,748		5		0.020		0.024
2010	1,190,139		2,501,278		3,976,476	28,082,738		5		0.020		0.031
2011	1,039,755		1,719,133		2,764,623	19,694,381		5		0.015		0.024
2012	925,460		1,126,836		2,407,355	16,708,659		5		0.012		0.025
2013	1,085,225		1,356,926		4,889,501	9,995,753		8		0.016		0.058
2014	1,161,553		1,909,823		7,148,427	12,882,151		8		0.018		0.066
2015	1,343,255		2,063,383		4,428,676	15,876,117		10		0.013		0.028
2016	1,442,561		3,080,708		10,770,703	21,093,813		11		0.014		0.049

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2017	1,766,758	4,872,888	11,078,990	37,765,190		12	0.012	0.026
2018	1,340,842	2,435,130	3,277,039	18,856,933		14	0.011	0.014
2019	1,336,440	2,126,262	2,782,039	16,245,551		14	0.011	0.014
Total	**14,084,361**	**$ 26,905,250**	**$ 57,629,905**	**247,062,160**		**9**	**$ 0.015**	**$ 0.031**
Energy House Calls								
2002	17	26,053	26,053	25,989		20	0.082	0.082
2003	420	167,076	167,076	602,723		20	0.023	0.023
2004	1,708	725,981	725,981	2,349,783		20	0.025	0.025
2005	891	375,610	375,610	1,775,770		20	0.017	0.017
2006	819	336,701	336,701	777,244		20	0.035	0.035
2007	700	336,372	336,372	699,899		20	0.039	0.039
2008	1,099	484,379	484,379	883,038		20	0.045	0.045
2009	1,266	569,594	569,594	928,875		20	0.052	0.052
2010	1,602	762,330	762,330	1,198,655		20	0.054	0.054
2011	881	483,375	483,375	1,214,004		20	0.027	0.027
2012	668	275,884	275,884	1,192,039		18	0.016	0.016
2013	411	199,995	199,995	837,261		18	0.016	0.016
2014	297	197,987	197,987	579,126		18	0.029	0.029
2015	362	214,103	214,103	754,646		18	0.020	0.020
2016	375	206,437	206,437	509,859		18	0.029	0.029
2017	335	183,035	183,035	428,819		16	0.032	0.032
2018	280	160,777	160,777	374,484		16	0.032	0.032
2019	248	161,894	161,894	309,154		16	0.039	0.039
Total	**12,379**	**$ 5,867,582**	**$ 5,867,582**	**15,441,368**		**19**	**$ 0.032**	**$ 0.032**
ENERGY STAR® Homes Northwest (gas heated)								
2014	282			195,372		22		
2015	69			46,872		22		
Total	**351**	**$ 0**	**$ 0**	**242,244**		**22**		
Fridge and Freezer Recycling Program								
2009	1,661	305,401	305,401	1,132,802		8	0.041	0.041
2010	3,152	565,079	565,079	1,567,736		8	0.054	0.054
2011	3,449	654,393	654,393	1,712,423		8	0.046	0.046
2012	3,176	613,146	613,146	1,576,426		8	0.046	0.046

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2013	3,307	589,054	589,054	1,442,344		8	0.061	0.061
2014	3,194	576,051	576,051	1,390,760		6	0.062	0.062
2015	1,630	227,179	227,179	720,208		6	0.048	0.048
2016	1,539	257,916	257,916	632,186		6	0.062	0.062
2017	2,031	265,942	265,942	498,513		6	0.080	0.080
2018	304	33,907	33,907	73,602		7	0.061	0.061
Total	**23,443**	**$ 4,088,069**	**$ 4,088,069**	**10,747,000**		**7**	**$ 0.062**	**$ 0.062**
2006		17,444	17,444					
2007	4	488,211	494,989	1,595		18	27.344	27.710
2008	359	473,551	599,771	561,440		18	0.073	0.092
2009	349	478,373	764,671	1,274,829		18	0.034	0.054
2010	217	327,669	1,073,604	1,104,497		20	0.025	0.083
2011	130	195,770	614,523	733,405		20	0.018	0.056
2012	141	182,281	676,530	688,855		20	0.018	0.066
2013	210	329,674	741,586	1,003,730		20	0.022	0.050
2014	230	362,014	1,247,560	1,099,464		20	0.022	0.075
2015	427	626,369	2,064,055	1,502,172		20	0.028	0.092
2016	483	594,913	1,404,625	1,113,574		20	0.040	0.040
2017	654	597,198	1,433,357	1,138,744		15	0.041	0.099
2018	712	585,211	1,686,618	1,556,065		15	0.029	0.085
2019	681	499,179	1,512,183	1,412,183		15	0.028	0.084
Total	**4,597**	**$ 5,757,857**	**$ 14,331,515**	**13,190,713**		**18**	**$ 0.038**	**$ 0.094**
Home Energy Audits								
2013		88,740	88,740					
2014	354	170,648	170,648	141,077		10	0.150	0.150
2015	251	201,957	226,806	136,002		10	0.184	0.184
2016	539	289,812	289,812	207,249		11	0.163	0.163
2017	524	282,809	353,385	175,010		12	0.146	0.182
2018	466	264,394	321,978	211,003		12	0.113	0.137
2019	421	230,786	282,215	179,754		11	0.122	0.150
Total	**2,555**	**$ 1,529,146**	**$ 1,733,584**	**1,050,095**		**11**	**$ 0.169**	**$ 0.192**

Program/Year	Participants	Total Costs: Utility Cost [b]	Total Costs: Resource Cost [c]	Savings and Demand Reductions: Annual Energy [e] (kWh)	Savings and Demand Reductions: Peak Demand [f] (MW)	Measure Life (Years)	Levelized Costs [a]: Total Utility ($/kWh)	Levelized Costs [a]: Total Resource ($/kWh)
Home Energy Reports Pilot Program								
2018	23,914	194,812	194,812	3,281,780		1	0.046	0.046
2019	24,976	200,406	200,406	8,444,746		1	0.018	0.018
Total	**48,890**	**$ 395,218**	**$ 395,218**	**11,726,526**		**1**	**$ 0.032**	**$ 0.032**
Home Improvement Program								
2008	282	123,454	157,866	317,814		25	0.029	0.037
2009	1,188	321,140	550,148	1,338,876		25	0.019	0.032
2010	3,537	944,716	2,112,737	3,986,199		45	0.016	0.035
2011	2,275	666,041	2,704,816	917,519		45	0.038	0.155
2012	840	385,091	812,827	457,353		45	0.044	0.093
2013	365	299,497	1,061,314	616,044		45	0.025	0.090
2014	555	324,717	896,246	838,929		45	0.020	0.055
2015	408	272,509	893,731	303,580		45	0.046	0.152
2016	482	324,024	1,685,301	500,280		45	0.034	0.177
2017	355	166,830	1,345,002	415,824		45	0.021	0.167
2018		2,926	2,926					
Total	**10,287**	**$ 3,830,946**	**$ 12,222,915**	**9,692,418**		**42**	**$ 0.025**	**$ 0.080**
Multifamily Energy Savings Program								
2016	196	59,046	59,046	149,760		10	0.040	0.040
2017	683	168,216	168,216	617,542		11	0.026	0.026
2018	764	205,131	205,131	655,953		11	0.030	0.030
2019	457	131,306	131,306	346,107		11	0.036	0.036
Total	**2,100**	**$ 563,699**	**$ 563,699**	**1,769,362**		**11**	**$ 0.037**	**$ 0.037**
Oregon Residential Weatherization								
2002	24	-662	23,971	4,580		25	0.010	0.389
2003		-943						
2004	4	1,057	1,057					
2005	4	612	3,608	7,927		25	0.006	0.034
2006		4,126	4,126					
2007	1	3,781	5,589	9,971		25	0.028	0.042
2008	3	7,417	28,752	22,196		25	0.025	0.096
2009	1	7,645	8,410	2,907		25	0.203	0.223

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2010	1	6,050	6,275	320		30	0.011	0.062
2011	8	7,926	10,208	21,908		30	0.021	0.027
2012	5	4,516	11,657	11,985		30	0.022	0.056
2013	14	9,017	14,369	14,907		30	0.035	0.055
2014	13	5,462	9,723	11,032		30	0.028	0.050
2015	4	5,808	10,388	11,910		30	0.028	0.050
2016	7	3,930	5,900	2,847		30	0.079	0.118
2017	7	2,384	3,755	2,154		30	0.063	0.099
2018	5	5,507	5,507					
2019	8	5,982	14,432	2,069		45	0.149	0.360
Total	**109**	**$ 79,615**	**$ 167,727**	**126,713**		**28**	**$ 0.045**	**$ 0.094**
Rebate Advantage								
2003	73	27,372	79,399	227,434		45	0.008	0.022
2004	105	52,187	178,712	332,587		45	0.010	0.034
2005	98	46,173	158,462	312,311		45	0.009	0.032
2006	102	52,673	140,289	333,494		45	0.010	0.027
2007	123	89,269	182,152	554,018		45	0.010	0.021
2008	107	90,888	179,868	463,401		45	0.012	0.025
2009	57	49,525	93,073	247,348		25	0.015	0.029
2010	35	39,402	66,142	164,894		25	0.018	0.031
2011	25	63,469	85,044	159,325		25	0.024	0.033
2012	35	37,241	71,911	187,108		25	0.012	0.024
2013	42	60,770	92,690	269,891		25	0.014	0.021
2014	44	63,231	89,699	269,643		25	0.014	0.020
2015	58	85,438	117,322	358,683		25	0.014	0.020
2016	66	111,050	148,142	411,272		25	0.016	0.022
2017	66	104,996	229,104	214,479		45	0.025	0.055
2018	107	147,483	355,115	284,559		45	0.027	0.064
2019	109	156,748	355,897	353,615		44	0.023	0.052
Total	**1,252**	**$ 1,277,917**	**$ 2,623,021**	**5,144,062**		**38**	**$ 0.016**	**$ 0.033**
Residential New Construction Pilot Program (ENERGY STAR® Homes Northwest)								
2003		13,597	13,597	0				
2004	44	140,165	335,437	101,200		25	0.103	0.246

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2005	200	253,105	315,311	415,600		25	0.045	0.056
2006	439	469,609	602,651	912,242		25	0.038	0.049
2007	303	475,044	400,637	629,634		25	0.056	0.047
2008	254	302,061	375,007	468,958		25	0.048	0.059
2009	474	355,623	498,622	705,784		25	0.039	0.055
2010	630	375,605	579,495	883,260		25	0.033	0.051
2011	308	259,762	651,249	728,030		32	0.020	0.051
2012	410	453,186	871,310	537,447		35	0.046	0.089
2013	267	352,882	697,682	365,370		36	0.053	0.104
2014	243	343,277	689,021	332,682		36	0.057	0.114
2015	598	653,674	1,412,126	773,812		36	0.046	0.099
2016	110	142,158	297,518	150,282		36	0.051	0.107
2017	277	323,520	603,420	608,292		45	0.029	0.054
2018	307	400,912	926,958	777,369		36	0.028	0.064
2019	322	534,118	1,411,391	774,597		54	0.035	0.092
Total	**5,186**	**$ 5,848,297**	**$ 10,681,433**	**9,164,559**		**33**	**$ 0.043**	**$ 0.078**
Shade Tree Project								
2014	2,041	147,290	147,290					
2015	1,925	105,392	105,392					
2016	2,070	76,642	76,642					
2017	2,711	195,817	195,817					
2018	2,093	162,995	162,995	35,571		20	0.307	0.307
2019	2,063	147,750	147,750	35,727		30	0.235	0.235
Total	**12,903**	**$ 835,886**	**$ 835,886**	**71,298**		25	**$ 0.868**	**$ 0.868**
Simple Steps, Smart Savings								
2007		9,275	9,275	0				
2008	3,034	250,860	468,056	541,615		15	0.044	0.082
2009	9,499	511,313	844,811	1,638,038		15	0.031	0.051
2010	16,322	832,161	1,025,151	1,443,580		15	0.057	0.070
2011	15,896	638,323	1,520,977	1,485,326		15	0.034	0.080
2012	16,675	659,032	817,924	887,222		14	0.061	0.075
2013	13,792	405,515	702,536	885,980		12	0.041	0.071

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2014	10,061	227,176	302,289	652,129		12	0.031	0.041
2015	9,343	139,096	397,898	770,822		10	0.018	0.053
2016	7,880	153,784	379,752	577,320		11	0.025	0.063
2017	12,556	191,621	484,380	900,171		11	0.020	0.051
2018	7,377	90,484	133,101	241,215		12	0.034	0.050
2019	5,729	90,499	123,541	271,452		11	0.032	0.043
Total	**128,164**	**$ 4,199,139**	**$ 7,209,692**	**10,294,870**		**13**	**$ 0.042**	**$ 0.073**
Weatherization Solutions for Eligible Customers								
2008	16	52,807	52,807	71,680		25	0.057	0.057
2009	41	162,995	162,995	211,719		25	0.059	0.059
2010	47	228,425	228,425	313,309		25	0.056	0.056
2011	117	788,148	788,148	1,141,194		25	0.042	0.042
2012	141	1,070,556	1,070,556	257,466		25	0.254	0.254
2013	166	1,267,791	1,267,791	303,116		25	0.240	0.240
2014	118	791,344	791,344	290,926		25	0.163	0.163
2015	171	1,243,269	1,243,269	432,958		25	0.175	0.175
2016	147	1,323,793	1,323,793	621,653		25	0.130	0.130
2017	164	1,108,862	1,121,071	604,733		23	0.115	0.117
2018	141	1,022,471	1,022,471	571,741		23	0.112	0.112
2019	129	957,626	957,626	504,988		23	0.119	0.119
Total	**1,398**	**$ 10,018,086**	**$ 10,030,296**	**5,325,483**		**24**	**$ 0.142**	**$ 0.142**
Window AC Trade Up Pilot								
2003	99	6,687	10,492	14,454		12	0.051	0.079
Total	**99**	**$ 6,687**	**$ 10,492**	**14,454**		**12**	**$ 0.051**	**$ 0.079**
Residential—Weatherization Assistance for Qualified Customers (WAQC)								
WAQC—Idaho								
2002	197	235,048	492,139					
2003	208	228,134	483,369					
2004	269	498,474	859,482	1,271,677		25	0.029	0.050
2005	570	1,402,487	1,927,424	3,179,311		25	0.033	0.045
2006	540	1,455,373	2,231,086	2,958,024		25	0.037	0.056
2007	397	1,292,930	1,757,105	3,296,019		25	0.029	0.040
2008	439	1,375,632	1,755,749	4,064,301		25	0.025	0.032

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2009	427	1,260,922	1,937,578	4,563,832		25	0.021	0.033
2010	373	1,205,446	2,782,597	3,452,025		25	0.026	0.060
2011	273	1,278,112	1,861,836	2,648,676		25	0.036	0.052
2012	228	1,321,927	1,743,863	621,464		25	0.157	0.208
2013	245	1,336,742	1,984,173	657,580		25	0.150	0.223
2014	244	1,267,212	1,902,615	509,620		25	0.184	0.276
2015	233	1,278,159	2,072,901	529,426		25	0.179	0.290
2016	234	1,254,338	1,870,481	722,430		25	0.129	0.192
2017	196	1,269,507	1,721,632	654,464		30	0.134	0.182
2018	190	1,254,630	1,795,301	641,619		30	0.136	0.194
2019	193	1,264,767	1,890,584	639,880		30	0.137	0.205
Total	**5,456**	**$ 20,479,840**	**$ 31,069,915**	**30,410,349**		**25**	**$ 0.050**	**$ 0.076**
WAQC—Oregon								
2002	31	24,773	47,221	68,323		25	0.027	0.051
2003	29	22,255	42,335	102,643		25	0.016	0.031
2004	17	13,469	25,452	28,436		25	0.035	0.067
2005	28	44,348	59,443	94,279		25	0.035	0.047
2006						25		
2007	11	30,694	41,700	42,108		25	0.054	0.074
2008	14	43,843	74,048	73,841		25	0.040	0.068
2009	10	33,940	46,513	114,982		25	0.023	0.031
2010	27	115,686	147,712	289,627		25	0.030	0.038
2011	14	46,303	63,981	134,972		25	0.025	0.035
2012	10	48,214	76,083	26,840		25	0.133	0.210
2013	9	54,935	67,847	24,156		25	0.168	0.208
2014	11	52,900	94,493	24,180		25	0.162	0.289
2015	10	36,873	46,900	20,595		25	0.133	0.169
2016	12	35,471	63,934	23,732		25	0.111	0.199
2017	7	37,978	61,052	15,074		30	0.175	0.281
2018	3	18,344	24,191	7,886		30	0.161	0.213
2019	4	38,960	62,905	9,419		30	0.287	0.463
Total	**247**	**$ 698,985**	**$ 1,045,810**	**1,101,093**		**25**	**$ 0.047**	**$ 0.070**

		Total Costs			Savings and Demand Reductions			Levelized Costs [a]			
Program/Year	Participants		Utility Cost [b]		Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)		Total Utility ($/kWh)		Total Resource ($/kWh)
WAQC—BPA Supplemental												
2002	75		55,966		118,255	311,347		25		0.013		0.028
2003	57		49,895		106,915	223,591		25		0.017		0.036
2004	40		69,409		105,021	125,919		25		0.041		0.062
Total	**172**	**$**	**175,270**	**$**	**330,191**	**660,857**		**25**	**$**	**0.020**	**$**	**0.037**
WAQC Total	**5,875**	**$**	**21,354,095**	**$**	**32,445,916**	**32,172,299**		**25**	**$**	**0.049**	**$**	**0.075**
Commercial												
Air Care Plus Pilot												
2003	4		5,764		9,061	33,976		10		0.021		0.033
2004			344		344							
Total	**4**	**$**	**6,108**	**$**	**9,405**	**33,976**		**10**	**$**	**0.022**	**$**	**0.034**
Commercial Energy-Saving Kits (Commercial Education Initiative)												
2005			3,497		3,497							
2006			4,663		4,663							
2007			26,823		26,823							
2008			72,738		72,738							
2009			120,584		120,584							
2010			68,765		68,765							
2011			89,856		89,856							
2012			73,788		73,788							
2013			66,790		66,790							
2014			76,606		76,606							
2015			65,250		65,250							
2016												
2017												
2018	1,652		146,174		146,174	442,170		10		0.034		0.034
2019	2,629		161,945		161,945	569,594		10		0.029		0.029
Total	**4,281**	**$**	**977,478**	**$**	**977,478**	**1,011,765**		**10**	**$**	**0.120**	**$**	**0.120**
New Construction												
2004			28,821		28,821							
2005	12		194,066		233,149	494,239		12		0.043		0.052
2006	40		374,008		463,770	704,541		12		0.058		0.072
2007	22		669,032		802,839	2,817,248		12		0.015		0.040

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2008	60	1,055,009	1,671,375	6,598,123		12	0.017	0.028
2009	72	1,327,127	2,356,434	6,146,139		12	0.024	0.043
2010	70	1,509,682	3,312,963	10,819,598		12	0.016	0.035
2011	63	1,291,425	3,320,015	11,514,641		12	0.010	0.026
2012	84	1,592,572	8,204,883	20,450,037		12	0.007	0.036
2013	59	1,507,035	3,942,880	10,988,934		12	0.012	0.032
2014	69	1,258,273	3,972,822	9,458,059		12	0.012	0.037
2015	81	2,162,001	6,293,071	23,232,017		12	0.008	0.024
2016	116	1,931,222	4,560,826	12,393,249		12	0.014	0.033
2017	121	2,433,596	4,265,056	17,353,820		12	0.013	0.022
2018	104	2,069,645	5,054,215	13,378,315		12	0.014	0.034
2019	168	3,548,476	5,292,835	20,640,334		12	0.015	0.023
Total	**1,141**	**$ 22,951,991**	**$ 53,775,955**	**166,989,294**		**12**	**$ 0.015**	**$ 0.035**
2006		31,819	31,819					
2007	104	711,494	1,882,035	5,183,640	0.8	12	0.015	0.040
2008	666	2,992,261	10,096,627	25,928,391	4.5	12	0.013	0.043
2009	1,224	3,325,505	10,076,237	35,171,627	6.1	12	0.011	0.032
2010	1,535	3,974,410	7,655,397	35,824,463	7.8	12	0.013	0.024
2011	1,732	4,719,466	9,519,364	38,723,073		12	0.011	0.022
2012	1,838	5,349,753	9,245,297	41,568,672		12	0.012	0.020
2013	1,392	3,359,790	6,738,645	21,061,946		12	0.014	0.029
2014	1,095	3,150,942	5,453,380	19,118,494		12	0.015	0.025
2015	1,222	4,350,865	7,604,200	23,594,701		12	0.017	0.029
2016	1,577	5,040,190	8,038,791	28,124,779		12	0.016	0.026
2017	1,137	4,343,835	12,500,303	23,161,877		12	0.017	0.049
2018	1,358	5,990,179	16,253,716	34,910,707		12	0.015	0.042
2019	1,033	6,281,056	17,700,769	42,674,418		12	0.013	0.037
Total	**15,913**	**$ 53,621,565**	**$ 122,796,579**	**375,046,788**		**12**	**$ 0.016**	**$ 0.036**
Holiday Lighting								
2008	14	28,782	73,108	259,092		10	0.014	0.035
2009	32	33,930	72,874	142,109		10	0.031	0.066

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2010	25	46,132	65,308	248,865		10	0.024	0.034
2011	6	2,568	2,990	66,189		10	0.004	0.005
Total	**77**	**$ 111,412**	**$ 214,280**	**716,255**		**10**	**$ 0.019**	**$ 0.037**
Oregon Commercial Audit								
2002	24	5,200	5,200					
2003	21	4,000	4,000					
2004	7	0	0					
2005	7	5,450	5,450					
2006	6							
2007		1,981	1,981					
2008		58	58					
2009	41	20,732	20,732					
2010	22	5,049	5,049					
2011	12	13,597	13,597					
2012	14	12,470	12,470					
2013	18	5,090	5,090					
2014	16	9,464	9,464					
2015	17	4,251	4,251					
2016	7	7,717	7,717					
2017	13	8,102	8,102					
2018	0	1,473	1,473					
2019	11	7,262	7,262					
Total	**236**	**$ 111,896**	**$ 111,896**					
2005		86	86					
2006	6	24,379	89,771	223,368		12	0.012	0.044
Total	**6**	**$ 24,465**	**$ 89,857**	**223,368**		**12**	**$ 0.012**	**$ 0.044**
Industrial								
Custom Projects								
2003		1,303	1,303					
2004	1	112,311	133,441	211,295		12	0.058	0.069
2005	24	1,128,076	3,653,152	12,016,678		12	0.010	0.033
2006	40	1,625,216	4,273,885	19,211,605		12	0.009	0.024

		Total Costs		Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]	Resource Cost[c]	Annual Energy[e] (kWh)	Peak Demand[f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2007	49	3,161,866	7,012,686	29,789,304	3.6	12	0.012	0.026
2008	101	4,045,671	16,312,379	41,058,639	4.8	12	0.011	0.044
2009	132	6,061,467	10,848,123	51,835,612	6.7	12	0.013	0.024
2010	223	8,778,125	17,172,176	71,580,075	9.5	12	0.014	0.027
2011	166	8,783,811	19,830,834	67,979,157	7.8	12	0.012	0.026
2012	126	7,092,581	12,975,629	54,253,106	7.6	12	0.012	0.021
2013	73	2,466,225	5,771,640	21,370,350	2.4	12	0.010	0.024
2014	131	7,173,054	13,409,922	50,363,052	5.6	12	0.013	0.024
2015	160	9,012,628	20,533,742	55,247,192	6.3	11	0.016	0.035
2016	196	7,982,624	16,123,619	47,518,871		16	0.013	0.026
2017	170	8,679,919	17,279,117	44,765,354		16	0.015	0.029
2018	248	8,808,512	16,112,540	46,963,690		16	0.014	0.026
2019	257	11,879,873	24,590,176	70,433,920		15	0.013	0.027
Total	**2,097**	**$ 96,793,261**	**$ 206,034,364**	**684,597,900**		**13**	**$ 0.015**	**$ 0.031**
Green Motors Rewind—Industrial								
2016	14			123,700		7		
2017	13			143,976		7		
2018	25			64,167		7		
2019	12			117,223		8		
Total	**64**	**$ 0**	**$ 0**	**449,066**		**7**		
Irrigation								
2003	2	41,089	54,609	36,792	0.0	15	0.106	0.141
2004	33	120,808	402,978	802,812	0.4	15	0.014	0.048
2005	38	150,577	657,460	1,012,883	0.4	15	0.014	0.062
2006	559	2,779,620	8,514,231	16,986,008	5.1	8	0.024	0.073
2007	816	2,001,961	8,694,772	12,304,073	3.4	8	0.024	0.103
2008	961	2,103,702	5,850,778	11,746,395	3.5	8	0.026	0.073
2009	887	2,293,896	6,732,268	13,157,619	3.4	8	0.026	0.077
2010	753	2,200,814	6,968,598	10,968,430	3.3	8	0.030	0.096
2011	880	2,360,304	13,281,492	13,979,833	3.8	8	0.020	0.113
2012	908	2,373,201	11,598,185	12,617,164	3.1	8	0.022	0.110
2013	995	2,441,386	15,223,928	18,511,221	3.0	8	0.016	0.098

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2014	1,128	2,446,507	18,459,781	18,463,611	4.6	8	0.016	0.119
2015	902	1,835,711	9,939,842	14,027,411	1.6	8	0.016	0.085
2016	851	2,372,352	8,162,206	15,673,513		8	0.018	0.063
2017	801	2,475,677	8,382,962	16,824,266		8	0.018	0.060
2018	1,022	2,953,706	11,948,469	18,933,831		8	0.019	0.076
2019	1,080	2,661,263	10,042,514	10,073,455		8	0.032	0.120
Total	**12,616**	**$ 33,612,574**	**$ 144,915,072**	**206,119,317**		**8**	**$ 0.024**	**$ 0.103**
Green Motors Rewind—Irrigation								
2016	23			73,617		19		
2017	27			63,783		19		
2018	26			67,676		19		
2019	34			44,705		20		
Total	**110**	**$ 0**	**$ 0**	**249,781**		**19**		
Other Programs								
Building Operator Training								
2003	71	48,853	48,853	1,825,000		5	0.006	0.006
2004	26	43,969	43,969	650,000		5	0.014	0.014
2005	7	1,750	4,480	434,167		5	0.001	0.002
Total	**104**	**94,572**	**97,302**	**2,909,167**		**5**	**0.007**	**0.007**
Comprehensive Lighting								
2011...................		2,404	2,404					
2012		64,094	64,094					
Total		**$ 66,498**	**$ 66,498**					
2005		21,552	43,969					
2006		24,306	24,306					
2007		8,987	8,987					
2008		-1,913	-1,913					
Total		**$ 52,932**	**$ 75,349**					
DSM Direct Program Overhead								
2007		56,909	56,909					
2008		169,911	169,911					
2009		164,957	164,957					

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	**Participants**	**Utility Cost [b]**	**Resource Cost [c]**	**Annual Energy [e] (kWh)**	**Peak Demand [f] (MW)**	**Measure Life (Years)**	**Total Utility ($/kWh)**	**Total Resource ($/kWh)**
2010		117,874	117,874					
2011		210,477	210,477					
2012		285,951	285,951					
2013		380,957	380,957					
2014		478,658	478,658					
2015		272,858	272,858					
2016		293,039	293,039					
2017		1,759,352	1,759,352					
2018		1,801,955	1,801,955					
2019		2,119,820	2,119,820					
Total		**$ 8,112,719**	**$ 8,112,719**					
2003	56	5,100	5,100					
2004		23,449	23,449					
2005	2	14,896	26,756	78,000		10	0.024	0.042
2006	480	3,459	3,459	19,027		7	0.009	0.009
2007	1	7,520	7,520	9,000		7	0.135	0.135
2008	2	22,714	60,100	115,931	0.0	15	0.019	0.049
2009	1	5,870	4,274	10,340	0.0	12	0.064	0.047
2010	1	251	251		0.0			
2011	1	1,026	2,052	2,028		30	0.035	0.070
2012								
2013								
2014	1	9,100	9,100	95,834		18		
Total	**545**	**$ 93,385**	**$ 142,061**	**330,160**		**14**	**$ 0.028**	**$ 0.043**
Other C&RD and CRC BPA								
2002		55,722	55,722					
2003		67,012	67,012					
2004		108,191	108,191					
2005		101,177	101,177					
2006		124,956	124,956					

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	**Participants**	**Utility Cost [b]**	**Resource Cost [c]**	**Annual Energy [e] (kWh)**	**Peak Demand [f] (MW)**	**Measure Life (Years)**	**Total Utility ($/kWh)**	**Total Resource ($/kWh)**
2007		31,645	31,645					
2008		6,950	6,950					
Total		**$ 495,654**	**$ 495,654**					
Residential Economizer Pilot								
2011		101,713	101,713					
2012		93,491	93,491					
2013		74,901	74,901					
Total		**$ 270,105**	**$ 270,105**					
Residential Education Initiative								
2005		7,498	7,498					
2006		56,727	56,727					
2007								
2008		150,917	150,917					
2009		193,653	193,653					
2010		222,092	222,092					
2011		159,645	159,645					
2012		174,738	174,738					
2013		416,166	416,166					
2014	6,312	423,091	423,091	1,491,225		11		
2015		149,903	149,903					
2016		290,179	290,179					
2017		223,880	223,880					
2018		160,851	160,851					
Total		**$ 2,801,555**	**$ 2,801,555**	**1,491,225**				
Solar 4R Schools								
2009		45,522	45,522					
Total		**$ 45,522**	**$ 45,522**					
Market Transformation								
Consumer Electronic Initiative								
2009		160,762	160,762					
Total		**$ 160,762**	**$ 160,762**					

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
NEEA								
2002		1,286,632	1,286,632	12,925,450				
2003		1,292,748	1,292,748	11,991,580				
2004		1,256,611	1,256,611	13,329,071				
2005		476,891	476,891	16,422,224				
2006		930,455	930,455	18,597,955				
2007		893,340	893,340	28,601,410				
2008		942,014	942,014	21,024,279				
2009		968,263	968,263	10,702,998				
2010		2,391,217	2,391,217	21,300,366				
2011		3,108,393	3,108,393	20,161,728				
2012		3,379,756	3,379,756	19,567,984				
2013		3,313,058	3,313,058	20,567,965				
2014		3,305,917	3,305,917	26,805,600				
2015		2,582,919	2,582,919	23,038,800				
2016		2,676,387	2,676,387	24,352,800				
2017		2,698,756	2,698,756	24,440,400				
2018		2,500,165	2,500,165	25,666,800				
2019 [1]		2,721,070	2,721,070	18,107,684				
Total	**$**	**36,724,592**	**$ 36,724,592**	**357,605,095**				
Annual Totals								
2002		1,932,520	2,366,591	16,791,100	0.0			
2003		2,566,228	3,125,572	18,654,343	0.0			
2004		3,827,213	4,860,912	19,202,780	6.5			
2005		6,523,348	10,383,577	37,978,035	43.9			
2006		11,174,181	20,950,110	67,026,303	43.6			
2007		14,896,816	27,123,018	91,145,357	57.9			
2008		20,213,216	44,775,829	128,508,579	74.3			
2009		33,821,062	53,090,852	143,146,365	235.5			
2010		44,643,541	68,981,324	193,592,637	357.7			
2011		44,877,117	79,436,532	183,476,312	415.2			
2012		47,991,350	77,336,341	172,054,327	448.8			
2013		26,100,091	54,803,353	109,505,690	54.5			

		Total Costs		Savings and Demand Reductions			Levelized Costs[a]	
Program/Year	Participants	Utility Cost[b]	Resource Cost[c]	Annual Energy[e] (kWh)	Peak Demand[f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2014		35,648,260	71,372,414	145,475,713	389.7			
2015		37,149,893	70,467,082	162,533,155	374.5			
2016		40,499,570	70,984,604	170,792,152	379.0			
2017		44,828,089	78,799,054	191,471,395	383.0			
2018		42,926,872	75,797,483	184,078,634	358.7			
2019		47,390,056	83,661,890	203,041,359	332.5			
Total Direct Program		**$ 507,013,424**	**$ 898,316,540**	**2,240,138,636**				
Indirect Program Expenses								
DSM Overhead and Other Indirect								
2002		128,855						
2003		-41,543						
2004		142,337						
2005		177,624						
2006		309,832						
2007		765,561						
2008		980,305						
2009		1,025,704						
2010		1,189,310						
2011		1,389,135						
2012		1,335,509						
2013		$741,287						
2014		1,065,072						
2015		1,891,042						
2016		2,263,893						
2017		2,929,407						
2018		1,335,208						
2019		1,194,640						
Total		**$ 18,823,178**						
Total Expenses								
2002		2,061,375						
2003		2,528,685						
2004		3,969,550						

		Total Costs		Savings and Demand Reductions			Levelized Costs [a]	
Program/Year	Participants	Utility Cost [b]	Resource Cost [c]	Annual Energy [e] (kWh)	Peak Demand [f] (MW)	Measure Life (Years)	Total Utility ($/kWh)	Total Resource ($/kWh)
2005		6,700,972						
2006		11,484,013						
2007		15,662,377						
2008		21,193,521						
2009		34,846,766						
2010		45,832,851						
2011		46,266,252						
2012		49,326,859						
2013		26,841,378						
2014		36,713,333						
2015		39,040,935						
2016		42,763,463						
2017		47,757,496						
2018		44,262,080						
2019		48,584,696						
Total 2002–2019		**$ 525,836,602**						

[a] ’s *2017 Integrated Resource Plan* and calculations include line loss adjusted energy savings.
[b] .
[c] The Total Utility Cost is all cost incurred by Idaho Power to implement and manage a DSM program.
[d] The Total Resource Cost is the total expenditures for a DSM program from the point of view of Idaho Power and its customers as a whole.
[e] Average Demand = Annual Energy/8,760 annual hours.
[f] Peak Demand is reported for programs that directly reduce load or measure demand reductions during summer peak season. Peak demand reduction for demand response programs is reported at the generation level assuming 9.7% peak line losses.
[1] Savings are preliminary funder share estimates. Final results will be provided by NEEA in June 2020.

ACLARA **ACE™**

Adaptive Consumer Engagement

Idaho Power Corporation
Home Energy Report Year 2
Public Program Summary Report

Version 1.5

Updated: 2/28/2020

Table of Contents

Revision History

Date	Version	Description	Author/Editor
2019-10-31	1.0	Version 1	Laura Cornish
2019-11-21	1.1	Version 1.1	Laura Cornish
2020-01-13	1.2	Version 1.2	Laura Cornish
2020-01-24	1.3	Version 1.3	Laura Cornish
2020-02-26	1.4	Version 1.4	Laura Cornish
2020-02-28	1.5	Version 1.5	Laura Cornish

Document Approval

The purpose of this section is to acknowledge approval of the information presented within. Please use the track-changes features to indicate any changes necessary before approval of the plan can be made. When ready to approve, please indicate the version number being approved, and complete the fields below.

This Idaho Power Company Home Energy Report year two Final Program Summary, version 1.4 approved by:

Client Name: ____________________
Name, Title: ____________________
Signature ____________________
Date: ____________________

Client Name: ____________________
Name, Title: ____________________
Signature: ____________________
Date: ____________________

For Aclara: ____________________
Signature: ____________________
Date: ____________________

1 Executive Summary

PROJECT OVERVIEW

In July 2017, Idaho Power contracted with Aclara and its subcontractor, Uplight[1] to create a Home Energy Report pilot program with the goal of reducing participating residential customers' energy use while meeting cost-effectiveness guidelines. The program was initially to span one year, with the possibility of renewal.

The Home Energy Reports included the following elements:

- **Customer information:** customer name, address, and account number
- **Household energy-usage disaggregation:** home usage separated into four loads (heating, air conditioning, lights & appliances, and always-on)
- **Targeted message(s)**: customized messaging to drive customers to relevant programs and the *My Account* portal
- **Social benchmarks**: customer's home energy use compared to similar homes and efficient homes, designed to motivate savings
- **Personalized savings recommendations:** Tips for saving energy based on home profile attributes, customer segmentation, and season

Figure 1. Sample Home Energy Report (see Appendix A for detail)

In year one, pilot program participants were selected based on their historical energy usage and were divided into different treatment groups according to their energy-use patterns. Each treatment group received reports with messaging targeted to its members that was deemed most likely to help them save energy. Between July 2017 and June 2018, ~25,500 customers received Home Energy Reports, which resulted in statistically significant energy savings with a 95% confidence interval in three out of the four treatment groups. By percentage, the savings ranged from 0.5% to 1.7%.

The program was renewed and expanded for a second year (which is detailed in this report). The treatment groups were optimized by removing people with low savings potential, a new treatment group was added (T2), and the frequency of the reports was altered to compare the performance of

[1] Uplight in this case is formerly known as Ecotagious. Ecotagious was acquired by Uplight in August 2019, after the completion of the program.

bimonthly versus quarterly delivery. Customers were also given the option of receiving reports by email. In total, around 24,000 customers received reports during the second year of the program (which ran from August 1, 2018 to July 31, 2019).

In year two, each treatment group showed savings of between 0.5 percent and 1.82 percent, which added up to a total savings of 5,433,539 kWh across all groups (all groups' savings are considered statistically significant, except the bimonthly T5 group, whose statistical non-significance may be due to the small group size and members' low kWh usage).

RESULTS AND FINDINGS

Main takeaways from year two of the program are as follows.

Overall Energy Savings Met Program Goals (With One Exception)

The program's energy-savings goals were generally met, with four out of five treatment groups having average savings between 1 and 2 percent:

- **T1**: 1.8%, or 386 kWh per customer
- **T2**: 1.1%, or 155 kWh per customer
- **T3**: 1.8%, or 266 kWh per customer
- **T4**: 1.8%, or 184 kWh per customer
- **T5**: 0.5%, or 45 kWh per customer

Only the T5 group did not achieve statistically significant savings. This may be due to their having already been low energy users prior to the program.

Winter-Heating Group Savings Increased in Year Two

T1 had more savings in year two of receiving reports than they had in year one. In year one, they had average savings of 1.5%, and in year two, 1.8%. In general, participants in HER programs tend to see their savings increase in the second year over the first. It is expected that the T2 group will follow suit and see greater savings in the third year (but T2's second) of the program.

Bimonthly Report Delivery Did Not Save More Than Quarterly Delivery

A bimonthly report-delivery schedule did not result in greater energy savings than a quarterly delivery schedule (see 3.2.2). Although not statistically significant, the customer satisfaction survey showed a potentially slight lift in customer satisfaction with the bimonthly reports. Given the savings results and the lack of solid evidence re: customer satisfaction, it is recommended that IPC move forward with six reports in the first year of treatment and four reports in the following years.

Customer Satisfaction Was High

Customer satisfaction with IPC is generally high, regardless of participation in the HER program. However, customers who receive HERs have an improved opinion of the company (see Appendix C).

Report Readthrough and Retention Were High

Customers who were surveyed scored high in terms of five key factors: report recall, report readthrough rates, detailed report recall, actions taken as a result of reports, and impression of IPC. (See 3.4.1 for details.)

Opt-Out Rates Remained Below 1%

Opt-out rates for the program were below 0.25% (0.22% for quarterly report recipients, 0.20% for bimonthly).

The overall program opt-out rate was 0.22% in year 2, a decrease from year 1 (0.64%), and lower than the industry average of 1%[2].

[2] Sussman, R., & Chikumbo, M. (2016). Behavior Change Programs: Status and Impact, 12.

2 Program Overview

2.1 Team Structure

The IPC Home Energy Report program has been a joint effort between Idaho Power Company, Aclara, and Uplight since 2017.

Aclara and Uplight have been partnering since 2016, combining their offerings to deliver greater value and energy savings to customers. In combining Uplight's ability to segment residential energy use into load types and Aclara's behavioural efficiency programs, they have driven savings for gas and electric utilities.

2.2 Objectives

2.2.1 ONGOING OBJECTIVES FROM YEAR ONE

The primary year-one objectives that continued into year two included the following:

- Provide average annual savings of 1 to 3 percent across the participant group.
- Maintain or enhance current customer satisfaction levels.
- Encourage customer engagement with electricity usage, including utilization of online tools and lift for other energy efficiency programs.
- Meet cost-effectiveness guidelines from a Total Resource Cost (TRC) perspective.

Secondary objectives carried over from year one include:

- Following industry best practices/protocols for all segments to ensure lessons learned from the pilot to appropriately inform program decisions going forward.
- Ensuring program design will stand up to the rigors of a third-party evaluation on the back end (i.e., sample sizes are adequate to detect and claim expected savings, control and treatment group assignments are clean and accurate, etc.)
- Obtaining information to provide insights for the future of the program, such as:
    - Scalability
    - Anticipated savings for various customer segments
    - Best target audiences (energy use, geography, etc.)
    - Audiences to exclude, etc.
    - Ability to measure savings.

2.2.2 YEAR-TWO OBJECTIVES

In addition to continuing year-one objectives, year two of the HER program also endeavored to answer the following questions:

- How did T1's rollout in year one (with monthly reports for four months) compare to T2's rollout in year two (with bimonthly reports), in terms of:
    - Energy savings

- Customer satisfaction
- Opt-out rate

- How do bimonthly reports compare to quarterly reports in terms of:
  - Energy savings
  - Customer satisfaction
  - Opt-out rate

A final objective of year two was to allow customers to choose to receive reports by email, to potentially improve customer satisfaction.

2.3 Treatment Groups Defined

2.3.1 YEAR-ONE TREATMENT GROUPS

In year one, customers were selected to participate in the HER program based on their historical energy usage. Of customers selected for the program, four treatment groups were created:

- **T1:** customers with high electric heating in the winter,
- **T3:** customers with high year-round energy use,
- **T4:** customers with medium year-round energy use, and
- **T5:** customers with low year-round heating use.

There was no active **T2** group in year one, but customers from T1 who did not have enough historical data to participate in year one (but would accumulate enough data by year two) were removed from that group and put into T2 for possible future participation in the program.

In year one, T1, T3, T4 and T5 received Home Energy Reports. The T1 group reports gave tips related to reducing heating use, while T3, T4, and T5 received reports focused on lights & appliances, always on, and air conditioning loads.

2.3.2 YEAR-TWO TREATMENT GROUPS

In year two, the treatment groups were adapted from the groups that had been used in year one. The following changes were made:

- **The T2 group was added to the program.**

  The T2 group was added to the HER program in year two. This group had previously been created in year one. Its members were initially part of the T1 group but were removed due to insufficient data on household heating source for sufficient benchmarking, and labeled T2. After year one, IPC provided data that allowed for the addition of T2 to the HER program in year two. T2 was sent bimonthly reports.

- **Treatment groups were split into monthly and Quarterly Report Schedules.**

  In year one, all of the treatment groups received reports bimonthly, except T1, who received reports monthly (and only for four months — November to February), and T2, who had inadequate data and received no reports.

In year two, as mentioned, the T2 group began receiving bimonthly reports. In November 2018, the T1, T3, T4, and T5 groups were all divided into halves, with one half receiving reports quarterly, the other half receiving them bimonthly. This allowed the program's facilitators to examine if there was a difference in response or energy usage between customers receiving quarterly and bimonthly reports.

Table 1. Year-Two Report Schedule

- **The total number of customers receiving reports was reduced**

  In year one of the program, the total number of customers receiving reports was ~25,500. In year two, the total was around 24,000.

  Prior to the start of year two of the program, the T3, T4, and T5 groups were optimized by removing customers with factors correlated with low savings (their respective control groups were optimized using the same factors). So even though a new treatment group (T2) was added in year two, there were fewer customers in the program overall compared with year one.

2.3.3 SIDE-BY-SIDE: YEAR ONE VS. YEAR TWO TREATMENT GROUPS

Tables 2 and 3 give a high-level overview of the makeup of year-one and year-two treatment groups.

Table 2. Year-One Treatment Groups

	Description	Sample Size (at 1st report)	Report Frequency	Mailout Period	Total # Reports
T1	Winter Heating Group	7,092	Monthly	Nov 2017 – Feb 2018	4
T3	Year-Round Group – High Users	8,295	Bimonthly	July 2017 – July 2018	7
T4	Year-Round Group – Medium Users	3,985	Bimonthly	July 2017 – July 2018	7
T5	Year-Round Group – Low Users	6,305	Bimonthly	July 2017 – July 2018	7
TOTAL		25,677			

**Plus welcome report in July 2017*

Table 1. Year-Two Treatment Groups

	Description	Sample Size (at 1st report)	Report Frequency	Mailout Period	Total # Reports
T1-Q	Winter Heating Group (Quarterly)	3,260	Quarterly*****	Sept 2018 – May 2019	4
T1-B	Winter Heating Group (Bimonthly)	3,262	Bimonthly	Sept 2018 – May 2019	6
T2	Winter Heating Group	5,623	Bimonthly	Dec 2018 – July 2019	5
T3-Q	Year-Round Group – High Users (Quarterly)	3,297	Quarterly*****	Sept 2018 – May 2019	4
T3-B	Year-Round Group – High Users (Bimonthly)	3,315	Bimonthly	Sept 2018 – July 2019	6
T4-Q	Year-Round Group – Medium Users (Quarterly)	1,596	Quarterly*****	Sept 2018 – May 2019	4
T4-B	Year-Round Group – Medium Users (Bimonthly)	1,554	Bimonthly	Sept 2018 – July 2019	6
T5-Q	Year-Round Group – Low Users (Quarterly)	1,002	Quarterly*****	Sept 2018 – May 2019	4
T5-B	Year-Round Group – Low Users (Bimonthly)	1,034	Bimonthly	Sept 2018 – July 2019	6
TOTAL		23,943			

2.3.4 ELIGIBILITY SCREENING

Eligibility screening for T1, T3, T4, and T5 was initially conducted in year one, and these groups persisted into year two.

However, as mentioned, the T3, T4, and T5 groups were optimized prior to the start of the year two program by removing customers with factors correlated with low savings (their respective control groups were optimized using the same factors). This was done to improve the performance of these groups.

As for T2, Aclara had previously conducted eligibility screening of these potential participants before the creation of the treatment and control groups in year one. In year two, these participants were reviewed for eligibility again, after extra data on their primary heating source was provided by Idaho Power.

Table 3. Criteria and Rationale for Culling Customers During Eligibility Screening

Culling Criteria	Rationale
Multi-family dwellings	Data concerns: 1. Program requires a 1:1 relationship of meter to dwelling, which could not be established in these dwellings. 2. Multiplexes and condos had unreliable floor-size data.
Tenant-billing mismatch	In homes where the service address does not match the billing address, it is likely that landlords would receive reports relating to tenants (reports would not go to the households they pertained to).
<1 year of AMI data available	More than one year of energy data is needed to provide a baseline for EM&V purposes.
Oregon Accounts	For the pilot period, participation was limited to Idaho customers.
Net Metering Accounts	In households on a net metering rate, HERs would not accurately reflect household energy use.
Counties without sufficient eligible accounts to create robust benchmarks.	All customers receiving reports should be compared to robust benchmarks.

The criteria for culling customers during eligibility screening are listed in Table 4.

2.4 Customer Data Acquisition/Integration

The initial data acquisition and integration required to begin the program was performed in year one. This involved using third-party demographic and property data, as well as IPC's data on customer usage.

In year two, data acquisition and integration was primarily maintenance, including receiving weekly electric customer-billing data and weekly electric AMI data for the treatment groups, control groups, and a sample of customers (for benchmarking). In addition, Aclara extracts customer action and profile data from *My Account* tools (EnergyPrism) weekly for treatment and control groups (this ensures home profiles are up to date), and Idaho Power provides Aclara with real-time data re: customers who have opted out so they can be removed from the program.

Table 4. Program Data Integration

Integration Point	Description	Format	Frequency	Initiator	Recipient
Public Record Data	Aclara uses third-party data for latest property records for treatment group customers, selected control customers, and random sample for benchmarking.	CSV	batch: one-time historical (performed year one)	Aclara	Aclara
Electric Customer-Billing Data	Idaho Power provides electric customer-billing data for treatment-group customers, selected control customers, and all eligible customers incrementally each week.	CSV	recurring weekly	IPC	Aclara
Electric Customer-AMI Data	Idaho Power provides recurring daily AMI updates of electric AMI data for treatment group customers, selected control customers, and all eligible customers for benchmarking.	CSV	recurring weekly	Idaho Power	Aclara
Action and Profile Data	Aclara extracts customer action and profile data from *My Account* tools (EnergyPrism) for treatment and control group customers.	CSV	recurring weekly	Aclara	Aclara
Opt-Outs	Aclara provides a weekly report on all customer calls and opt-outs to Idaho Power.	CSV	recurring weekly	Idaho Power	Aclara

2.5 Aligning Tip Selection with Season

In year one customers received tips based on the past two months electricity use. A program improvement was made to provide seasonal tips in a more relevant fashion, such as tips based on last season's usage.

3 Year-Two Program Results

3.1 Year-Two Objectives: Findings

3.1.1 HOW DID THE T1 ROLLOUT IN YEAR ONE (WITH MONTHLY REPORTS FOR FOUR MONTHS) COMPARE TO THE T2 ROLLOUT IN YEAR TWO (WITH BIMONTHLY REPORTS) IN TERMS OF:

A) ENERGY SAVINGS

The T1 rollout differed from the T2 rollout in that T1 received monthly reports, whereas T2 received bimonthly reports. T1 received four reports total during year one (from Nov 2017 to Feb 2018), whereas, T2 received five reports (regular bimonthly reports, plus one introductory report). This may account for the slight difference in saving seen between these two groups in their respective first years in the program, with T1 saving about 0.3% more energy than T2.

The T1 group, with its four-report rollout, outperformed the T2 bimonthly rollout in raw kWh savings in all months from December to June, except April (even though T1 stopped receiving reports after February). This may suggest that these four monthly reports contributed to increased savings even after the treatment group stopped receiving them.

Savings During T1 Vs. T2 Rollout

Table 5. Average kWh Savings During T1 Rollout

Month	Average kWh savings
December 2017	25
January 2018	29
February 2018	41
March 2018	38
April 2018	24
May 2018	22
June 2018	20

Note: T1 received only 4 reports in year one — one each in Nov 2017, Dec 2017, Jan 2018, and Feb 2018. This chart also shows savings in the months after report delivery ceased.

Table 6. Average kWh Savings During T2 Rollout

Month	Average kWh savings
December 2018	18
January 2019	25
February 2019	26
March 2019	32
April 2019	28
May 2019	15
June 2019	9

To try to ensure T1's and T2's first-year performances were measured as identically as possible considering that they occurred in different calendar years, the savings for each group were taken from the same time period in the year:

- **T1 year-one savings period:** December 1, 2017 – July 31, 2018
- **T2 year-one savings period:** December 1, 2018 – July 31, 2019

Table 8. T1 (December 1, 2017 – July 31, 2018) and T2 (December 1, 2018 – July 31, 2019) Energy Savings

Group	Average Usage during period	Average Savings Percent	Average Savings (kWh) per household
T1	15,266	1.36	207.1
T2	15,093	1.03	155.3

B) CUSTOMER SATISFACTION

Customers were asked to rate their overall level of satisfaction with Idaho Power on a scale of 1 to 5 (1 — very dissatisfied, 2 — dissatisfied, 3 — neither satisfied nor dissatisfied, 4 — satisfied, 5 — very satisfied).

Table 7. Customer Satisfaction with IPC, Monthly vs. Bimonthly Reports

	1 ☹	2	3	4	5 ☺
T1 Rollout (monthly reports)	1%	4%	4%	33%	58%
T2 Rollout (bimonthly reports)	2%	5%	6%	29%	58%

The results did not show any major differences in satisfaction between the T1 and T2 groups. T1 (the monthly-report group) had a slightly higher percentage of customers self-report as "very satisfied" as compared to the T2 group (receiving bimonthly reports). However, T1 also had a slightly higher percentage of customers on the overall "dissatisfied" end of the spectrum. There did not appear to be any overarching trends regarding T1 versus T2.

C) OPT-OUT RATE

The opt-out rate was less than 1 percent after both the year-one and year-two rollouts. It was slightly lower in year two (which received bimonthly reports) at 0.47 percent, versus 0.65 percent in year one.

Table 8. Opt-Out Rates, Monthly vs. Bimonthly Rollout Groups

	Opt-Outs	Sample Size (at 1st report)	Opt-Out Rate
Y1 rollout (T1) (monthly reports)	46	7,092	0.65%
Y2 rollout (T2) (bimonthly reports)	20	5,623	0.36%

3.1.2 HOW DO BIMONTHLY REPORTS COMPARE TO QUARTERLY REPORTS IN TERMS OF:

A) ENERGY SAVINGS

There has not been any clear indication that one group (quarterly or bimonthly) regularly saves more than another (see section 3.2.2 for detailed analysis).

B) CUSTOMER SATISFACTION

Over 85 percent of customers in the year-two T1, T3, T4, and T5 groups reported they were "satisfied" or "very satisfied" overall with Idaho Power, both amongst monthly and quarterly report-delivery schedules, when asked (please list question).

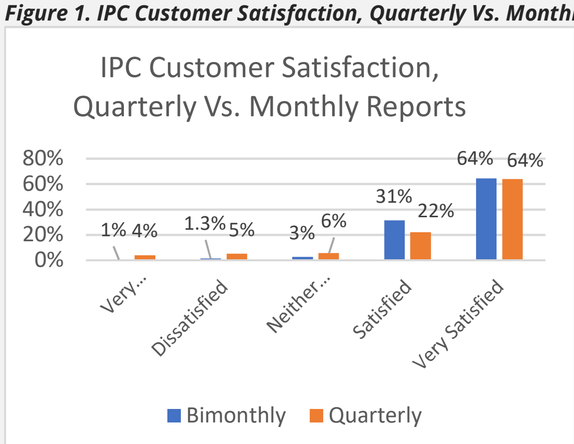
The group receiving bimonthly HERs reported slightly higher levels of satisfaction than the quarterly group, with 64 percent saying they were "very satisfied" and 31 percent saying they were "satisfied" (versus 64 percent and 22 percent in the quarterly group). The quarterly group also reported higher levels of dissatisfaction: 3.8 percent said they were "very dissatisfied" (versus 0.6 percent in the bimonthly group) and 5 percent said they were "dissatisfied" (versus 1.3 percent in the bimonthly group).

Table 9. Customer Satisfaction by Treatment Group

	1 ☹	2	3	4	5 ☺
Bimonthly (T345)	0.6%	1.3%	2.5%	31.3%	64.4%
Quarterly (T345)	3.8%	5.0%	5.6%	21.9%	63.8%

1 = Very Dissatisfied, 5 = Very Satisfied

Figure 1. IPC Customer Satisfaction, Quarterly Vs. Monthly Reports



C) OPT-OUT RATE

Opt-out rates for both groups were very similar. The group receiving quarterly reports opted out at a slightly higher rate of 0.22 percent, versus the 0.20 percent opt-out rate for the bimonthly group.

Table 10. Opt-Out Rates for Bimonthly and Quarterly T3, T4, and T5 Groups

Group	Opt-Outs	Sample Size (at 1st report)	Opt-Out Rate
Bimonthly (T345)	12	5,903	0.20%
Quarterly (T345)	13	5,895	0.22%

3.2 Energy Savings Results

Cumulative Savings During Treatment Period

In total, each treatment group showed savings of between 0.5 percent and 1.82 percent. This added up to a total savings of 5,433,539 kWh across all groups. All savings were shown to be statistically significant, except the bimonthly T5 group's savings. This may be due to the T5 group's small group size and low kWh usage.

Table 11. Cumulative Savings by Cohort Over Entirety of Year Two
(T1345 Treatment Period: Aug 1, 2018 – July 31, 2019; T2 Treatment Period: Dec 1, 2018 – July 31, 2019)

Cohort	Avg kWh Savings per Customer	Average savings percent	95% Confidence Margin of Error	One-Sided Null Hypothesis P-Value	Cumulative Aggregate Savings (kWh)
Winter Heating – T1	386	1.8	136.44	1.41831E-08	2,336,715
Winter Heating – T2	155	1.1	97	0.000886278	821,687
Year-Round - T3	266	1.8	79.785	2.94214E-11	1,649,319
Year-Round - T4	184	1.8	75.21235	8.06114E-07	539,327
Year-Round - T5	45	0.5	91.08169	0.167808163	86,491
					5,433,539

3.2.1 EVALUATION, MEASUREMENT & VERIFICATION PROCESS

The treatment groups' energy savings were evaluated following standard industry-accepted evaluation practices. The program was set up as a Randomized Control Trial (RCT), with a third party (DNV-GL) randomly assigning the treatment and control groups. The evaluation employed a difference-in-differences method, which allows for accurate evaluation of program-driven energy savings.

In year one, appropriately sized treatment and control groups were created for each cohort, assuming an attrition rate of 10 percent and allowing for statistically significant detection of energy savings in excess of 1.2 percent in the treatment groups. To achieve this objective, all eligible customers were placed in either the treatment or control group.

Table 12. Treatment and Control Group Sizes

	Year Two	Year One	Control
T1-B: Winter Heating, Bimonthly Reports	3,260	7,092	12,720
T1-Q: Winter Heating, Quarterly Reports	3,262		
T2-B: Winter Heating, Bimonthly Reports	5,623	None	5,316
T3-B: Year-Round High Users, Bimonthly Reports	3,297	8,295	36,965
T3-Q: Year-Round High Users, Quarterly Reports	3,315		
T4-B: Year-Round Medium Users, Bimonthly Reports	1,596	3,985	33,638
T4-Q: Year-Round Medium Users, Quarterly Reports	1,554		
T5-B: Year-Round Low Users. Bimonthly Reports	1,002	6,305	22,330
T5-B: Year-Round Low Users. Bimonthly Reports	1,034		
TOTAL	23,943	25,677	110,969

In year one, 27,000 customers were identified as initial program participants. After taking into consideration exclusionary factors such as move-ins/move-outs, as well as removing a number of potential T1 participants due to a lack of adequate county benchmarks, the sample size at the time of the first report was 25,677.

In year two at the time the bimonthly and monthly groups were created, the total number of customers in treatment groups was down to around 23,000, a net decrease from the previous year. The changes made to the treatment groups were as follows:

1. The T2 group was added to the study.
2. Move-outs were removed from all EMV treatment groups, the result of on-going attrition due to customers moving out over the course of year 1.
3. All groups were optimized to remove households with low savings potential (see 2.3.3).

The total number of customers in control groups in year two was 110,969 (down from 166,840 in year one). The same changes made to the treatment groups were applied to the control groups:

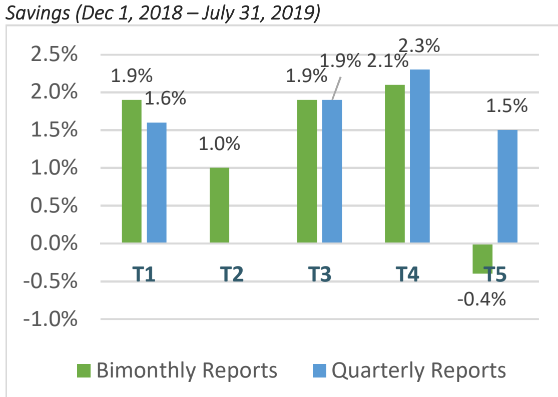
1. A new control group was created to accompany the new T2 group.
2. Move-outs were removed from all control groups, the result of on-going attrition due to customers moving out over the course of year 1.
3. The control groups were similarly optimized to remove households with low savings potential.

Households where residents moved out during the evaluation period were taken out of both the treatment and control groups for the purpose of measuring energy savings. Customers who opted out or did not receive reports due to being marked non-deliverable by the National Change of Address database were left in both the treatment and control groups for the purpose of measuring energy savings.

3.2.2 BIMONTHLY VS. QUARTERLY REPORT SAVINGS, ALL TREATMENT GROUPS

Starting at the beginning of 2019, the treatment groups from year one (T1, T3, T4 and T5) were split into two, with each group receiving either quarterly or bimonthly reports. Customers were randomly assigned to quarterly and bimonthly groups by a third party (DNV-GL). Since then, the savings of the quarterly and bimonthly groups have been assessed and compared.

Figure 2. Side-By-Side Comparison of Bimonthly Vs. Quarterly Report Savings (Dec 1, 2018 – July 31, 2019)



Between January 2019 and the end of July — seven months — there has not been any clear indication that one group regularly saves more than another. T1-B saved .03 percent more energy than T1-Q, while T5-Q and T4-Q saved more energy than their respective bimonthly counterparts (T5-Q saved 1.9 percent more, T4-Q saved .02 percent more). The two T3 groups saved the same amount of energy.

Table 13. Cumulative Savings by Bimonthly Vs. Quarterly Cohort (Treatment Period: Dec 1, 2018 – July 31, 2019)

	Average kWh Savings per Customer	Average Savings Percent	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant?
T1-B	300	1.9	138	0.000011	Yes
T1-Q	253	1.6	140	0.000201	Yes
T2 (bimonthly)	155	1.0	97	0.000886	Yes
T3-B	192	1.9	84	0.000004	Yes
T3-Q	192	1.9	79	0.000001	Yes
T4-B	144	2.1	78	0.000178	Yes
T4-Q	156	2.3	78	0.000045	Yes
T5-B	-25	-0.4	98	0.692583	No
T5-Q	90	1.5	93	0.028654	Yes

Table 14. Bimonthly Versus Quarterly Savings for Combined T3, T4, and T5 Groups (Since Quarterly and Bimonthly Schedule Creation)

	Treatment Period	Average Energy Savings in kWh per Customer	Percent Savings	95% Confidence Margin of Error	P-Value of Null Hypothesis being true	Statistically Significant
T345 Bimonthly	Dec 1, 2018-July 31, 2019	140	1.68	54.27	2.03342E-07	Yes
T345 Quarterly	Dec 1, 2018-July 31, 2019	165	1.99	51.55	1.90732E-10	Yes

The difference in savings between quarterly and bimonthly groups was not statistically significant for any group except T5, meaning that for the T1, T3, and T4 groups, the different report delivery schedules likely do not significantly impact how much energy customers save.

Note: we used the null hypothesis that the bimonthly and quarterly groups' saving results were the same. Only for the T5 group was the P-Value smaller than 0.05, which is the threshold value for statistical significance. This means only the T5 bimonthly and quarterly groups had a difference in savings that is statistically significant.

Table 15. Statistical significance of savings differences between quarterly and bimonthly delivery schedules for T1, T3, T4, and T5

	T1-B & -Q	T3-B & -Q	T4-B & -Q	T5-B & -Q
T- Statistic	0.534	0.005	0.237	1.713
P-Value	0.297	0.498	0.407	0.0436

Table 16. Monthly Average Percentage Energy Savings per Treatment Group

	T1-B	T1-Q	T2	T3-B	T3-Q	T4-B	T4-Q	T5-B	T5-Q
Dec 2018	1.29%	2.36%	0.64%	1.69%	2.93%	1.82%	2.46%	-0.10%	3.04%
Jan 2019	2.43%	1.51%	0.91%	1.35%	3.15%	2.03%	4.57%	1.14%	1.68%
Feb 2019	1.82%	1.74%	1.03%	2.24%	3.00%	2.14%	3.21%	1.42%	1.56%
March 2019	2.35%	2.23%	1.52%	2.07%	2.17%	2.54%	2.83%	-0.18%	2.38%
April 2019	2.08%	1.01%	2.07%	1.73%	0.72%	2.63%	3.33%	-0.84%	1.51%
May 2019	2.53%	1.70%	1.33%	1.93%	1.51%	2.30%	2.42%	-0.61%	1.18%
June 2019	1.96%	0.99%	0.91%	1.84%	1.06%	2.31%	-0.30%	-1.41%	1.37%

3.2.3 WINTER HEATING GROUP MEASUREMENT & VERIFICATION RESULTS

The T1 group's energy savings continued to improve in year two, as is expected in HER programs. The performance of T2 in its first year did not quite match T1 in its first year (as discussed in 3.1.1 and 3.1.2), but it is expected that T2's energy savings results will continue to improve similarly to T1. Both groups' savings results are statistically significant.

Table 17. Winter Heating Group Percentage Savings

T1 — Winter Heating	1.8%
T2 — Winter Heating	1.0%

Figures 2 and 3 show the average monthly energy savings per household for the winter-heating groups (T1 and T2) by percentage and total kWh (negative values are energy savings). The monthly energy savings results in this section and section 3.2.4 do not show monthly results from August through November because the treatment groups were not split into the bimonthly vs quarterly groups until November. The savings have been calculated and accrued, although they are not shown in the chart. The total savings kWh savings for all groups is outlined in table 13.

Figure 2. Winter Heating Groups' Monthly Energy-Use Reduction (as a Percentage)

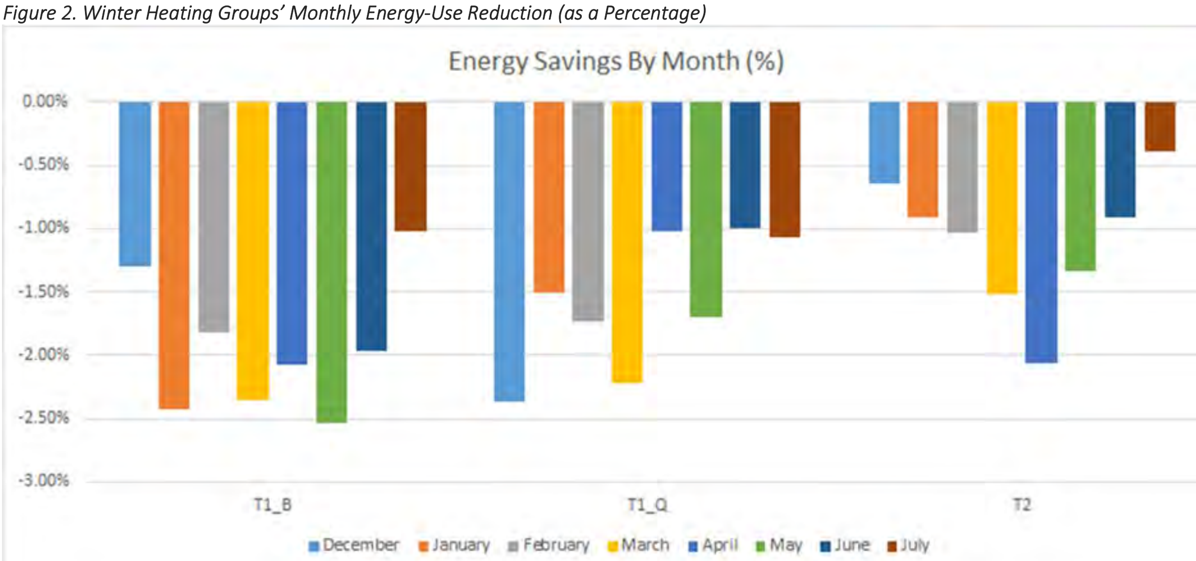
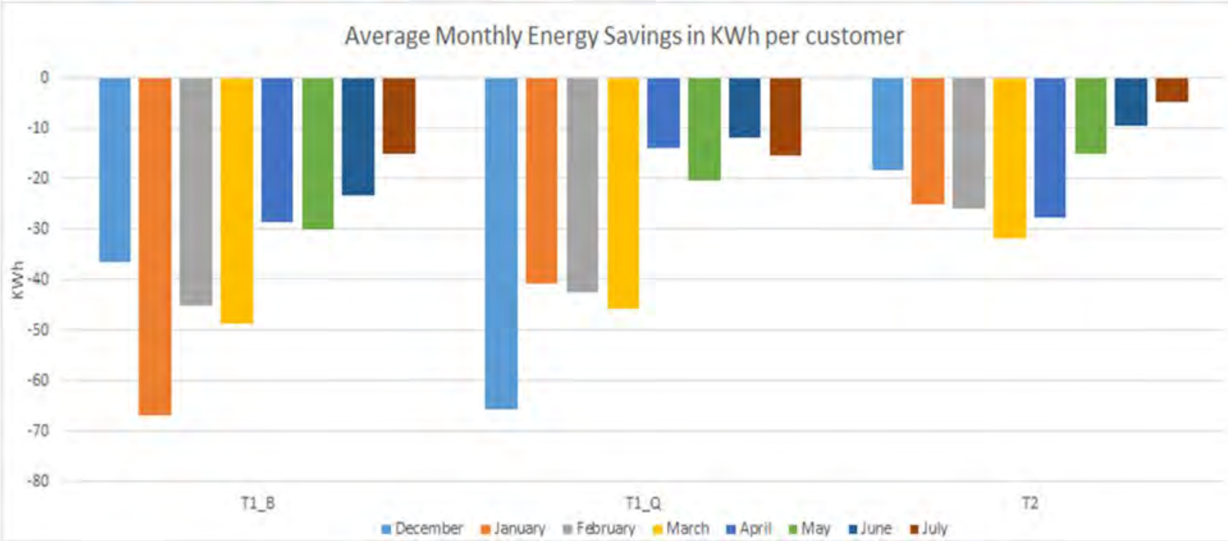


Figure 3. Winter Heating Groups' Monthly Average Reduction in Energy Use per Household (in kWh)



Figures 4 through 6 show average monthly kWh savings per customer with 95% confidence bounds.

Figure 4. T1 Quarterly Group Savings by Month per Household with 95% Confidence Bounds

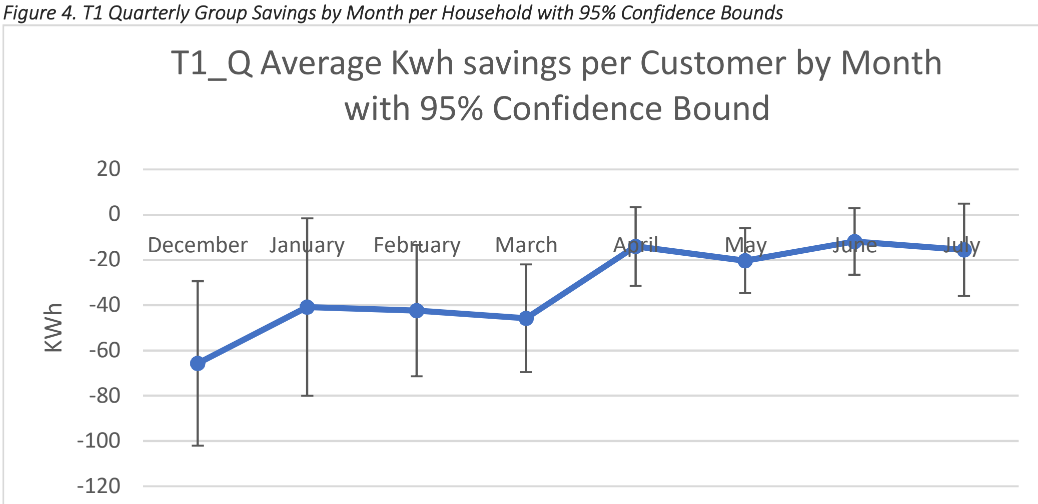


Figure 5. T1 Bimonthly Group Savings by Month per Household with 95% Confidence Bounds

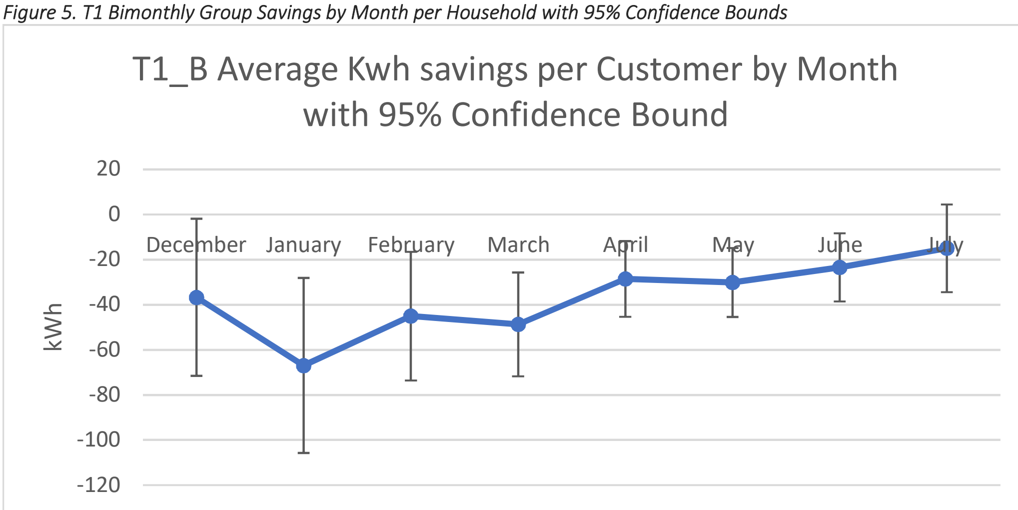


Figure 6. T2 Savings by Month per Household with 95% Confidence Bounds

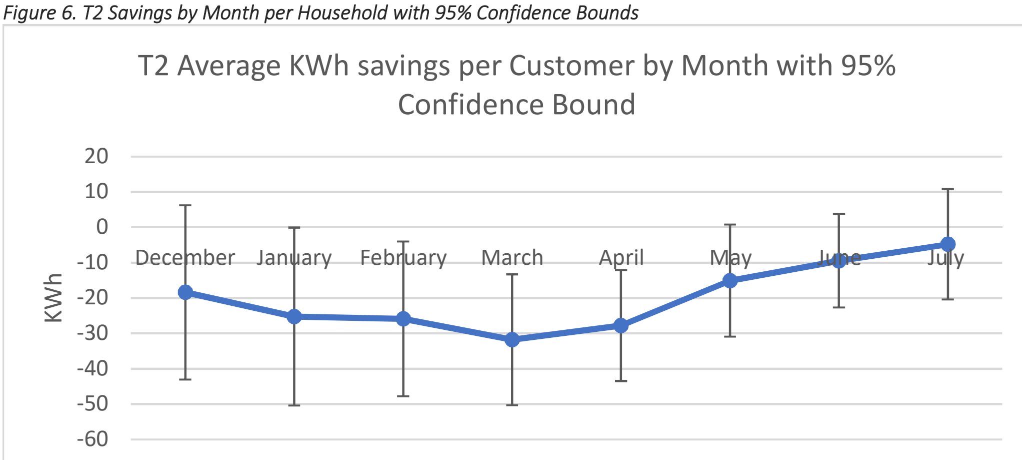
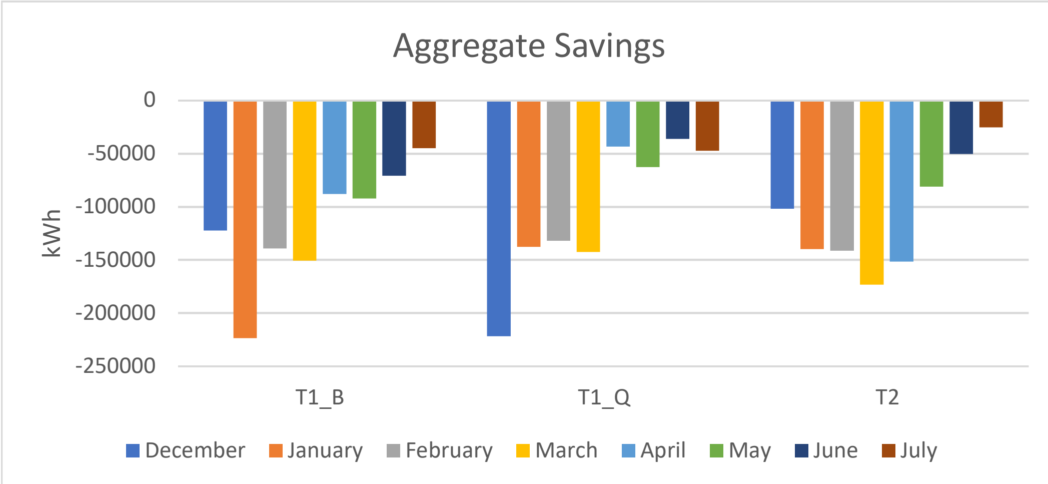


Figure 7 shows the total kWh savings each winter-heating group achieved combined.

Figure 7. Total (Aggregate) Winter Heating Group Energy-Use Reduction in kWh, by Month



3.2.4 YEAR-ROUND GROUP MEASUREMENT & VERIFICATION RESULTS

Of the groups that received reports year-round, T3 and T4 showed increased savings over year one. However, T5 (the group with low energy use prior to the program) did not show satisfactory savings, despite the group having been optimized to remove customers with low savings potential.

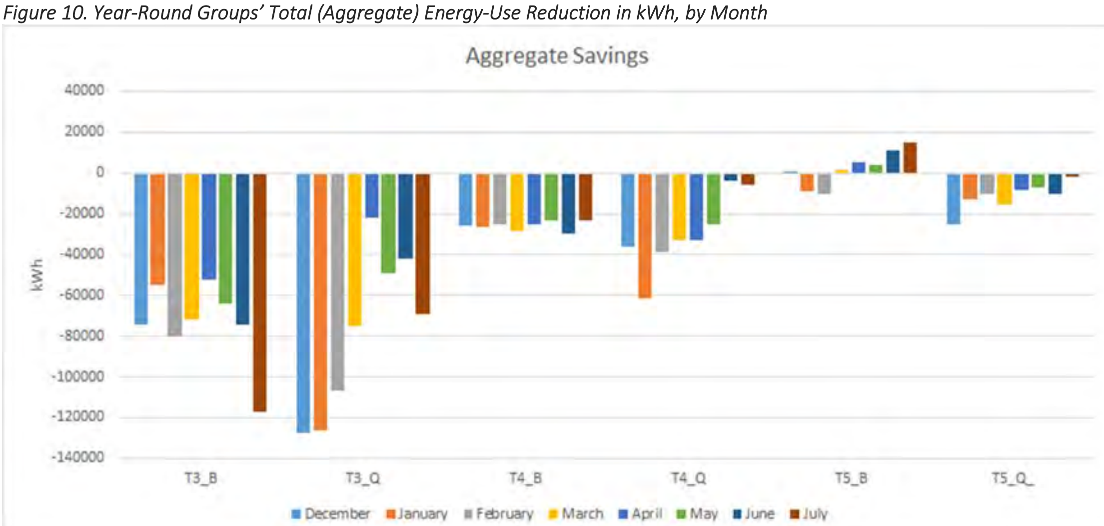
Interestingly, the high-energy-user (T3) and medium-energy-user (T4) groups saw the same percentage energy savings (1.8%). However, in kilowatt hours, T3 delivered more savings because of their overall higher kWh usage.

Table 18. Year-Round Treatment Groups Percentage Savings

T3 — Year-Round	1.8%
T4 — Year-Round	1.8%
T5 — Year-Round	0.5%

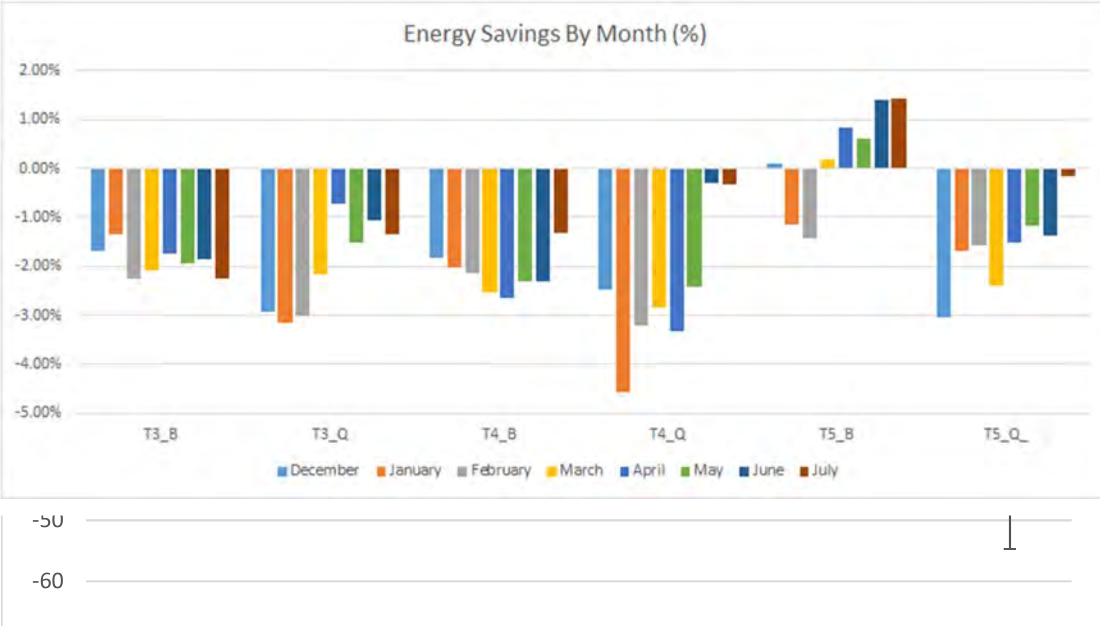
Figures 8 and 9 show the various year-round groups' average household energy reduction each month by percentage and in kilowatt hours. Figure 10

Figure 10. Year-Round Groups' Total (Aggregate) Energy-Use Reduction in kWh, by Month



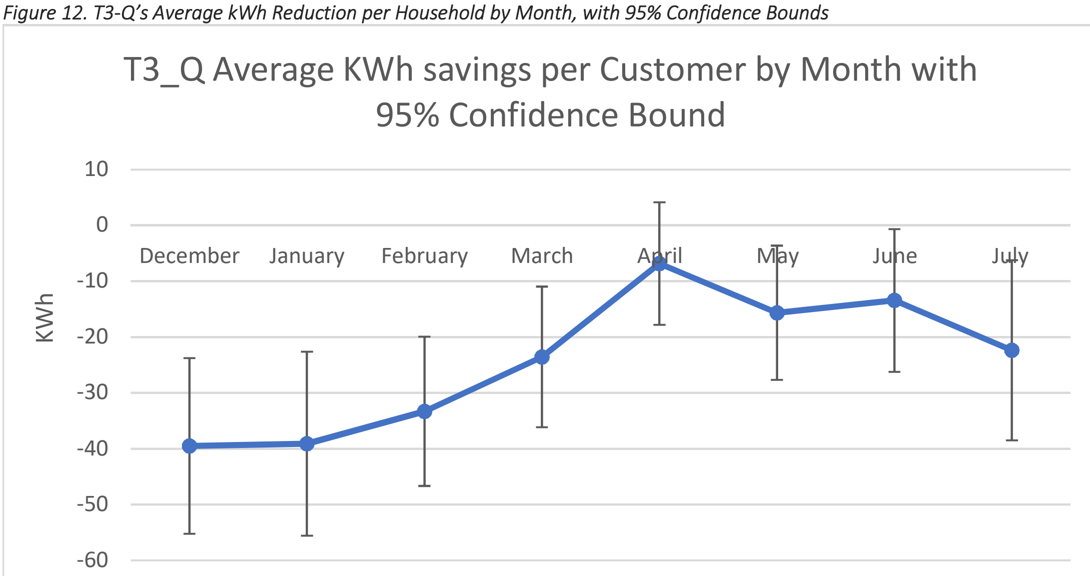
shows the combined kWh reduction made by each group each month.

Figure 8. Year-Round Groups' Monthly Energy-Use Reduction (as a Percentage)



Figures 11 and 12 show the T3 groups' average energy savings per household by month (in kWh), with 95% confidence bounds.

Figure 12. T3-Q's Average kWh Reduction per Household by Month, with 95% Confidence Bounds



Figures 13 and 14 show the T3 groups' average energy savings per household by month (in kWh), with 95% confidence bounds.

Figure 13. T4-B's Average kWh Reduction per Household by Month, with 95% Confidence Bounds

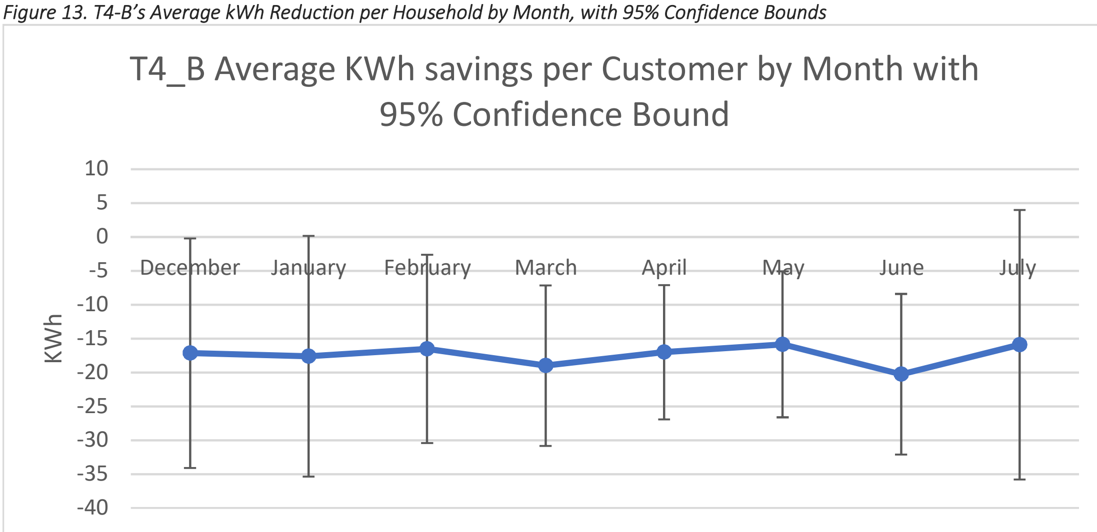
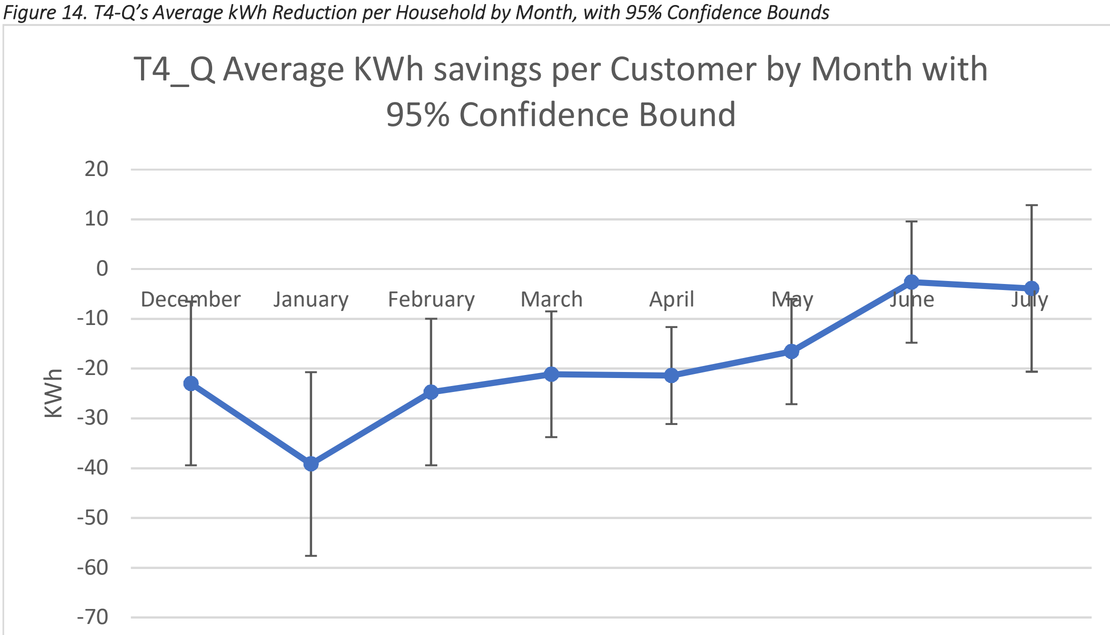


Figure 14. T4-Q's Average kWh Reduction per Household by Month, with 95% Confidence Bounds



Figures 15 and 16 show the T5 groups' average energy savings per household by month (in kWh), with 95% confidence bounds.

Figure 15. T5-B's Average kWh Reduction per Household by Month, with 95% Confidence Bounds

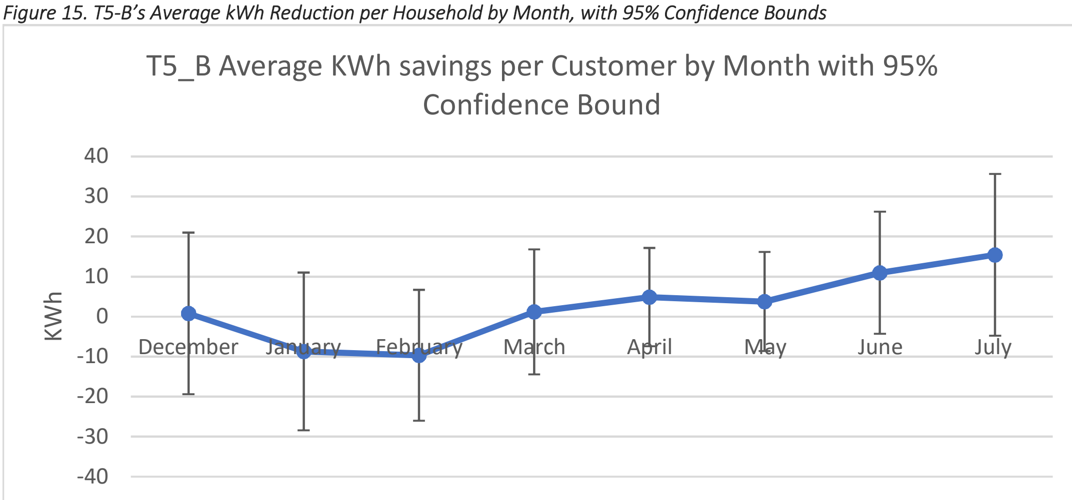
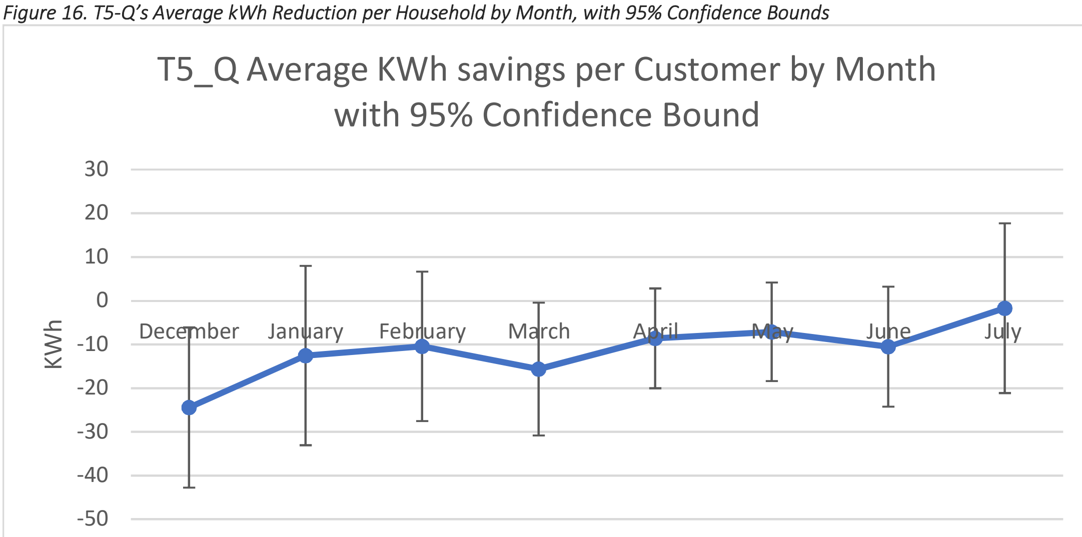


Figure 16. T5-Q's Average kWh Reduction per Household by Month, with 95% Confidence Bounds



3.3 Email Reports

3.3.1 ENROLLMENT

Starting in March 2019, HER recipients were given the option to receive reports by email. They were made aware of this option through a note in the header of their print HERs. No further promotion of email reports was conducted. According to a customer survey, 45 percent of HER recipients who responded were aware that they could choose to receive their reports by email (see Appendix C).

In total, only 11 customers signed up to receive reports by email. However, according to the customer survey, email was the most-preferred method for receiving reports, with 45 percent of respondents saying they preferred email reports, followed by 25 percent who preferred print, and 22 percent who preferred print *and* email reports.

Figure 17. HER Header with Email Sign-Up Information


Report Period:
December 1, 2018 – January 31, 2019
Home Energy Report
For: 3747 LIPTON LANE
Account Number: 1111111115

IDAHO POWER
An IDACORP Company

SALLY CARDONA
3747 LIPTON LANE
BOISE, ID 83706-1822

We're here to help.
Call 1-800-632-6605, Mon – Fri, 7:30 a.m. to 6:30 p.m. MT to update your profile or unsubscribe, or visit idahopower.com/HomeEnergyReport.
To receive future reports via email, send a request to solutions@idahopower.com.

Since customers have indicated a high interest in email reports, the low sign-up rate may be due to low awareness (as mentioned, the survey found awareness was at 45 percent) and/or the relatively high barrier to signing up (customers cannot sign up through a website or online form, but instead must send an email request to receive email reports). It is possible that lowering barriers to enrollment — for example, sending customers an email with a sign-up link — would result in more customers adopting email.

While some customers indicated that they would prefer to receive email reports, the impact of email reports on savings is presently unknown. Currently, email reports are offered for customer convenience, not due to any impact they may (or may not) have on savings.

3.3.2 DELIVERY, OPEN, AND BOUNCE RATES

As of August 26, 2019, a total of 33 email reports had been sent to Idaho customers and seeds (i.e., IPC employees receiving an eHER in order to evaluate it). Of these, 31 emails were successfully delivered, and a total of 22 were opened. The total clickthrough rate (that is, the rate of clicks on links contained within the emails) was 3.2 percent, which came from one person clicking on the "want to learn more?" link leading to IPC's "Savings for Your Home" page. This is a normal clickthrough rate, though the sample size receiving emails is too small to draw any real conclusions.

As noted, 33 emails were sent, but only 31 were delivered. The reason for the non-deliveries was because two emails, both sent to the same customer, bounced (i.e., were unable to be delivered to the customer's inbox) due to their subject lines, which contained words that may have caused them to be marked as spam. These words included "cost" and "savings" — words related to money.

3.4 Customer Satisfaction

3.4.1 CUSTOMER SATISFACTION SURVEY

A survey to gauge customer satisfaction with IPC and with the HER program was performed in July 2019 by Oraclepoll, a third-party company, via live telephone interviews. Eight hundred customers were interviewed, six hundred of which were in treatment groups, and two hundred who were not (as a control group).

The Home Energy Report program scored high in terms of five key performance indicators: 1. Recall, 2. Readthrough, 3. Detailed recall, 4. Action, and 5. Impression of IPC.

Analysis of the customer survey showed the following responses:

1. **Recall:** Customers recalled receiving reports at a high rate (82%).
2. **Readthrough:** The readthrough rate was also high at 83%.
3. **Detailed recall:** Customers remembered specific elements of their reports, including the energy-use breakdown (90%), social benchmarking (87%), and tips (76%).
4. **Action:** With 77% of those reading their reports saying they have acted on the information given in their reports, Idaho Power has the highest action rate of any Ecotagious program.
5. **Impression of IPC:** Customers said that HERs have improved their opinion of Idaho Power (63%) and that the recommendations given within them are useful (74%).

Customers also generally agreed that the information in their HERs was accurate (78%) and that the tips contained in reports were useful (74%). However, it was found that younger customers were more likely to read the reports, so engaging customers age 55+ may require different methods.

A detailed report on the survey is included in Appendix C. A full set of the cross-tabs were delivered to IPC for further analysis. The phone survey instrument is included in Appendix B.

3.4.2 CUSTOMER SERVICE LINE CALL RATES AND OPT-OUTS

In year two, IPC customer solutions advisors (CSAs) received 160 calls related to the HER program, down from 411 calls in year one. This means 0.64 percent of customers in the treatment groups (or less, if there were repeat callers) called in about the program.

Table 21. CSA Calls and Opt-Out Rates, Year-One Vs. Year-Two

	Year One	Year Two
Total Calls	411	160
Opt-Out Rate	0.64%	0.22%

The opt-out rate in year two was 0.22 percent (down from 0.64% in year one). This remains below the industry average of 1 percent. A low opt-out rate in year 2 is expected because customers who wished to opt out of the program are likely to have done in year 1. T2 did have a slightly higher opt-out rate: 0.36%. This is expected because year 2 was the first year that treatment group received reports.

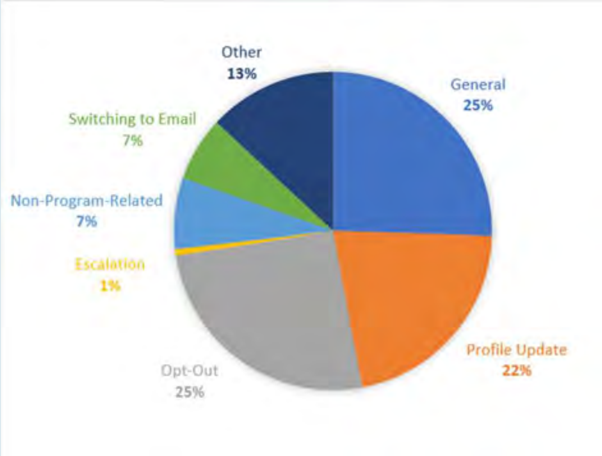
From January to July 2019, CSAs classified each call they received into one of seven categories:

- General
- Profile Update

- Opt-Out
- Escalation
- Non-Program-Related
- Switching to Email Reports
- Other

Figure 18. Reasons for Calls to CSAs in 2019 by Category

	Jan	Feb	Mar	Apr	May	June	July	Total
General	8	2	6	1	17	0	5	39
Profile Update	4	2	9	0	9	1	8	33
Opt Out	12	3	7	0	7	1	9	39
Escalation	0	0	1	0	0	0	0	1
Non-Program-Related	2	0	4	0	3	1	1	11
Switch to Email	2	3	3	0	2	0	0	10
Other	3	0	8	2	2	1	4	20



Following are some sample notes from CSAs regarding phone calls from customers about the HER program:

- *"Discussed energy breakdown and updated home profile. Explained the usage breakdown is an estimate."*
- *"Customer was interested in a home energy audit and signed up after we discussed the program. I mailed her an ESK as well."*
- *"Customer called in to talk about energy efficiency and ways to save. Was showing him much higher than average home on his report."*
- *"[Customer] thinks the report is waste as she thinks the same information can be found on her monthly bill. I explained the report shows her usage vs. other homes and breaks it down more to show how the energy was used."*
- *"HER to the rescue! [Customer] is on budget and had a setting wrong on their new heat pump. They didn't notice the billing had gone way up this winter due to their budget plan but their HER tipped them off to the extreme usage and they called their HVAC installer who figured out the issue right away. [Customer] called to see how it would affect their budget moving forward."*

3.5 Additional Metrics

3.5.1 MICROSITE ENGAGEMENT

Table 22. Monthly Microsite Activity from August 2018 to July 2019

	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Total
Unique Clicks	13	0	1	1	0	2	1	1	1	1	0	0	21
Total Clicks	14	0	1	1	0	2	4	1	1	1	0	0	25
Unique Page Views	0	36	15	10	33	22	36	10	9	12	8	13	204
Total Page Views	0	42	25	10	34	31	48	14	10	13	11	15	253

Microsite usage has remained low, as expected. From August 1, 2018 to July 31, 2019, there were a total of 204 unique page views (that is, people who navigated to the site) and 21 unique clicks within the site.

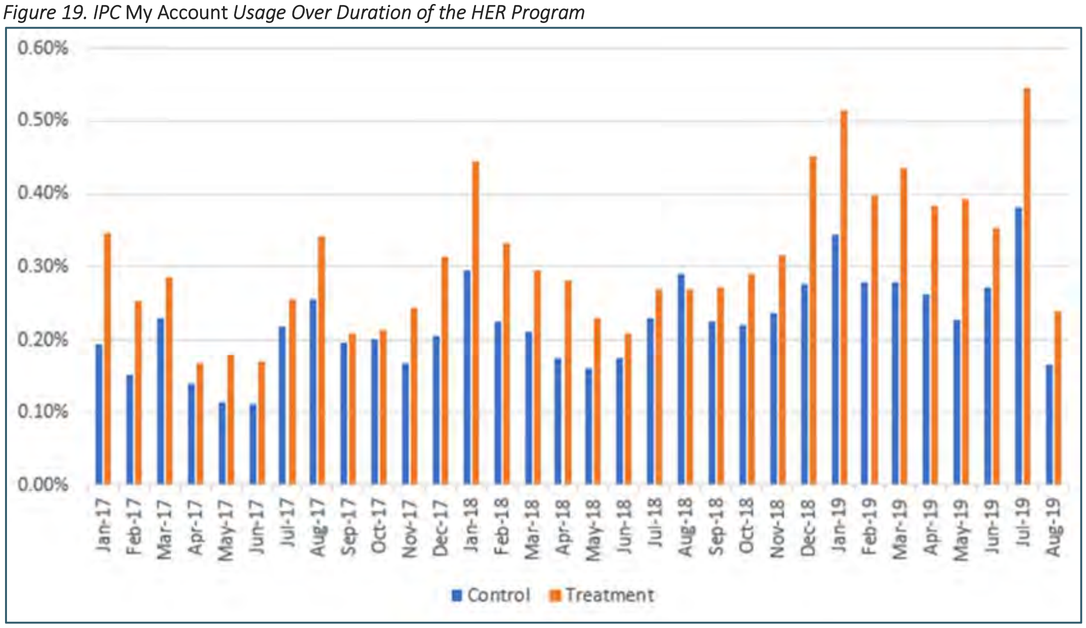
Low microsite usage is to be expected, as the site serves only to supplement the HER program and does not offer extra value to customers beyond answering basic FAQs. It is not a venue for customers to update their home profiles or opt out of the program; it functions primarily to help reduce call volumes.

The microsite link — http://idahopower.com/homeenergyreport — is available from HER reports.

3.5.2 MY ACCOUNT WEB ACTIVITY

Since the beginning of the program, the treatment groups have consistently used IPC's *My Account* slightly more than the controls. The treatment group has been an average of 0.1 percent more active on My Account than the controls since January 2017.

Figure 19. IPC My Account *Usage Over Duration of the HER Program*



3.5.3 ATTRITION RATES

Attrition rates measure the number of people removed from the HER program, either due to not meeting program requirements or because participants chose to opt out. The attrition rate in Y2 was 15.15%.

Table 23. T1 Attrition Rates in Sep/Nov 2018

Reason for Removal	Sep	Nov	Total
Billing	375	10	385
Location	0	0	0
Property	0	0	0
AMI Insufficient/Negative Usage	0	5	5
USPS Non-Deliverables	43	57	100
Opt-Outs	4	4	8
Total Removal	422	76	498
Reports Dropped	6,489	6,413	

Table 24. T345 Attrition Rates in Sep/Nov 2018

Reason for Removal	Sep	Nov	Total
Billing	324	18	342
Location	0	0	0
Property	0	0	0
AMI Insufficient/Negative Usage	32	12	44
USPS Non-Deliverables	36	69	105
Opt-Outs	2	6	8
Total Removal	394	105	499
Reports Dropped	11,845	11,740	

Bimonthly Treatment Group Attrition Rates

Table 25. T1-B and T2-B Attrition Rates in 2019

Reason for Removal	Jan	March	May	July	Total
Billing	151	129	85	128	493
Location	0	0	0	0	0
Property	12	0	2	1	15
AMI Insufficient/Negative Usage	509	389	1	3	902
USPS Non-Deliverables	81	16	11	13	229
Opt-Outs	9	6	5	3	23
Total Removal	762	540	104	148	1154
Reports Dropped	8,170	7,630	7,526	7,378	

Table 26. T3-B, T4-B, and T5-B Attrition Rates in 2019

Reason for Removal	Jan	March	May	July	Total
Billing	164	100	73	111	448

Location	0	0	0	0	0
Property	40	0	0	2	42
AMI Insufficient/Negative Usage	64	99	2	4	169
USPS Non-Deliverables	22	30	7	5	64
Opt-Outs	2	2	3	1	8
Total Removal	292	231	85	124	732
Reports Dropped	6,085	5,854	5,769	5,645	

E-2. QUARTERLY TREATMENT GROUP ATTRITION RATES

Table 27. T1-Q Attrition Rates in 2019

Reason for Removal	Feb	May	July	Total
Billing	98	41	37	176
Location	0	0	0	0
Property	0	1	0	1
AMI Insufficient/Negative Usage	105	3	19	127
USPS Non-Deliverables	8	2	4	14
Opt-Outs	2	1	1	4
Total Removal	213	48	61	322
Reports Dropped	2,994	2,946	2,885	

Table 28. T3-Q, T4-Q, and T5-Q Attrition Rates in 2019

Reason for Removal	Feb	May	July	Total
Billing	272	94	92	458
Location	0	0	0	0
Property	46	0	2	48
AMI Insufficient/Negative Usage	7	1	39	47
USPS Non-Deliverables	9	6	7	22
Opt-Outs	1	2	2	5
Total Removal	335	103	142	580
Reports Dropped	5,688	5,586	5,444	

4 Lessons Learned & Future Recommendations

4.1 Lessons Learned

During year two of the pilot there were a number of lessons learned, detailed below.

1. Minimize HER with Zero Usage

In the pilot year 1 and 2, reports where customers had zero usage in the reporting period were sent out. This is due to a variety of reasons: the inclusion of T5 customers in the program who had very low usage, changes in occupancy in households as well as vacation homes. To minimize the number of reports sent out with zero usage, our operations team checks for low usage reports with every report run.

2. Consider Rules for Attrition

In Year 1 and Year 2 of the pilot, customers who did not receive a report because they had missing billing data or other data errors in one report period were also removed from the program and did not receive any future reports. This affects program savings and also means that a customer that is potentially a good candidate to receive HERs will no longer receive HERs at all. In the expansion, this decision should be revisited so that a customer is not removed from the program if they miss one report due to insufficient billing or AMI data error.

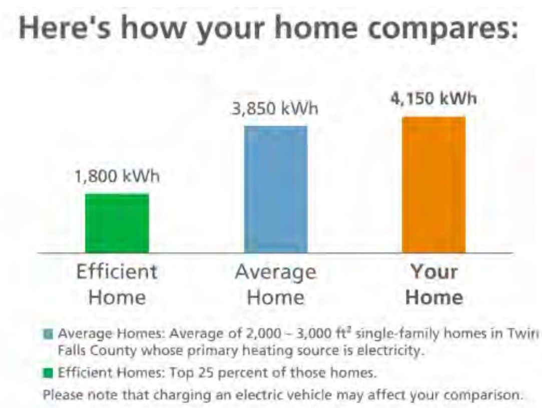
3. Review Email Opt-In Recruitment

The number of households who decided to switch from paper to email reports once the opportunity was offered after the March report was very low – only 11 households. There are a couple of reasons that the uptake was very low: a) the barrier to switch from print to email is high: requiring customers to send an email b) many customers might not even notice the text saying that this is an option, even though it was put in red font in the first couple reports c) the Customer Satisfaction survey indicates that households may be satisfied just knowing this is an option offered by Idaho Power and not decide to switch to email.

This channel was offered for customer satisfaction reasons so as not to upset customers who did not want to receive print reports, and to offer customers the ability to receive the information in their channel of choice. The very small number of customers receiving email precludes any analysis to determine if receipt mechanism affected energy savings. In addition, the email group does not have a valid control group to use to perform M&V as there are inherent differences between customer groups who opt-in to email vs. those who do not. Therefore, offering email HER as an option that customers can switch to from print should be viewed as a customer experience choice rather than a channel that savings can be expected of.

4. Be Cognizant of Sending Appropriate Messaging to Electric Vehicle (EV) Owners

Idaho Power is encouraging customers to purchase EVs. At the same time the HERs currently do not differentiate for customers who have electric vehicles. This means that a customer who recently purchased an EV to be environmentally responsible can receive HERs messaging indicating they are using more than similar homes without acknowledging that it may be due to an electric vehicle. This creates confusion in company messaging, creating a less-than-ideal customer experience. As an interim solution, the text of the HER benchmarking section was updated to add “Please note that charging an electric vehicle may affect your comparison.” If the program expands, Idaho Power will be looking to adjust messaging for HER participants/EV owners in a way that validates the EV purchase decision while still providing energy use home comparisons and recommendations for improving the homes’ energy use.



4.2 Recommended Improvements

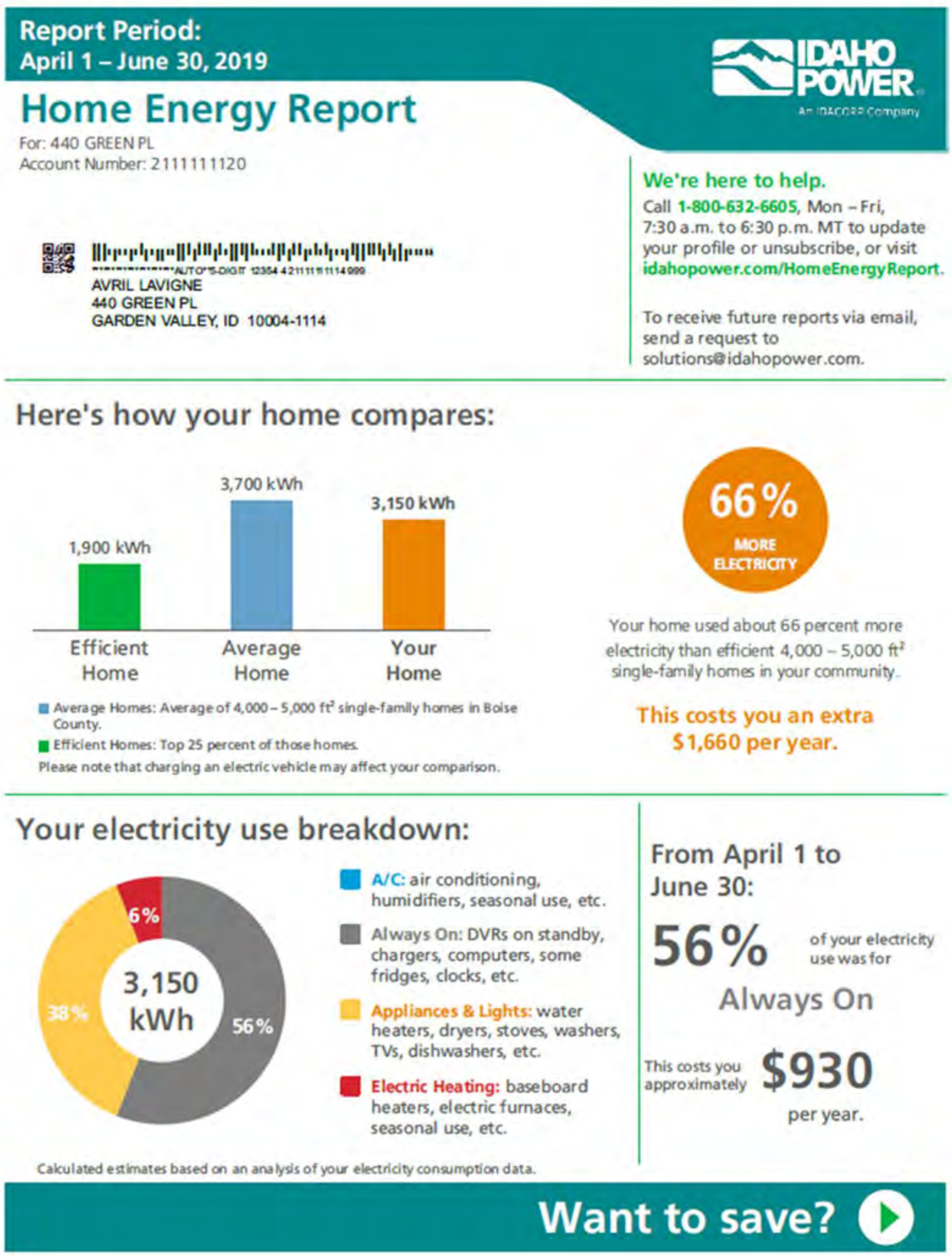
Based on the findings from year two of the pilot, Aclara/Uplight has the following recommendations for enhancing the program in year three and beyond:

1. Do a full program roll-out, expanding to treat an optimized group of IPC customers based on the characteristics that have proven to be cost-effective during the two-year pilot.
2. Improve the email subject lines to they are less likely to be caught by spam filters.
3. Continue to allow program participants to switch from print to email reports. Ensure new participants know the option is available by offering email reports in the welcome letter.
4. Continue to promote IPC energy-efficiency programs in HERs to drive participation in these programs.
5. Send six reports on a bimonthly schedule in the first year customers receive reports, and align on a quarterly report format after the first year of HER treatment. There is not enough of a difference in savings to justify sending bimonthly reports. Customer satisfaction differences were small between the quarterly and bimonthly reports.
6. Simplify the program by merging all treatments groups into one group for the purpose of simplifying the report template and cadence and improving the cost-effectiveness of the program.
7. Remove the T5 group from the program. Their inclusion in this program confirmed the belief that low-energy-users do not save well in HER programs.
8. Improve in-home times (the time it takes for a report to reach the customer in their home) by switching to a daily AMI data schedule.

5 Appendices

Appendix A: Sample Home Energy Reports

A-1. SAMPLE PRINT HER — ALWAYS-ON TIPS


Report Period:
April 1 – June 30, 2019

Home Energy Report

For: 440 GREEN PL
Account Number: 2111111120

IDAHO POWER
An IDACORP Company

AVRIL LAVIGNE
440 GREEN PL
GARDEN VALLEY, ID 10004-1114

We're here to help.

Call 1-800-632-6605, Mon – Fri, 7:30 a.m. to 6:30 p.m. MT to update your profile or unsubscribe, or visit idahopower.com/HomeEnergyReport.

To receive future reports via email, send a request to solutions@idahopower.com.

Here's how your home compares:

Average Homes: Average of 4,000 – 5,000 ft² single-family homes in Boise County.
Efficient Homes: Top 25 percent of those homes.
Please note that charging an electric vehicle may affect your comparison.

66% MORE ELECTRICITY

Your home used about 66 percent more electricity than efficient 4,000 – 5,000 ft² single-family homes in your community.

This costs you an extra $1,660 per year.

Your electricity use breakdown:

- A/C: air conditioning, humidifiers, seasonal use, etc.
- Always On: DVRs on standby, chargers, computers, some fridges, clocks, etc.
- Appliances & Lights: water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- Electric Heating: baseboard heaters, electric furnaces, seasonal use, etc.

Calculated estimates based on an analysis of your electricity consumption data.

From April 1 to June 30:

56% of your electricity use was for Always On

This costs you approximately $930 per year.

Want to save?

Tips to tackle the energy use from your Always On appliances:

✓ Unplug that unused extra fridge.

SAVE UP TO $75 PER YEAR

Refrigerators, which run 24 hours a day, are among the most energy-hungry appliances in your home. A 10-year-old fridge can use up to twice as much energy as a newer, efficient model.

If you have a fridge or freezer you aren't using, unplug it and enjoy the energy savings.

✓ Tame living room electronics.

SAVE UP TO $25 PER YEAR

Most TVs, DVRs and game consoles use electricity even when in standby mode.

You can prevent this by plugging your TV and other electronics into a smart power strip to eliminate standby power use.

In addition to saving energy, smart strips can help tame unruly entertainment system cords.

✓ Check out a Kill A Watt™ Meter at your local library.

TRY IT TODAY

Have you ever wondered how much energy it takes to run your TV, computer or kitchen appliance? Idaho Power has teamed up with libraries throughout Idaho to bring you an easy-to-use tool to help you find out.

Check out an Energy Efficiency Kit from your local library and learn ways to save energy and money. The kit features a Kill A Watt meter, a device that measures the energy use of appliances in your home, instructions for using the meter and tips for saving energy.

Visit idahopower.com/killawatt for details.

This report is based on estimates and projections and is provided for informational purposes only with no warranty. Actual results will vary.

©2019 Idaho Power

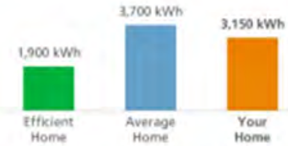
A-2. SAMPLE EMAIL REPORT — ALWAYS-ON TIPS

Home Energy Report

For: 440 Green Pl
Account Number: 2111111115
Report Period:
April 1 – Jun 30, 2019

We're here to help.
Call 1-800-632-6605, Mon – Fri, 7:30 a.m. to 6:30 p.m. MT to update your profile or unsubscribe, or visit us online to learn more.

Here's how your home compares:



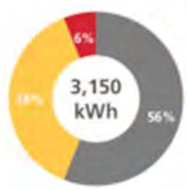
Your home used about 66% more electricity than efficient 4,000 – 5,000 ft² single-family homes in your community.

This costs you an extra $1,660 per year.

Average Homes: Average of 4,000 – 5,000 ft² single-family homes in Boise County.
Efficient Homes: Top 25% of those homes.
Please note that charging an electric vehicle may affect your comparison.

Log in to My Account to view your usage, update your account information, and more.

Your electricity use breakdown:



- **A/C:** air conditioning, humidifiers, seasonal use, etc.
- **Always On:** DVRs on standby, chargers, computers, some fridges, clocks, etc.
- **Appliances & Lights:** water heaters, dryers, stoves, washers, TVs, dishwashers, etc.
- **Electric Heating:** baseboard heaters, electric furnaces, seasonal use, etc.

From April 1 to June 30:
56% of your electricity use was for Always On
This costs you approximately $930 per year.

Calculated estimates are based on an analysis of your home's electricity consumption data.

Tips to tackle the energy use from your Always On appliances:

Unplug that extra fridge or freezer.

Running 24 hours a day, fridges are energy-hungry appliances. Unplug unused fridges to save.

Save up to $75 per year

Tame living room electronics.

Use a smart power strip to automatically reduce the energy used by your electronics when they're in standby mode.

Save up to $25 per year

Check out a Kill A Watt™ Meter at your local library.

Find more ways to save by measuring your appliance energy use with a Kill A Watt Meter.

Try it today

Want to learn more?

To unsubscribe from email delivery and begin receiving your Home Energy Report by mail, click here.

Appendix B: Customer Satisfaction Survey Report

An IDACORP Company

2019 Annual Customer Survey Report

August 2019

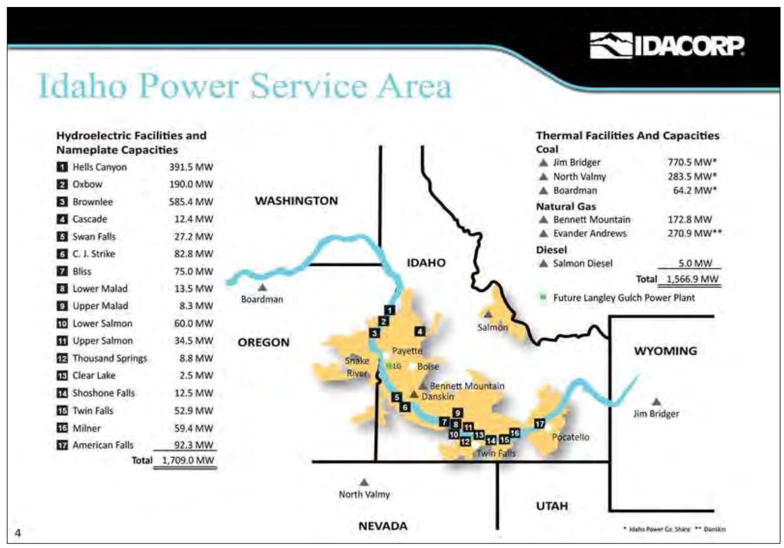
Methodology and Logistics

Background

Ecotagious commissioned Oraclepoll Research Limited to conduct survey research among Idaho Power customers. The research assessed customers' satisfaction levels, as well as customers' willingness to conserve energy.

A primary focus of the study was to determine the impact of Home Energy Reports on the select group of Idaho Power customers who received them (i.e., the treatment group). To determine this, a sample of customers were interviewed from the treatment group, as well as general customers (i.e., a control group).

This survey project is a follow-up to a baseline poll that was conducted by Oraclepoll in April 2018 for Ecotagious/Idaho Power. That survey established baseline data for several indicators that were repeated in this project. When and where possible, the results are compared over time.



Survey Method

The survey was conducted by live person-to-person researchers at the Oraclepoll call centre using computer-assisted techniques of telephone interviewing (CATI). An initial call was made to contact respondents or, if requested, to set up a suitable callback time to complete the interview. Researchers asked for the contact person provided in the database, but respondents were also screened to ensure they were 18 years of age or older and responsible for making energy-related decisions in their home.

Logistics

Surveys were completed between July 10 and July 23, 2019.

Confidence

The margin of error for the total (N=800) sample is ±3.5 percent, 19/20 times. The error rate for the control sample (N=200) is ±6.9 percent, 19/20 times. For the treatment group (N=600), it is ±4.0 percent, 19/20 times.

Study Sample

Idaho Power provided a database of customers to be interviewed. Quotas were set for each customer category to ensure enough respondents were selected from each treatment group to allow for comparison between them.

The total number of customers interviewed was **800**. Of these, **600** were in treatment groups and **200** were in control groups. This is an increase in respondents from 2018, when the sample size was **400** — 200 in the control group and 200 in treatment groups (100 from T1, 100 from T1/T2/T3 combined).

Breakdown of respondents from each customer group (2019)

Category	Respondents	% of Total Sample
T1 Total	180	22.5%
T2 Total (bimonthly)	100	12.5%
T3 Total	180	22.5%
T4 Total	85	10.6%

Treatment Group Details

The treatment groups were created based on their electricity usage prior to the program. T1 and T2 have high electric heating in the winter, whereas T3, T4, and T5 do not. T3 are considered high energy users, T4 are medium, and T5 are low.

Findings to date show that T1 and T2 have higher savings than T3, T4, and T5. However, this is likely because, as users of electric heating, they have higher electricity usage than other groups (and therefore more savings potential), not because they have a different response to the reports.

Starting in 2019, all treatment groups except T2 were split into two groups with different report schedules, one quarterly and the other bimonthly (e.g., T1 was divided into T1-Q and T1-B).

Summary

The survey measured customer perceptions of Idaho Power and Home Energy Reports (HERs). A basic summary of results follows.

Customer Satisfaction

Customer satisfaction, both with Idaho Power as a whole and with the Home Energy Report program specifically, was found to be very high.

A vast majority (90%) of customers — in treatment *and* control groups — indicated that they are satisfied with Idaho Power. In addition, most customers who received and read HERs indicated that their opinion of Idaho Power had improved as a result of receiving reports (63%). Customers who received reports also saw a larger increase in satisfaction over 2018 (7%) than those who did not (2%). So, while a majority of all customers are satisfied with Idaho Power, those who received HERs found that the reports improved their opinion of the company.

Customer Impressions of Home Energy Reports

Most customers in the treatment group agreed that the information in their HERs was accurate (78%) and that the tips contained in the reports were useful (74%). Furthermore, customers' belief in the reports' accuracy increased 17 percent over last year. This is a favorable finding, as accuracy and credibility are often customers' most common subjects of complaint.

Demographics

The survey found that older customers were the least likely to read Home Energy Reports (12–13% of customers aged 55+ did not read them, compared with less than 4% of customers under 55). Similarly, older customers were found to be less motivated to reduce their electricity consumption than respondents under 55. Notably, 100 percent of the 18–24 age group said they were motivated to reduce consumption. There were no notable differences between the responses of males vs. females.

These findings may indicate that energy-saving programs like HERs may be more effective with younger customers, and that different methods may be required to engage older customers.

Energy Savings Indicators

When asked, most customers agreed that Idaho Power helps them to save energy and offers helpful tools, tips, and programs. However, only 46 percent agreed that their smart meter provides valuable information.

It is possible that many customers are not aware that their smart meters are essential to creating Home Energy Reports. In the future, it may be useful to create a clearer link between HERs and smart meters, or to implement features such as alerts using smart meter data.

Treatment Groups

A comparison of the bimonthly and quarterly treatment groups' responses was performed for each question, and in most cases, no notable pattern of difference was found between quarterly and bimonthly treatment groups. The only notable exception was that the quarterly and bimonthly report recipients had different recall of how frequently they received HERs.

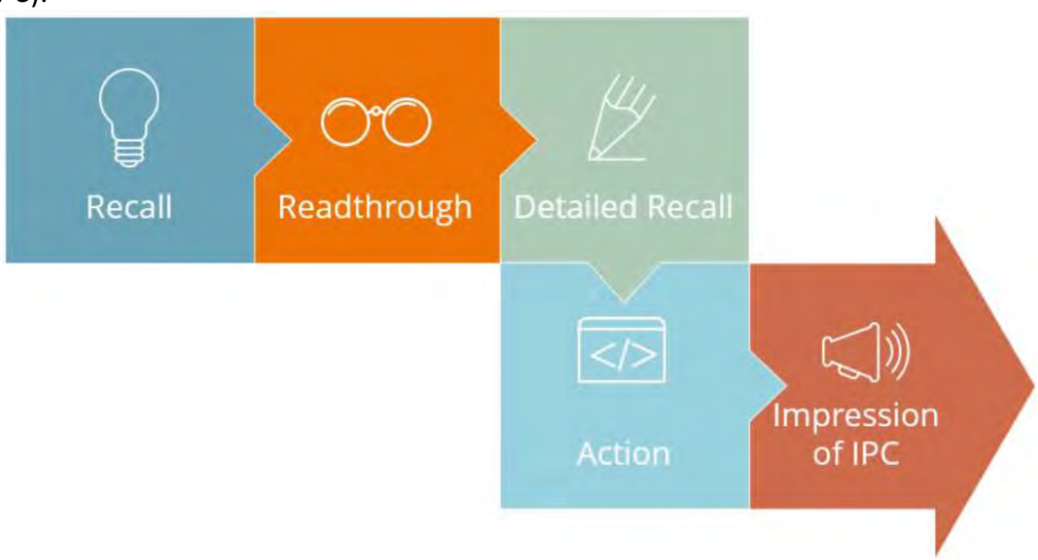
The fact that different delivery schedules did not seem to affect results is likely because the schedules had been implemented only seven months before the survey was conducted (meaning the bimonthly groups had only received two more reports than the quarterly groups). Thus, in this report, results are given for each treatment group as a whole, unless otherwise specified.

Regarding differences in response between the T1, T2, T3, T4, and T5 groups, little difference was found, except where noted. For Question #T9 ("How, if at all, has your opinion of Idaho Power changed since receiving the Home Energy Reports? Would you say it is much worse, somewhat worse, stayed the same, somewhat better or much better?"), results were tested to see if there was any significant difference between the T1–T5 treatment groups. No statistically significant difference was found (see Appendix for details).

Customer Journey

The goal for the customer experience with Home Energy Reports is that report recipients:

A. remember the reports (*recall*),
B. read them (*readthrough*),
C. recall specific elements (*detailed recall*),
D. take action based on the reports (*action*), and
E. have a higher opinion of Idaho Power as a result of being in the program (*impression of IPC*).



Analysis of the customer survey shows that results are very positive on all fronts:

A. **Recall:** Customers recall receiving reports at a high rate (82%).
B. **Readthrough:** The readthrough rate is also high at 83%.
C. **Detailed recall:** Customers remembered specific elements of their reports, including the energy-use breakdown (90%), social benchmarking (87%), and tips (76%).
D. **Action:** With 77% of those reading their reports saying they've acted on the information given in their reports, Idaho Power has the highest action rate of any Ecotagious program.
E. **Impression of IPC:** Customers say that HERs have improved their opinion of Idaho Power (63%) and that the recommendations given within them are useful (74%).

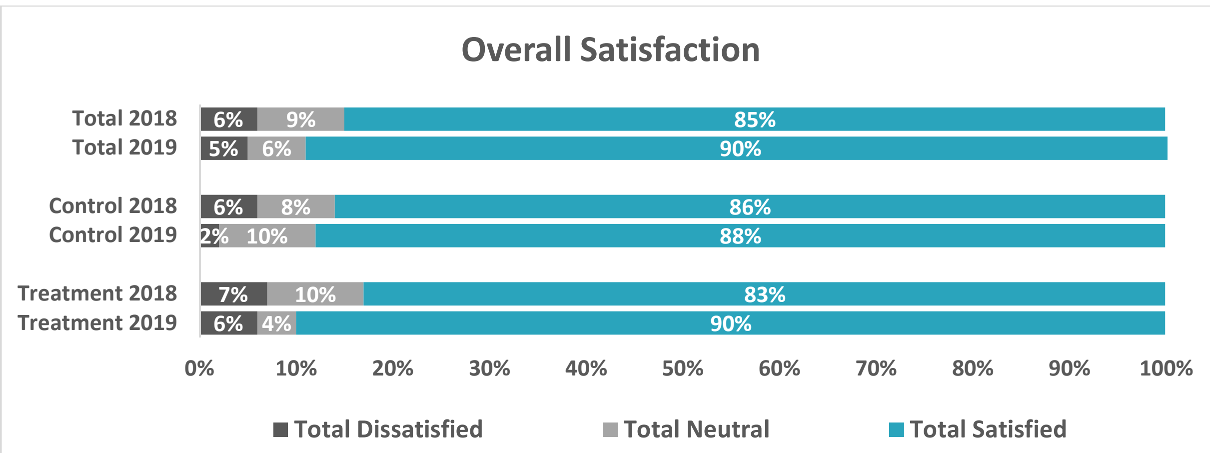
Overall Satisfaction

The following section includes questions asked of all respondents — in both treatment and control groups.

In the first question, all respondents (N=800) rated their level of satisfaction with Idaho Power using a five-point scale.* The graph below combines total "satisfied" (5 and 4) and total "dissatisfied" (1 and 2) results. It also compares the findings over the baseline 2018 survey.

**5 = very satisfied, 4 = satisfied, 3 = neither satisfied nor dissatisfied, 2 = unsatisfied, 1= very unsatisfied*

Question #Q1: *Using a scale from one to five where one is "very dissatisfied" and five is "very satisfied," what is your overall satisfaction with Idaho Power?*



There is a very high level of satisfaction among Idaho Power customers, as evidenced by the 90-percent overall "satisfied" score (61% "very satisfied," 29% "satisfied"), which is 5 percent higher the 85-percent score in 2018 (60% "very satisfied," 25% "satisfied").

The survey did not include follow-up questions as to why customers were satisfied or unsatisfied. However, as of February 2019, customers were offered the opportunity to switch from print reports to email reports, which potentially might have helped increase the treatment group's satisfaction between year one and year two. Otherwise, the HER program was not notably changed between 2018 and 2019, so the overall increase in satisfaction may be due to broader trends of communication and policy in Idaho Power and/or customers who did not like the HER program having opted out in year one.

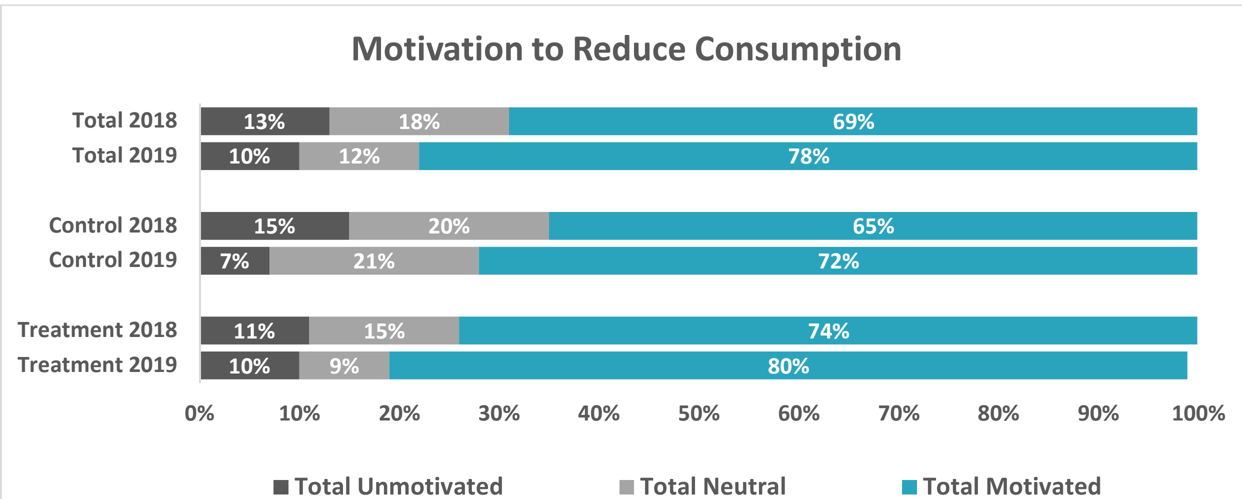
There were no notable differences in satisfaction between treatment groups or according to report delivery frequency, gender, or education. There were small differences in satisfaction according to age group, with 25- to 34-year-olds being the least satisfied (85% total satisfied) and 55- to 64-year-olds being the most satisfied (94% total satisfied).

Motivation to Reduce Consumption

All customers (N=800) were questioned about how motivated they are to reduce the amount of electricity consumed at their residence. Results from "total motivated" (5 and 4) and "total not motivated" (1 and 2) scores are combined below.

**5 = very motivated, 4 = motivated, 3 = neither motivated nor not motivated, 2 = not motivated, 1 = not at all motivated*

Question #Q2: *How motivated are you to reduce the amount of electricity you use in your home? Please respond using a scale from one to five where one is "not at all motivated" and five is "very motivated."*



Almost eight in ten (78%) of all customers said that they are "motivated" (34%) or "very motivated" (44%) to reduce the amount of electricity they use at home. This is a 9 percent increase over 2018, when 69 percent stated the same. Results from the treatment group were notably higher at 80 percent than from the control sample at 72 percent, indicating a correlation between receiving reports and wanting to save energy. The increase in motivation to reduce electricity use between 2018 and 2019 may be due to the length of time customers have been receiving reports — T1, T3, T4, and T5 have been receiving reports since 2017, and their motivation to reduce electricity consumption may have increased over time.

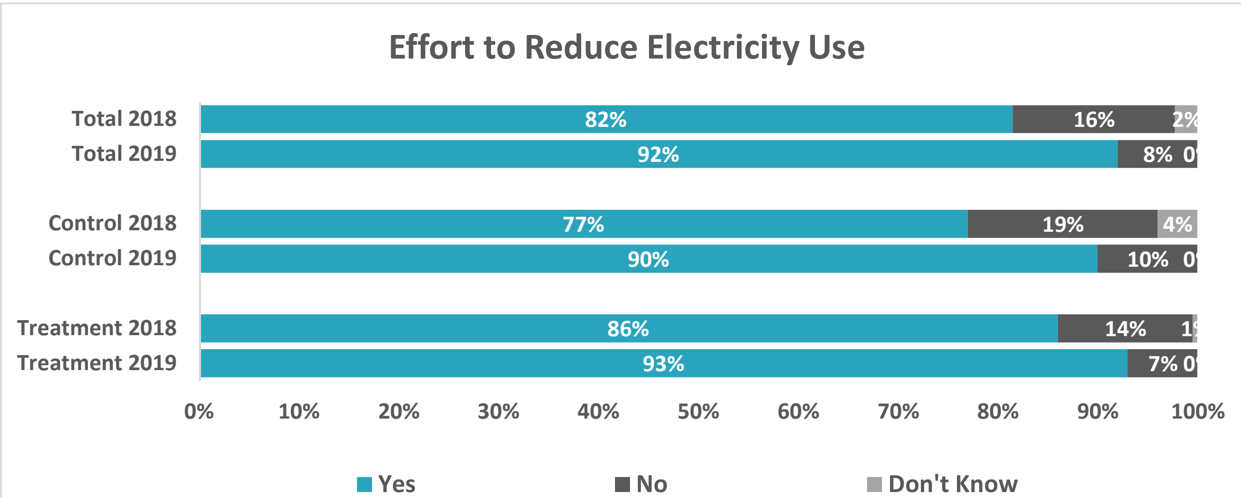
There were no notable differences in response rates between the treatment groups. Respondents under the age of 55 tend to be the most motivated to reduce electricity consumption. All respondents aged 18–24 said they are motivated, as are 80 percent of respondents aged 25–34, 81 percent of respondents aged 35–44, and 82 percent of respondents aged 45–54.

These motivation rates are higher than those of respondents aged 55–64 (72% reported being motivated), 65–74 (76% were motivated), and 75 years or older (67% were motivated).

Efforts to Reduce Use

All respondents (N=800) were then specifically asked if they make efforts to reduce the electricity that they use.

Question #Q3: *Do you make any efforts to reduce your electricity use?*



A very strong majority (92%) of all customers claimed that they make efforts to reduce their electricity use. This is 10 percent higher than the 82 percent in 2018 who claimed the same. The increase in effort may be due to increased societal pressure to conserve, which would impact both treatment and control groups.

Results from both 2018 and 2019 show treatment samples making slightly higher efforts to reduce electricity use than their respective control groups (in 2019, 93% of respondents in treatment groups said they make efforts, compared to 90% of the control group. In 2018, 86% in the treatment groups reported making efforts, compared to 77% in the control). Although the gap between treatment and control groups narrowed in 2019, more customers overall reported making efforts to reduce electricity use.

There was no notable difference in response to this question according to gender. There *were* some differences according to age group, with a greater percentage of younger respondents reporting that they make an effort to reduce electricity use. Notably, 100 percent of 18- to 24-year-olds reported making efforts to reduce their electricity use, while only 85 percent of those 75 or older reported the same. (However, as a standalone figure, 85 percent is still quite high.)

Reasons for Reducing Electricity Use

The respondents from Q3 who said they make efforts to reduce their electricity consumption (N=737) were then asked to indicate the reasons why they conserve electricity, selecting from five factors. The numbers below indicate those that answered "yes" to each factor.

Question #Q4: *Please tell me if each of the following are reasons why you make efforts to reduce your electricity use.*

	2018			2019		
Reason	**Total Sample**	**Control**	**Treatment**	**Total Sample**	**Control**	**Treatment**
Save money	**98%**	97%	98%	**99%**	98%	99%
Reduce waste	**86%**	83%	88%	**82%**	78%	83%
Help preserve the environment	**76%**	69%	83%	**80%**	77%	80%
Make your home more comfortable	**73%**	64%	81%	**75%**	72%	76%
Reduce your dependence on fossil fuels (propane, coal, etc.)"	**67%**	60%	73%	**65%**	60%	66%

Saving money was the prime motivator for saving energy for nearly all customers in both 2019 (99%) and 2018 (98%). The next most common reason was reducing waste (82% — a 4% decrease from 2018), followed by helping to preserve the environment (80% — a 4% increase from 2018). Home comfort ranked fourth at 80 percent (4% higher than in 2018), while the least-selected reason was reducing dependence on fossil fuels at 65 percent (2% less than in 2018).

Agreement Statements

All respondents (N=800) were asked to rate their level of agreement with nine statements, using a five-point scale.* Figures in the following tables include the total "agree" answers (5 and 4) for each indicator.

**5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree*

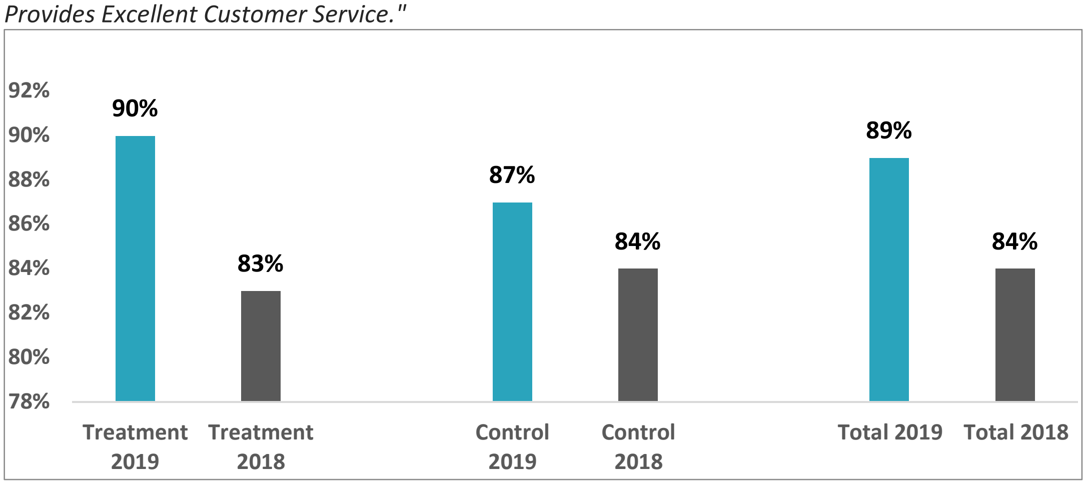
Question #Q5: *I am now going to ask you to rate your level of agreement with a series of statements related to Idaho Power. For each one, please respond using a scale from one to five where one means you strongly disagree and five means you strongly agree.*

Customer-Service Indicators

The first three statements related to Idaho Power's service (results below).

	2019			2018		
Customer Service Indicator	**Total Sample**	**Control**	**Treatment**	**Total Sample**	**Control**	**Treatment**
"Idaho Power provides excellent customer service."	**89%**	**87%**	**90%**	**84%**	**84%**	**83%**
"Idaho Power provides service at a reasonable cost."	**80%**	**81%**	**79%**	**74%**	**75%**	**74%**
"Idaho Power cares about its customers."	**77%**	**73%**	**79%**	**69%**	**70%**	**68%**

Percentage of Customers who Responded "Agree" or "Strongly Agree" to the phrase, "Idaho Power Provides Excellent Customer Service."



Results show a strong level of satisfaction with Idaho Power's service and improved (in 2019, over 2018) for every customer-service statement. Findings are roughly consistent between the control and treatment groups.

Energy-Savings Indicators

The next six statements related to Idaho Power's offerings to help customers understand their energy use and save energy (results below).

	2019			2018		
Energy-Savings Indicator	**Total Sample**	**Control**	**Treatment**	**Total Sample**	**Control**	**Treatment**
"Idaho Power helps you understand how you're using energy."*	***77%***	**63%**	**82%**	***71%***	**59%**	**83%**
"Idaho Power provides helpful tools to help you save money."*	***76%***	**62%**	**81%**	***68%***	**61%**	**75%**
"Idaho Power is a trusted resource for information on how to save energy."	***72%***	**65%**	**74%**	***65%***	**60%**	**70%**
"Idaho Power helps you manage your energy usage."*	***69%***	***58%***	***73%***	***58%***	**45%**	**71%**
"Idaho Power helps you save electricity by providing useful energy-saving recommendations and programs."*	***69%***	**62%**	**72%**	***62%***	**53%**	**72%**
"You feel like your smart meter is providing valuable information."*	***46%***	**42%**	**48%**	***45%***	**39%**	**52%**

***First-person words (e.g., "I" and "my") from the 2018 survey were changed to second-person (e.g., "you" and "your") in 2019.** E.g., "Idaho Power helps me understand how I'm using energy" (2018) vs. "Idaho Power helps you understand how you're using energy" (2019)

Overall, the difference between treatment and control groups was quite high for all statements, suggesting the HERs are improving customers' perception of Idaho Power in these categories. The statements that saw the highest rates of agreement were "Idaho Power helps you understand how you're using energy" and "Idaho Power provides helpful tools to help you save money." Results for these two indicators were higher overall in 2019 than in 2018, with the treatment groups' results being 19 percent higher than the control groups' for both questions. This suggests that HERs contributed to the improved perception of Idaho Power in relation to these statements.

Treatment-group results were also stronger for the remaining four statements, and the scores had improved compared to 2018. The statement with the third-highest rate of agreement was "Idaho Power is a trusted resource for information on how to save energy," followed by "Idaho Power helps you manage your energy usage," which made the biggest gains over 2018 results and was selected by 15% more of the treatment group than the control group. The next highest ranked statement was "Idaho Power helps you save electricity by providing useful energy-saving recommendations," and there was a 10 percent gap between the treatment group's results and the control's. Results for "You feel like your smart meter is providing valuable information" remained lowest and are consistent with the results from 2018.

Actions to Save

Next, all respondents (N=800) were asked if they had completed a series of fourteen conservation actions in the past six months.

Question #Q6: *Please indicate if you have completed or done any of the following actions at your residence within the last 6 months to save energy.*

Actions taken to save energy	*Total sample "yes" 2018*	*Total sample "yes" 2019*	Control sample "yes" 2019	Treatment sample "yes" 2019
Turned off lights	***N/A***	***93%***	92%	93%
Purchased LEDs to install in your home	***83%***	***91%***	90%	92%
Set your thermostat to a lower or higher temperature	***74%***	***84%***	78%	86%
Only used dryer when it's full	***85%***	***82%***	82%	82%
Avoided heating unused rooms	***85%***	***75%***	72%	76%
Washed clothes in cold water	***71%***	***70%***	63%	72%
Unplugged electrical devices	***N/A****	***67%***	62%	69%
Reduced shower time	***N/A****	***60%***	53%	62%
Installed a high efficiency showerhead	***41%***	***44%***	35%	47%
Checked air ducts for leaks	***37%***	***39%***	37%	40%
Changed appliances	***N/A****	***30%***	26%	32%
Used a clothesline to dry clothing	***25%***	***29%***	32%	28%
Changed windows or doors	***N/A****	***20%***	**21%**	**20%**
Added insulation to your home	***21%***	***14%***	12%	15%

*Responses marked "N/A" indicate questions that were not asked in the 2018 survey. These questions were added in 2019 after they were found to be common open-ended customer responses in the 2018 survey.

These 20% (N=163) were asked a follow-up question about how many windows or doors were changed.

"How many were changed?"

1–3	***42%***
4–6	***11%***
7–9	***21%***
10 or more	***24%***
Don't know	***2%***

According to the 2019 survey, a more than nine-in-ten majority have turned off lights (93%) and have purchased LEDs (91%) for their home in the last six months in order to save energy. A large majority have also adjusted their thermostats (84%) and only used the dryer when it was full (82%). Also topping the list of energy-saving actions taken were: not heating unused rooms (75%), washing clothes in cold water (70%), unplugging electrical devices (67%), and reducing shower time (60%). Fewer customers took more labor-intensive, time-consuming, and costly actions such as installing showerheads (44%), checking for air-duct leaks (39%), buying new appliances (3%), using clotheslines (29%), and doing renovations such as replacing windows and doors (20%) or adding insulation (14%).

All respondents were asked a final, open-ended question (#Q7) regarding whether they had done anything else to save electricity. Given the exhaustive list in Question 6, most (90%) said no, and another 2 percent were unsure. Of those who gave responses, 3 percent said they had upgraded a furnace or air conditioner, while 1 percent each named adding solar panels, turning off their air conditioner, using less water, burning wood or pellets, and closing blinds or curtains during the day.

Customer Recall of Reports

The following questions were asked only to those customers receiving a home energy report (treatment).

The treatment group (N=600) was asked a series of questions relating specifically to the Home Energy Reports.

This total group was made up of five sub-groups (T1, T2, T3, T4, T5). The T1, T3, T4, and T5 groups were further subdivided into those receiving bimonthly reports and those receiving quarterly reports (e.g., T1 was divided into T1-B and T1-Q). All members of T2 received bimonthly reports.

The groups were created according to the customers' household energy usage prior to the start of the program. T1 and T2 were customers with high winter usage, T3 was customers with high usage, T4 had medium usage, and T5 had low usage.

The number of respondents in each group was as follows:

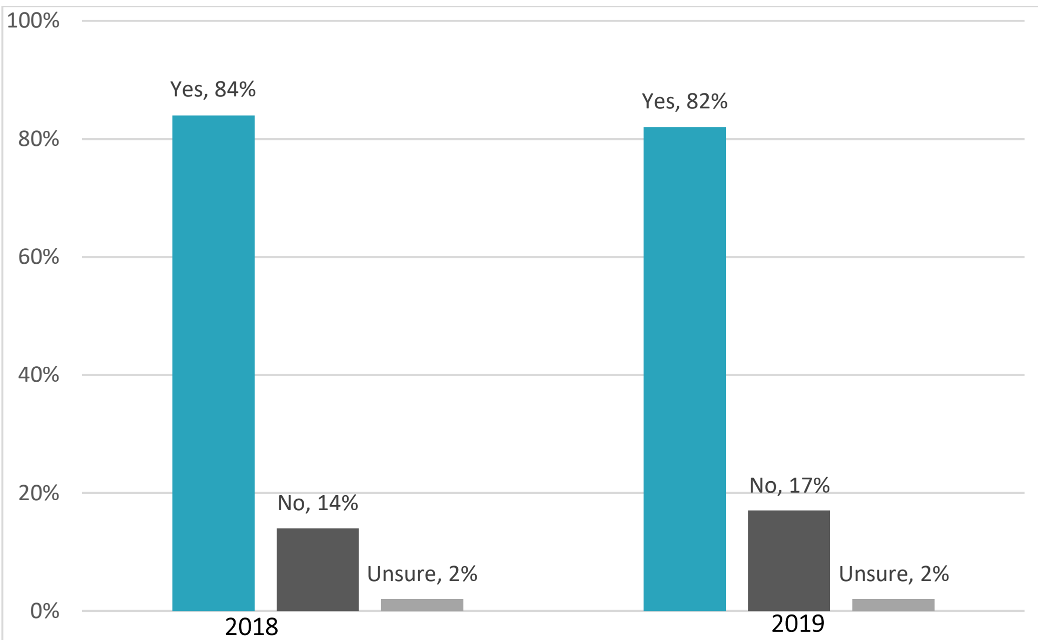
- T1: 180 (T1-B: 90; T1-Q: 90)
- T2: 100 (all bimonthly)
- T3: 180 (T3-B: 90; T3-Q: 90)
- T4: 85 (T4-B: 43; T4-Q: 42)
- T5: 55 (T5-B: 27; T5-Q: 28)

The number of respondents surveyed that were in treatment groups was markedly larger in 2019 (N=600) than in 2018 (N=200).

The respondents in treatment groups (N=600) were read the following short introductory statement, after which they were asked if they recalled receiving a Home Energy Report.

***Question #T1:** Over the last couple months, Idaho Power sent Home Energy Reports to select customers in the mail. These reports provide a breakdown of your electricity use by major appliance, a comparison of your electricity use in relation to other homes similar to yours, and recommendations on how you can save electricity.*

"Do you recall receiving a Home Energy Report?"



The number of respondents in the treatment group who recalled receiving a HER was consistent with last year. In 2019, 82 percent said they recalled receiving a report, compared with 84 percent in 2018.

There was not a large difference between the bimonthly and quarterly groups' overall recall of having received a Home Energy Report, as shown in the table to the right.

Responses to Question #T1: Do you recall receiving a Home Energy report?

	Yes	No	Don't know
T345 Bimonthly	81%	18%	1%
T345 Quarterly	77%	20%	3%

The 82 percent of respondents who answered "yes" when asked if they recalled receiving a HER were asked a series of follow-up questions about the reports, while those who said "no" (17%) or "don't know" (2%) were not.

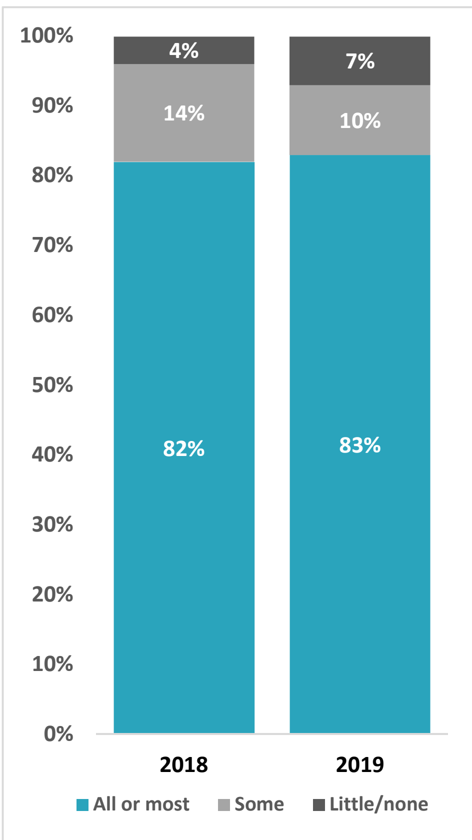
Customer Rates of Reading the Report

The following questions were asked only to those customers who recalled receiving a report and had read some or all of it (N=457).

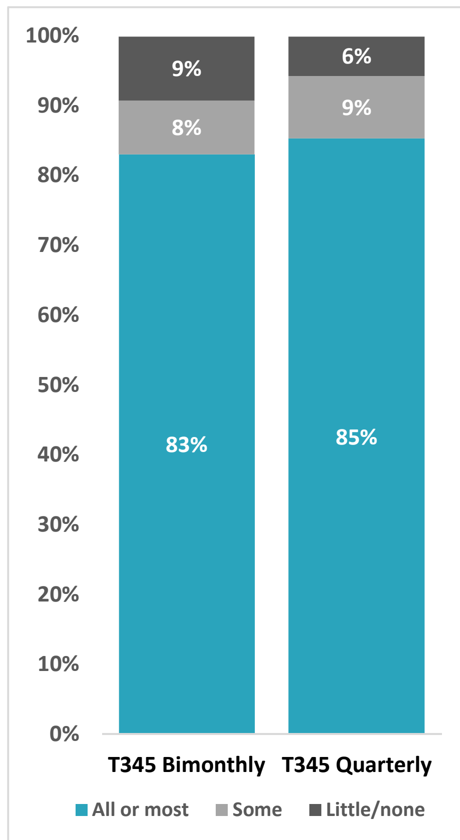
The treatment group respondents that recalled receiving the reports (N=490) were asked about how thoroughly they had read them.

Question #T2: *How thoroughly did you read the reports you received? Did you read all or most of them, some of them, or little to none of them?*

Comparison between 2018 and 2019



Comparison between Bimonthly and Quarterly



Findings over the two survey periods show consistency in the rates of readership. In 2019, 83 percent of treatment customers that recalled receiving a Home Energy Report said they had read all or most of it, while 10 percent said they had gone through some of it.

These responses do not seem to differ between the bimonthly and quarterly treatment groups. There was also not a notable difference between the electric heating groups (T1 and T2) and the year-round usage groups (T3, T4 and T5)

Responses, by Report Frequency, to Question #T2: "How thoroughly did you read the Reports you received? Did you read…"

Report Frequency	*All or most of them*	*Some of them*	*Little to none of them?*
T345 Bimonthly	83%	8%	9%
T345 Quarterly	85%	9%	6%

There does appear to be a correlation between customer age and their rates of reading the report. Younger customers (those under 55) were more likely to read all or most of their reports, while people 55 and over were more likely to read little or none of their reports.

Responses, by Age, to Question #T2: "How thoroughly did you read the Reports you received? Did you read…"

Age Group	*All or most of them*	*Some of them*	*Little to none of them?*
18–24	91%	9%	0%
25–34	91%	6%	3%
35–44	84%	16%	0%
45–54	92%	4%	4%
55–64	74%	14%	13%
65–74	79%	8%	13%

For the 7 percent of all respondents who answered that they'd read little or none of the reports, the survey ended here.

Experience with the Report

The respondents who had received a report and had read some or all of it (N=457) were read three statements related to information contained within the report and asked to rate their level of agreement using a five-point scale*. The respondents who had received a report and had read some or all of it (N=457) were read three statements related to information contained within the report and asked to rate their level of agreement using a five-point scale*. Figures in the following table include the total "agree" answers (5 and 4) for each statement.

**5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree*

***Question #T3:** I am now going to read three statements related to your experience with the Reports. Please rate your level of agreement with each one using a scale from one to five where one means you strongly disagree and five means you strongly agree.*

Overall, responses to this question indicated that most customers find their Home Energy Reports accurate, useful, and easy to understand.

Of the treatment group customers surveyed in 2019, almost eight in ten (78%) agreed that the information in the Home Energy Report seemed accurate (a 17% increase from the 61% who agreed in 2018), indicating that an increasing majority of customers see HERs as credible.

Percentage of Respondents who Answered "Agree" or "Strongly Agree" to the Following Statements

Statement	2018	2019
"The information presented in your* Home Energy Report was easy to understand."	85%	84%
"The information presented in your* Home Energy Report seemed accurate."	61%	78%
"The recommendations and tips on how to conserve were useful."	64%	74%

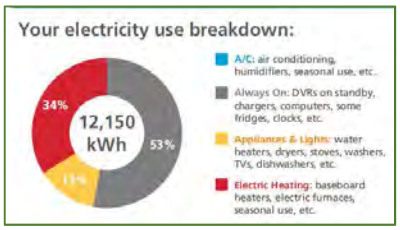
Up 10 percent from last year, 74 percent of respondents agreed or strongly agreed that the recommendations and tips in the report were useful. At a very similar rate to last year, 84 percent agreed or strongly agreed that the information in the report was easy to understand.

The were no notable differences in responses between the treatment groups.

Customer Recognition of HER Features

Next, the respondents who had received a report and had read some or all it (N=457) were asked if they remembered seeing three features, and which were most useful.

Question #T4: *Do you recall seeing each of the following features of the Home Energy Report?*

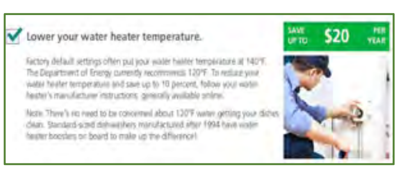


90%

In 2019, 90 percent recalled seeing **"The breakdown of your electricity use providing insights into how much your electricity use goes towards the different major appliance categories in your home"** (compared to 88% in 2018).

87%

The next most remembered feature was **"the comparison of your electricity use in relationship to homes of similar type and size in your area"** at 87% (versus 91% in 2018).



76%

Less frequently recalled, but still remembered by more than three-quarters of those questioned, was **"Saving tips, including personalized savings tips just for you"** (13% higher than the 63% who recalled it in 2018).

Question #T5: *Which one of the features you recall seeing did you find the most useful?*

33%

37%

30%

In terms of usefulness, there was a near-three-way split of opinion, with a similar number of customers seeing each feature as most useful. However, by a few percentage points, the comparison feature was found to be most useful, followed by the energy breakdown, then saving tips.

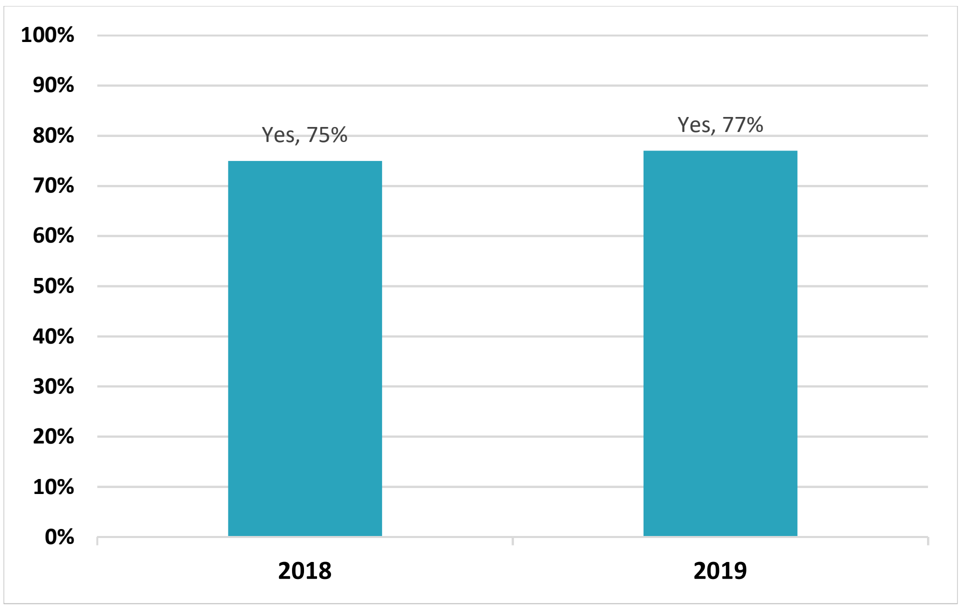
Finally, the respondents (N=457) were asked if there was anything else that they had found useful, and most were unable to recall anything else.

Response	N	%
No/nothing else	*N=250*	*55%*
Don't know	*N=91*	*20%*
Information (in general)	*N=39*	*9%*
Breakdown of energy usage (over time, peak times, etc.)	*N=34*	*7%*
Everything	*N=32*	*7%*
Having an efficient home	*N=11*	*2%*

Taking Actions

Those that received the report and had read some or all it (N=457) were asked if they had acted on any of the suggestions or information provided regarding saving money and electricity.

Question #T6: *Have you acted on any of the information and suggestions to save money and electricity that were included in the report?*



Of those asked, 77 percent said that they had taken actions to save money or electricity, which is slightly higher than the 75 percent who took actions in 2018.

Frequency of Report Receipt

Customers that recalled receiving the report and that had read some or all it (N=457) were asked how often they remembered getting it, and then at what frequency they would prefer to receive reports.

Question #T7: *How frequently do you recall receiving your Home Energy Report?*

Monthly	**51%**
Bimonthly	**5%**
Quarterly	**32%**
Twice a year	**1%**
Don't know	**11%**

More than half, or 51 percent, of respondents said they remembered getting the report monthly, while 32 percent answered quarterly. Eleven percent could not recall, while only 5 percent said bimonthly, and 1 percent said twice a year.

The table below outlines the responses to this question according to the frequency of reports the customers are currently receiving.

Responses to Question #T7: "How frequently do you recall receiving your Home Energy Report?"

Treatment Group	Monthly	Bimonthly	Quarterly	Twice a year	Don't know
T1 Bimonthly	77%	3%	7%	1%	12%
T1 Quarterly	12%	-	75%	3%	10%
T2 (Bimonthly)	37%	16%	28%	12%	7%
T345 Bimonthly	76%	13%	3%	-	8%
T345 Quarterly	40%	1%	50%	2%	8%

Question #T8: *At what frequency would you prefer to receive the report?*

Monthly	**42%**
Bimonthly	**11%**
Quarterly	**28%**
Twice a year	**14%**
Don't know	**5%**

Monthly receipt is preferred by 42 percent of respondents, and quarterly receipt is preferred by 28 percent. The remaining responses were split between biannually (14%) and bimonthly (11%).

The table below outlines responses to this question according to the frequency of reports the customers are currently receiving.

Responses to Question #T8: "At what frequency would you prefer to receive the report?"

Treatment Group	Monthly	Bimonthly	Quarterly	Twice a Year	Don't Know
T1 Bimonthly	62%	8%	15%	10%	5%
T1 Quarterly	15%	8%	52%	21%	4%
T2 (Bimonthly)	44%	7%	31%	-	19%
T345 Bimonthly	56%	14%	18%	9%	3%
T345 Quarterly	36%	8%	33%	18%	5%

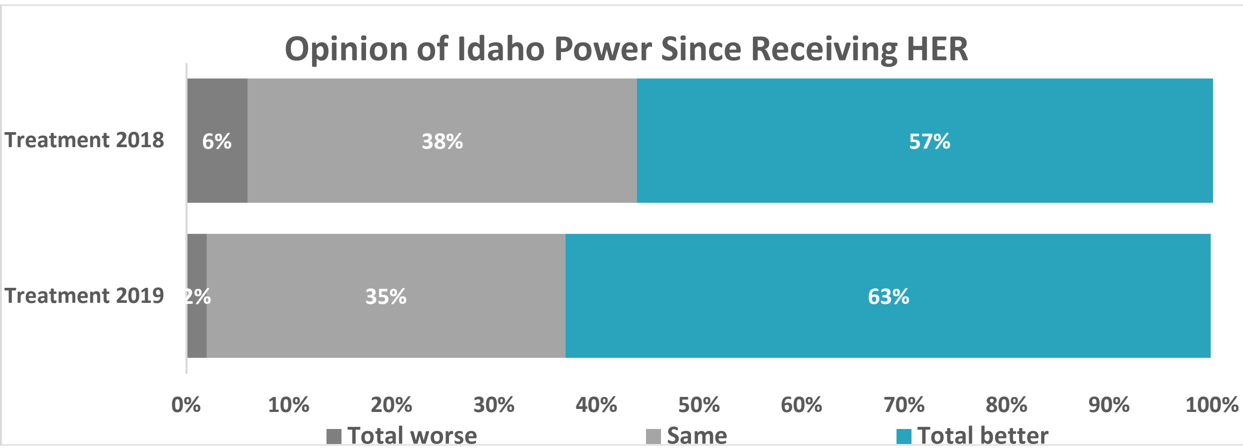
Those receiving the report bimonthly tended to answer that they received the report monthly or bimonthly and that they would prefer to get it each month. Quarterly recipients most answered that they received it quarterly and monthly and that they would prefer to get it monthly and quarterly.

Report and Opinion of Idaho Power

The respondents who had received a report and had read some or all of it (N=457) were asked to rank on a five-point scale* how, if at all, the report had changed their opinion of Idaho Power. The graph below combines the total "worse" (1 and 2) and the total "better" (5 and 4) results.

**5 = much better, 4 = somewhat better, 3 = neither better nor worse, 2 = somewhat worse, 1 = much worse*

Question #T9: *How, if at all, has your opinion of Idaho Power changed since receiving the Home Energy Reports? Would you say it is much worse, somewhat worse, stayed the same, somewhat better or much better?*



The Home Energy Reports have had a positive impact on perceptions of Idaho Power, with 63 percent of respondents saying they now have a better opinion of the utility (29% "somewhat better" and 34% "much better"), which is a 7-percent improvement over the 57 percent that held this opinion in 2018 (27% "somewhat better" and 30% "much better").

In 2019, 35 percent of those surveyed stated that their opinion has remained the same (3% more than the 38% who answered this way in 2018), and only 2 percent said their opinion had worsened (4% less than the 6% who gave this answer in 2018).

Responses to Question #T9 by Treatment Group and Report Schedule

	T1	T2	T3	T4	T5
Total "better"	68%	63%	57%	63%	61%
Same	28%	35%	42%	38%	39%
Total "worse"	3%	3%	2%	0%	0%

The separate treatment groups did not show any notable variation in their responses to the question ("How, if at all, has your opinion of Idaho Power changed since receiving the Home Energy Reports?"). Respondents from T1 had the most improved opinion of Idaho Power due to the receiving Home Energy Reports.

T3 had the most respondents whose opinion remained the same. No one in groups T4 and T5 had a decreased opinion of Idaho Power due to the reports.

A comparison between T1 and T2 vs T3, T4 and T5 shows a modest trend that the electric heating reports (T1 and T2) have a higher impact on improving opinion of Idaho Power than the year-round reports (T3, T4 and T5).

	T1 & T2	T3, T4, T5
Total "better"	66%	59%
Same	31%	40%
Total "worse"	3%	1%

There was no notable difference of opinion between the customers who received reports bimonthly and those who received them quarterly.

	T345 Bimonthly	T345 Quarterly
Total "better"	57%	61%
Same	42%	38%
Total "worse"	1%	1%

Question #T10: *Is there anything about the reports you think could be improved?*

In an open-ended, unaided question, respondents were asked about how to improve the report.

Nothing else	50%
Don't know	24%
Better analysis of breakdowns/better comparative analysis	12%
Have month-by-month breakdown over time	5%
Clearer to read/understand	5%
Digital reports/ability to access (website, app)	3%
More information/detail (in general) how to save	2%
Send more often	1%

Email and Preferred Future Methods of Delivery

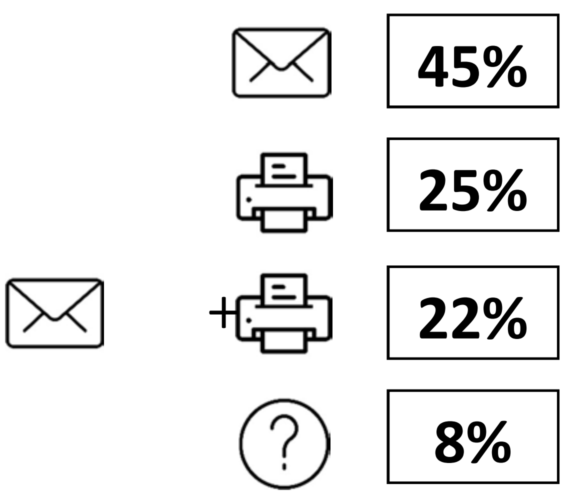
The respondents who had received a report and had read some or all of it (N=457) were asked two final questions about their awareness of electronic delivery and their preferred method for receiving future reports.

Question #T11: *Are you aware that you can choose to receive the Home Energy Report by email?*

Yes: 45%

Slightly more than four in ten (45%) of respondents were aware that they could receive the report by email.

Question #T12: *Idaho Power is evaluating the options for delivering Home Energy Reports. If available, how would you prefer to receive the report?*



Email is the preferred delivery method, named by 45 percent of those asked, while 25 percent preferred print. There were 22 percent that identified both email and print as preferred methods, while 8 percent were unsure.

Appendix: Statistical Significance Test

Statistical significance is determined by calculating the probability of error (p-value). The difference between groups (such as treatment vs. control in this case) is judged to be statistically significant when p=0.05 or less.

At p=0.05, there is only a 5% probability that the differences between the two groups are occurring by chance alone, meaning there is only a 1-in-20 chance that a reported effect does not reflect a true effect.

For Question #T9, statistically significant differences were tested to see if there was any significant difference between the treatment groups (T1, T2, T3, T4, T5). Question T9 asked respondents if their opinion of Idaho Power changed after receiving the Reports.

There was no statistically significant difference as a function of treatment groups (p<.705).

#T9. How, if at all, has your opinion of Idaho Power changed since receiving the Home Energy Reports? Would you say it is:

		much worse	somewhat worse	stayed the same	somewh at better	much better	Total
T1	Count	3	2	42	48	53	148
	%	2%	1%	29%	32%	36%	100%
T2	Count	0	2	26	19	28	75
	%	0%	3%	35%	25%	37%	100%
T3	Count	1	1	54	35	38	129
	%	1%	1%	42%	27%	30%	100%
T4	Count	0	0	24	19	21	64
	%	0%	0%	38%	30%	33%	100%
T5	Count	0	0	16	11	14	41
	%	0%	0.0%	39%	27%	34%	100%
Total	Count	4	5	162	132	154	457
	%	1%	1%	35%	29%	34%	100%

Appendix C: Quarterly Program Monitoring Reports

Reports on program metrics were reported on a quarterly basis, according to the schedule below.

Report #	Date Presented	Report Period
Q1	February 6, 2019	July 31, 2018 – November 30, 2018
Q2	March 5, 2019	July 31, 2018 – January 31, 2019
Q3	June 3, 2019	July 31, 2018 – April 30, 2019
Q4	Fall 2019	July 31, 2018 – July 31, 2019

Idaho Power Energy Wise®
Program Summary Report
2018-2019

Made possible by:

An IDACORP Company

Submitted by:

RESOURCEACTION
PROGRAMS

August 2019

"I appreciate the awareness this program provides the kids. It helps reinforce their ability to be proactive in their home, and it also saves energy."

[redacted], Parents

Ronald Reagan Elementary School

Table of Contents

“The students liked having an active role in conserving and it is so cool for them! We not only talk about it, but they are able to do something about it.”

Heather Mueller, Teacher
Washington Elementary School

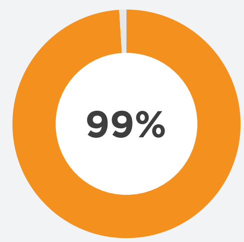
Executive Summary

Resource Action Programs® (RAP), a Franklin Energy Company, is pleased to present this Program Summary Report to Idaho Power, which summarizes the 2018-2019 Idaho Power Energy Wise® Program. The program was implemented in the Idaho Power service area in the state of Idaho and Oregon by 10,053 teachers, students, and their families.

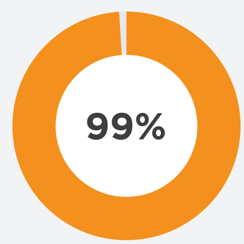
The following pages provide an overview of the program and materials, outline of program implementation, introduction to the program team, description of program enhancements, impact of the program, and summary of results from the home activities. In addition to this information, evaluations, letters, 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

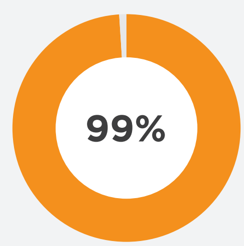
A successful program excites and engages participants. Students, parents, and teachers are asked to evaluate the program and provide personal comments. A sample of the feedback is given in the margin. ›



Teachers who indicated that materials were clearly written and well organized.

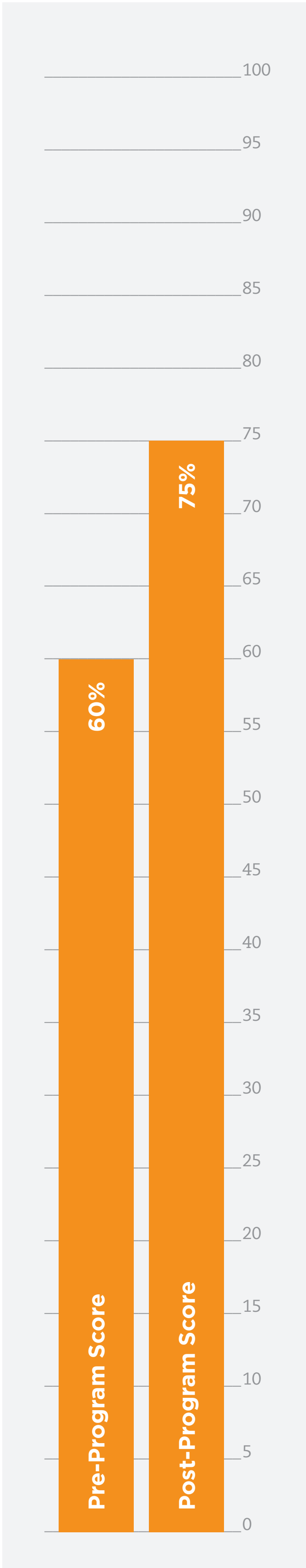


Teachers who indicated they would recommend this program to other colleagues.



Teachers who indicated they would conduct this program again.

A summary of responses can be found in Appendix D.



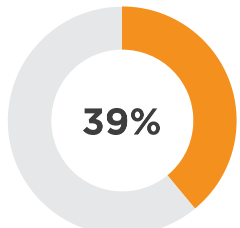
Knowledge Gained

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 **75%**.

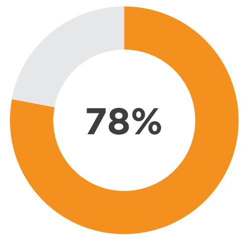
Measures Installed

Students completed take-home activities as part of the program and reported on the kit measures they installed in their homes.

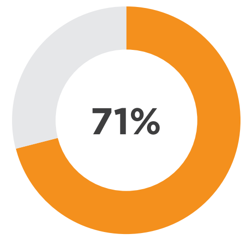
A summary of responses can be found in Appendix B.



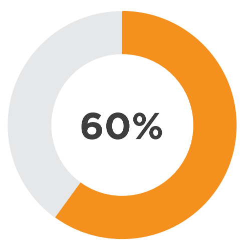
Students who reported they installed the High-Efficiency Showerhead.



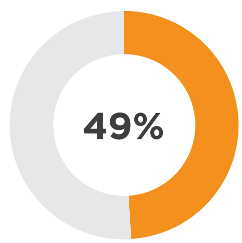
Students who indicated they installed the LED Night Light.



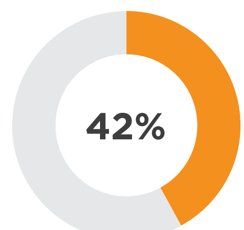
Students who reported they used the Shower Timer.



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	10,053	2,239	2,938	1,953	2,157	766
Students	9,703	2,164	2,834	1,889	2,078	738
Surveys Received	5,463	1,041	1,898	1,493	590	441
Percent Response	56%	48%	67%	79%	28%	60%

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	
14,110,344	gallons of water saved
2,113,566	kWh of electricity saved
56,405	therms of gas saved
14,110,344	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS	
141,103,441	gallons of water saved
22,656,318	kWh of electricity saved
564,054	therms of gas saved
141,103,441	gallons of wastewater saved

PROJECTED ANNUAL SAVINGS PER HOME	
1,404	gallons of water saved
210	kWh of electricity saved
6	therms of gas saved
1,404	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS PER HOME	
14,036	gallons of water saved
2,254	kWh of electricity saved
56	therms of gas saved
14,036	gallons of wastewater saved

***Per Idaho Power's request, the associated savings for the shower timer have not been included in savings totals.*

“The students enjoyed working on the home projects and also the fun worksheets in the student guide.”

Bill Henry, Teacher

Connor Academy Public Charter 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 2018-2019 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 Energy Wise program team tabulates all participant responses—including home survey information, teacher responses, student letters, and parent feedback—and generates this Program Summary Report.

"My child educated me about saving power and energy. He then wanted to use all the gadgets immediately. We all sat down and he presented everything."

[redacted], Parent

Eliza Hart Spalding 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 Energy 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

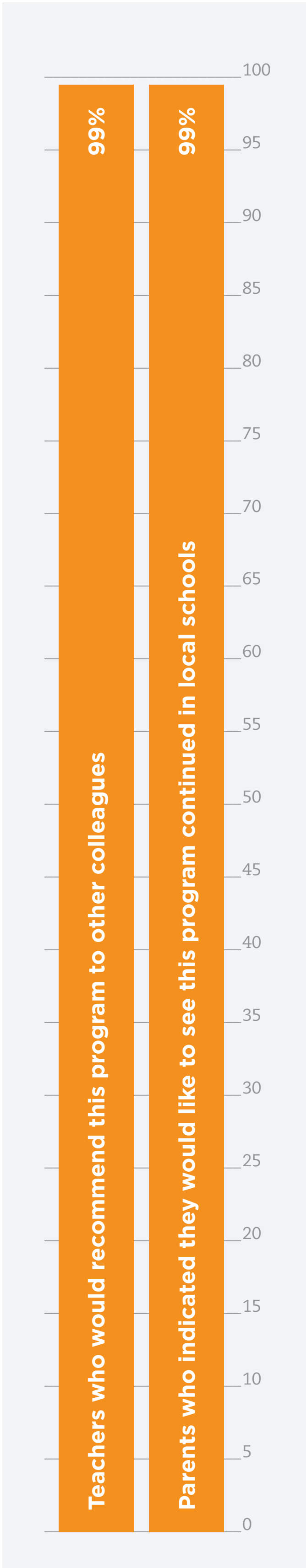
Extra Activities Booket

Teacher Survey Form

Pre/Post Student Survey Answer Keys

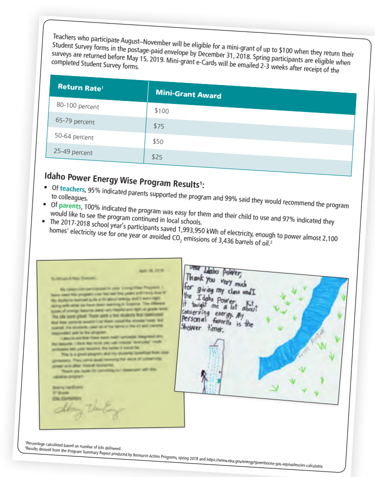
Electricity Poster

Self-Addressed Postage-Paid Envelope

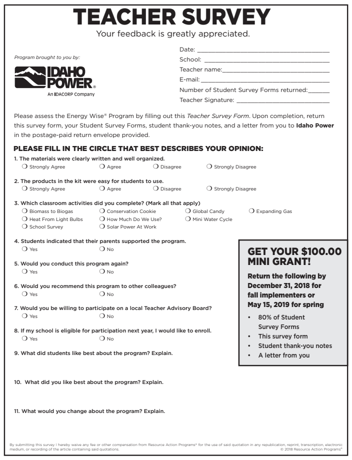


Custom Branding

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.



Program Materials



TEACHER SURVEY

Your feedback is greatly appreciated.

Program brought to you by:

IDAHO POWER
An IDACORP Company

Date: ____________________
School: ____________________
Teacher name: ____________________
E-mail: ____________________
Number of Student Survey Forms returned: ______
Teacher Signature: ____________________

Please assess the Energy Wise® Program by filling out this *Teacher Survey Form*. Upon completion, return this survey form, your Student Survey Forms, student thank-you notes, and a letter from you to **Idaho Power** in the postage-paid return envelope provided.

PLEASE FILL IN THE CIRCLE THAT BEST DESCRIBES YOUR OPINION:

1. **The materials were clearly written and well organized.**
   ❍ Strongly Agree ❍ Agree ❍ Disagree ❍ Strongly Disagree
2. **The products in the kit were easy for students to use.**
   ❍ Strongly Agree ❍ Agree ❍ Disagree ❍ Strongly Disagree
3. **Which classroom activities did you complete? (Mark all that apply)**
   ❍ Biomass to Biogas ❍ Conservation Cookie ❍ Global Candy ❍ Expanding Gas
   ❍ Heat From Light Bulbs ❍ How Much Do We Use? ❍ Mini Water Cycle
   ❍ School Survey ❍ Solar Power At Work
4. **Students indicated that their parents supported the program.**
   ❍ Yes ❍ No
5. **Would you conduct this program again?**
   ❍ Yes ❍ No
6. **Would you recommend this program to other colleagues?**
   ❍ Yes ❍ No
7. **Would you be willing to participate on a local Teacher Advisory Board?**
   ❍ Yes ❍ No
8. **If my school is eligible for participation next year, I would like to enroll.**
   ❍ Yes ❍ No
9. **What did students like best about the program? Explain.**
10. **What did you like best about the program? Explain.**
11. **What would you change about the program? Explain.**

GET YOUR $100.00 MINI GRANT!

Return the following by December 31, 2018 for fall implementers or May 15, 2019 for spring

- 80% of Student Survey Forms
- This survey form
- Student thank-you notes
- A letter from you

By submitting this survey I hereby waive any fee or other compensation from Resource Action Programs® for the use of said quotation in any republication, reprint, transcription, electronic medium, or recording of the article containing said quotations.
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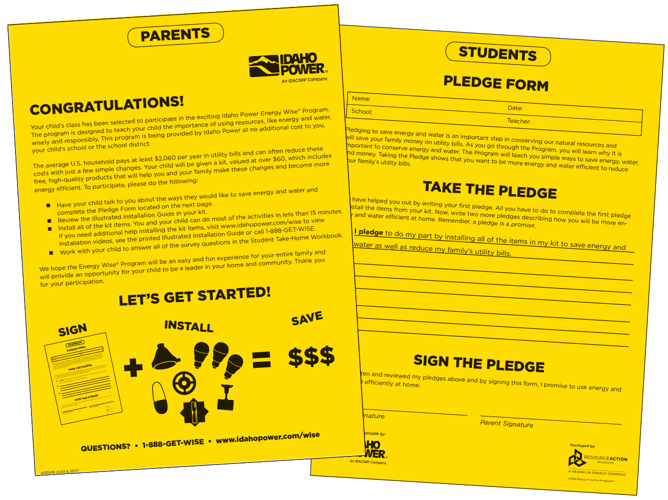
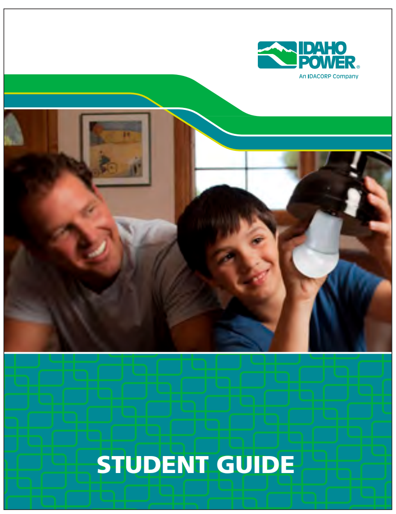
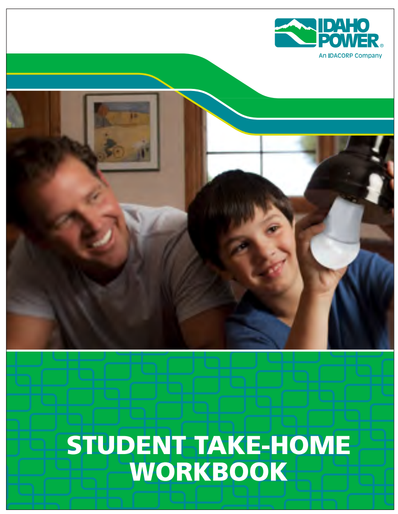
Teacher Survey Form



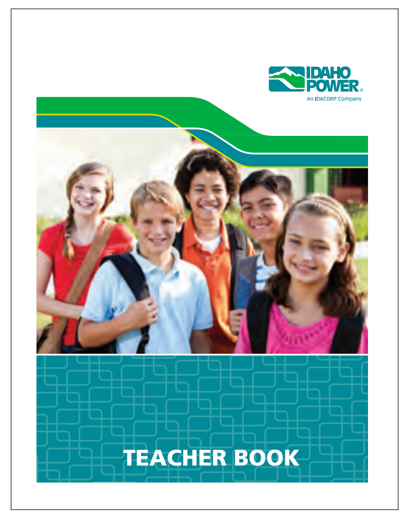
Parent Letter/Pledge Form



Student Guide



Student Take-Home Workbook



Teacher Book

Certificate of Achievement

Kit Box

Introduction Video (flash drive) Pen

“The thought of getting items to help their families save money was something the students were excited about. Also, the presentation Ms. Root gave was great!”

Jessica Lillquist, Teacher

Central Canyon Elementary School

Program Implementation

The 2018-2019 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 2018-2019 school year.

Resource Action Programs (RAP) has been in the business of designing and implementing energy and water efficiency programs for nearly three decades. Throughout this time we've built an expert team of industry professionals that deliver a seamless program to achieve your goals.

We designed the Idaho Power Energy Wise® Program in our program center from the ground up. Working in conjunction with Idaho Power, we identified goals, desired outcomes of the program, and specific materials' customization. The result is a stimulating program that delivers significant and measurable resource savings. The Idaho Power Energy Wise Program features a proven blend of innovative education, comprehensive implementation services, and hands-on activities to put efficiency knowledge to work in homes throughout the Idaho Power service territory.

The Idaho Power Energy Wise Program is a reflection of true teamwork. On behalf of the entire implementation team at Resource Action Programs, we would like to thank you for the opportunity to design and implement the Idaho Power Energy Wise Program. It has been a pleasure working with you. We look forward to many more years of program success.

Sincerely,

Chase Griswold
Program Manager

Libby Wilson
Director of Program Services

Program Team

Program Team

The success of the Idaho Power Energy Wise® Program is owed to a cross-functional implementation team chosen specifically to meet the goals of the program. We incorporated both a PMP® certified Program Manager and a CEM® designated energy analyst to ensure the program hits key milestones and delivers results. These thought leaders are supported by an integral mix of specialists working in unity to accomplish your program objectives. The Idaho Power Energy Wise Program implementation team consisted of the following:

Education

Led by a Ph.D. educator having both classroom and administration leadership experience, this team is responsible for the development of educational content as well as classroom energy literacy and engagement. The group also ensures the program's content is aligned with Idaho state expectations in science, math, and language as well as the rigorous expectations of STEM (Science, Technology, Engineering, and Math).

Outreach

Our outreach team is the face of the Idaho Power Energy Wise Program, introducing teachers to the program, and providing support throughout implementation to guarantee the program's success in the classroom. This group builds relationships and keeps teachers engaged in program execution year after year.

Graphic Design and Marketing

Expertly-designed kits and program materials are a result of our Graphic Design and Marketing teams. This group provides brand alignment and marketing strategies to ensure program branding is within guidelines. Additionally, this team facilitates copy and art direction and works with education to develop end-user activities.

Information Technology

We leave IT strategy and cyber security in the hands of our experts. This team built and manages the integrated systems responsible for seamlessly blending operations, driving automation, and maximizing participation in the Idaho Power Energy Wise Program. This group provides the managed data services and software in support of outreach, enrollment, order processing, fulfillment, data collection and reporting.

Warehouse and Logistics

Last but not least, our warehouse and logistics teams guarantee Idaho Power Energy Wise program materials reach the classroom on-time and without errors. This group provides printing, purchasing, production, quality assurance & control, warehousing and shipping for all program materials. Additionally, this team ensures that all materials are consistent with orders and confirms delivery.

“The students loved the material in the kits. They enjoyed telling each other what they changed at home to save energy.”

Shawna Hiller, Teacher

Valley View Elementary School

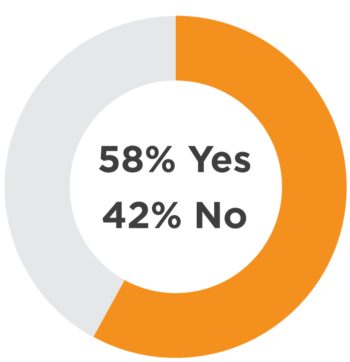
Program Impact

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:

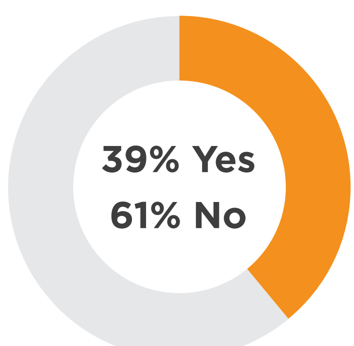
A. Home Survey for Capital Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 75 participating teachers in the Capital region, 28 (37%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,164 participating children in the Capital region, 1,041 (48%) returned completed surveys.

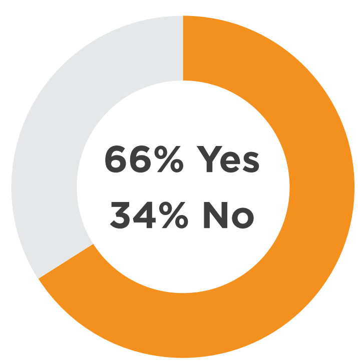
Did your family install the first 9-watt LED Light Bulb?	**Yes - 58%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 39%**
Did your family change the way they use energy?	**Yes - 66%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

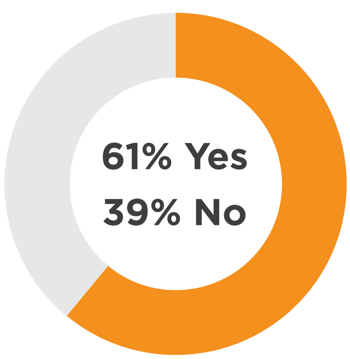


Students who indicated their family changed the way they use energy.

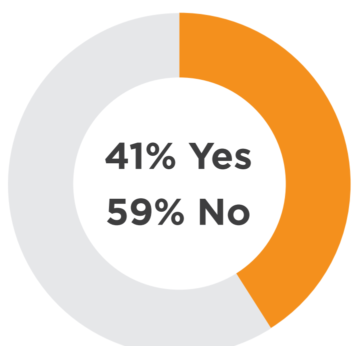
Home Survey for Canyon Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 104 participating teachers in the Canyon region, 64 (62%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,834 participating children in the Canyon region, 1,898 (67%) returned completed surveys.

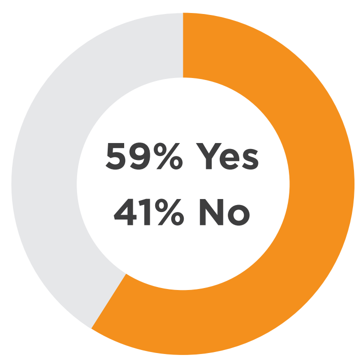
Did your family install the first 9-watt LED Light Bulb?	**Yes - 61%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 41%**
Did your family change the way they use energy?	**Yes - 59%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

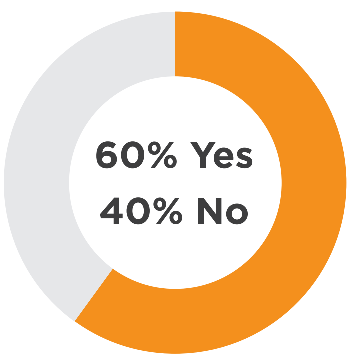


Students who indicated their family changed the way they use energy.

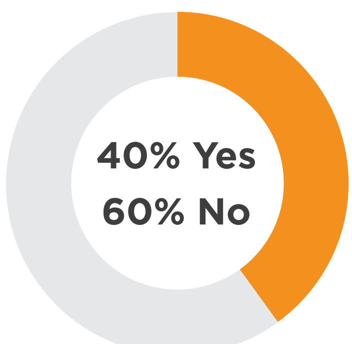
Home Survey for Eastern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 64 participating teachers in the Eastern region, 37 (58%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,889 participating children in the Eastern region, 1493 (79%) returned completed surveys.

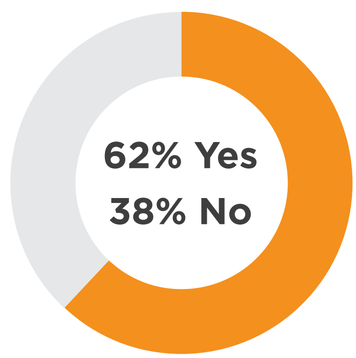
Did your family install the first 9-watt LED Light Bulb?	**Yes - 60%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 40%**
Did your family change the way they use energy?	**Yes - 62%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

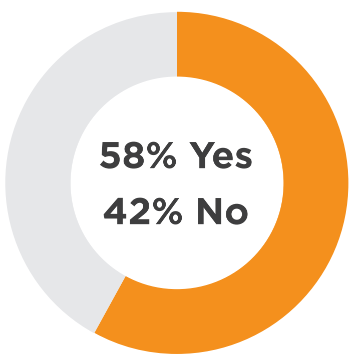


Students who indicated their family changed the way they use energy.

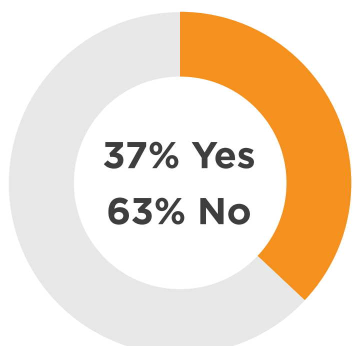
Home Survey for Southern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 79 participating teachers in the Southern region, 18 (23%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,078 participating children in the Southern region, 590 (28%) returned completed surveys.

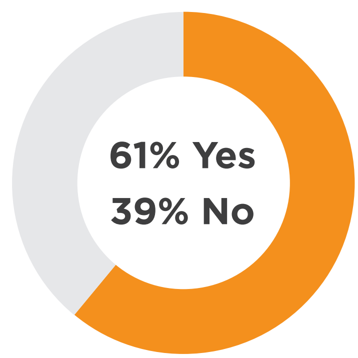
Did your family install the first 9-watt LED Light Bulb?	**Yes - 58%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 37%**
Did your family change the way they use energy?	**Yes - 61%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

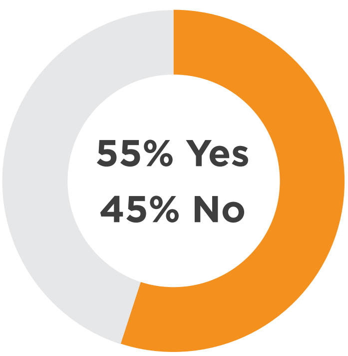


Students who indicated their family changed the way they use energy.

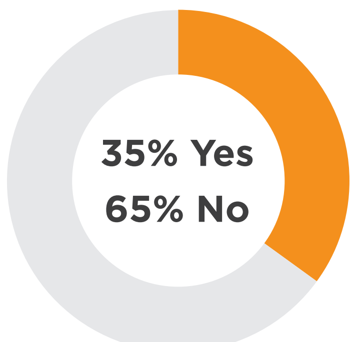
Home Survey for Western Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 28 participating teachers in the Western region, 16 (57%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 738 participating children in the Western region, 441 (60%) returned completed surveys.

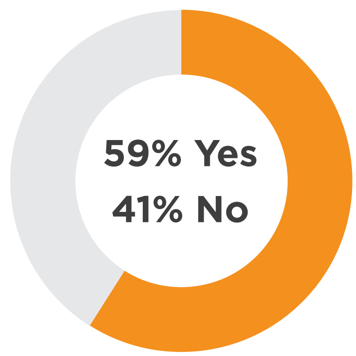
Did your family install the first 9-watt LED Light Bulb?	**Yes - 55%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 35%**
Did your family change the way they use energy?	**Yes - 59%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

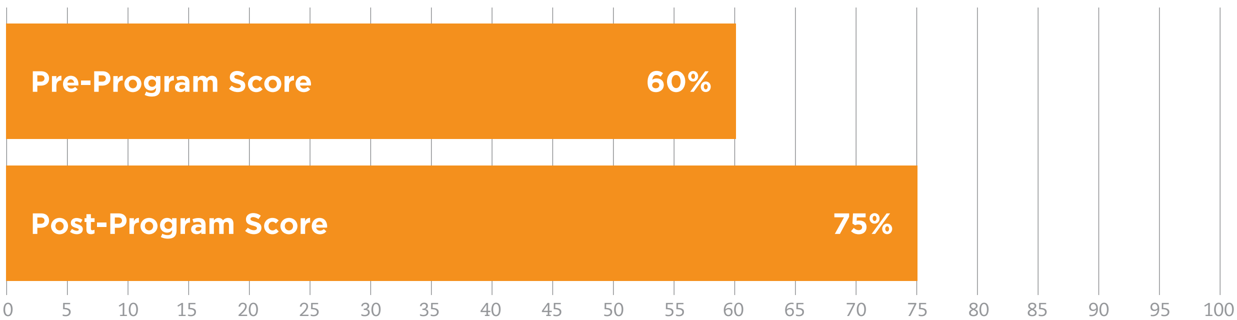


Students who indicated their family changed the way they use energy.

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 **7.5** questions correctly following participation. Of the 9,703 student households participating, 5,463 returned survey responses.

Scores improved from 60% to 75%.



Pre-Program and Post-Program Test Questions

		Pre	Post
1	Which layer of Earth do we live on?		
	Crust	71%	87%
	Mantle	7%	3%
	Inner Core	6%	3%
	Outer Core	16%	7%
2	Non-Potable water is safe to drink.		
	True	24%	13%
	False	76%	87%
3	Which of these is not a renewable resource?		
	Wind	20%	9%
	Plants	6%	3%
	Gold	57%	78%
	Animals	17%	10%
4	Saving water saves energy.		
	True	86%	94%
	False	14%	6%

Pre-Program and Post-Program Test Questions

		Pre	Post
5	Which are fossil fuels?		
	Coal	23%	16%
	Oil	11%	6%
	Natural Gas	12%	7%
	All of the above	54%	72%
6	Which type of energy is created in the process of Photosynthesis?		
	Nuclear Energy	19%	15%
	Thermal Energy	26%	22%
	Chemical Energy	31%	53%
	Electric Energy	24%	11%
7	Which Kit item will save the most natural resources?		
	Compact Fluorescent Lamp	35%	35%
	High-Efficiency Showerhead	30%	47%
	FilterTone® Alarm	17%	9%
	LED Night Light	18%	9%
8	Which major appliance uses the most energy?		
	Dishwasher	20%	16%
	Refrigerator	60%	67%
	Dryer	20%	17%
9	An LED (light emiting diode) light bulb uses more energy than an incandescent bulb.		
	True	34%	18%
	False	66%	82%
10	On-peak time is the best time to play video games.		
	True	30%	18%
	False	70%	82%

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, 10,053 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 9,703 student households participating, 5,463 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:	**10,053**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	**14,110,344**	**141,103,441**	gallons
Product Life: **10 years**	**926,688**	**9,266,876**	kWh
	46,371	**463,706**	therms
Projected reduction from first **9**-watt LED Light Bulb:	**304,493**	**3,653,913**	kWh
Product Life: **25,000 hours** (**12** years)			
Projected reduction from second **9**-watt LED Light Bulb:	**247,405**	**2,968,857**	kWh
Product Life: **25,000 hours** (**12** years)			
Projected reduction from third **9**-watt LED Light Bulb:	**208,433**	**2,501,199**	kWh
Product Life: **25,000 hours** (**12** years)			
Projected reduction from LED Night Light retrofit:	**224,016**	**2,240,157**	kWh
Product Life: **10,000 hours**			
Projected reduction from FilterTone® installation:	**202,532**	**2,025,316**	kWh
Product Life: **10 years**	**10,035**	**100,348**	therms
TOTAL PROGRAM SAVINGS:	**14,110,344**	**141,103,441**	gallons
	2,113,566	**22,656,318**	kWh
	56,405	**564,054**	therms
TOTAL PROGRAM SAVINGS PER HOUSEHOLD:	**1,404**	**14,036**	gallons
	210	**2,254**	kWh
	6	**56**	therms

***Per Idaho Power's request, the associated savings for the shower timer have not been included in savings totals*

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 332 participating teachers, 159 returned teacher program evaluation surveys.

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

99% of participating teachers indicated they would conduct the program again given the opportunity.

99% of participating teachers indicated they would recommend the program to their colleagues.

What did students like best about the program? Explain.

"The students loved receiving the kits and having the opportunity to see how much energy they will save."
Dan Hoehne, Silver Trail Elementary School

"They love to take home the kit and use it with their family."
Audra Thompson, Summit Elementary School

"They enjoyed the activities and the lessons. They really got into drawing a floor plan of their homes. They really got excited about the kits."
Candice Smith, Camas County School

"Students loved the kits! It was fun to watch them learn about the tools they were using."
Danielle Petitmermet, Cambridge Elementary School

"They love the kits, and this year they participated in energy saving discussions."
Brad Winder, Summit Elementary School

"The students liked the home kits! They liked the opportunity to try at home & share with their families."
Caitlyn McConnell, Lewis & Clark Elementary

"Students liked that they could apply what they learned with the kit materials at home."
Melissa Langan, Wilson Elementary School

"The ease of the lessons provided. They of course love the materials they receive."
Juilana Lookhart, Birch Elementary School

"Students enjoyed learning about how energy works and their part/responsibility in conservation of energy."
Brenda Fly, Birch Elementary School

"The kits and the student workbook. Kits were exciting, workbook was interesting."
Adam Trowbridge, Lewis & Clark Elementary

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

What did you like best about the program? Explain.

"Helping students learn about finite resources & where their use of energy plays into the world consumption."
Paula Barnhart, Nyssa Elementary School

"I like that it gets us talking about how we can change our habits and why we should. It also helps me cover the standards."
Audra Thompson, Summit Elementary School

"The student materials cover a variety of topics that the students have learned in my class and they involve the student's families."
Kristie Olsen, Camas County School

"The engagement level of the kids. They loved the activities!"
Meghan Willard, Lewis & Clark Elementary

"The students received information and materials, which are awesome."
Julie Fowlkes, Claude A. Wilcox Elementary School

"The program is well-organized and easy to follow. The extra activities were fun too. We would love more science experiments or ideas!"
Katie Strawser, Melba Elementary

"I love that it starts a conversation about energy conservation. It's a seed!"
Brad Winder, Summit Elementary School

"I liked that this hit science standards with good real life application."
Sally VanderVeen, West Canyon Elementary

"The chance to talk to students about conservation and that they students have an active role in it."
John Stull, Greenhurst Elementary School

"I liked that the books for each child were informational and provided a challenge to some of my students."
Andrea Chester, West Canyon Elementary

"I loved how this incorporated our science standards. I was able to supplements with my renewable resource unit. Great info."
Kim Birkinbine, Silver Trail Elementary School

"I talked a lot with my students about making their conservation techniques into habits. I enjoyed listening to them talk about what they did with the items in the kit."
Alisa O'Berry, Rockford 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 9,703 participating families, 94 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.

98% of participating parents indicated they would continue to use the kit items after the completion of the program.

99% 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?

"I appreciate the awareness this program provides the kids. It helps reinforce their ability to be proactive in their home, and it also saves energy."
[redacted], **Ronald Reagan Elementary School**

"I loved how there was a guide to explain why and how the easy changes help the environment."
[redacted], **Central Canyon Elementary School**

"Raising awareness of the resources we use, so we can be more mindful about it."
[redacted] **Connor Academy Public Charter School**

"Showing my kids how to become more efficient, save money, and help the environment."
[redacted] **Hansen Elementary School**

"How it helped educate our children on the importance of water and power conservation."
[redacted], **New Plymouth Elementary School**

"Teaching the kids that turning off lights and taking shorter showers saves energy."
[redacted], **Prospect Elementary**

"Working together with my son to learn how to be more energy conscious. Also, some plumbing and electrical skills."
[redacted], **Ronald Reagan Elementary School**

Parent Response

(A summary of responses and regional data can be found in Appendix E)

Are there any comments you would like to express to your child's program sponsor?

"Thank you for helping our family be more aware of our energy use. We are going to share this information with our cub scout troop too. Thank you!"
[redacted], **Connor Academy Public Charter School**

"This is great. This was fun for the kids and family. Thank you!"
[redacted], **Gem Prep Nampa**

"Thank you my child was very excited and I am grateful for the help."
[redacted], **Green Acres Elementary School**

"Thank you! My son was excited to learn about cost savings and water conservation."
[redacted], **Melba Elementary**

"This is a great way to teach young kids about important environmental issues and ways to be more efficient with energy use."
[redacted], **Hawthorne Elementary School**

"Thank you to your company for thinking of us, great companies help people make better decisions."
[redacted], **Horizon Elementary School**

"Thanks for helping us save money throughout the year."
[redacted], **Nyssa Elementary School**

"I think this is a great program that helps kids reduce the power and water that they use."
[redacted] **Ronald Reagan Elementary School**

"Just keep up the great work with this program."
[redacted], **Prospect Elementary**

"It was great to start them early on conservation of energy efficiency."
[redacted], **Ronald Reagan Elementary School**

"Great job! Please continue to educate children on this important matter."
[redacted], **New Plymouth Elementary School**

"It was wonderful hearing my child give advice on to help with saving power."
[redacted], **Hollister Elementary**

"This is great. This was fun for the kids and family. Thank you!"
[redacted], **Gem Prep Nampa**

F. Teacher Letters

March 1st, 2019

To Whom it May Concern:

I have participated in this program for a few years and every year I feel so privileged to be part of such an awesome experience. My students and their families enjoy the Energy Wise Kits and take away greater knowledge about energy conservation. This is a hands-on experience where students are actively exploring concepts that are difficult to comprehend, and hopefully will change their lifestyle. I see so much value in these kits.

Since this program has been a fourth-grade thing at Spalding STEM Academy the anticipation of the kits to arrive is always fun to see! Some students whose siblings participated were exited to see if there were improvement with their family's energy conservation. The showerheads and timer always cause the most excitement and competition among siblings.

Thank you, Idaho Power, for this fun kit! Along with Mr. Weedon's presentations my 4th grade students have a better understanding of energy conservation. I look forward to doing this next year. The mini grant that I get goes towards to purchase science supplies for our STEM Camp the last week of school.

Sincerely,

Rachel Lindquist

Rachel Lindquist

Teacher Letters

(continued)

Greenacres Elementary

2350 Oak Street

Pocatello, Idaho 83201

Dear Idaho Power:

I would like to take this opportunity to thank you for all that you do for schools and especially for our classroom.

We have enjoyed our Idaho Power kits that you sent to us. We did many of the activities that are included in the teacher edition. The kids are always excited to do projects.

I would also like to mention how much we enjoy and appreciate the classroom visits by the school representative. We love the lessons that she presents. She is always willing to share her knowledge with us.

Thanks again,

Kathy Walker

5th grade Greenacres

Teacher Letters

(continued)

Dear Idaho Power,

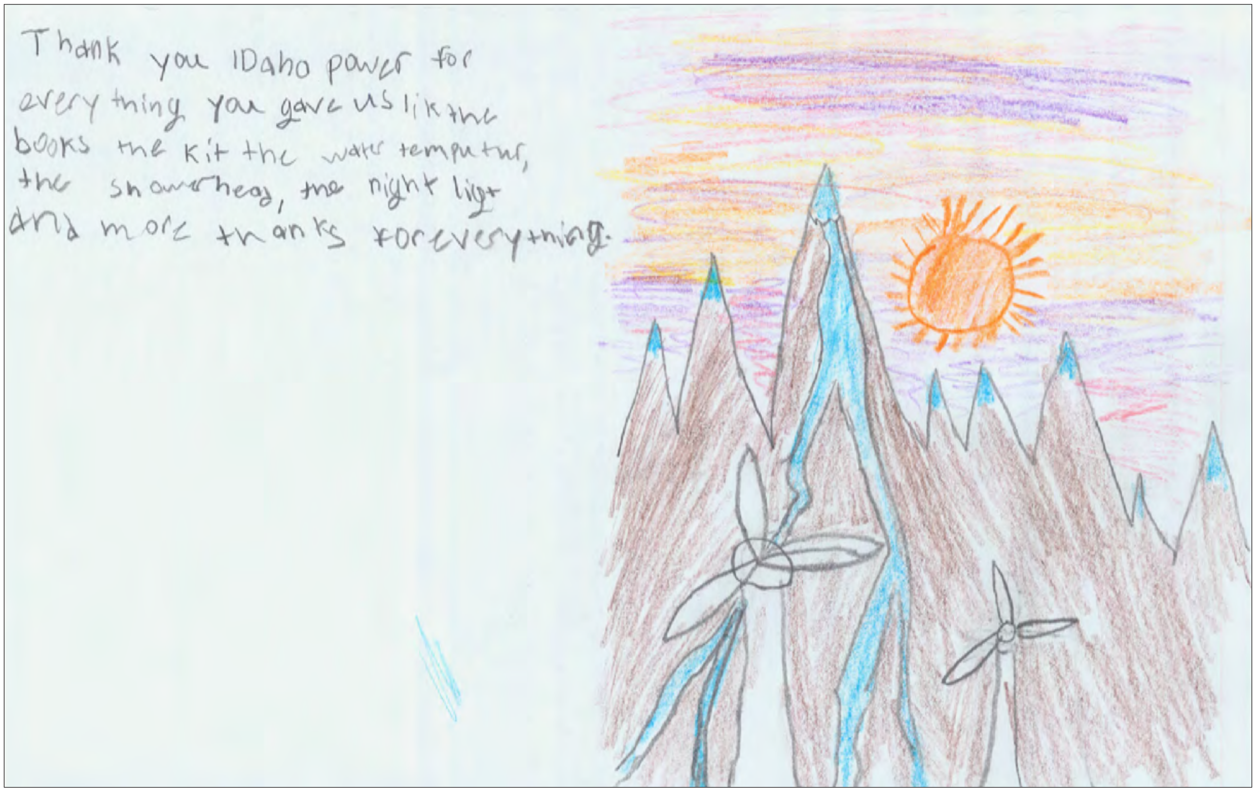
Thank you so much for providing concrete lessons that help students to realize their impact on the environment. Students were very interested to find out how they could make a difference in saving energy and resources. They loved learning that little things can really add up and make a difference.

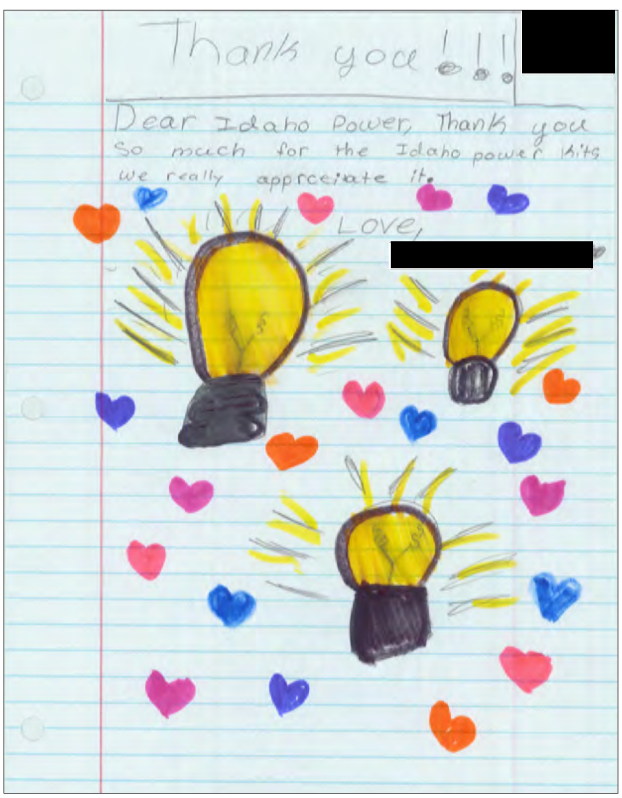
The kids were excited to try all the items at home such as the led light bulbs and the special showerhead. I even learned quite a bit that I didn't know, and think that families were probably impacted in a similar way. Thank you for helping students to become aware that the small choices they make can change the world. It is very empowering for kids to know that they can help take care of the world! Thanks for your great program.

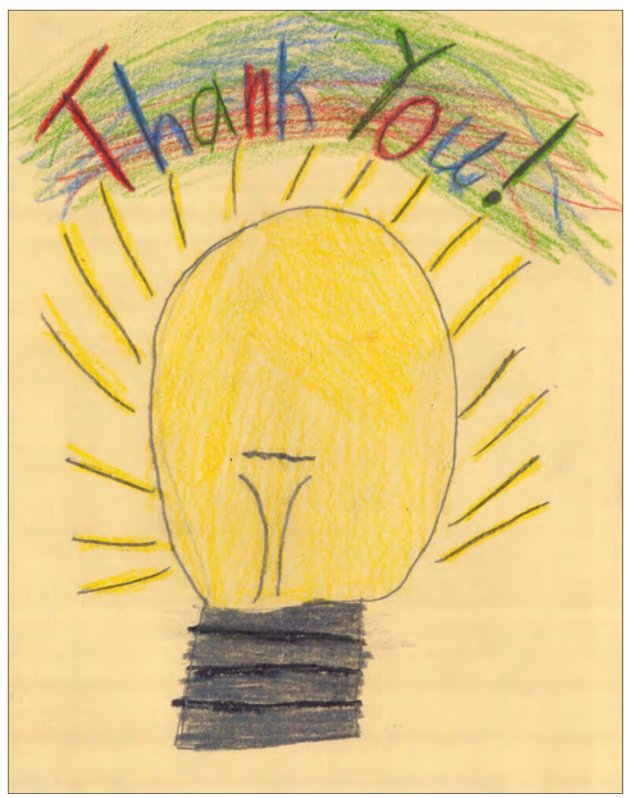
Sincerely,

Melody Craw

G. Student Letters

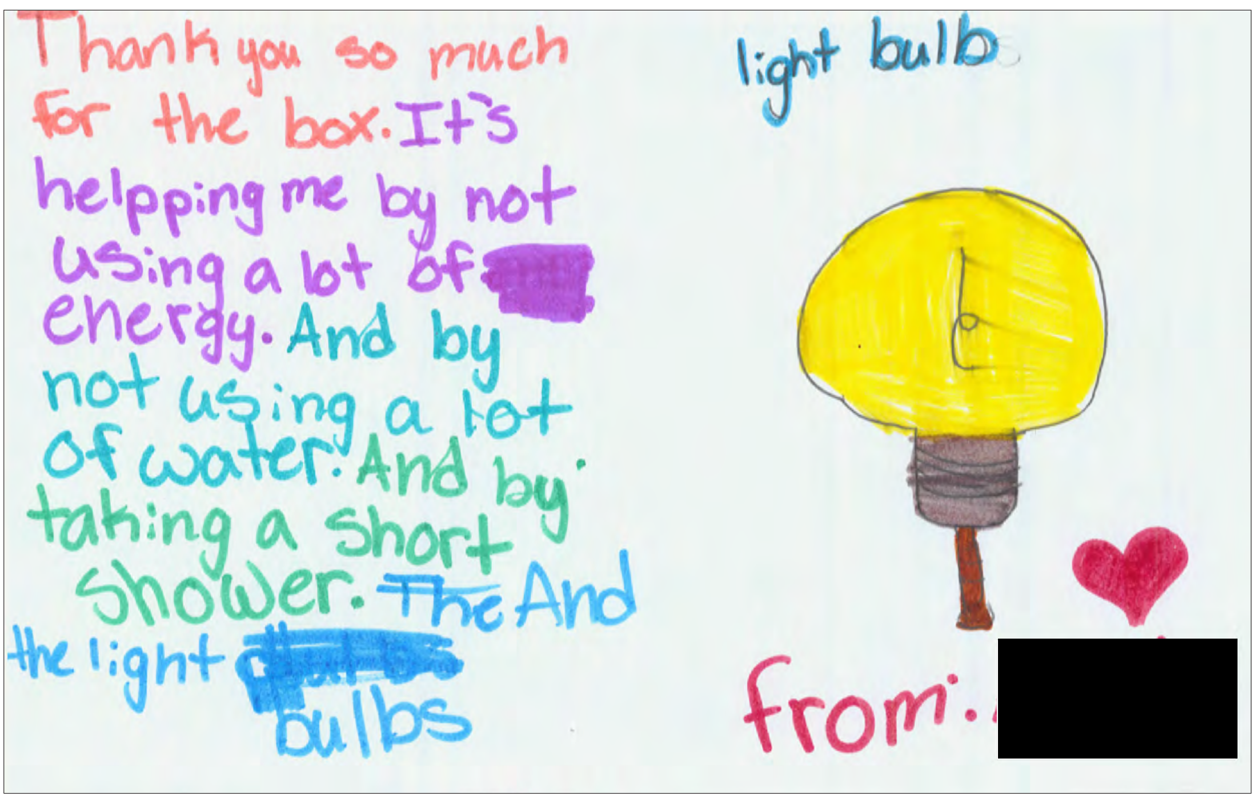






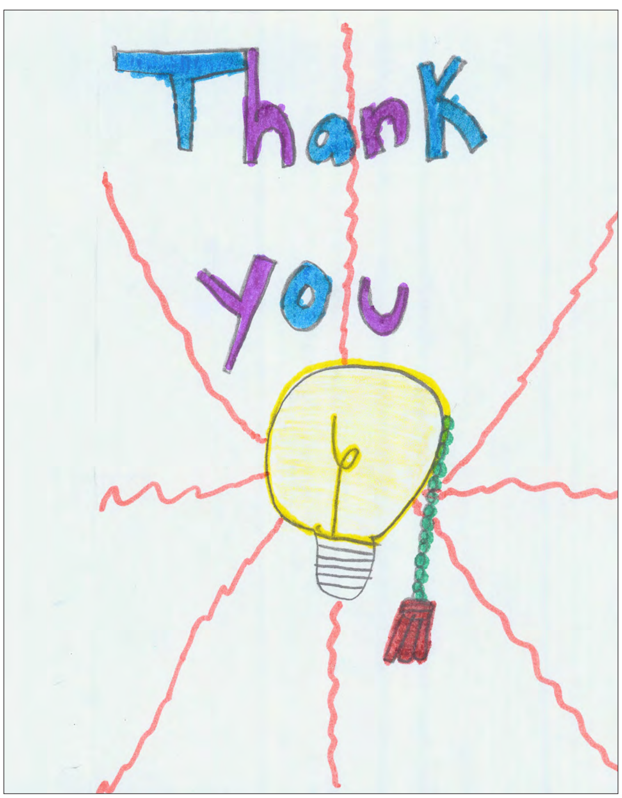
Student Letters

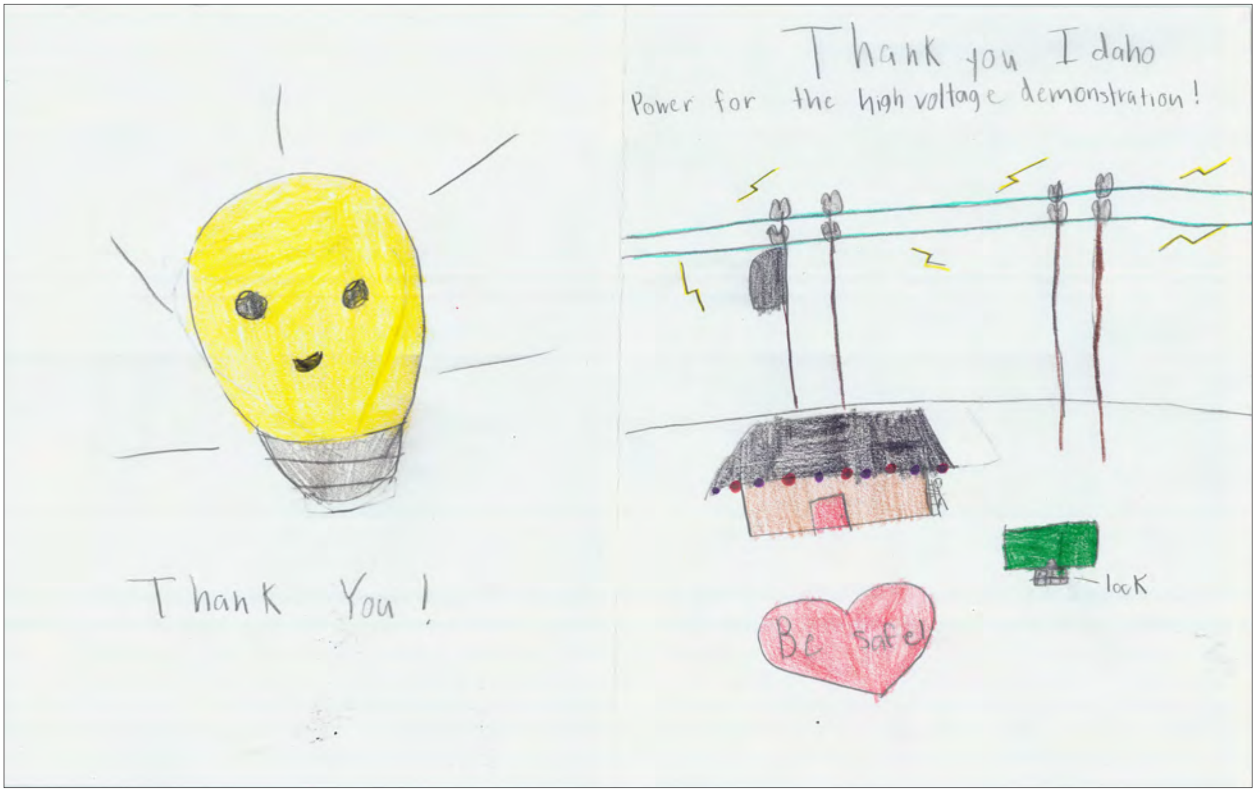
(continued)



Student Letters

(continued)

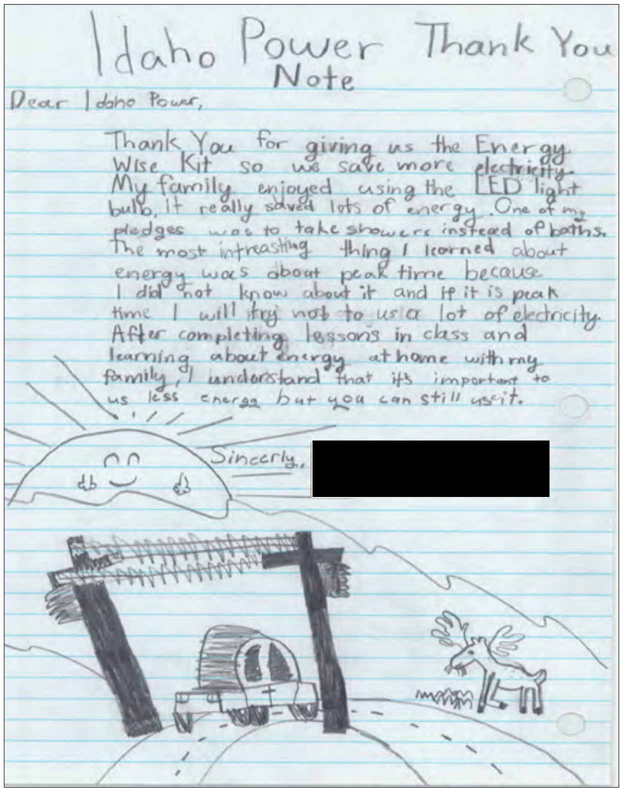



Thank You!
Thank you Idaho Power for the high voltage demonstration!
look
Be safe!


Meow
IDAHO
power
By: [redacted]

Student Letters

(continued)

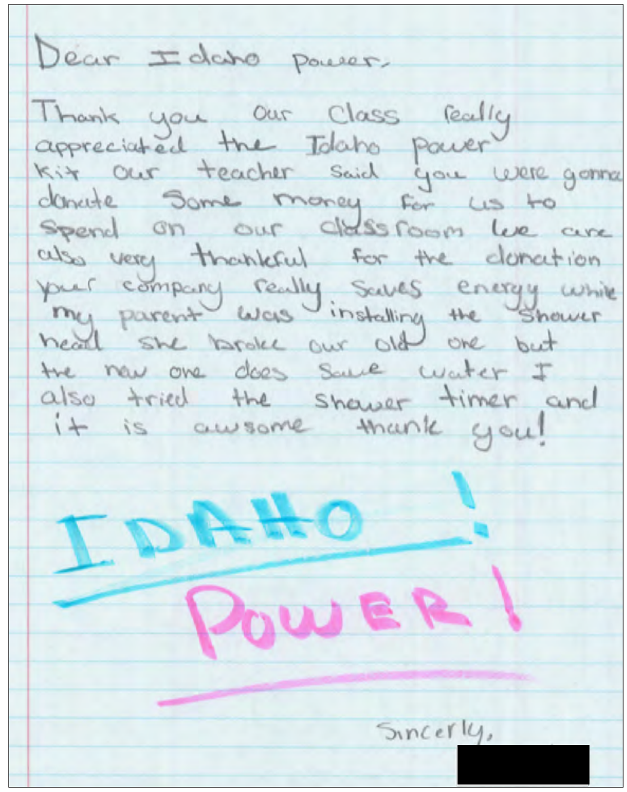


Idaho Power Thank You Note

Dear Idaho Power,

Thank You for giving us the Energy Wise Kit so we save more electricity. My family enjoyed using the LED light bulb, It really saved lots of energy. One of my pledges was to take showers instead of baths. The most intreasting thing I lorned about energy was about peak time because I did not know about it and if it is peak time I will try not to us a lot of electricity. After completing lessons in class and learning about energy at home with my family, I understand that its important to us less energy but you can still use it.

Sincerly, [redacted]



Dear Idaho Power,

Thank you Our Class really appreciated the Idaho power kit our teacher said you were gonna donate some money for us to spend on our classroom we are also very thankful for the donation your company really saves energy while my parent was installing the shower head she broke our old one but the new one does save water I also tried the shower timer and it is awsome thank you!

IDAHO! POWER!

Sincerly, [redacted]

[redacted]

Student Letters

(continued)

Dear Idaho Power,

My name is [redacted] and I am a student at Greenacres.I wanted to thank you for the booklets and the energy saving kits.

I put in the light bulb in are kitchen because we have not changes them in 8 months.We also put the shower head in and my family loves it and I do to.I put the night light in my bathroom.I used the timer for when I am getting ready for school so I know what time I have.

I also thank you for coming in are class and teaching us about birds. After school I told my mom all about it and some of the things I told here she did not know.I thought leaning about a lot of different birds was interesting.Thank you for everything you did for are school and me.

Sincerely,
[redacted]

Dear Idaho Power,

Hey my name is [redacted] and I am a student at Greenacres elementary. I had such a great time learning about science this year because of you thank you for the books and the kits. Learning about energy. Plus your presentation was on point. I love learning about birds. Thank you for spending time with us. can't wait to to see you again.

Thanks again,
[redacted]

Dear Idaho Power,

Dear Idaho Power, Thank you for all the items in the kit it was very helpful around my house. The shower head it 100 times better than my old one. Also the thermometre, that one is I think the most helpful, and that is all because it is fun to have when you don't want to set your mouth on fire with hot liquid.I almost forgot! The books,the books were very fun but at the same time challenging. I think my whole class enjoys doing the books.

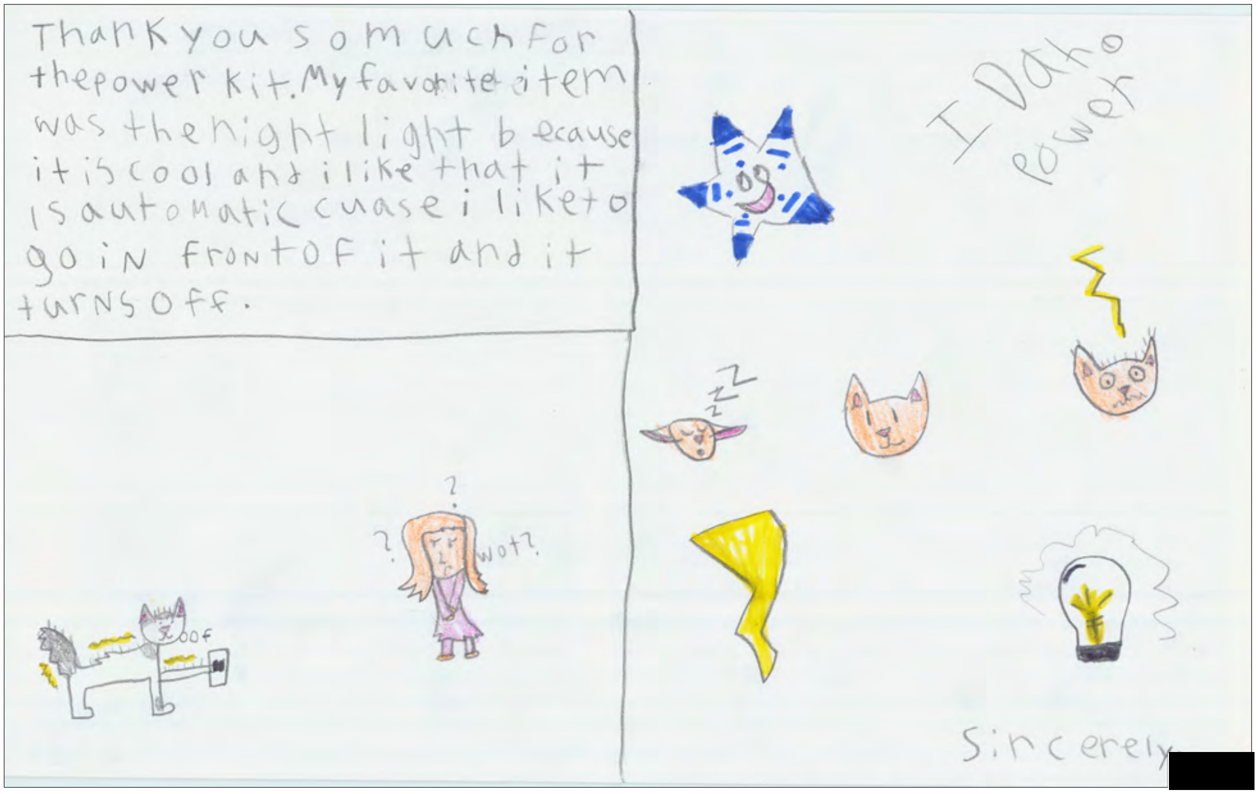
Sincerely-,[redacted]

Dear Idaho power,
Thank you for the kit I learned A lot I used the LED light for my room the shower head for my bathroom that was A relaxing shower thank you for doing this for pocatello Idaho that is kind to let us learn about the birds I tot my dad that stuff he liked that that is very interesting you pay A lot of money thank you for paying to learn.

Sincerely [redacted]

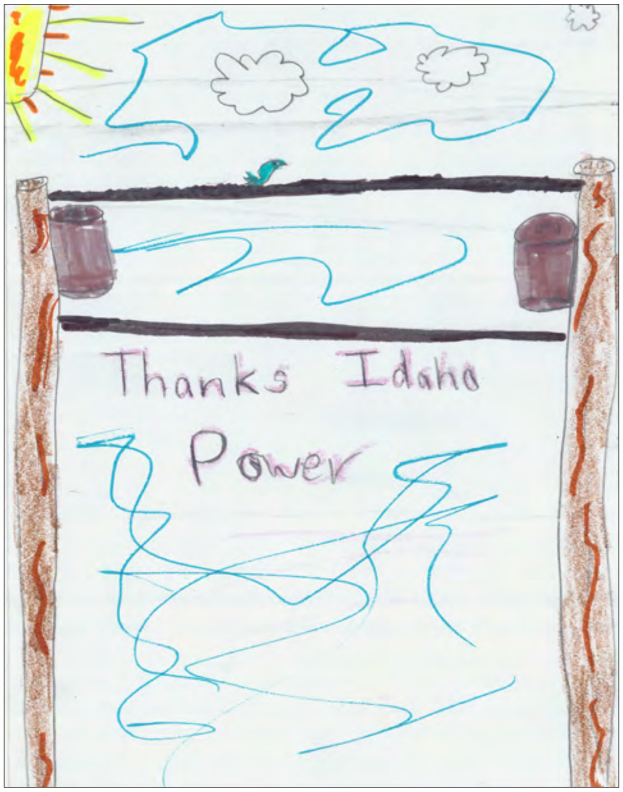
Student Letters

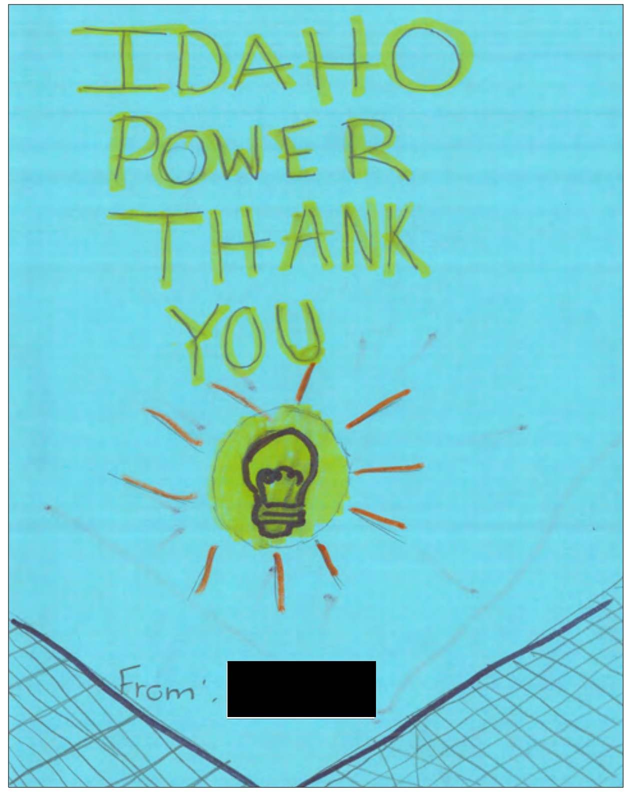
(continued)

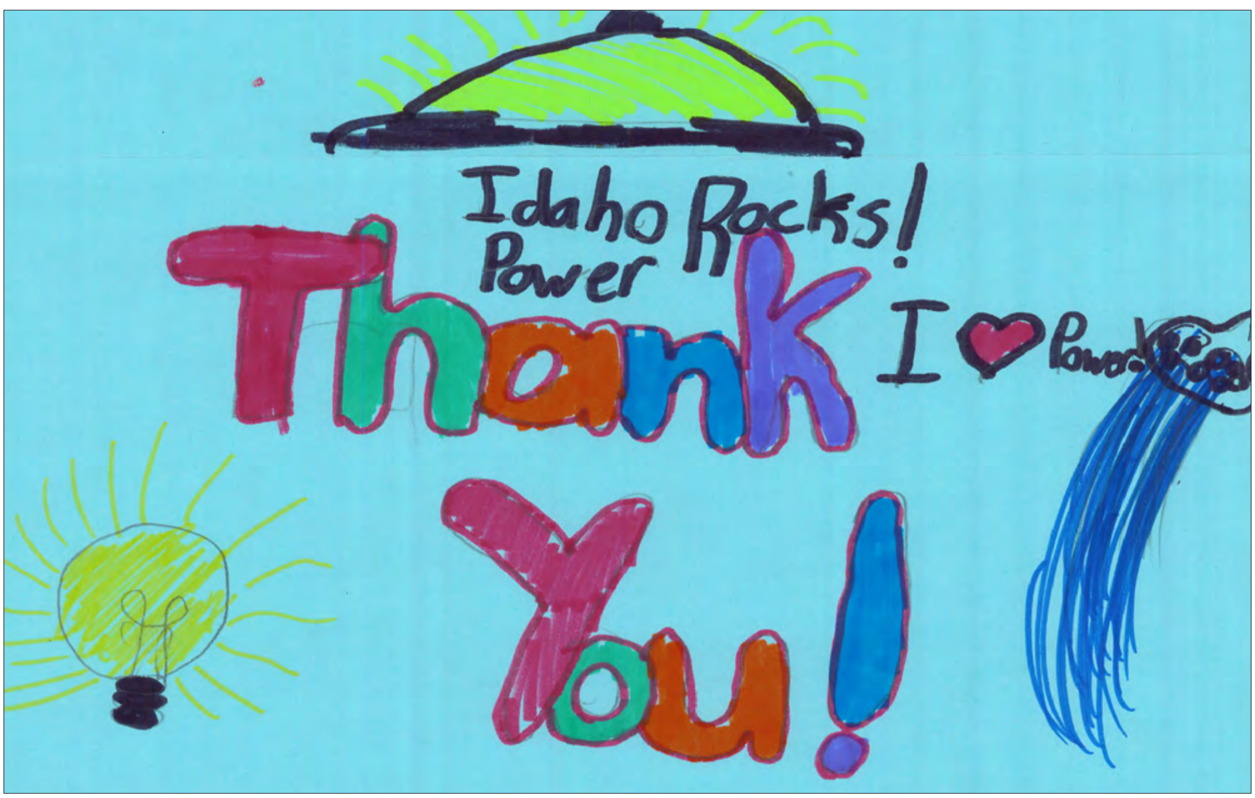

Thank you so much for the power kit. My favorite item was the night light because it is cool and i like that it is automatic cuase i like to go in front of it and it turns off.

Student Letters

(continued)







“I love the educational programs and my son loves them too. He finds them very interesting and informative.”

[redacted], Parent

Washington 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:	**2.06**	full bathrooms per home[1]
% of water heated by gas:	**50.02%**	[1]
% of water heated by electricity:	**49.98%**	[1]
Installation / participation rate of:	**39.42%**	[1]
Average Showerhead has a flow rate of:	**2.01**	gallons per minute[1]
Retrofit Showerhead has a flow rate of:	**1.30**	gallons per minute[1]
Number of participants:	**10,053**	[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:	**14,110,344**	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	**141,103,441**	gallons[5]

Projected Electricity Savings:

Showerhead retrofit projects an **annual** reduction of:	**926,688**	kWh[2,6]
Showerhead retrofit projects a **lifetime** reduction of:	**9,266,876**	kWh[2,7]

Projected Natural Gas Savings:

Showerhead retrofit projects an **annual** reduction of:	**46,371**	therms[2,8]
Showerhead retrofit projects a **lifetime** reduction of:	**463,706**	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:	**50.02%**	[1]
% of water heated by electricity:	**49.98%**	[1]
Installation / participation rate of Shower Timer:	**71.12%**	[1]
Average showerhead has a flow rate of:	**2.01**	gallons per minute[1]
Retrofit showerhead has flow rate of:	**1.30**	gallons per minute[1]
Number of participants:	**10,053**	[1]
Average of baseline and retrofit showerhead flow rate:	**1.65**	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:	**9,246,587**	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	**18,493,174**	gallons[7]

Projected Electricity Savings:

Shower Timer installation projects an **annual** reduction of:	**607,264**	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	**1,214,527**	kWh[9]

Projected Natural Gas Savings:

Shower Timer installation projects an **annual** reduction of:	**30,387**	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	**60,774**	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

**Per Idaho Power's request, the savings figures for the shower timer have not been included in the savings totals.*

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:	25.77%	[4]
Number of participants:	10,053	[4]

Projected Electricity Savings:

The FilterTone installation projects an **annual** reduction of:	202,532	kWh[5]
The FilterTone installation projects a **lifetime** reduction of:	2,025,316	kWh[6]

Projected Natural Gas Savings:

The FilterTone installation projects an **annual** reduction of:	10,035	therms[7]
The FilterTone installation projects a **lifetime** reduction of:	100,348	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

LED 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:	**58.61**	watts[3]
Installation / participation rate of:	**59.53%**	[3]
Number of participants:	**10,053**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**304,493**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**3,653,913**	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

Appendix A

Projected Savings from Second 9-watt LED Light Bulb Retrofit

LED 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:	**57.71**	watts[3]
Installation / participation rate of:	**49.26%**	[3]
Number of participants:	**10,053**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**247,405**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,968,857**	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

LED 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:	**57.69**	watts[3]
Installation / participation rate of:	**41.52%**	[3]
Number of participants:	**10,053**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**208,433**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,501,199**	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 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
Product life:	**10**	years[2]
Energy saved per year:	**28**	kWh per year
Energy saved over life expectancy:	**285**	kWh
Installation / participation rate of:	**78.27%**	[3]
Number of participants:	**10,053**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**224,016**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**2,240,157**	kWh[5]

1 Assumption (12 hours per day)

2 Product life provided by manufacturer

3 Data reported by program participants

4(kWh per year x Number of participants) x Installation rate

5((kWh per year x Number of participants) x Installation rate) x Effective useful life

Home Check-Up

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	10,053	2,239	2,938	1,953	2,157	766
Students	9,703	2,164	2,834	1,889	2,078	738
Surveys Received	5,463	1,041	1,898	1,493	590	441
Percent Response	56%	48%	67%	79%	28%	60%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What type of home do you live in?						
Single Family Home (Mobile)	12%	8%	11%	13%	13%	12%
Single Family Home (Manufactured)	8%	6%	8%	7%	12%	11%
Single Family Home (Built)	64%	72%	62%	66%	57%	60%
Multi-Family (2-4 units)	10%	8%	11%	10%	12%	8%
Multi-Family (5-20 units)	4%	4%	5%	3%	5%	7%
Multi-Family (21+ units)	2%	2%	3%	1%	1%	3%
2 Was your home built before 1992?						
Yes	43%	28%	33%	57%	51%	62%
No	57%	72%	67%	43%	49%	38%
3 Is your home owned or rented?						
Owned	74%	79%	69%	78%	70%	69%
Rented	26%	21%	31%	22%	30%	31%
4 How many kids live in your home (age 0-17)?						
1	13%	15%	13%	12%	13%	11%
2	29%	37%	27%	27%	27%	26%
3	25%	25%	26%	24%	27%	27%
4	18%	14%	18%	21%	18%	17%
5+	15%	9%	16%	16%	16%	19%

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%	13%	10%	12%	16%	10%
	2	69%	74%	66%	71%	64%	68%
	3	11%	8%	13%	11%	11%	12%
	4	5%	3%	7%	4%	7%	6%
	5+	3%	1%	4%	2%	3%	4%
6	Does your home have a programmable outdoor sprinkler system?						
	Yes	65%	82%	68%	56%	53%	50%
	No	35%	18%	32%	43%	47%	50%
7	Does your home have a programmable thermostat?						
	Yes	78%	87%	79%	72%	74%	71%
	No	22%	13%	21%	28%	26%	29%
8	What is the main source of heating in your home?						
	Natural Gas	43%	58%	42%	46%	30%	27%
	Electric Heater	40%	34%	42%	37%	52%	48%
	Propane	4%	1%	4%	6%	5%	7%
	Heating Oil	1%	1%	1%	1%	1%	1%
	Wood	5%	2%	4%	7%	6%	10%
	Other	6%	4%	8%	4%	6%	6%
9	What type of air conditioning unit do you have?						
	Central Air Conditioner	71%	85%	76%	59%	63%	64%
	Evaporative Cooler	6%	4%	5%	7%	6%	12%
	Room Unit	13%	8%	12%	16%	16%	15%
	Don’t Have One	10%	3%	8%	18%	14%	8%
10	Does your home have a Dishwasher?						
	Yes	86%	96%	87%	82%	78%	81%
	No	14%	4%	13%	18%	22%	19%

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	63%	49%	59%	73%	74%	70%
1	29%	43%	33%	21%	20%	19%
2	5%	5%	5%	4%	5%	7%
3	2%	2%	2%	1%	1%	3%
4+	1%	1%	1%	1%	0%	2%
12 How many full bathrooms are in your home?						
1	23%	13%	20%	26%	31%	36%
2	54%	58%	63%	41%	55%	48%
3	19%	23%	14%	29%	10%	12%
4	3%	5%	3%	4%	3%	3%
5+	1%	1%	1%	1%	1%	1%
13 How many toilets are in your home?						
1	16%	8%	14%	17%	23%	29%
2	43%	33%	46%	40%	54%	46%
3	31%	43%	33%	29%	17%	18%
4	8%	14%	5%	11%	4%	4%
5+	2%	2%	2%	3%	2%	3%
14 How is your water heated?						
Natural Gas	50%	64%	52%	48%	34%	36%
Electricity	50%	36%	48%	52%	66%	64%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	10,053	2,239	2,938	1,953	2,157	766
Students	9,703	2,164	2,834	1,889	2,078	738
Surveys Received	5,463	1,041	1,898	1,493	590	441
Percent Response	56%	48%	67%	79%	28%	60%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What is the flow rate of your old showerhead?						
0 - 1.0 GPM	12%	10%	12%	12%	10%	12%
1.1 - 1.5 GPM	18%	13%	18%	19%	19%	18%
1.6 - 2.0 GPM	20%	22%	18%	20%	23%	20%
2.1 - 2.5 GPM	24%	27%	26%	22%	20%	20%
2.6 - 3.0 GPM	18%	19%	16%	17%	19%	23%
3.1+ GPM	9%	8%	9%	9%	8%	7%
2 Did you install the new High-Efficiency Showerhead?						
Yes	39%	39%	41%	40%	37%	35%
No	61%	61%	59%	60%	63%	65%
3 If you answered "yes" to question 2, what is the flow rate of your new showerhead?						
0 - 1.0 GPM	24%	16%	22%	26%	30%	34%
1.1 - 1.5 GPM	39%	40%	42%	37%	34%	37%
1.6 - 1.75 GPM	37%	44%	35%	37%	36%	30%
4 Did you use the Shower Timer?						
Yes	71%	70%	71%	73%	75%	67%
No	29%	30%	29%	27%	25%	33%
5 Did your family install the first 9-watt LED Light Bulb?						
Yes	60%	58%	61%	60%	58%	55%
No	40%	42%	39%	40%	42%	45%

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	18%	14%	19%	17%	18%	22%
60-watt	39%	41%	39%	38%	38%	41%
75-watt	14%	15%	15%	11%	16%	16%
100-watt	10%	10%	10%	10%	11%	9%
Other	19%	21%	18%	24%	18%	11%
7 Did your family install the second 9-watt LED Light Bulb?						
Yes	49%	47%	51%	50%	45%	50%
No	51%	53%	49%	50%	55%	50%
8 If you answered "yes" to question 7, what is the wattage of the incandescent bulb you replaced?						
40-watt	19%	16%	23%	17%	17%	20%
60-watt	38%	36%	35%	40%	38%	43%
75-watt	14%	17%	13%	11%	20%	17%
100-watt	9%	10%	10%	7%	8%	7%
Other	20%	21%	19%	25%	17%	12%
9 Did your family install the third 9-watt LED Light Bulb?						
Yes	42%	39%	42%	42%	38%	45%
No	58%	61%	58%	58%	62%	55%
10 If you answered "yes" to question 9, what is the wattage of the incandescent bulb you replaced?						
40-watt	18%	17%	20%	16%	19%	20%
60-watt	35%	33%	33%	37%	33%	41%
75-watt	14%	18%	14%	12%	16%	15%
100-watt	10%	10%	10%	9%	11%	9%
Other	23%	22%	23%	27%	21%	16%
11 Did your family install the FilterTone® Alarm?						
Yes	26%	27%	26%	26%	24%	24%
No	74%	73%	74%	74%	76%	76%

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%	24%	18%	18%	16%	21%
3 - 4 Degrees	18%	22%	17%	16%	18%	20%
5+ Degrees	13%	14%	15%	10%	11%	15%
Didn't Adjust Thermostat	50%	40%	49%	56%	55%	45%
13 How much did your family turn up the thermostat in summer for cooling?						
1 - 2 Degrees	18%	23%	17%	16%	13%	21%
3 - 4 Degrees	18%	21%	20%	13%	16%	18%
5+ Degrees	14%	15%	17%	11%	15%	16%
Didn't Adjust Thermostat	50%	41%	46%	60%	57%	44%
14 Did you install the LED Night Light?						
Yes	78%	77%	78%	81%	80%	75%
No	22%	23%	22%	19%	20%	25%
15 Did your family lower your water heater settings?						
Yes	22%	23%	21%	20%	23%	26%
No	78%	77%	79%	80%	78%	74%
16 Did your family raise the temperature on your refrigerator?						
Yes	18%	18%	18%	16%	16%	22%
No	82%	82%	82%	84%	84%	78%
17 Did you complete the optional online energy use activity?						
All of it	8%	7%	8%	7%	11%	14%
Some of it	16%	14%	17%	13%	18%	19%
None	76%	79%	76%	79%	71%	67%
18 Did you work with your family on this Program?						
Yes	60%	63%	58%	63%	62%	50%
No	40%	37%	42%	37%	38%	50%

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	54%	58%	52%	55%	55%	47%
No	46%	42%	48%	45%	45%	53%
20 Did your family change the way they use energy?						
Yes	61%	66%	59%	62%	61%	59%
No	39%	34%	41%	38%	39%	41%
21 How would you rate the Idaho Power Energy Wise® Program?						
Great	48%	50%	48%	46%	49%	49%
Pretty Good	38%	37%	40%	37%	36%	38%
Okay	11%	11%	10%	14%	12%	10%
Not So Good	3%	3%	2%	4%	3%	3%

Due to rounding of numbers, percentages may not add up to 100%

Participant List

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	Aberdeen Middle School	Layne Arnoldson	1	67	YES
Western	Aiken Elementary School	Candace Zugner	1	30	NO
Western	Aiken Elementary School	Patty Eidson	1	30	NO
Southern	Alturas Elementary School	Juan Salamanca	1	23	NO
Southern	Alturas Elementary School	Kiley Hoefer	1	23	NO
Southern	Alturas Elementary School	Melanie Blacker	1	24	NO
Eastern	American Falls Intermediate School	Kristen Jensen	1	11	NO
Southern	Bellevue Elementary School	Alexis Duvall	1	16	NO
Southern	Bellevue Elementary School	Andrea Gallegos	1	15	NO
Southern	Bellevue Elementary School	Krista Jones	1	46	NO
Canyon	Birch Elementary School	Brenda Fly	1	28	YES
Canyon	Birch Elementary School	Carol Briggs	1	29	YES
Canyon	Birch Elementary School	Juilana Lookhart	1	28	YES
Canyon	Birch Elementary School	MaryJo Pegram	1	28	YES
Eastern	Blackfoot Charter Community Learning Center	Britani Barrus	1	19	YES
Eastern	Blackfoot Charter Community Learning Center	Camilla Polish	1	20	NO
Eastern	Blackfoot Charter Community Learning Center	Krystal Murdock	1	24	YES
Southern	Buhl Middle School	Caroline Barger	1	108	YES
Southern	Camas County School	Bridget Smith	1	13	NO
Southern	Camas County School	Candice Smith	1	14	YES
Southern	Camas County School	Kristie Olsen	1	16	YES
Western	Cambridge Elementary School	Danielle Petitmermet	1	12	YES
Southern	Carey Public School	Jan Morey	1	12	NO
Canyon	Centennial Elementary School	Aimee Christensen	1	30	YES
Canyon	Centennial Elementary School	Diane Gharring	1	30	YES
Canyon	Centennial Elementary School	Doris Atherton	1	30	YES
Canyon	Central Canyon Elementary School	Ashley Van Vorous	1	26	NO
Canyon	Central Canyon Elementary School	Betsy Smith	1	26	YES
Canyon	Central Canyon Elementary School	Jessica Lillquist	1	26	YES
Canyon	Central Canyon Elementary School	Tracy Bullock	1	26	YES
Canyon	Central Elementary School	Aubrey Crisp	1	28	NO
Canyon	Central Elementary School	Courtney Craner	1	28	YES
Capital	Christine Donnell School of Arts	Amy Hymas	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
Capital	Christine Donnell School of Arts	Cynthia Compton	1	29	YES
Capital	Christine Donnell School of Arts	Debra Tiffany	1	30	YES
Eastern	Chubbuck Elementary School	Christenia Coast	1	23	YES
Eastern	Chubbuck Elementary School	Lori Schmitt	1	28	NO
Eastern	Chubbuck Elementary School	Terra Pirrong	1	25	NO
Eastern	Chubbuck Elementary School	Wendy VanDyke	1	24	NO
Eastern	Claude A. Wilcox Elementary School	Julie Fowlkes	1	28	YES
Eastern	Claude A. Wilcox Elementary School	Krista Campos	1	29	YES
Eastern	Claude A. Wilcox Elementary School	Tricia Hemsley	1	28	YES
Southern	Clover Trinity Lutheran	Wendy Barckholtz	1	10	NO
Capital	Collister Elementary School	Gwendolyn Balmer	1	15	NO
Eastern	Connor Academy Public Charter School	Bill Henry 4th Grade	1	30	YES
Eastern	Connor Academy Public Charter School	Bill Henry 5th grade	1	36	YES
Eastern	Connor Academy Public Charter School	Bill Henry 6th Grade	1	50	YES
Eastern	Connor Academy Public Charter School	Bill Henry 7th Grade	1	60	YES
Eastern	Connor Academy Public Charter School	Bill Henry 8th Grade	1	63	YES
Capital	Cynthia Mann Elementary School	Lisa Stitt	1	25	YES
Capital	Cynthia Mann Elementary School	Rachael Cromie	1	25	NO
Capital	Cynthia Mann Elementary School	Wendy Frost	1	21	YES
Canyon	Desert Springs Elementary School	Jackie Sodaro	1	23	YES
Canyon	Desert Springs Elementary School	Janelle Smith	1	23	YES
Canyon	Desert Springs Elementary School	Lindsay Mangum	1	26	YES
Canyon	Desert Springs Elementary School	Stacey Pearson	1	26	YES
Southern	Dietrich School	Jerry Heimerdinger	1	16	NO
Eastern	Donald D. Stalker Elementary School	LaNita McRae	1	25	YES
Eastern	Donald D. Stalker Elementary School	Lisa Clark	1	26	NO
Canyon	East Canyon Elementary	Brett Mizuta	1	22	NO
Canyon	East Canyon Elementary	Brian Constant	1	22	NO
Canyon	East Canyon Elementary	Tiara Shippy	1	22	YES
Canyon	East Canyon Elementary	Trisha Cramer	1	22	NO
Eastern	Edahow Elementary School	Debbie Nickel	1	31	YES
Eastern	Edahow Elementary School	Megan Bullock	1	30	YES
Capital	Eliza Hart Spalding Elementary School	Rachel Lindquist	1	34	YES
Capital	Eliza Hart Spalding Elementary School	Robin Apalategui	1	34	YES
Capital	Eliza Hart Spalding Elementary School	Sarah Williams	1	34	YES

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Eliza Hart Spalding Elementary School	Shawna Brenna	1	34	YES
Eastern	Ellis Elementary School	Anna Pugliano	1	26	YES
Eastern	Ellis Elementary School	Margo Lamont	1	26	YES
Eastern	Ellis Elementary School	Sherry VanEvery	1	26	YES
Eastern	Fern Waters Campus/Upper Carmen	Eryk Foss	1	42	YES
Southern	Filer Elementary School	Stacie Beem	1	24	NO
Southern	Filer Intermediate School	Anna Koch	1	22	YES
Southern	Filer Intermediate School	Jo Borrup	1	22	YES
Southern	Filer Intermediate School	Mary Kelly	1	23	NO
Southern	Filer Intermediate School	Robyn Flint	1	23	YES
Southern	Filer Intermediate School	Tes Fields	1	24	NO
Western	Fruitland Elementary School	Amber Bridgewater	1	25	YES
Western	Fruitland Elementary School	Heather Heitz	1	25	NO
Western	Fruitland Elementary School	Ish Green	1	25	YES
Western	Fruitland Elementary School	Linda Langley	1	25	NO
Western	Fruitland Elementary School	Stacy Wescott	1	25	NO
Western	Fruitland Elementary School	Suzy Hrizuk	1	25	YES
Western	Garden Valley Elementary	Shannon Court	1	20	NO
Eastern	Gate City Elementary School	Christin Brown	1	27	YES
Eastern	Gate City Elementary School	John Humphrey	1	27	YES
Eastern	Gate City Elementary School	Lacey Smart	1	27	YES
Canyon	Gem Prep Nampa	Elaine Gross	1	30	NO
Canyon	Gem Prep Nampa	Jolene Daniels	1	30	YES
Capital	Glenns Ferry Middle School	Liza Martin	1	33	NO
Capital	Grace Jordan Elementary School	Darwood Ashmead	1	27	NO
Capital	Grace Jordan Elementary School	Jason Fewkes	1	28	NO
Capital	Grace Jordan Elementary School	Rebekah Spille	1	28	NO
Eastern	Grace Lutheran School	Katie Grant	1	26	YES
Eastern	Green Acres Elementary School	Kathy Walker	1	30	YES
Eastern	Green Acres Elementary School	Rachel Thomas	1	30	YES
Canyon	Greenhurst Elementary School	John Stull	1	27	YES
Canyon	Greenhurst Elementary School	Tami Ashley	1	28	NO
Eastern	Groveland Elementary	Kalli Lopez	1	14	YES
Eastern	Groveland Elementary	Melissa Schreiber	1	16	YES
Southern	Hagerman Elementary School	Marianne Christian	1	12	NO

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Southern	Hagerman Elementary School	Melissa Kast	1	16	NO
Southern	Hansen Elementary School	Marcie Parkinson	1	22	YES
Southern	Harrison Elementary School	Chelsea Kelly	1	24	NO
Southern	Harrison Elementary School	Corissa Johns	1	24	NO
Southern	Harrison Elementary School	Karley Wilkins	1	22	NO
Capital	Hawthorne Elementary School	Susie Noland	1	27	YES
Southern	Heritage Academy School	Amanda Thayne	1	25	NO
Southern	Heritage Academy School	Ana Carpenter	1	20	NO
Capital	Hillsdale Elementary School	Angie Fraas	1	31	YES
Capital	Hillsdale Elementary School	Hannah Kessler	1	30	YES
Capital	Hillsdale Elementary School	Jocelyn Robinson	1	28	YES
Capital	Hillsdale Elementary School	Michelle Montoya	1	30	YES
Southern	Hollister Elementary	Elara Smith	1	9	NO
Southern	Hollister Elementary	Susan Hamby	1	14	YES
Southern	Horizon Elementary School	Gayle Butts	1	23	YES
Southern	Horizon Elementary School	Jennifer Mandis	1	24	NO
Southern	Horizon Elementary School	Kelly Semler	1	24	NO
Southern	Horizon Elementary School	Michelle Powell	1	24	NO
Southern	Horizon Elementary School	Mikayla Fox	1	24	NO
Southern	Horizon Elementary School	Sheena Teal	1	24	NO
Southern	Horizon Elementary School	Sherry Young	1	32	NO
Southern	Horizon Elementary School	Stephanie Anderson	1	24	NO
Capital	Hunter Elementary School	Angela Zweifel	1	29	YES
Capital	Hunter Elementary School	Cinda Bodell	1	30	NO
Capital	Hunter Elementary School	Diane Escandon	1	30	YES
Capital	Hunter Elementary School	Rebecca Lenon	1	30	YES
Capital	Hunter Elementary School	Rene Bilkiss	1	30	YES
Southern	I.B. Perrine Elementary School	Emily Strom	1	30	YES
Southern	I.B. Perrine Elementary School	Mary Fraley	1	30	YES
Southern	I.B. Perrine Elementary School	Rob Weaver	1	30	YES
Canyon	Idaho Arts Charter School	Amanda Pearcy	1	31	NO
Canyon	Idaho Arts Charter School	Jenell Mee	1	30	NO
Canyon	Idaho Arts Charter School	Lindsey Corey	1	30	NO
Canyon	Idaho Arts Charter School	Samantha Barnes	1	30	NO

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Appendix C

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	Idaho Science & Technology Charter School	Lydia Beck	1	21	NO
Eastern	Indian Hills Elementary	Deri Hall	1	23	YES
Eastern	Indian Hills Elementary	Heidi Austin	1	26	YES
Eastern	Indian Hills Elementary	Janet Plowman	1	26	YES
Eastern	Indian Hills Elementary	Mark Bowman	1	25	YES
Eastern	Inkom Elementary School	Virginia Robinson	1	30	YES
Canyon	Iowa Elementary	Pepper Allen	1	30	YES
Canyon	Iowa Elementary	Shetila Henry	1	30	YES
Canyon	Iowa Elementary	Veronica Knutson	1	30	NO
Capital	Joplin Elementary School	Amy Bass	1	38	NO
Capital	Joplin Elementary School	Kirsten Grover	1	37	NO
Western	Kenneth Carberry Elementary School	Alissa Combe	1	28	YES
Western	Kenneth Carberry Elementary School	Karen Nichols	1	27	YES
Western	Kenneth Carberry Elementary School	Katrina Savitz	1	30	YES
Western	Kenneth Carberry Elementary School	Vicki Beckman	1	27	YES
Southern	Kimberly Elementary School	Deanna Miller	1	25	NO
Southern	Kimberly Elementary School	Rachelle Mueller	1	25	NO
Southern	Kimberly Elementary School	Roberta Beck	1	25	NO
Capital	Lake Hazel Elementary	Courtney Randall	1	29	NO
Capital	Lake Hazel Elementary	Elizabeth McLaughlin	1	29	NO
Capital	Lake Hazel Elementary	Michelle Roach	1	29	NO
Canyon	Lake Ridge Elementary School	Deanna Menssen	1	26	YES
Canyon	Lake Ridge Elementary School	Laura Crawford	1	27	YES
Canyon	Lake Ridge Elementary School	Laura VanDerschaaf	1	27	YES
Canyon	Lake Ridge Elementary School	Tanya Scheibe	1	25	YES
Eastern	Leadore School	Melody Kauer	1	13	YES
Canyon	Lewis & Clark Elementary	Adam Trowbridge	1	25	YES
Canyon	Lewis & Clark Elementary	Caitlyn McConnell	1	25	YES
Canyon	Lewis & Clark Elementary	Meghan Willard	1	25	YES
Eastern	Lewis and Clark Elementary	John Anderson	1	27	YES
Eastern	Lewis and Clark Elementary	Stacy Briner	1	25	YES
Eastern	Lewis and Clark Elementary	Tamara Palmer	1	27	YES
Capital	Maple Grove Elementary	Erin Luthy	1	26	NO
Capital	Maple Grove Elementary	Kaitlyn Ilg	1	24	NO

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Maple Grove Elementary	Scott Roe	1	24	YES
Canyon	Melba Elementary	Carrie Bowers	1	27	YES
Canyon	Melba Elementary	Katie Strawser	1	27	YES
Canyon	Melba Elementary	Marie Rockwood	1	27	YES
Canyon	Middleton Heights Elementary School	Emily Rebrich	1	28	NO
Canyon	Middleton Heights Elementary School	Katelyn Shannon	1	27	NO
Canyon	Middleton Heights Elementary School	Kim Platt	1	25	YES
Canyon	Middleton Heights Elementary School	Scott Brocke	1	27	NO
Canyon	Mill Creek Elementary School	Jill Mescher	1	28	YES
Canyon	Mill Creek Elementary School	Lauren Denny	1	28	YES
Canyon	Mill Creek Elementary School	Lyna Butler	1	28	YES
Canyon	Mill Creek Elementary School	Staci Miller	1	28	YES
Southern	Morningside Elementary School	Katie Mancari	1	22	NO
Southern	Morningside Elementary School	Sandy Paul	1	21	NO
Southern	Morningside Elementary School	Stephen Rahe	1	24	NO
Southern	Murtaugh Middle School	Amy Jensen	1	38	NO
Canyon	Nampa Christian School	Zachary Dwello	1	33	YES
Western	New Plymouth Elementary School	Cherry Meckert	1	28	YES
Western	New Plymouth Elementary School	Dorothy Woods	1	28	YES
Western	New Plymouth Elementary School	Jolene Taggart	1	28	YES
Capital	North Elementary	Denise Weis	1	23	YES
Capital	North Elementary	Rosemary Ash	1	23	YES
Capital	North Elementary	Shelby Sandefur	1	23	YES
Capital	North Elementary	Sherri Redmond	1	17	YES
Capital	North Star Charter School	Carol DeFriez	1	30	NO
Capital	North Star Charter School	Mariah Rodeghiero	1	30	NO
Capital	North Star Charter School	Michelle Obenchain	1	30	NO
Western	Nyssa Elementary School	Diane Moats	1	22	NO
Western	Nyssa Elementary School	Paula Barnhart	1	30	YES
Western	Nyssa Elementary School	Trisha Bunker	1	45	NO
Southern	Oakley Elementary School	Gloria Muhlestein	1	18	NO
Southern	Oakley Elementary School	Rose Marie Warrell	1	16	NO
Canyon	Owyhee Elementary	Becki Wheeler	1	30	YES
Canyon	Owyhee Elementary	Brenda Allen	1	30	YES

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Appendix C

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Owyhee Elementary	Christa Roesberry-Barber	1	30	YES
Western	Park Intermediate	Grace Sharp	1	22	YES
Western	Park Intermediate	Jessica Mosley	1	21	YES
Western	Park Intermediate	Kathleen Cahill	1	20	NO
Canyon	Park Ridge Elementary School	Allison Garrison	1	25	NO
Canyon	Park Ridge Elementary School	Karey Cahan	1	25	NO
Capital	Pierce Park Elementary	Bill Hoffman	1	22	YES
Capital	Pierce Park Elementary	Shannon Nicholson	1	30	
Southern	Pillar Falls Elementary School	Angella Enders	1	30	NO
Southern	Pillar Falls Elementary School	Gaelene Miller	1	30	NO
Southern	Pillar Falls Elementary School	Rachael Simson	1	30	NO
Southern	Pillar Falls Elementary School	Robin Mason	1	30	NO
Southern	Pine Elem/Jr High School	Jane Burke	1	1	NO
Capital	Ponderosa Elementary School	Deborah Lichter	1	30	YES
Capital	Ponderosa Elementary School	Kris Pfaff	1	30	YES
Capital	Ponderosa Elementary School	Veronica McAchran	1	31	YES
Southern	Popplewell Elementary School	Bill Clements	1	24	NO
Southern	Popplewell Elementary School	Cathy Butenschoen	1	24	NO
Southern	Popplewell Elementary School	Elizabeth Smith	1	24	NO
Southern	Popplewell Elementary School	Melinda Fontana	1	24	NO
Capital	Prospect Elementary	Alyssa Finley	1	30	NO
Capital	Prospect Elementary	Christin Cantlon	1	30	NO
Capital	Prospect Elementary	Felicia Lewis	1	30	NO
Capital	Prospect Elementary	Kit Shuman	1	30	NO
Capital	Prospect Elementary	Megan Yates	1	30	NO
Canyon	Purple Sage Elementary School	Madeline Laan	1	27	NO
Canyon	Purple Sage Elementary School	Melissa McPherson	1	27	YES
Canyon	Purple Sage Elementary School	Melody Craw	1	27	YES
Canyon	Reed Elementary	Arielle Jensen	1	31	YES
Canyon	Reed Elementary	Jennifer Dolan	1	32	YES
Canyon	Reed Elementary	Mary Holmes	1	31	YES
Southern	Richfield School	Jessica Scott	1	40	NO
Eastern	Ridge Crest Elementary School	Jacalyn Bombard	1	28	YES
Eastern	Ridge Crest Elementary School	Trina Heiner	1	25	NO

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	Rockford Elementary School	Alisa O'Berry	1	23	YES
Eastern	Rockford Elementary School	Kristine VanOrden	1	24	NO
Eastern	Rockland Elementary School	Kristi Thomas	1	24	NO
Canyon	Ronald Reagan Elementary School	Kelsey Rogers	1	30	YES
Canyon	Ronald Reagan Elementary School	Lisa Martell	1	30	YES
Canyon	Ronald Reagan Elementary School	Sheryll Sharp	1	26	YES
Canyon	Roosevelt Elementary	Anna Ganske	1	27	NO
Canyon	Roosevelt Elementary	Callie Hall	1	27	NO
Canyon	Roosevelt Elementary	Michael Palmer	1	27	NO
Canyon	Sacajawea Elementary School	Jennifer Howell	1	28	YES
Canyon	Sacajawea Elementary School	Penny Washburn	1	28	YES
Canyon	Sacajawea Elementary School	Terra Hurd	1	28	YES
Capital	Sage International School of Boise	Emily Seid	1	26	YES
Capital	Sage International School of Boise	Jennifer Laird	1	26	YES
Capital	Sage International School of Boise	Kadie Johnson	1	26	YES
Eastern	Salmon Junior/Senior School	Krystal Smith	1	65	YES
Southern	Sawtooth Elementary	Emily Martin	1	26	YES
Capital	Seven Oaks Elementary School	Heather Neptune	1	28	YES
Capital	Seven Oaks Elementary School	Jennifer DeMarini	1	28	YES
Capital	Seven Oaks Elementary School	Liz Paradis	1	28	YES
Capital	Shadow Hills Elementary School	Christy Schwehr	1	28	YES
Capital	Shadow Hills Elementary School	Clare Arnzen	1	90	YES
Capital	Shadow Hills Elementary School	Janell Irwin	1	28	YES
Capital	Shadow Hills Elementary School	Shannon Cullen	1	28	YES
Canyon	Sherman Elementary School	Chad Moore	1	20	YES
Canyon	Sherman Elementary School	Jennifer Castricone	1	27	NO
Canyon	Sherman Elementary School	Jennifer Jensen	1	20	YES
Canyon	Sherman Elementary School	Josephine Fisher	1	27	YES
Canyon	Sherman Elementary School	Meribeth Mathews	1	27	NO
Canyon	Sherman Elementary School	Tyler Keefe	1	20	YES
Southern	Shoshone Elementary School	Charli Cenarrusa	1	22	NO
Southern	Shoshone Elementary School	Denice Christiansen	1	21	NO
Canyon	Silver Trail Elementary School	Cathy Funkhouser	1	13	YES
Canyon	Silver Trail Elementary School	Dan Blitman	1	33	YES
Canyon	Silver Trail Elementary School	Dan Hoehne	1	33	YES

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Silver Trail Elementary School	Kim Birkinbine	1	15	YES
Canyon	Skyway Elementary School	Casi Spengler	1	24	YES
Canyon	Skyway Elementary School	Elizabeth Pierce	1	24	NO
Canyon	Skyway Elementary School	Jamie Warren	1	24	NO
Canyon	Skyway Elementary School	Lexxi Radke	1	24	NO
Canyon	Skyway Elementary School	Mark Elli	1	24	NO
Canyon	Snake River Elementary	Heather Packer	1	30	YES
Canyon	Snake River Elementary	Lindsey Strong	1	30	YES
Canyon	Snake River Elementary	Matea Schindel	1	30	YES
Southern	South Hills Middle School	Desiree Montoya	1	130	YES
Southern	St Edwards Catholic School	Cortney Allison	1	16	NO
Canyon	St. Paul's Catholic School	Annette Wall	1	32	YES
Capital	Star Elementary School	Angela Fulkerson	1	25	NO
Capital	Star Elementary School	Candy Franscella	1	25	NO
Capital	Star Elementary School	Carmi Scheller	1	25	YES
Capital	Star Elementary School	Joyanna Galan	1	25	NO
Eastern	Stoddard Elementary School	Alicia Cody	1	29	YES
Eastern	Stoddard Elementary School	Brenna Waterbury	1	31	YES
Eastern	Stoddard Elementary School	Hallie Snyder	1	28	YES
Southern	Summit Elementary School	Anne Winder	1	29	YES
Southern	Summit Elementary School	Audra Thompson	1	30	YES
Southern	Summit Elementary School	Brad Winder	1	31	YES
Southern	Summit Elementary School	Jorma Fletcher	1	31	NO
Southern	Summit Elementary School	Kimberly Wallace	1	31	YES
Southern	Summit Elementary School	Leah Jones	1	36	NO
Southern	Summit Elementary School	Maggie Stump	1	32	YES
Southern	Summit Elementary School	Michele Putnam	1	31	YES
Southern	Summit Elementary School	Rosa Gonzalez	1	30	NO
Southern	Summit Elementary School	Stacey Lakey	1	29	YES
Southern	Summit Elementary School	Todd Lakey	1	29	NO
Southern	Summit Elementary School	Tracy Park	1	32	YES
Southern	Summit Elementary School	Trisha Neudorff	1	27	NO
Eastern	Syringa Elementary School	Andrea Gulden	1	27	NO
Eastern	Syringa Elementary School	Aubrey Eldredge	1	27	NO
Eastern	Syringa Elementary School	Cindel Vasquez	1	27	NO

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Taft Elementary School	Jessica Rose	1	29	YES
Capital	Taft Elementary School	Sarah Wright	1	28	YES
Eastern	Tendoy Elementary	Cody Perry	1	25	YES
Eastern	Tendoy Elementary	Diana Son	1	21	YES
Southern	Three Creek School	Dena Pollock	1	10	YES
Capital	Trail Wind Elementary School	Jonathan Roesler	1	27	NO
Capital	Trail Wind Elementary School	Karen Palazzolo	1	26	NO
Capital	Trail Wind Elementary School	Kori Beavis	1	27	NO
Capital	Trail Wind Elementary School	Tyler Targee	1	27	NO
Eastern	Tyhee Elementary School	Haley Luce	1	28	NO
Eastern	Tyhee Elementary School	Jayne Johnson	1	28	YES
Capital	Valley View Elementary School	Meko Myers	1	27	YES
Capital	Valley View Elementary School	Shawna Hiller	1	26	YES
Eastern	Wapello Elementary School	Kristine Schnittgen	1	19	YES
Eastern	Wapello Elementary School	LaNae Porter	1	18	YES
Canyon	Washington Elementary School	Chris Wilcox	1	28	YES
Canyon	Washington Elementary School	Heather Mueller	1	26	YES
Canyon	Washington Elementary School	Joleena Malugani	1	27	YES
Canyon	Washington Elementary School	Kyle Backlund	1	27	NO
Eastern	Washington Elementary School	Jan Damron	1	22	YES
Eastern	Washington Elementary School	Teresa O'Toole	1	23	YES
Canyon	West Canyon Elementary	Andrea Chester	1	28	YES
Canyon	West Canyon Elementary	Chuck Knox	1	28	NO
Canyon	West Canyon Elementary	Sally VanderVeen	1	28	YES
Western	Westside Elementary School	Amy Brownell	1	28	YES
Western	Westside Elementary School	Brianne Garner	1	28	YES
Western	Westside Elementary School	Danielle Hayes	1	28	YES
Western	Westside Elementary School	Sarah Nesbitt	1	28	YES
Western	Westside Elementary School	Shauna Bain	1	28	YES
Capital	Whitney Elementary School	Eden Rodriguez	1	28	YES
Capital	Whitney Elementary School	Kayden Tague	1	25	YES
Capital	Whitney Elementary School	Tasha Crowell	1	32	NO
Eastern	William Thomas Middle School	Kelly Coleman	1	110	YES
Canyon	Willow Creek Elementary School	Kayla Stone	1	27	YES
Canyon	Willow Creek Elementary School	Kim Chierici	1	27	YES

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Willow Creek Elementary School	Nick Channer	1	27	YES
Canyon	Willow Creek Elementary School	Nicole Gibbs	1	27	YES
Canyon	Wilson Elementary School	Afton McSherry	1	35	YES
Canyon	Wilson Elementary School	Debbie Peterson	1	34	NO
Canyon	Wilson Elementary School	Melissa Langan	1	34	YES
Southern	Xavier Charter School	Stacey McFarland	1	33	YES

TOTALS		350	9,703	
TOTAL PARTICIPANTS		10,053		
TOTAL PARTICIPATING 2018-2019 TEACHERS	350	211	60%	YES
		138	39%	NO
TOTAL STUDENT SURVEYS RETURNED	5,463			
TOTAL INCENTIVE PAID OUT	$19,875			
FULL YEAR SURVEY RETURN PERCENTAGE	56%			

Teacher Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	350	75	104	64	79	28
Surveys Received	163	28	64	37	18	16
Percent Response	47%	37%	62%	58%	23%	57%

	Number	Percent
1 The materials were clearly written and well organized.		
Strongly Agree	117	72%
Agree	44	27%
Disagree	0	0%
Strongly Disagree	2	1%
2 The products in the Kit were easy for students to use.		
Strongly Agree	87	54%
Agree	70	43%
Disagree	4	2%
Strongly Disagree	1	1%
3 Students indicated that their parents supported the program.		
Yes	149	93%
No	11	7%
4 Would you conduct this Program again?		
Yes	161	99%
No	1	1%
5 Would you recommend this program to other colleagues?		
Yes	161	99%
No	2	1%
6 If my school is eligible for participation next year, I would like to enroll.		
Yes	155	95%
No	8	5%

Due to rounding of numbers, percentages may not add up to 100%

Parent/Guardian Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	9,703	2,164	2,834	1,889	2,078	738
Surveys Received	94	28	28	14	17	7
Percent Response	.97%	1.29%	.99%	.74%	.82%	.95%

Total Parent Responses	**94**	
	Number	**Percent**
1 Was the Program easy for you and your child to use?		
Yes	94	100%
No	0	0%
2 Will you continue to use the Kit items after the completion of the Program?		
Yes	92	98%
No	2	2%
3 Would you like to see this Program continued in local schools?		
Yes	93	99%
No	1	1%

Due to rounding of numbers, percentages may not add up to 100%

2019 Irrigation Peak Rewards Program Report

October 2019

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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 potentially high system load periods (summer peak). IPC estimates future capacity needs through the Integrated Resource Plan and then plans resources to mitigate these shortfalls. IPR is a result of this planning process and the success of the program is measured by the amount of demand reduction available to IPC during potential system peak periods.

Details

Interruption Options

IPR is available to IPC irrigation customers receiving service under schedules 24 and 84 in Idaho and Oregon. Eligibility is based on prior participation at the pump location. There are two options for shut off: automatic dispatch option and manual dispatch option. The load reduction spans a seven-hour timeframe with four groups. Each group is off for four hours starting at 2:00 p.m. If four or more events are dispatched during the season, any participant willing to have the pump remain off until 9:00 p.m. may have an additional variable payment. Currently, the options for dispatch groups are as follows:

- 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.

Automatic Dispatch Option

Pumps enrolled in the automatic dispatch option have one of two devices installed at the pump location. The device controls the associated irrigation pump(s) with a signal from IPC. This option requires all pumps shut off at a site for the demand response event. Approximately 90 percent of the devices are demand response units (DRU) and use IPC's Automated Metering Infrastructure (AMI) to send the signal to open the contactor to shut off the pump. The other 10 percent of automatic participants have a cellular device (cell device) installed. If the pump has an AMI meter, then a DRU is installed. If AMI technology is not available, a cell device is installed. The cell device has the same load control feature as the AMI DRU but a cellular network signal is used to send the command for shut off during the event.

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 select a nominated load reduction of kilowatts (kW) available for shut off during the season. They may choose to shut down all or partial load at the site.

Parameters

- Season dates June 15 to August 15
- Minimum of three load-control events
- Load-control events may occur any weekday or Saturday, excluding July 4 between the hours of 1:00 p.m. and 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 notifies automatic participants by phone, email, and/or text messaging four hours before the start of the event whenever possible
- IPC notifies manual participants by phone, email, and/or text four hours before the start of the event
- IPC may cancel the load-control event and notify participants of the cancellation up to 30 minutes before 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 billing dates June 15 through August 15. The demand and energy credits for the manual dispatch participants are paid with a 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. No variable incentive payments were made in 2019.

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 credits are calculated using interval metering data and nominated kW. The participants receive payment in the form of a check sent through the mail. The incentive rates for 2019 are listed in Table 1.

Table 1
Monthly incentive rates for manual and automatic options

Fixed Demand Credit ($/billing kW)	Fixed Energy Credit ($/billing kWh)	Variable Energy Credit ($/billing kWh)	Extended Variable Energy Credit* ($/billing kWh)
$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 option to opt-out of a load control event up to five times per pump per season. Opt-out fees are equal to $5.00 multiplied by the billed kW for that billing cycle. An explicit opt-out occurs when the participant asks IPC to remove the pump for that specific load control event. An inexplicit opt-out occurs when a participant turns the pump on prior to the four hours. Interval metering data and the hp rating are used to determine an inexplicit opt-out after the event data has been collected and analyzed.

PARTICIPATION

IPR enrollment packets were mailed to all past participants in February 2019. Contents of the packet included an IPR brochure, program application, incentive structure details, eligible pump locations, eligible pumps pinpointed on a map and an estimated incentive for each pump location.

IPC presented IPR details at ten irrigation workshops across the service area. IPC also had the opportunity to communicate program details while staffing the booth at four agricultural shows across the service area. IPC continues to encourage past participants to enroll.

Nominated billing demand was 408.65 MW with 2,332 pumps enrolled for the 2019 season. The annual participation has remained steady over the past couple of years.

Figure 1 shows IPC's service area divided into three regional areas; Canyon–West, Capital, and South–East. Five areas within the three regions will be referenced throughout this report: Western, Canyon, Capital, Southern, and Eastern.

Figure 1
IPC service area

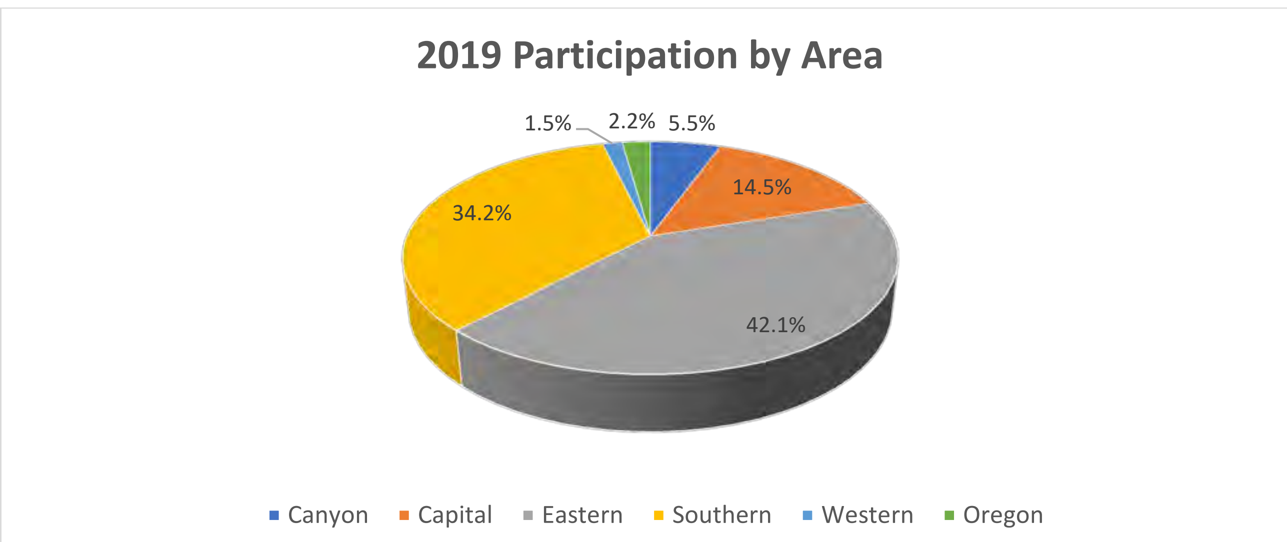

Figure 2
Distribution of participants by service area

Table 2
Eligible pump locations, nominated MW, and participation levels by area

IPC Regional Area	Eligible Service Locations	Manual Dispatch Option	Automatic Dispatch Option	Total Enrolled by Area	Eligible Enrolled	Nominated MW
Canyon	156	12	116	128	82.1%	35.70
Capital	378	31	307	338	89.4%	90.99
Eastern	1126	0	982	982	87.2%	136.23
Southern	979	5	792	797	81.4%	133.43
Western	62	0	36	36	58.1%	2.81
Oregon	63	3	48	51	81.0%	9.49
Totals	**2,764**	**51**	**2,281**	**2,332**	**84.4%**	**408.65**

OPERATIONS

Equipment

IPC has expanded 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 command through the power line.

AMI technology allows IPC to investigate the status of participating pumps during load-control events. Three days after the event an hourly usage report is downloaded and analyzed. These reports provide data to help determine which DRUs functioned properly and which pumps were off during the event. During the 2019 season 2,461 DRUs were active and installed at 1,936 pump locations.

In addition to using AMI technology, IPC developed its own load control device. These devices utilize a cellular network signal to communicate with and shut off the pump during a load-control event. The data available from the cellular device systems allows IPC to view status information for each location and successful cellular communication. Hourly usage data is not available at these sites. During the 2019 season 319 cellular devices were active and installed at 274 pump locations.

Monitoring

Identification and correction of device failure is an ongoing effort before the season begins and throughout the season. Proper identification of malfunctioning devices helps to accurately predict the load reduction. Based on assumptions made around the interval metering data and the communication reports a work order may be sent to the electrician to troubleshoot the device. Often it is found the device is not working or damaged and exchanged for a new device.

A variety of issues with the DRUs and cell devices were identified including:

- Inoperable
- Damaged or missing fuse in the DRU
- DRU serial 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 missing—no longer at the pump location

Data Gathering and Processing

Troubleshooting, customer payments and program performance are informed by the interval metering data analysis. The first steps of the data analysis are gathering and processing the data. This includes AMI data, cellular device data, MV-90 hourly data, and logged data from manually read meters. The data was then separated into three data sets:

1. Pumps with AMI technology and hourly usage data
2. Pumps with cellular device data
3. Pumps running on the manual dispatch option with interval data

LOAD REDUCTION ANALYSIS

The load reduction analysis or program performance for the season is calculated using six primary sources:

1. Program participant list
2. AMI hourly usage data
3. Interval metering data
4. MV90 interval data
5. Cellular device communication data from event days
6. Total system load data for event days and surrogate days

The IPR participant data for each event day includes the following:

- Pump number
- Meter number
- 2019 dispatch option
- 2019 dispatch group
- Nominated kW
- Cellular device or DRU number or identified as Manual site

IPC system load monitoring was used as a comparison for impact of the load reduction during the event. The total system load monitoring provides megawatt (MW) readings in five-minute increments on event days as well as comparative nonevent days.

Baseline Calculations and Event Reduction Calculations

Calculating the performance of the program requires a comparison between usage prior to the event (baseline hours) and usage during the event. See Appendix 1 for the definition of terms and the demand reduction calculation method. The descriptions below outline the process.

- Baseline hours are calculated using the average of the three hours prior to the dispatch group start time.
- The event hour reduction is calculated using the average of the second, third and fourth hours of each dispatch group. The first hour is not used for event performance due to the potential for delay in AMI commands. The command may take up to 10 minutes to reach the pump location for shut off.
- Data with errors is removed from the data set.
- Load reduction for automatic AMI dispatch option is calculated and then extrapolated to represent the nominated amount.
- Load reduction for the automatic cell dispatch option is calculated using the AMI percentage extrapolated to represent the load reduction of sites with cell phones and sites with data errors.
- Load reduction for manual dispatch option is calculated using interval metering data without errors and then extrapolated to represent the total manual population.
- 2,057 pump locations have interval data, representing 88.8 percent of the total program MW nomination.

Table 3 displays the load reduction results for each event day. The load reduction at generation level includes a 9.7 percent line loss.

Table 3
Hourly demand reduction results (MW) for each event for total program, including line losses

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.
7/11/2019	60.71	136.33	204.24	268.89	208.18	132.56	64.65
7/23/2019	64.75	140.72	216.92	278.00	213.26	137.28	61.08
8/05/2019	50.69	119.35	202.78	253.99	203.30	134.64	51.21

Table 4
Hourly demand reduction results (MW) for each event, for Oregon-only pumps, including line losses

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.
7/11/2019	0.00	0.00	6.00	6.13	6.13	6.13	0.13
7/23/2019	0.00	0.00	6.68	6.80	6.80	6.80	0.12
8/05/2019	0.00	0.00	7.28	7.38	7.38	7.38	0.10

July 11

The first event occurred on a Thursday. The load control commands for the 2 p.m. dispatch group were initiated however during the processing of the commands the program unexpectedly quit and failed to send a portion of the commands to the substations. The metering department isolated the problem and made an adjustment to the configuration file to compensate for the error. The issue was resolved and for each dispatch group thereafter the commands were sent successfully. This error impacted 88 substations and 21 MW of expected load reduction.

July 23

The second event occurred on a Tuesday. The highest reduction for the 2019 season occurred during the 5:00 to 6:00 p.m. hour at 278 MW. Notifications to program participants were successful and the AMI and cell commands were initiated and delivered timely resulting in the expected load reduction.

August 5

The third event occurred on a Monday. The notifications to participants went out as designed and the communication to the DRUs occurred without delays. The event had the anticipated load reduction of 253.4 MW for the 5:00 to 6:00 p.m. hour.

Potential Realization Rate Analysis

The 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 on and available for shutoff during a demand response event. For the analysis the realization rate percentage is reduced by the average of device failures, opt-outs and small loads left on during an event. These reductions averaged 5.49 percent for the 2019 season. Removing the average left on allows IPC to accurately calculate the potential load reduction for any day during the season had a demand response event been called. Table 5 shows the average by category for load left on at participating pumps.

Table 5
Results for each event day by category and percentage, percentage during each event by reason

Event Date	Small Load	Opt Out	Device Failure	Average percent of MW on during an event
7/11/2019	2.91%	0.95%	3.23%*	7.09%
7/23/2019	1.42%	0.63%	2.88%	4.93%
8/05/2019	1.04%	0.37%	3.05%	4.46%

*Substation command failure on 7/11 is not included in this percentage

This rate is highest at the end of June and the beginning of July when a larger percentage of irrigation pumps are operating nearly 24 hours per day seven days per week. The potential realization rate is lower later in the season when many pumps are not operating due to crop maturity and reduced watering demands. Figure 3 shows eligible days in the season and pumping load of participating pumps. The percentage of load running is reduced by the average percentage of small load, opt out and device failure during the three load control event days. The graph shows a maximum potential realization rate of 73.03 percent on July 3, which results in a maximum potential load reduction for IPR of 327.33 MW for the 2019 IPR season.

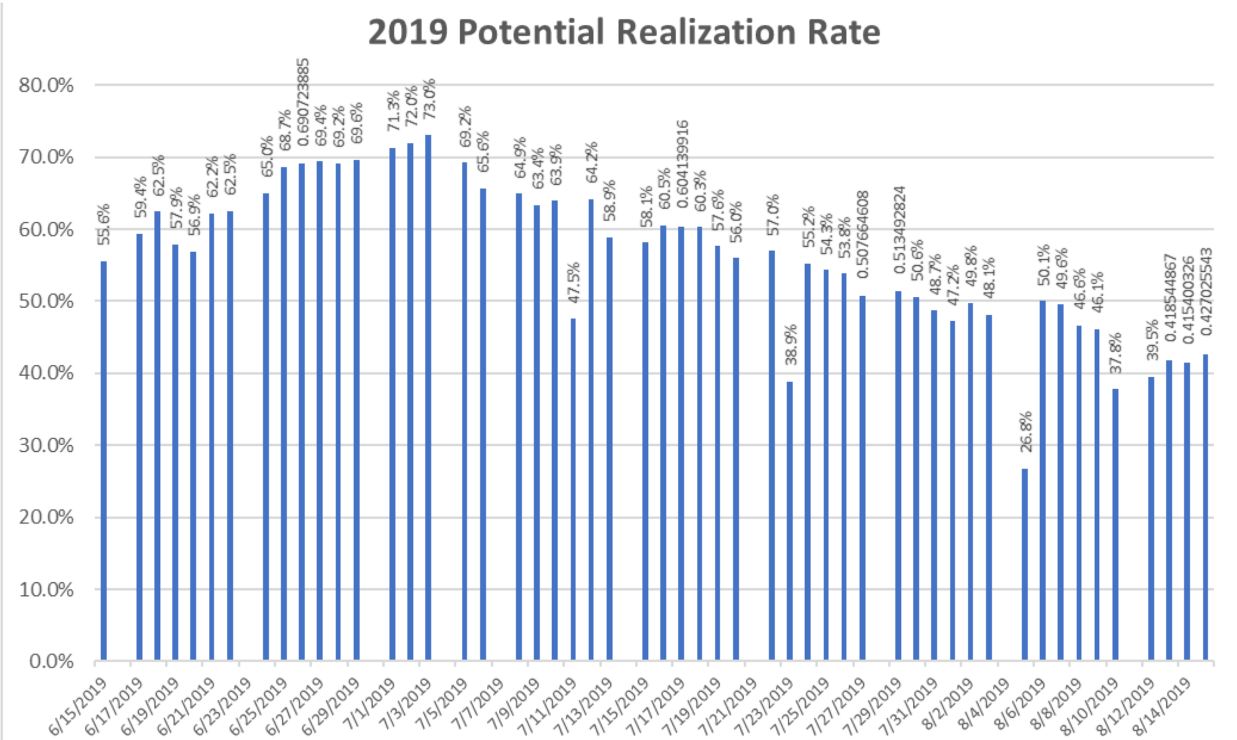

Figure 3
Potential realization rate per day exluding Sundays and July 4

Load Reduction Results—Total System Load Data

IPC measures system load data in five-minute intervals. This data is also used to validate load reduction for IPR during the season. Each event day is considered to evaluate the results of the program operation. The reduction is considered an estimate due to the expected load curve being estimated from similar days without events. Figure 4 shows each load reduction day in 2019 with an estimated curve showing expected load. Each day shows a similar reduction to the interval metering data analysis.

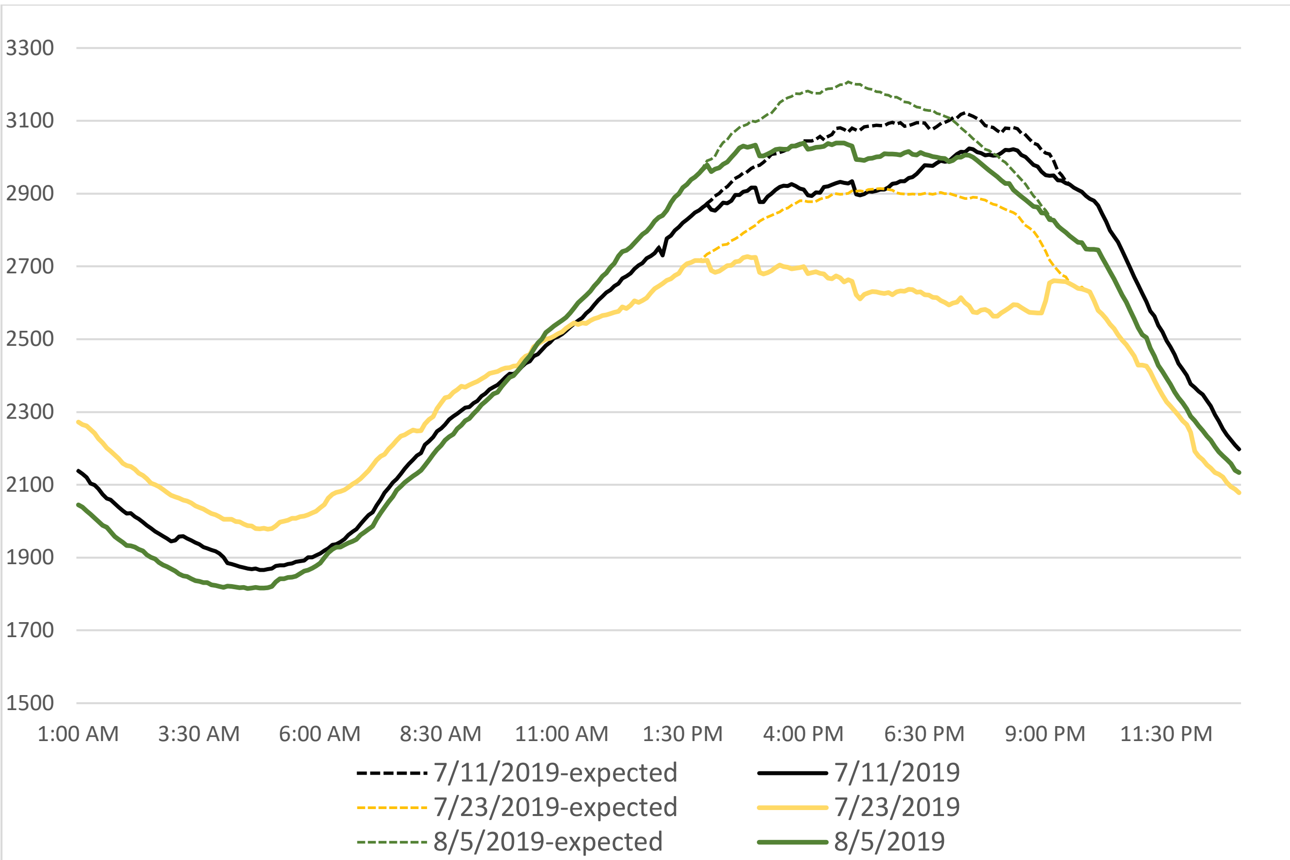

Figure 4
Load reduction results—total system load data

COSTS

IPR spent a total of $6,714,914.28 with the incentive credit being the largest portion at 96.9 percent of total program costs. Incentives paid for the 2019 season total $6,510,245.14. Had the program been utilized beyond 3 events then additional variable incentives would have been paid. The estimated maximum cost of variable incentives of running the program at the full 60 hours per season or an additional 48 hours is another $2.9 million dollars.

Table 6
Annual program costs by category

Expense Item	2019 Total Cost
Materials & Equipment	$25,730.02
Purchased Service	$114,519.86
Other Expense	$106.92
Incentives	$6,510,245.14
Labor/Administrative Expense	$64,312.34
Total	$6,714,914.28

CUSTOMER SATISFACTION

On October 2, an invitation was sent via text message to 905 cell phone numbers. The text included a link to a six-question survey enabling the respondent to participate using their cell phone. 165 surveys were completed. Approximately 80 percent of the respondents were owners. Over 95 percent of respondents indicate they are satisfied with the IPR and IPC's responsiveness. Ninty-two percent indicate satisfaction with the timeliness of messages on event days and 99 percent are satisfied with the content of the message. 30 respondents chose to leave additional comments. The general sentiment of the comments was positive with most folks asking for more notice of an event and to enroll more pumps into the program. Also mentioned a couple of times was the monetary value being worth the risk and inconvenience.

CONCLUSIONS

Highlights from the 2019 season include the following:

- 2,332 pumps enrolled
- 408.65 MW of nominated billing demand
- Potential demand-reduction of 327.33 MW including line losses
- Event 1: July 11 - max reduction 268.9 MW including line losses
- Event 2: July 23 - max reduction 278.0 MW including line losses
- Event 3: August 5 - max reduction 253.9 MW including line losses
- 2,361 active AMI DRUs
- 319 active IPC cellular devices
- 84.4 percent of eligible pump locations with devices participated
- 95 percent of participants are satisfied with IPR
- The cost of running the program for three events this season was $6.7 million
- The cost of having this resource available was $21.98 per kW
- The estimated cost of running the program at the full 60 hours per season or an additional 48 hours is another $2.9 million

Appendix 1

Definition of terms and the 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

MV-90—Specific Meter Package with Interval Data

Σ—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:

$$DR_{group} = \Sigma\ DR_{pump\ (groups\ 1\text{-}4)} + \frac{DR_{(groups)}}{DR_{nominated\ (groups)}} * \text{Nominated } DR_{\text{pumps with errors}}$$

Load reduction for the automatic dispatch option was calculated as follows:

$$DR_{ADO} = \Sigma\ DR_{group}$$

Manual Dispatch Option

Data utilized for manual dispatch option participants is AMI hourly usage or MV-90 interval data.

Load reduction for manual dispatch option was calculated as follows:

$$DR_{group} = \Sigma\ DR_{pump\ AMI} + \Sigma\ DR_{pump\ MV\text{-}90} + \frac{DR_{(groups)}}{DR_{nominated\ (groups)}} * \text{Nominated } DR_{pumps\ with\ errors}$$

The total demand reduction for the Manual Dispatch Option was calculated as follows:

$$DR_{MDO} = \Sigma\ DR_{group}$$

The total IPR load reduction was calculated by summing the Automatic Dispatch Option sites and the Manual Dispatch Option sites calculated reduction:

$$\text{Total Program DR} = DR_{MDO} + DR_{Group}$$

Regional Technical Forum
2020-2024 Business Plan

October 2019

Introduction

The Regional Technical Forum (RTF) is an advisory committee to the Northwest Power and Conservation Council (Council). The RTF meets monthly to review analysis and make decisions on methodologies for estimating energy efficiency savings and demand response impacts. The RTF is supported by Council staff and outside contractors that manage the work flow and conduct technical analysis. This document describes the RTF's role, funding, operations and staffing, and planned activities for the 2020-2024 period.

Role of the RTF

The RTF was formed in 1999 as an advisory committee to the Council in response to a directive from Congress (1996) and the 1996 Comprehensive Review of the Northwest Energy System. The primary roles of the RTF have been, and continue to be:

- Developing and maintaining a readily accessible list of eligible conservation resources, the estimated lifetime costs and savings associated with those resources, and the estimated regional power system value associated with those savings;
- Establishing a process for updating the list of eligible conservation resources as technology and standard practices change, and an appeals process through which utilities, trade allies, and customers can demonstrate that different savings and value estimates should apply;
- Developing a set of protocols by which the savings and system value of conservation resources should be estimated with a process for applying the protocols to existing or new measures;
- Assisting the Council in assessing: 1) the current performance, costs and availably of new conservation technologies and measures; 2) technology development trends; and 3) the effect of these trends on the future performance, cost and availability of new conservation resources;
- Tracking regional progress toward the achievement of the region's conservation targets by collecting and reporting on regional research findings and energy savings annually.

For the 2020-2024 funding cycle, the RTF will expand upon its core mission to include:

- Developing and maintaining a list of natural gas and dual fuel energy efficiency resources, including methodologies for estimating lifetime energy savings and costs associated with those resources, and a process for updating those estimates as technology and standard practices change
- Conducting technical analysis on technologies that provide both energy efficiency and demand response potential to assist the Council in assessing the technical potential of the technologies

Funding

The RTF is funded by Bonneville, the Energy Trust of Oregon, investor owned utilities, and large generating public utilities in the region. The RTF Policy Advisory Committee (RTF PAC) established funding levels for 2020-2024 based on the planned activities described below in more detail. The proposed funding level for the five-year period is $9,461,300, starting out at $1.8 million in 2020 and increasing annually at 2.5% to account for inflation. The five-year funding period provides a level of consistency to ensure long-term goals of the RTF are sufficiently supported, while providing flexibility to meet regional needs on an annual basis.

The RTF PAC agreed to use the allocation method developed by the Northwest Energy Efficiency Alliance (NEEA) for funding. The RTF PAC further agreed to the following methodology for sharing costs across the electric and gas utility funds:

- Electric ratepayer dollars are allocated to work that is intended to solely support electric demand side management programs (ex: electric-only energy efficiency measures and demand response)
- Gas ratepayer dollars are allocated to work that is intended to solely support natural gas programs (ex: gas-only efficiency measures)
- Costs will be shared for work that is intended to support all ratepayers (ex: dual fuel measures, tool development, and overhead) with 75 percent allocated to electric ratepayer dollars and 25 percent to gas ratepayer dollars

The resulting funding shares are as follows:

Table 1: Funding Shares and Five-Year Contribution

Organization	Proposed Funding Share	Total 5-Year Contribution
Bonneville Power Administration	30.03%	$2,841,100
Energy Trust of Oregon	22.54%	$2,132,800
Puget Sound Energy	18.99%	$1,796,500
Idaho Power Company	7.54%	$713,300
Avista Corporation, Inc	6.78%	$641,400
PacifiCorp (Washington)	2.08%	$197,200
PacifiCorp (Idaho)	1.78%	$168,200
NorthWestern Energy*	1.70%	$161,000
Seattle City Light	2.86%	$270,800
PUD No 1 of Clark County	1.02%	$96,800
Tacoma Power	0.77%	$73,200
Snohomish County PUD	0.54%	$51,400
Eugene Water and Electric	0.17%	$16,500
Chelan County	0.81%	$76,700
PUD No 1 of Cowlitz County	0.15%	$14,500
Cascade Natural Gas	1.66%	$157,000
NW Natural	0.56%	$52,900
Total	**100.00%**	**$9,461,300**

*NorthWestern Energy share adjusted to 52% of NEEA allocation share.

Operations and Staffing

The RTF is an advisory committee consisting of 20-30 voluntary members. The Council appoints the membership to ensure a fair balance in technical expertise for successful completion of the work plan. The RTF as a body meets approximately once a month for a full-day meeting at the Council's main office in Portland, OR.

To reduce the burden placed on the voluntary members, the RTF budget supports funding for one full-time manager and contracted technical support. The RTF Manager is a Council employee whose responsibility is to oversee day to day operation of the RTF. This includes developing and managing work plans, managing contracts, developing quarterly and annual reports, and interfacing with the Council. Approximately 10 percent of the RTF budget goes to this function.

The largest portion of the budget (around 70 percent) supports a team of dedicated contract analysts that conduct the bulk of technical analysis on behalf of the RTF. The RTF transitioned to this team approach from one-off contracts as a way of ensuring greater consistency in analysis across work products and providing flexibility in work flow for achieving annual work plan goals. The 2020-2024 funding levels are sufficient to support up to six contract analysts annually.

The remaining 20 percent of the budget is set aside for specific contracts in support of work plan goals. This work generally falls into one of the following categories: 1) contracting with a firm to act as a third party for quality control review, 2) supporting members attendance at meetings, and 3) expanding the technical capabilities of the team for specific projects or tool development.

Council Contribution

In addition to the funding described above, the Council contributes staff time and office and meeting space to the RTF. From a staffing perspective, the Council contributes a full time RTF assistant who provides day to day support of the operations, as well as a portion of others' time to support technical analysis, contracting and legal assistance, and other administrative tasks. These staff contributions are estimated in the table below.

Table 2: Annual Funding Levels

	2020	2021	2022	2023	2024
Contract RFP	$433,000	$431,400	$412,900	$440,400	$436,000
Contract Analyst Team	$1,193,000	$1,235,200	$1,295,400	$1,310,600	$1,358,700
RTF Manager	$174,000	$178,400	$182,800	$187,400	$192,100
Annual Funding	**$1,800,000**	**$1,845,000**	**$1,891,100**	**$1,938,400**	**$1,986,800**
Council Staff Contribution	$185,600	$190,300	$195,000	$199,900	$204,900

Activities and Budget

The specific tasks contained in this business plan are driven by existing measure work, anticipated growth for new measure requests, and expectations for future analysis tied to regional research or planning efforts. The specific work in any calendar year is largely driven by the existing measure needs and any requests received from parties within the region, primarily utilities, Bonneville, the Energy Trust of Oregon, NEEA, and Council staff. The RTF solicits topics from stakeholders through an annual request as part of the work planning and through an online form for proposing new measures. Each year, the RTF typically adjusts the allocation of resources among the categories in its work plan based on requests received, proposals, and the pace of multi-year projects. The RTF notifies the Council and its funders of all significant reallocation of resources or priorities.

Table 3 provides an overview of the anticipated allocation of work for the 2020-2024 business plan cycle, and

Table 4 provides a more detailed breakdown of activities for 2020. As shown in Table 3, the annual changes in budget represent shifts in work between measure analysis and other analytical support through tools and regional coordination. This section provides more detail on the proposed activities for 2020 and how those activities fit into the longer-term five-year business plan.

Table 3: Annual Funding, by high level category, excluding Council contribution

Subtotal Funders	2020	2021	2022	2023	2024
Measure Analysis	$971,000	$916,400	$883,600	$928,400	$1,029,800
Tools and Regional Coordination	$275,000	$360,800	$425,500	$413,500	$345,400
Demand Response	$50,000	$51,200	$52,500	$53,800	$55,200
RTF Management	$504,000	$516,600	$529,500	$542,700	$556,400
Total	**$1,800,000**	**$1,845,400**	**$1,891,100**	**$1,938,300**	**$1,986,800**

Table 4: Proposed 2020 Budget Levels

Category	Contract RFP	Contract Analyst Team Manager	Total Funders	Council Contribution	% of total
Existing Measure Maintenance	$92,000	$345,000	$437,000	$9,700	24%
New Measure Development	$44,000	$220,000	$264,000	$4,400	15%
Standardization of Technical Analysis	$40,000	$230,000	$270,000	$1,500	15%
Tool Development	$0	$120,000	$120,000	$16,500	7%
Regional Coordination	$0	$155,000	$155,000	$22,000	9%
Demand Response	$40,000	$10,000	$50,000	$10,000	3%
Regional Conservation Progress	$50,000	$0	$50,000	$45,000	3%
RTF Meeting Support	$163,000	$113,000	$276,000	$10,000	15%
RTF Management	$4,000	$174,000	$178,000	$66,500	10%
Total	**$433,000**	**$1,367,000**	**$1,800,000**	**$185,600**	**100%**

Measure Analysis

Approximately 50 percent of the five-year budget is anticipated to directly support measure analysis. This includes maintenance of the existing measure library, the addition of new measures, and activities associated with ensuring consistency in analysis approach across the entire measure suite.

Existing Measure Maintenance

One half of the measure analysis work is focused on the maintenance of existing measures. The pace of existing measure review and update is driven by the sunset dates of measures. The RTF assigns sunset dates that range from one to five years based on the specific circumstances of a measure. For example, the RTF typically applies shorter sunset dates for measures in markets that are changing rapidly to keep pace with that change, where as it applies longer sunset dates to more stable markets and measures. Other factors that will impact sunset dates are anticipated updates to Federal or state codes and standards, updates to ENERGY STAR specifications, or anticipation of new data. The number of anticipated measures sunsetting or otherwise requiring review in any given year of the funding cycle ranges between 16 and 26 measures. This assumption is in line with the 2015 to 2018 funding cycle, during which time the number of existing measures considered in any year ranged from 15 to 30.

The 2020 work plan assumes updates to 23 of its existing measures. The majority of these measures (21) are slated to sunset in 2020 and will require the RTF to reconsider the measure. This includes 10 dual fuel measures for which the RTF will develop robust electric and natural gas savings estimates. In 2020, the RTF is also expected to update two dual fuel measures that the RTF considered in 2019, focusing on adding in the natural gas savings estimates.

New Measure Development

The RTF is continually seeking ways to provide value to the region's utilities. As efficiency programs are successful in transforming markets, emerging technologies are going to be important for meeting future efficiency goals. To support this need, the RTF is allocating approximately 15 percent of its budget to assessing new measure opportunities. The estimate of new measure work varies each year, with the anticipation of between six and nine new measures annually. The exact number of measures in any given year is highly uncertain, as it is driven primarily by utilities' needs. For reference, the RTF developed between two and nine new measures in any given year of the 2015 to 2019 funding cycle.

The 2020 work plan assumes development of eight new measures. The primary driver for this assumption is that the ongoing work on the Council's 2021 Regional Power Plan, which is likely to identify a handful of fruitful measures for the RTF to consider. The work plan also assumes that the RTF will continue to focus on identifying opportunities to support more complex efficiency opportunities, such as whole building performance or behavior programs. The number of new measures drops off in the middle years of the funding cycle, increasing again in 2024 as the Council starts to launch efforts on the ninth power plan. The RTF also anticipates working on six new gas-only measures during the 2020 to 2024 cycle. This work will primarily take place in 2022 and 2023, allowing time for the RTF to build up any analytical tools necessary to support this work and for the natural gas efficiency programs to prioritize measure opportunities.

Standardization of Technical Analysis

The RTF has made attempts over the last several years to improve the consistency of its analysis across measures. Key to this was the development of Operative Guidelines and the establishment of a dedicated contract analyst team to perform the majority of the technical analysis. As part of the 2020 to 2024 funding cycle, the RTF is allocating approximately 15 percent of its budget to ensuring thorough and consistent analysis across all its categories.

The largest portion of this work is to support coordination and review across the contract analyst team. This work primarily takes place in the weekly contract analyst team meeting, during which the team reviews each other's analysis, develops recommendations to the RTF for consideration, and explores new analytical techniques.

Another piece of this work is the maintenance of the RTF Operative Guidelines and its Standard Information Workbook. For the 2020 to 2024 funding cycle, the RTF anticipates two updates to each of these products. The first set will take place in 2020 and will focus on making enhancements to the Guidelines and Standard Information Workbook, ensuring both products effectively support natural gas measures. The RTF anticipates another update to the Guidelines in 2022 to ensure they are keeping pace with RTF analytical work. The RTF also anticipates another update to the Standard Information Workbook in 2023 in advance of the Council's ninth power plan.

Support of Small and Rural Utilities

The RTF allocates a small portion of its new measure development ($40,000 annually) to support the needs of region's small and rural utilities. This includes a portion of one contract analyst's time to support a standing subcommittee that discusses the applicability of existing

RTF measures to small and rural utilities and explores potential refinements to measures to better meet their specific needs. This work also includes the development of new measures of specific interest to small and rural utilities that might not otherwise get developed for the RTF.

Tool Development

The RTF maintains a handful of tools to support measure development, including its cost-effectiveness tool (ProCost) and building simulation models to estimate energy savings. For the 2020 to 2024 funding cycle, the RTF is allocating approximately 7 percent of its budget to this function. The annual funding level varies, as much of the work is tied to other regional efforts. Additionally, the RTF will spend more time on tool development when there are fewer measures requiring update or development.

ProCost

The RTF uses and maintains the Council's cost-effectiveness tool. Given this, the ProCost development work is closely tied to the Council's regional planning cycles. The focus for 2020 will be enhancing ProCost to support natural gas efficiency measure assessment. A small portion of budget is also allocated to any other enhancements required for 2021 Power Plan analytics. The ProCost work is anticipated to pick up again in 2021, after completion of the regional power plan. At this time, the RTF will be responsible for incorporating the 2021 Power Plan findings into ProCost and will reevaluate the cost-effectiveness of all measures with respect to those findings. ProCost maintenance will drop off somewhat in 2022 and 2023, with another uptick in 2024 as the Council starts to prepare for its ninth regional power plan.

Building Simulation Models

The RTF uses building simulation models for estimating energy savings in residential and commercial buildings. Currently, the RTF uses SEEM[1] for modeling residential single family, manufactured homes, and low-rise multifamily buildings and uses EnergyPlus[2] to model commercial buildings. Much of the efforts in 2020 through 2024 are focused on ensuring that these models are well calibrated to the region's building stock. Earlier on in the five-year period, the RTF will focus more on its EnergyPlus models, leveraging the latest NEEA Commercial Building Stock Assessment. In the latter portion of the funding cycle, the RTF will shift to making updates to its residential building model in alignment with the next NEEA Residential Building Stock Assessment.

The RTF has also allocated some funding to explore alternative modeling tools and/or enhancements to existing tools that might improve its assessment of energy efficiency and demand response savings, with a focus on residential opportunities. This work is anticipated to take place in 2020 and 2021.

[1] The Simplified Energy Enthalpy Model (SEEM) is developed and maintained by Ecotope. More information, and the latest version of SEEM, can be found on the RTF's website: https://rtf.nwcouncil.org/simplified-energy-enthalpy-model-seem.

[2] EnergyPlus is a whole building energy simulation program developed by the Department of Energy. The RTF uses and adapts the building prototype models to better reflect buildings in the Pacific Northwest, based on regional data from NEEA's Commercial Building Stock Assessment.

Another component of building simulation is using weather files to represent weather sensitive loads. For its 2021 Power Plan, the Council is exploring opportunities to enhance existing weather files to better reflect future weather resulting from climate change. The RTF has allocated some funding in 2022 and 2023 to further expand this work to improve the RTF's analysis of weather dependent measures. This work is also expected to support the Council's ninth power plan efforts.

Regional Coordination

The RTF does not have funding for the primary research required to inform its savings analysis. Rather, the RTF relies on Bonneville, NEEA, the Energy Trust, the region's utilities, and others to conduct this primary research. The RTF has allocated approximately 9 percent of its budget to coordinating with those regional entities to help inform research, identify opportunities to leverage that research for RTF analysis, and connect RTF analysis to regional efforts. As with its tool development efforts, the annual work flow varies to better coordinate with regional efforts, while also providing a balance in the RTF work load when there are fewer measures requiring updates or development.

Research Coordination

The RTF's contract analysts are expected to coordinate with regional entities to help inform regional research. This includes working with specific utilities on defining upcoming research needs that might support RTF measure development and discussing the outcomes of the research to inform measure analysis. As directed by interested research funders, the contract analysts can support coordination of joint research projects funded by utilities in support of RTF analysis.

The RTF also allocates a portion of contract analyst time to help inform regional studies, such as the NEEA stock assessments. In preparation for the third Residential Building Stock Assessment, the RTF will allocate resources to providing recommendations to NEEA on future data needs and research design considerations based on lessons learned to date.

Market Analysis Review

The RTF, Council, and efficiency programs rely on market intelligence to inform baselines and program design. Over the last several years, Bonneville and NEEA have dedicated more resources to studying markets. During the 2020 through 2024 business cycle, the RTF will allocate resources to increased engagement in this research. The goal of this effort is to understand available data, provide recommendations on data analysis, weigh in on uncertainty around market factors, and support estimation of total market consumption.

In addition, a portion of the budget is allocated to understanding and supporting sub-regional market data analysis, as data are available and the need arises from regional utilities.

Savings Shape Development

Over the last few years, the region has increased its focus on understanding when energy efficiency measures save energy to inform how energy efficiency can provide capacity benefits. The RTF reviewed its existing load profiles to understand the relative quality of profiles and where better data are needed to improve our understanding of the timing of savings. The region has also launched residential and commercial end use metering studies to collect more data on energy use. In this business plan, the RTF has allocated resources to using the results of the end use metering studies (and other data sources as available) to develop end use load profiles and measure savings shapes. The bulk of this work is anticipated to occur in the latter half of the funding cycle, as the data come in and in preparation for the Council's ninth power plan.

Council Plan and Other Regional Support

Being an advisory committee to the Council, one of the roles of the RTF is to provide technical support and analysis on energy efficiency measures. Most of this work is directly tied to the Council's power planning efforts. The Council's 2021 Power Plan is anticipated to be completed in early 2021. To that end, the bulk of the analytical work on energy efficiency will be complete by the start of 2020. The RTF has allocated some time in 2020 to support any additional analytical work required as the Council finishes the development of energy efficiency supply curves. Direct Council planning support then tapers off in 2021 and 2022, ramping up again towards the last two years of the funding cycle as the Council starts preparing for its ninth power plan.

In addition to supporting power planning analysis, the RTF has often been called upon to conduct technical studies on energy efficiency. For the 2020 to 2024 funding cycle, the RTF has allocated funding to support such a study. The anticipated timing is in the middle years of the funding cycle, after completion of the 2021 Power Plan. The specifics of any study are to be defined by the Council and/or other stakeholders.

Demand Response

The RTF has allocated 3 percent of its budget annually to support technical analysis on demand response technologies. The RTF will specifically look at technologies that provide both energy efficiency and demand response opportunities, as a way of leveraging the RTF's existing knowledge and thinking about these opportunities holistically. The RTF analysis will focus on technical considerations of the technologies, estimating the technical, per unit demand impact potential for technologies, absent any specific product design considerations. The purpose of this work is to be one input, of many, into Council and utility demand response supply curves.

The work in the 2020 to 2024 funding cycle builds upon the RTF's scoping effort in 2019. In 2020 and 2021, the focus of the work is on enhancing the RTF's analytical capabilities, including exploring enhancements to existing building simulation models or alternative modeling approaches. In the middle portion of the funding cycle, the demand response efforts are expected to build on the analysis around end use profiles, to help inform current timing of end use loads for the technologies of interest. The final two years of the funding cycle will focus on updates to the RTF's 2019 analysis, leveraging these new analytical tools and profiles.

Regional Conservation Progress Report

Per its charter, one of the roles of the RTF is to track the region's progress against the Council's power plan targets for energy efficiency. This is done through the annual Regional Conservation Progress (RCP) survey and report. Every year, the RTF collects data from Bonneville, Energy

Trust, NEEA, and the region's utilities on the energy efficiency savings and expenditures from the previous year. The 2020 to 2024 funding cycle allocates $50,000 annually, plus inflation, to contract out the data collection and analysis. This budget assumes that the RTF Manager, in coordination with the RTF Assistant and other Council staff, will be responsible for compiling the results into a final report for the Council.

RTF Management

The final 25 percent of the budget is allocated to management of the RTF, including support for RTF meetings and the RTF Manager.

Meeting and Member Support

The RTF meets approximately monthly for a one-day meeting at the Council offices. It is at these meetings where the formative work of the RTF occurs. Given the importance of these meetings, the RTF allocates approximately 15 percent of its budget to supporting this function. The most significant portion of this budget is ensuring that all the members and contract analysts are able to attend and participate in the monthly meetings in person. As noted above, the RTF members serve in a voluntary capacity. To ensure that all members can attend the meeting in person, the RTF supports travel costs and participation for some of the members. Additionally, several of the contract analysts have traditionally lived outside of Portland. Part of contract costs for these analysts includes the travel and time for attending the RTF meetings.

The RTF also allocates a small portion of the budget to contract out for meeting minute services, as well as phone lines and web conferencing. Each of these components is important to ensuring that the RTF meetings are publicly available, including to those that are unable to travel or attend a specific meeting.

Management and Administration

The final 10 percent of the RTF annual budget goes to support RTF management and administration. This is primarily the support of the RTF Manager, who provides the day to day management of the RTF.

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ENERGY-SAVING KIT PROGRAM SUMMARY REPORT

2019

SUBMITTED BY:
RESOURCE ACTION PROGRAMS®

Idaho Power Energy-Saving Kit Program Summary Report 2019

Sponsored by:

Submitted by:

February 2020

"Great tools! Thanks for offering and educating us!"

– Idaho Power Energy-Saving Kit Program Participant

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"I installed everything. As a first year teacher, I need to save all the money I can. Thanks for doing this! :)

– 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 2019 Energy-Saving Kit program, which was implemented by forty thousand, five-hundred and forty seven (40,547) Idaho households and one thousand, one hundred and sixty-three (1,163) 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 40,547 Idaho and 1,163 Oregon households.
   - Affected all five regions of the Idaho Power service territory
   - Affected 115 cities & towns in Idaho
   - Affected 20 cities & towns in Oregon

REGIONS	HOUSEHOLDS	ELECTRIC KIT	NON-ELECTRIC KIT
Canyon	9,106	3,936	5,170
Capital	17,408	5,362	12,046
Eastern	4,392	2,396	1,996
Southern	5,892	3,469	2,423
Western	4,912	3,372	1540
TOTALS	41,710	18,535	23,175

2. Generated residential energy and water savings. Projected annual savings:
   - 215,396,245 gallons of water saved*
   - 10,802,276 kWh of electricity saved
   - 128,538 therms of gas saved

(continued on next page)

*Assuming 100% Installation.

3. Idaho Power supported their customers through utilization of the following diverse marketing methods.

- Direct Mail
- Email from Idaho Power
- Idaho Power employee
- Idaho Power website
- Info in bill
- Facebook/Twitter
- Friend or Family
- Other:
  - ✔ Fair/Expo/Tradeshow
  - ✔ Fit One
  - ✔ Home and Garden Show
  - ✔ Energy Savings Booklet
  - ✔ New customer Welcome Kit
  - ✔ Nextdoor
  - ✔ Chamber of Commerce
  - ✔ School
  - ✔ Senior Center
  - ✔ Idaho Conservation League
  - ✔ TV
  - ✔ WICAP Head Start
  - ✔ Miscellaneous
  - ✔ Other
  - ✔ Blank

4. Designed and provided complementary educational materials and incentives to maximize installation of targeted efficiency measures (Installation rates ranged from 40 – 90 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	**9,761**	**23%**
Phone	**905**	**2%**
Postcards	**31,044**	**75%**

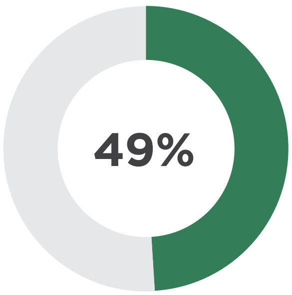
Direct mailings were distributed in January (95,950), April (95,369) August (84,192), and October (87,628) and resulted in an 11% response rate from Idaho Power customers.

Program content on the Idaho Power website, mention on the Idaho Power Infomercial combined with community events generated a steady demand for the energy-saving kit. The program served a total of 41,710 households in both Idaho and Oregon.

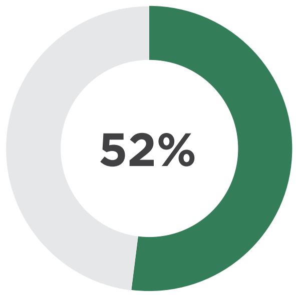
The Program provided customized Direct-to-Customer Program modules, which included educational materials and energy-saving products. A participant survey was included with the program materials (in-kit). The purpose of the survey was to increase educational retention and impact while serving as a data collection tool.

Since 2018, a second follow-up survey was distributed two to three months after participants' kit receipt. The objective being to determine if those initially responding they had not yet installed but will followed through. The installation responses in the follow-up surveys confirmed they did as overall installation percentages improved. Of the 725 customers who responded "Not yet, but will" to the showerhead installation question from the In-Kit survey, 16% (115 customers) responded to the Follow-up survey that they did install the showerhead.

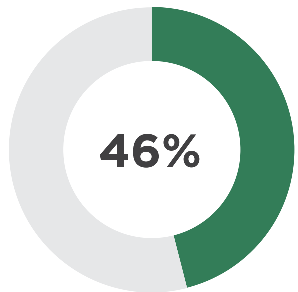
Survey responses indicated high participant satisfaction and participation in product retrofits and adoption of new energy saving behaviors. Total 9,734 households returned completed surveys and the responses were overwhelmingly positive. The increase in installation rates from the In-kit Survey results to the Follow-up Survey results show a marked improvement over time. Highlights include:



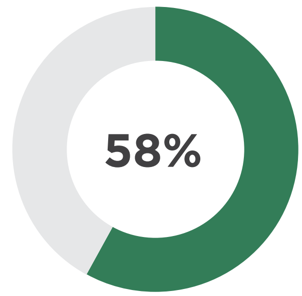
In-kit surveys reporting all 9 LED Light Bulbs installed.



Follow-up surveys reporting all 9 LED Light Bulbs installed.



In-kit surveys reporting the Evolve TSV & Showerhead installed.



Follow-up surveys reporting the Evolve TSV & Showerhead installed.

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	
215,396,245	gallons of water saved*
10,802,276	kWh of electricity saved
128,538	therms of gas saved

PROJECTED LIFETIME SAVINGS	
1,858,650,089	gallons of water saved*
100,227,348	kWh of electricity saved
257,077	therms of gas saved

PROJECTED ANNUAL SAVINGS PER HOME	
11,598	gallons of water saved*
259	kWh of electricity saved
3	therms of gas saved

PROJECTED LIFETIME SAVINGS PER HOME	
100,277	gallons of water saved*
2,403	kWh of electricity saved
6	therms of gas saved

**Assuming 100% Installation rate.*

"Thank you so much for LED bulbs; wasn't sure I would like, but I plan to replace all bulbs with LED."

– 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 650,000 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.

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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.

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.

HEARD ABOUT PROGRAM	HOUSEHOLDS	%
Direct Mail	34,077	81.76%
Friend or Family	2,220	5.30%
Info in Bill	995	2.38%
Idaho Power Website	966	2.31%
Idaho Power Employee	706	1.69%
Email from Idaho Power	364	0.87%
Other: Fair/Expo/Tradeshow	303	0.72%
Other	270	0.65%
Facebook/Twitter	143	0.34%
Other: News	33	0.08%
Other: Welcome Kit	26	0.06%
Other: Work	8	0.02%
Other: Wicap	3	0.01%
Other: Camas County SD	1	0.00%
Blank	1,595	3.81%
TOTALS	41,710	100%

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.

Kit installation surveys were received from 9,625 participating households, representing an average response rate of 23% of the 41,710 energy-saving kits distributed. A monthly drawing for a $100 gift card provided the incentive for returning the household installation surveys.

OPTING-IN METHODS	HOUSEHOLDS	%
Postcards	**31,044**	**74%**
Web	**9,761**	**23%**
Phone	**905**	**2%**

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QUICK START GUIDE
Español en el otro lado
IDAHO POWER
An IDACORP Company
START SAVING NOW!
Install the energy-efficient products in your kit.
Follow the energy-saving tips provided in this Quick Start Guide.
For additional ways to save, visit idahopower.com/save2day.
117419
Shower Timer
LED Lighting
Water Flow-Rate Test Bag
Refrigerator/Freezer
Want to Save More?
Water Heater
Evolve Showerhead Plus TSV
Installation Questions?
Don't forget!
Return your survey for a chance to win a $100 gift card.
Developed in partnership:
RESOURCE ACTION PROGRAMS
A FRANKLIN ENERGY COMPANY

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 (excluding 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.


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.
15035 A0092 Idaho Power DTC

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.

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"We installed kit items and used the thermometer; was good to see we were already in appropriate range!"

– Idaho Power Energy-Saving Kit Program Participant

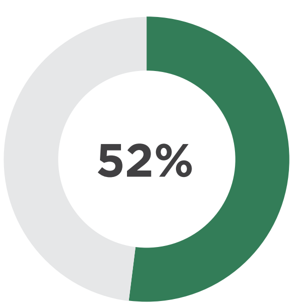
Idaho Power Energy-Saving Kit Program Impact

The program impacted 115 cities and towns throughout Idaho and 20 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.

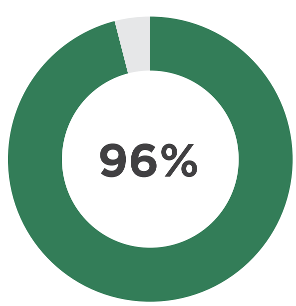
A. Home Survey and Retrofit Data

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 from the Follow-up Survey appear below and a complete summary of all responses is included in Appendix B.

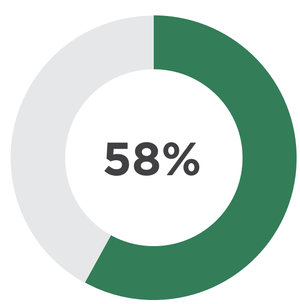
Did you install ALL 9 LED Light Bulbs?	**Yes - 52%**
Did you install the LED Night Light?	**Yes - 96%**
Did you install the Evolve TSV & Showerhead?	**Yes - 58%**
Did you use the Shower Timer?	**Yes - 55%**



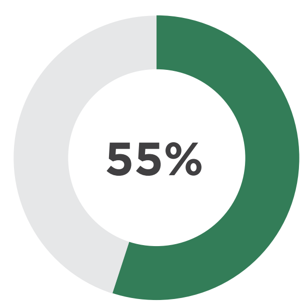
Reported households with ALL 9 LED Light Bulbs installed.



Reported households with the LED Night Light installed.



Reported households with the Evolve TSV & Showerhead installed.



Reported households who used the Shower Timer.

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 surveys as the basis for this calculation, 41,710 households are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come. Reported water savings assume 100% installation of the product.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

Total Number of Participants:	**41,710**		
Number of Electric Only Participants:	**18,535**		
Number of Non-Electric Participants:	**23,175**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	**103,091,880**	**1,030,918,797**	gallons
Measure Life: **10 years**	**2,740,029**	**27,400,291**	kWh
Projected reduction from Shower Timer installation:	**36,914,045**	**73,828,090**	gallons
Product Life: **2 years**	**2,231,233**	**4,462,465**	kWh
	128,538	**257,077**	therms
Projected reduction from Kitchen Faucet Aerator retrofit:	**43,831,581**	**438,315,815**	gallons
Measure Life: **10 years**	**682,829**	**6,828,294**	kWh
Projected reduction from Bathroom Faucet Aerator retrofit:	**31,558,739**	**315,587,387**	gallons
Measure Life: **10 years**	**818,506**	**8,185,056**	kWh
Projected reduction from **9**-watt LED Light Bulbs:	**2,162,246**	**28,325,428**	kWh
Measure Life: **13.1 years**			
Projected reduction from **6**-watt LED Light Bulbs:	**1,081,123**	**14,162,714**	kWh
Measure Life: **13.1 years**			
Projected reduction from LED Night Light:	**1,086,310**	**10,863,101**	kWh
Measure Life: **10 years**			
TOTAL PROJECTED PROGRAM SAVINGS:	**215,396,245**	**1,858,650,089**	gallons
	10,802,276	**100,227,348**	kWh
	128,538	**257,077**	therms
TOTAL PROJECTED PROGRAM SAVINGS PER HOUSEHOLD:	**11,621.05**	**100,277.86**	gallons
	259	**2,403**	kWh
	3	**6**	therms

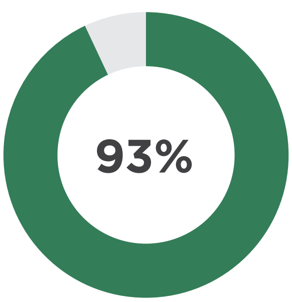
C. Participant Response

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.

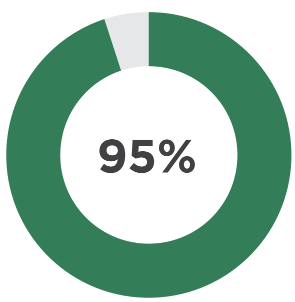
SURVEY TYPE	KITS SHIPPED	IN-KIT SURVEYS RECEIVED	IN-KIT SURVEY RESPONSE %	FOLLOW-UP SURVEYS RECEIVED*	FOLLOW-UP SURVEY RESPONSE%*
Electric	18,535	1,832	10%	3,029	16%
Non-Electric	23,175	2,942	13%	1,822	8%
TOTAL	41,710	4,774	11%	4,851	12%

Includes Q4 2018 served, excludes Follow-up Surveys from Q4 2019 due to three month survey distribution.

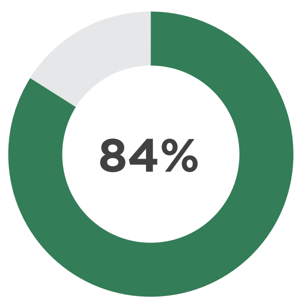
How satisfied were you with the kit ordering process? **Very Satisfied - 93%**
Did you receive your kit within 3 weeks? **Yes - 95%**
How likely would you be to tell a friend or family member to order a kit? **Very Likely - 84%**
How likely are you to participate in another energy efficiency program? **Very Likely - 76%**



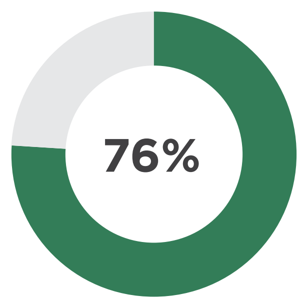
Reported households that were very satisfied with the ordering process.



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

Thank you!

Thank you, Idaho Power.

What I didn't use I gave to others who did use them.

Great kit!

Thank you, Idaho Power!

Great deal, installed all, Thank you!

We used everything. Thank you so much for the kit!

Thanks for reminding me.

Very happy with the kit. Thank you!

Thank you!

Using LED's as other bulbs burn out - will use all of them.

Used everything!

Thank you for the kit. We will probably use the bathroom faucet aerators.
All I need is attic insulation and energy windows.

Thank you! :)

Used them all - thank you. :)

Thank you.

Thank you for the info & items!! Freezer and water were at suggested temp - LED's will be replaced.

Used most items/much more aware of power use than before.

Enjoying the ones I did install.

Great items - thanks!

Participant Responses *(continued)*

Used the items I liked!

Will be installing - mostly want LED bulbs throughout the home first.

Yes, I loved it!

We did. Thanks :)

A little bit of comfort is worth more than a little bit of savings.

Thank you for the kit!

I'm replacing burned out bulbs with the LED lights. I will use the temp adjuster for the refrigerator.

Temps already lowered, already have low water pressure.

Very pleased with everything in the kit.

I haven't but I will.

Thank you!

Thank you for this program!

Thank you for the kit, we were already being very conservative.

Thank you for this great kit! loved every item.

Thanks for sending.

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*An Electric Kit.

Appendices

Appendix A

Appendix B

Appendix C

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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:	**41,710**	
Deemed savings per lamp (kWh):	**8.64**	kWh[1]
Measure life:	**13.1**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**2,162,246**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**28,325,428**	kWh[3]

1 *Based on Regional Technical Forum. By request. General purpose and Three-Way. 250 to 1049 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

6-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per participant:	**3**	
Number of participants:	**41,710**	
Deemed savings per lamp (kWh):	**8.64**	kWh[1]
Measure life:	**13.1**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**1,081,123**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**14,162,714**	kWh[3]

1. *Based on Regional Technical Forum. By request. General purpose and Three-Way. 250 to 1049 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 Evolve TSV Combo Showerhead Retrofit

Evolve TSV Combo showerhead retrofit inputs and assumptions:

Showerheads per electric DHW kit:	**1**	
Number of electric DHW participants:	**18,535**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Deemed Savings:	**147.83**	[2]
Length of average shower:	**7.84**	minutes[3]
Showerhead (baseline):	**2.50**	gpm[3]
TSV Combo showerhead new (retrofit):	**1.75**	gpm
Measure life:	**10.00**	years[2]

Projected Electricity Savings:

TSV Combo showerhead retrofit projects an **annual** reduction of:	**2,740,029**	kWh[5]
TSV Combo showerhead retrofit projects a **lifetime** reduction of:	**27,400,291**	kWh[5]

Potential Water Savings with 100 Percent Installation:

TSV Combo showerhead retrofit projects an **annual** reduction of:	**103,091,880**	gallons[4]
TSV Combo showerhead retrofit projects a **lifetime** reduction of:	**1,030,918,797**	gallons[4]

1. *Data Reported by Program Participants.*
2. *Based on Regional Technical Forum.*
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).*

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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:	**18,535**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Savings:	**36.84**	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 Electricity Savings:

Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**682,829**	kWh[4]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**6,828,294**	kWh[5]

Potential Water Savings with 100 Percent Installation:

Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**43,831,581**	gallons[6]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**438,315,815**	gallons[6]

1. *Data Reported by Program Participants.*
2. *Based on Regional Technical Forum. By request.*
3. *(March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.*
4. *Kitchen Aerators kWh formula (Number of Participants x Savings).*
5. *Kitchen Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).*
6. *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).*

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:	**18,535**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.59**	[1]
Savings:	**22.08**	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 Electricity Savings:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**818,506**	kWh[4]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**8,185,056**	kWh[5]

Potential Water Savings with 100 Percent Installation:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**31,558,739**	gallons[6]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**315,587,387**	gallons[6]

1. *Data Reported by Program Participants.*
2. *Based on Regional Technical Forum. By request.*
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 kWh formula (Number of participants x savings x Bathroom Faucet Aerators per electric DHW kit).*
5 *Bathroom Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).*
6. *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).*

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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:	**91.48%**	[3]
Number of participants:	**41,710**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**1,086,310**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**10,863,101**	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:	**53.00%**	[1]
% of water heated by electricity:	**46.00%**	[1]
Installation / participation rate of Shower Timer:	**53.22%**	[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:	**41,710**	[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:	**36,914,045**	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	**73,828,090**	gallons[7]
Projected Electricity Savings:		
Shower Timer installation projects an **annual** reduction of:	**2,231,233**	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	**4,462,465**	kWh[9]
Projected Natural Gas Savings:		
Shower Timer installation projects an **annual** reduction of:	**128,538**	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	**257,077**	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*

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Enrollment Survey Response Summary

1 How is the water heated in your home?	
Electricity	46%
Gas	53%
Other	1%
2 Do you own or rent your home?	
Own	81%
Rent	19%
3 What is the primary method of heating your home?	
Gas forced air	62%
Heat pump	7%
Electric forced air	20%
Baseboard or ceiling cable	5%
Other	7%
4 What is the primary method of cooling your home?	
Central A/C	69%
Window A/C	15%
Heat pump	7%
Other	3%
None	7%
5 What, if any, energy-saving improvements are you planning to make in the next two years?	
Windows	26%
Furnace or A/C	14%
Insulation	11%
Appliances	18%
Smart thermostat	15%
Other	16%
6 How did you hear about this kit offering?	
Direct mail	82%
Idaho Power employee	2%
Idaho Power website	2%
Info in bill	2%
Facebook/Twitter	0%
Friend or Family	5%
Other	2%
Blank	4%

Due to rounding of numbers, percentages may not add up to 100%

In-Kit Survey Response Summary

1 What type of home do you live in?	
Single family home - detached	84%
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	9%
2 How many people live in your home?	
5 or more	8%
4	10%
3	14%
2	46%
1	21%
3 How many of the LEDs did you install?	
All of them	49%
7-8	5%
5-6	16%
3-4	16%
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	26%
Stored for later use	64%
Gave them to someone else	3%
Other _________	6%
5 Have you installed the Evolve Showerhead?	
Yes	46%
Not yet, but will	42%
No, won't use	12%
6 Have you installed the Kitchen Faucet Aerator?	
Yes	52%
Not yet, but will	29%
No, won't use	18%
7 Have you installed the Bathroom Faucet Aerator #1?	
Yes	55%
Not yet, but will	33%
No, won't use	12%
8 Have you installed the Bathroom Faucet Aerator #2?	
Yes	40%
Not yet, but will	37%
No, won't use	23%

Due to rounding of numbers, percentages may not add up to 100%

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In-Kit Survey Response Summary *(continued)*

9 Have you used the LED Night Light?	
Yes	87%
Not yet, but will	11%
No, won't use	1%
10 Have you used the Shower Timer?	
Yes	51%
Not yet, but will	33%
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	4%
131 F to 140 F	10%
121 F - 130 F	24%
< 121 F	25%
Did not check water temperature	37%
13 Did you adjust the temperature of your electric water heater?	
Yes, I lowered it	14%
Yes, I raised it	2%
No, I did not adjust	83%
14 Did you adjust the temperature of your refrigerator?	
Yes, I lowered it	26%
Yes, I raised it	14%
No, I did not adjust	60%
15 Did you adjust the temperature of your freezer?	
Yes, I lowered it	51%
Yes, I raised it	16%
No, I did not adjust	93%
16 How satisfied were you with the kit ordering process?	
Very satisfied	93%
Somewhat satisfied	5%
Somewhat dissatisfied	1%
Very dissatisfied	1%
17 Did you receive your kit within 3 weeks?	
Yes	95%
No	5%

Due to rounding of numbers, percentages may not add up to 100%

In-Kit Survey Response Summary *(continued)*

18 How likely would you be to tell a friend or family member to order a kit?

Very likely	84%
Somewhat likely	13%
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	51%
No	49%

20 Have you ever gone to Idaho Power's website to look for information about energy efficiency programs and incentives?

Yes	28%
No	72%

21 How likely are you to participate in another energy efficiency program?

Very likely	76%
Somewhat likely	21%
Somewhat unlikely	2%
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%

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Follow-Up Survey Response Summary

1	Did you install the LEDs received in your kit?	
	Yes, I installed all of them	52%
	Yes, I installed some of them	44%
	No, I didn't install any of them	3%
2	Did your experience with the LEDs in your kit cause you to purchase more LEDs?	
	Yes, I purchased 10 or more LEDs	17%
	Yes, I purchase less than 10 LEDs	40%
	No, I did not purchase any additional LEDs	42%
3	Have you installed the Evolve Showerhead?	
	Yes	58%
	No, won't use	42%
4	Have you installed the Kitchen Faucet Aerator?	
	Yes	61%
	No, won't use	39%
5	Have you installed the Bathroom Faucet Aerator #1?	
	Yes	62%
	No, won't use	38%
6	Have you installed the Bathroom Faucet Aerator #2?	
	Yes	43%
	No, won't use	57%
7	Have you used the LED Night Light?	
	Yes	96%
	No, won't use	4%
8	Have you used the Shower Timer?	
	Yes	55%
	No, won't use	45%
9	Have you used the Flow-Rate Test Bag to test the flow rate of your shower or faucets?	
	Yes	36%
	No, won't use	64%
10	After receiving the kit, did you reduce the temperature of your refrigerator?	
	Yes	47%
	No	53%
11	After receiving the kit, did you reduce the temperature of your freezer?	
	Yes	40%
	No	60%

Follow-Up Survey Response Summary *(continued)*

12 After receiving the kit, did you reduce the temperature of your water heater?	
Yes	32%
No	68%
13 Did you review and/or complete the Mini Home-Assessment included in the kit?	
Yes	67%
No	33%
14 Since receiving the kit, have you gone to Idaho Power's website to look for information about energy efficiency programs or to find other ways to save?	
Yes	31%
No	69%

15 If you did not install some of the kit items, please tell us why.

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Idaho Cities & Towns Served

IDAHO CITIES & TOWNS SERVED		
ABERDEEN	GOODING	NEW MEADOWS
AMERICAN FALLS	GRAND VIEW	NEW PLYMOUTH
ARBON	GREENLEAF	NORTH FORK
ATOMIC CITY	HAGERMAN	NOTUS
BANKS	HAILEY	OAKLEY
BELLEVUE	HAMMETT	OLA
BLACKFOOT	HANSEN	OREANA
BLISS	HAZELTON	PARMA
BOISE	HEYBURN	PAUL
BRUNEAU	HILL CITY	PAYETTE
BUHL	HOLLISTER	PICABO
BURLEY	HOMEDALE	PINE
CALDWELL	HORSESHOE BEND	PINGREE
CAMBRIDGE	IDAHO CITY	PLACERVILLE
CAREY	INDIAN VALLEY	POCATELLO
CARMEN	INKOM	POLLOCK
CASCADE	JACKSON	PRAIRIE
CASTLEFORD	JEROME	RICHFIELD
CENTERVILLE	KETCHUM	RIGGINS
CHUBBUCK	KIMBERLY	ROCKLAND
CORRAL	KING HILL	ROGERSON
COUNCIL	KUNA	RUPERT
DIETRICH	LAKE FORK	SALMON
DONNELLY	LEADORE	SHOSHONE
EAGLE	LEMHI	SPRINGFIELD
EAST MAGIC	LETHA	STAR
EDEN	LOWMAN	STERLING
EMMETT	MARSING	SUN VALLEY
FAIRFIELD	MCCALL	SWEET
FEATHERVILLE	MELBA	TENDOY
FILER	MERIDIAN	TRIUMPH
FORT HALL	MESA	TWIN FALLS
FRUITLAND	MIDDLETON	WEISER
FRUITVALE	MIDVALE	WENDELL
GANNETT	MONTOUR	WEST MAGIC
GARDEN CITY	MOUNTAIN HOME	WILDER
GARDEN VALLEY	MURPHY	YELLOW PINE
GIBBONSVILLE	MURTAUGH	
GLENNS FERRY	NAMPA	
TOTAL NUMBER OF CITIES & TOWNS SERVED: 115		
TOTAL NUMBER OF HOUSEHOLDS SERVED: 40,547		

Oregon Cities & Towns Served

OREGON CITIES & TOWNS SERVED		
ADRIAN	HEREFORD	ONTARIO
AROCK	HUNTINGTON	OXBOW
BROGAN	IRONSIDE	RICHLAND
DREWSEY	JAMIESON	UNITY
DURKEE	JORDAN VALLEY	VALE
HALFWAY	JUNTURA	WESTFALL
HARPER	NYSSA	
TOTAL NUMBER OF CITIES & TOWNS SERVED: 20		
TOTAL NUMBER OF HOUSEHOLDS SERVED: 1,163		

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Idaho Power Regions Served

REGIONS (IDAHO)	ELECTRIC	NON-ELECTRIC
CANYON	3,883	5,166
CAPITAL	5,362	12,046
EASTERN	2,396	1,996
SOUTHERN	3,469	2,423
WESTERN	2,522	1284
NUMBER OF HOUSEHOLDS IMPACTED:	17,632	22,915
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	40,547	

REGIONS (OREGON)	ELECTRIC	NON-ELECTRIC
CANYON	53	4
WESTERN	850	256
NUMBER OF HOUSEHOLDS IMPACTED:	903	260
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	1,163	

REGIONS (IDAHO POWER)	ELECTRIC	NON-ELECTRIC
NUMBER OF HOUSEHOLDS IMPACTED:	18,535	23,175
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	41,710	