IDAHO POWER
An IDACORP Company

MARCH 15 • 2021

2020 ANNUAL REPORT
DEMAND-SIDE MANAGEMENT

A VIEW FROM ABOVE

SUPPLEMENT 2: **EVALUATION**

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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 2020, Idaho Power contracted with ADM Associates, DNV GL and Tetra Tech to conduct program evaluations for the Educational Distributions (impact and process, DNV GL), Home Energy Reports (process, DNV GL), Irrigation Efficiency Rewards (impact and process, Tetra Tech), and Rebate Advantage (impact, ADM Associates) programs. Nexant conducted a joint billing analysis for the Weatherization Assistance for Qualified Customers and Weatherization Solutions for Eligible Customers programs. DNV GL started the Home Energy Report Program process evaluation with the Educational Distributions evaluations. However, due to some late findings, additional analysis was required to complete the evaluation. The evaluation report will be completed in April 2021 and will be included in the *Demand-Side Management 2021 Annual Report.* Idaho Power also contracted Tetra Tech to conduct a process evaluation on the Small Business Direct Install program. The start of the evaluation has been delayed until the second quarter of 2021 to allow time for more installs to be completed after the program was shut down early 2020 due to the COVID-19 pandemic.

Franklin Energy conducted a program summary analysis for residential Energy-Savings Kits as well as Student Energy Efficiency Kits. Aclara conducted a summary analysis for the Home Energy Reports Program, and AM Conservation conducted a summary analysis for the Commercial Energy Saving Kits Program. The company conducted internal analyses for the 2020 demand response events for Irrigation Peak Rewards, Flex Peak and A/C Cool Credit Programs.

Idaho Power also contracted with Applied Energy Group to conduct an Energy Efficiency Potential Study for Idaho Power's service area and ADM Associates to update the *Technical Reference Manual*. Due to the size of these reports, they are not included in the report, but can be accessed by a link found in Other Reports section.

Throughout 2020, 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 2020 Annual Report, Supplement 2: Evaluation*.

Evaluation Plan

Energy Efficiency 2010–2022 Program Evaluation Plans

Program Evaluation Schedule	2022	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	I/O	O	P/O	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	
Simple Steps, Smart Savings™						
Weatherization Assistance for Qualified Customers			O			
Weatherization Solutions for Eligible Customers			O			
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	O	I	O	I	O	O
Flex Peak Program	O	I	O	O	O	O
Irrigation Peak Rewards	O	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 February 13, April 28, May 6, August 5, October 8, and November 12, 2020.

Energy Efficiency Advisory Group (EEAG)
Notes dated February 13th, 2020

Present:

Tina Jayaweera-Northwest Power & Conservation Council (on phone)
Wil Gehl–Community. Action Partnership Assoc of ID
Stacey Donohue–Idaho Public Utilities Commission
Diego Rivas–Northwest Energy Coalition
Connie Aschenbrenner–Idaho Power
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
Katie Pegan–Office of Energy & Mineral Resources
Sid Erwin–Idaho Irrigation Pumpers Association
Billie McWinn*-Idaho Power
Haley Falconer-City of Boise

Not Present:

Jim Hall-WaFd
Selena O'Neal-Ada County Operations
Anna Kim–Public Utility Commission of Oregon

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Tracey Burtch*–Idaho Power
Shelley Martin–Idaho Power
Pete Pengilly*–Idaho Power
Andrea Simmonsen*–Idaho Power
Todd Greenwell–Idaho Power
Chellie Jensen–Idaho Power
Rachelle Farnsworth-IPUC
Jordan Prassinos*-Idaho Power
Madison Olson-Office of Energy & Mineral Resources
Becky Arte-Howell-Idaho Power
Denise Humphreys-Idaho Power
Amanda Richards-Honeywell
Tonja Dyke-Idaho Power
Sheree Willhite–Idaho Power
Theresa Drake–Idaho Power
Chad Severson–Idaho Power
Annie Meyer*-Idaho Power
Krista West-Idaho Power
Zeke VanHooser-Idaho Power
Chris Pollow–Idaho Power
Mindi Shodeen-Idaho Power
Paul Goralski-Idaho Power
Brad Iverson-Long-Idaho Public Utilities Commission
Brittany Nixon-Idaho Power
Randy Thorn-Idaho Power
Allison Williams-Idaho Power
Jared Hansen*-Idaho Power

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:34 am

Announcements

Pete convened the meeting with housekeeping and safety. He announced that Kent Hanway has resigned from EEAG. Billie will be organizing and leading EEAG meetings and will be reaching out to members individually for one on one meetings. Rosemary had members and guests introduce themselves. There were no comments or questions on the November 2019 or the revised January 2019 meeting notes.

Pete updated the group on the IECC 2018 Building Codes. He showed a copy of the letter that Idaho Power submitted to the Senate Commerce Committee in support of the adoption of the 2018 building codes, including the 2018 International Conservation Code with amendments as recommended by the Idaho Building Code Board. Letters from support came from City of Boise, Association of Idaho Cities, The American Institute of Architects, and others.

9:45 am-Potential Study/Load Forecast/IRP Schedule—Pete Pengilly, Jared Hansen, Jordan Prassinos

Pete explained a potential study and outlined the timeline and process of Integrated Resource Planning (IRP). One member asked if the IRP will be doing an economic screen. Pete explained that the company is working on how to bundle the achievable technical potential.

Jared Hansen showed a video that explained the 2017 IRP. The basic concept of IRP planning is still the same; balancing cost, risk, and environment. The goal of this balancing is to create a portfolio that is in the best interest of customers. The 2019 IRP process utilized an optimized resource expansion model that created several different portfolios. Since this was a new process, the company did further analysis and an amended IRP was submitted. There was some discussion about the 120 MW of solar resource included in the preferred portfolio.

Load Forecast-Jordan Prassinos

Jordan explained the residential end use components and how residential load is forecasted. The commercial and industrial modeling process uses seven linear regression models that are then segmented by customer type. Jordan explained the three different methods that Idaho Power is evaluating for potential use in the next IRP cycle. There were questions regarding the three different models being considered. There was discussion around historical energy efficiency being predictive of future energy efficiency trends and making sure that energy efficiency savings targets are set appropriately for IRP planning. EEAG members recognized the company’s efforts in the IRP planning and thanked them for sharing this information.

Pete provided an update on the 2020 potential study timeline, its emphasis on the Utility Cost Test (UCT) and the bundling of energy efficiency. The company will schedule a webinar in March to discuss the results of the potential study. EEAG members expressed appreciation for the effort the company is putting into this change and recognize that it is a lot of work. In preparation for the webinar, one member asked for more information prior to the meeting in order to ensure feedback provided to the company is meaningful.

10:48 am-Break

11:06 am-Preliminary 2019 Savings/Financial Results—Pete Pengilly

Pete provided portfolio energy savings and expenses, savings amounts by sector, demand response results year over year, and cumulative energy efficiency savings. Pete also provided the Idaho and Oregon year-end rider balances. He went on to explain that all numbers are preliminary and are still being audited. Once the company publicly releases its earnings, he will send out more detailed information to EEAG members.

One member commented on the negative rider balance. Connie explained that there have been some large variances from the company's initial forecast when the 2.75% funding level was recommended – largely attributed to Custom Efficiency program projects. The company will and has always pursued all cost-effective energy efficiency regardless of the rider balance but will commit to reevaluating the Rider collection after the impact of transitioning to the UCT is better understood.

Pete provided more detail on what expenditures are included in the "purchased services" category. One member thanked the company for breaking out those expenses and recognized that even though they may not be actual incentives, the customer still benefits from them. Pete highlighted "Other DSM Activities." These are activities that the company participates in but doesn't count energy savings.

- Lunch & Learn
- IDL Tool Loan Library (900 pieces of equipment available for customer to check out)
- Training sponsorships for Commercial/Industrial customers
- Irrigation & Ag shows
- Residential EE Guides
- Company participation in 45 local community outreach events

One member commented that these activities are very important investments. They help to build relationships and trust with customers. Pete also thanked the EEAG for encouraging and supporting Idaho Power in these efforts.

11:23 am-Commercial/Industrial/Irrigation Programs—Quentin Nesbitt

Quentin provided updates and 2019 results on the commercial, industrial, and irrigation programs. He highlighted the Small Business Direct Install program and provided a status update since its launch in November. He also highlighted a video that was developed in coordination with the Integrated Design Lab and the Idaho Power Teacher extern last summer. During the last few EEAG meetings there had been discussion around the Green Motors measure and with feedback from EEAG members, new informational collateral was developed for participating shops in Idaho Power's service area to help drive participation. One member suggested reaching out to the pump service providers.

Quentin passed around a new brochure that was created for the Wastewater/Water Cohort. He shared a success story that was a direct result of the cohort workshop process.

Quentin updated the group on the Targeting Operational Energy Savings Energy Management incentive. This will be targeting energy management, behavioral changes.

The company is still working with the Regional Technical Forum (RTF) workgroup to evaluate savings for the Irrigation Menu program. Idaho Power worked with the RTF to develop a survey that was recently sent to all Idaho Power irrigation customers. The results of this survey will be evaluated and provided to the RTF.

12:00 pm—Lunch

1:00 pm-Meeting Reconvened

1:05 pm-Residential Program Update—Andrea Simmonsen

Andrea highlighted the preliminary year-to-date participation and energy savings for the residential programs. She provided an update on the status of changes made to the smart thermostats measure qualifications in the Heating & Cooling Efficiency program, and the new incentive tiers for the Residential New Construction program, both of which were implemented on January 1st. EEAG showed support for grandfathering new homes that were in the pipeline as of that date at the initial incentive level of $1500. Andrea provided examples of different measure scenarios that contractors could install to increase their incentive. There were questions about how new building codes could impact this program. Andrea answered that these new building codes go into effect in 2021 and the company will monitor any potential impacts to the program.

Andrea provided an update on the Home Energy Reports. These reports will be expanding to reach a total of 150,000 participants, which includes current pilot participants. She also requested feedback from EEAG regarding nightlights. Currently, the company hasn't been claiming energy savings for these. Andrea provided three different savings assumptions the company is considering. These LED nightlights are great for giveaways at home shows and can be a great way to engage customers on programs and energy efficiency.

Several EEAG members gave examples of how they or their family members currently use nightlights. There was questions and comments about the types of customers to target, how to make sure they are being used in high usage areas, and that this could be a good way to introduce LED usage. One member commented that it isn't clear that the nightlights are LED. Could there be a way to make that connection for people, so they know what they are buying. A survey could be done with customers to get an idea of hours of use and how many of what types of lights they replaced.

2:13 pm- Home Improvement Program—Kathy Yi

Kathy provided a background and historical timeline of the Home Improvement Program. The last full year of this program was in 2016. For the current 2020 analysis, 2016 participation numbers were used. This is an initial analysis using known changes at this moment in time. The company looked at several different scenarios along with numerous measure combinations for determining cost effectiveness; 2017 vs. 2019 DSM Alternate Costs and the different RTF Multifamily and Single-Family Workbook versions. Several caveats to these assumptions were shared and cost-effective outcomes could change based on new information. The company will continue to analyze new information as it becomes available and would like feedback from EEAG.

There was discussion about analyzing a tiered incentive approach which could lead to higher savings and participation, potentially adding low-e storm windows, and exploring assumptions around attic insulation levels. One member would like to see the actual cost effective "pass" ratios for future presentations. One member suggested packaging known cost-effective measures with measures that barely pass. Another member thought it might be worth exploring how the Home Energy Audit could tie together with some of these measures. EEAG members thanked Idaho Power for bringing the analysis to EEAG and soliciting feedback.

2:23 pm -Marketing— Annie Meyer

Annie highlighted marketing tactics the company had done in 2019 and what they will be pursuing in 2020. She played a radio spot that targeted irrigation customers and shared a video highlighting energy efficiency upgrades completed at the Sun Valley Lodge. One member asked if there is a way to correlate sign-ups and incentives to the radio spots. Annie answered that is more difficult to attribute any uptick with radio vs. digital ads. Another member complimented the company on the McCall Shore Lodge article asked if other businesses would be highlighted that would appeal to a different customer demographic. Tracey Burtch answered that upcoming articles would feature the Humane Society and Fresca.

235 pm Wrap/up Discussion

This was a-great year for savings. Congratulations! I appreciated the Home Improvement presentation. It was really done well.

I appreciate everyone's comments and suggestions that help to direct the company's activities.

It was a good meeting. Kathy's presentation was good and as savings for programs start to go down, it will be a challenge for us to find ways to improve programs.

I appreciate everyone understanding that energy efficiency is in a transformative time and looking for ways to think outside of the box.

I really appreciated the IRP presentation. It very helpful for me.

With Kent stepping away it would be good to still have someone else from the architect world on EEAG.

This was a good follow up meeting on stuff that we have talked about at other meetings. I appreciated the IRP presentation and the transparency.

It feels like a full meeting and there was a lot of opportunity for us to provide valuable feedback and input.

I think there was a good balance of information.

The next meeting will be May 6th and look for a webinar in the next couple of months**.**

2:40 pm Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)-Webinar
Notes April 28th, 2020

Present:

Steve Hubble (sitting in for Haley Falconer)-City of Boise
Wil Gehl–Community Action Partnership Assoc of Idaho
Tina Jayaweera-Northwest Power & Conservation Council
Connie Aschenbrenner–Idaho Power
Diego Rivas–Northwest Energy Coalition
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
Katie Pegan–Office of Energy & Mineral Resources
Anna Kim–Public Utility Commission of Oregon
Pete Pengilly*-Idaho Power
Stacey Donohue–Idaho Public Utilities Commission

Not Present:

Selena O'Neal-Ada County
Sid Erwin–Idaho Irrigation Pumpers Association
Jim Hall-Washington Federal Bank

Guests and Presenters*:

Scott Wright-Idaho Power
Andrea Simmonsen-Idaho Power
Becky Arte-Howell–Idaho Power
Quentin Nesbitt-Idaho Power
Alison Williams-Idaho Power
Jordan Prassinos-Idaho Power
Jared Hansen-Idaho Power
Paul Goralski–Idaho Power
Theresa Drake–Idaho Power
Brad Iverson-Long-Idaho Public Utilities Commission
Rachelle Farnsworth-Idaho Public Utilities Commission
Kurtis Kolnowski*-AEG
Jared Ellsworth-Idaho Power
John Chatburn-Office of Energy & Mineral Resources

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:00 a.m.

Rosemary had attendees introduce themselves and go over WEBEX protocols. Theresa welcomed the group and let them know that Pete would be retiring in July, covered leadership changes and spoke about how the company continues to pursue energy efficiency and customer engagement during remote work.

9:15 a.m.-Incentive Levels and the UCT—Pete Pengilly

Pete presented the Integrated Resource Plan (IRP) timeline and incentive levels. One member asked if Pete could speak more about finding the right incentive level and that he agreed with the balance mentioned. Pete commented that the company wants to find the right balance to drive participation but not free ridership. One member asked if a free ridership evaluation has ever been conducted so that an assessment could be done. Pete answered that type of information is hard to research, but it is done for every program. Kathy added that a sensitivity analysis is done at a program level to see how low the net-to-gross percentage can go before it is no longer cost-effective. Another member stated that it was their understanding that those kinds of studies are not always helpful because the information comes from self-reporting and may not always be reliable. Another member stated that those surveys could be used for the bigger ticket items where there is a more calculated purchase decision and not a light bulb and why someone bought it.

10:00 a.m.-Preview of Draft Energy Efficiency Potential Study 2020—Kurtis Kolnowski, AEG

Kurtis provided an overview of the 2020 Potential Study that was completed for Idaho Power Company.

One EEAG member asked if the comprehensive residential end use survey was incorporated into the 2018 study or if it was incorporated in the 2020 study. Kurtis answered that it was done in 2016 so it would have been incorporated in the 2018 study. Pete added that it is on the company's list to conduct a new one. One member asked if the UCT includes non-energy impacts. Kurtis answered that they are not included.

Treatment of EISA in the Study slide

One member commented that LED saturation varies between different bulb types and lumen bins. There could be some more targeted lighting work rather than the broad-brush approach. May be some activity to improve the fixture integrated lamp market instead of just the bulb market.
Another member stated that since the DOE rolled back the 2020 lighting standards and the Regional Technical Forum (RTF) provided a new forecast, would Idaho Power be using that new forecast? Kurtis answered that would be correct, the new RTF forecast is being used.
Another member asked if the different types of lighting categories were included in the study. Kurtis answered that they weren't modeled specifically but they were included in the results.

Levels of Potential slide

One member stated that it is nice to see that the achievable potential assumptions are being looked at again and look forward to diving in and learning more.

Sector-level achievable potential slide

One member commented about technical potential changing due to lighting.

10:30 a.m. DSM Inputs for 2021 IRP—Pete Pengilly

Inputs slide

Since 2002 we have been using the same inputs for the IRP, which were based on conditions that existed during that timeframe. Idaho Power proposes to update the inputs to be reflective of current conditions, and as part of that will update the hourly buckets, the avoided energy for summer on-peak hours, and the capacity resource based on the most recent acknowledged IRP and year of identified capacity deficit.

Updated weighted average avoided cost slide

One member stated that for the 2019 IRP, Idaho Power talked a lot about the need for B2H to enable market access during summer peaks because current transmission is constrained. How does this align with the proposal to use market prices now for summer peaks hours? The proposed updates to the DSM alternate costs wouldn't necessarily be reflective of market prices for summer peak hours, rather it would be reflected of the marginal energy prices from Aurora, instead of replacing all summer on-peak prices with the variable operating costs from a SCCT.

Timeline for 2021 IRP slide-

One member asked if those changes reflected in what Kurtis presented? The information that Kurtis presented reflected the achievable economic potential from the utility cost perspective.

Pete spoke about the plans to hold an EEAG/IRPAC subcommittee workshop exploring how EE potential would be included in the 2021 IRP. An invite would be sent to EEAG once scheduled.

Wrap Up Discussion
Pete asked the group for their input on options for the upcoming May 6th EEAG meeting**.**

- I would like to hear about topics on how to think through ways to capture energy efficiency while not being in people's homes.
- I support whatever type of meeting the company would like to have but asked how they could provide feedback based on today's meeting. Pete stated that the best way would be to email him or Quentin**.**
- I like the idea of a half day webinar. I am interested to hear how the programs are working in the current environment.
- I would like to keep regular scheduled meeting and get materials out in advance.
- I prefer a WEBEX.
- I will be the lone voice against a full day WEBEX. I think a half day meeting at the most, and email update is fine.

10:55 a.m.- Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Notes dated May 6th, 2020
Webinar

Present:

Steve Hubble-City of Boise
Wil Gehl–Community Action Partnership Assoc of Idaho
Pete Pengilly*-Idaho Power
Diego Rivas–Northwest Energy Coalition
Connie Aschenbrenner–Idaho Power
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
Katie Pegan–Office of Energy & Mineral Resources
Anna Kim–Public Utility Commission of Oregon
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Stacey Donohue–Idaho Public Utilities Commission
Haley Falconer–City of Boise
Jim Hall-WAFD
Sid Erwin–Idaho Irrigation Pumpers Association
Selena O'Neal-Ada County

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Tracey Burtch*–Idaho Power
Andrea Simmonsen*–Idaho Power
Chad Severson-Idaho Power
Donn English-Idaho Public Utilities Commission
Paul Goralski–Idaho Power
Theresa Drake–Idaho Power
Annie Meyer-Idaho Power
Brad Iverson-Long-Idaho Public Utilities Commission
Brittany Nixon-Idaho Power

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:00am

Rosemary convened the meeting with introductions. There were no comments or concerns regarding the February 13th notes. Quentin stated that Idaho Power is planning on holding a workshop to discuss options for incorporating energy efficiency into the Integrated Resource Plan (IRP). This workshop will be comprised of interested members from the EEAG, Integrated Resource Planning Advisory Committee (IRPAC), and the company's Load Forecasting department. The appropriate venue for questions and comments regarding energy efficiency in the 2021 IRP will be during that workshop.

9:10 am-First Quarter Savings & Financial Results—Pete Pengilly

Pete provided portfolio energy savings and expenses, savings amounts by sector, and the Oregon and Idaho Rider balances through March 31st, 2020**.** There was a comment regarding the current balances of the rider. Connie stated that as of right now, the company has not addressed the percentage currently collected in the rider. At the time the percentage was decreased to 2.75% there was evidence that it was an appropriate reduction. As we all know, forecasting can be difficult, and the company paid out a couple of large commercial/industrial incentives which lowered the rider balance. The company is mindful of the impact of increasing rates during the current economic environment. The group further discussed and some EEAG member's comments are that the company needs to address the rider balance and the preference would be to do it sooner rather than later. The longer the company waits the more it will potentially have to increase the percentage to cover the shortfall. Connie stated that at the next EEAG meeting we will plan to discuss further. One member stated that on the commercial/industrial side, businesses are in dire financial situations so there could be a reduction in funding for capital projects.

Pete reviewed the information that Theresa Drake had sent out in an email showing how COVID-19 has impacted the company's programs. The decisions that have been made align with the Governor's stay-at-home order and Rebound Idaho.

9:30 am Commercial/Industrial/ Irrigation Programs—Quentin Nesbitt

Quentin provided updates and year-to-date savings for the commercial, industrial, and irrigation programs. He also provided program performance data for Commercial Energy-saving Kits. Small Business Direct Install, and the Cohort projects. He provided an update on enrollments for Flex Peak and Irrigation Peak, the company's demand response programs**.**

9:50 am- Residential Programs—Andrea Simmonsen

Andrea provided preliminary year-to-date energy savings by program and customer participation. She provided an update on the night lights that were discussed at the February EEAG meeting. As a reminder, the night lights are a great way for the company to engage and start conversations with customers about energy efficiency. During our last meeting a suggestion was made to make it clear on the night light, that it is an LED. Andrea stated that all new lights that are ordered will have that information on them and she showed a picture of how that will look. Because there are still some night lights in stock that won't have that message, an educational card will be included with the light in a reusable bag.

Andrea provided an update on all the residential programs. The program specialist for the Weatherization programs is working with Project Share to update guidelines and help coordinate additional federal funding that will help customers avoid potential disconnections due to current economic conditions. The company is working on a special project to reach out to customers via telephone to obtain email address and/or numbers for texting. During that call energy efficiency questions can be addressed, programs introduced, and energy savings tips can be provided.

EEAG thanked Andrea for the updates. It was mentioned it is understandable that there is a reduction in projects and participation. There was a comment about advocating at the federal level to make sure there is enough money to support energy savings and how we need to work together to find a way to recoup energy savings in the future Theresa thanked the member for the suggestions and stated that she could take these comments offline and will follow up.

10:12 am- Marketing Overview—Tracey Burtch

Tracey provided an update on the types of energy efficiency marketing the company is doing during COVID-19. Alerts have been posted to the company's webpage indicating that programs could be impacted and social media posts shared tips for residential and business customers. The Enery@Work newsletter was delivered to customers and provided energy tips for business's dealing with potential shutdowns. The commercial/industrial trainings were postponed but the company is looking into an online format.

10:18 am-Wrap/Up Discussion.

Thank you, I think this went very well. You all navigated the online experience well.

Thank you for providing this meeting online, it went well and thanks for condensing. Thanks to everyone for making the adjustments.

There is going to be a large increase in federal financial assistance. We are hoping to receive those funds in May.

I think this format went well. I do like the marketing focus on tips especially for businesses as they are seeing financial impacts. I like the suggestion of looking for federal funding assistance. My position was funded by a grant from the DOE 10yrs ago.

Thank you for putting this together. I like the webinars being shorter/more numerous. I found today's material to be very informative.

I am excited for the opportunity in June to participate in potential study and IRP workshop. Congrats to Pete on his upcoming retirement.

I appreciate the shorter webinars and congrats to Pete. I'll miss having you around.

Thanks to the Idaho Power team for being flexible and showing us how COVID-19 has impacted you.

Congrats to Pete on your retirement.

Pete thanked everyone for their time and comments regarding his retirement. The next meeting is scheduled for August 5th, 2020.

10:30am Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
8/5/2020
Via WebEx

Present:

Brad Iverson-Long-Idaho Public Utilities Commission
Wil Gehl–Community Action Partnership Assoc of Idaho
Haley Falconer–City of Boise
Diego Rivas–Northwest Energy Coalition
Anna Kim–Public Utility Commission of Oregon
Connie Aschenbrenner*–Idaho Power
Quentin Nesbitt-Idaho Power
Don Strickler–Simplot
Ben Otto-Idaho Conservation League
Katie Pegan–Office of Energy & Mineral Resources
Lynn Tominaga–Idaho Irrigation Pumpers Association
Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Stacey Donohue–Idaho Public Utilities Commission
Jim Hall-Wafd
Sid Erwin-Idaho Irrigation Pumpers Association
Selena O'Neal-Ada County

Guests and Presenters*:

Quentin Nesbitt*-Idaho Power
Tracey Burtch*–Idaho Power
Andrea Simmonsen*–Idaho Power
Shawna Potter*-Idaho Power
Juliet Petersen*–Idaho Power
Chad Severson-Idaho Power
Erik Olson-Office of Energy & Mineral Resources
Mindi Shodeen-Idaho Power
Cheryl Paoli-Idaho Power
Chellie Jensen-Idaho Power
Paul Goralski–Idaho Power
Theresa Drake*–Idaho Power
Annie Meyer*-Idaho Power
Randy Thorn-Idaho Power
Steve Hubble-City of Boise
Donn English-Idaho Public Utilities Commission
Shelley Martin-Idaho Power
Denise Humphreys-Idaho Power
Krista West-Idaho Power
Sheree Willhite-Idaho Power

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:05 am

Rosemary started the meeting with the introductions of EEAG members.

9:05 am-May Meeting Notes-Announcements—Theresa Drake, Connie Aschenbrenner

Theresa updated the group on the leadership transitions in the Customer Relations and Energy Efficiency Department. Juliet Petersen is the new Commercial, Industrial, and Irrigation Leader. With the recent retirement of Pete Pengilly, Quentin Nesbitt has assumed the role of Customer Research & Analysis Leader. Shawna Potter is the new Residential Leader while Billie McWinn is on a temporary duty assignment as a Regional Customer Relations Manager at the Canyon Operations Center.

Connie provided an update of the Idaho Rider balance. In June of 2019, the rider percentage was decreased from 3.75% to 2.75%. As of June 30, 2020, the Rider balance is in a deficit of approximately $8.2 million.

The company is working on its 2021 budget. It is also working towards incorporating the Utility Cost Test into its cost effectiveness of programs. Connie reminded the group that due to the 2019 Integrated Resource Plan (IRP) delays, the 2021 IRP DSM working group has been delayed.

There were questions and comments about the ongoing rider balance fluctuations, some EEAG members support a longer-term view of the rider balance for customer stability. Quentin commented that predicting the number of projects and incentive amounts for the Commercial/Industrial programs can be a challenge. As you can see from the current Rider balance, it is not affecting participation or the company's efforts in pursuing all cost-effective energy efficiency. One member raised a concern that a deficit balance could result in a limit to funding future energy efficiency acquisition and decreased energy savings and going forward it would be better to err on the side of over collection in the Rider with mechanisms in place for returning customer money if needed. One member commented that they agreed with the over collection of Rider funds and acknowledged that this deficit isn't hindering Idaho Power from pursuing cost-effective energy efficiency. There was a question about programmatic change timelines and the recently completed Potential Study results. Quentin stated that upcoming presentations would cover upcoming changes that will impact programs. Connie added that the company intends to schedule a workshop to specifically address energy efficiency and the potential study for interested members of EEAG and IRPAC.

9:42 am-Future Impacts to Programs—Kathy Yi

Kathy's presentation focused on impacts to programs in 2021. She covered cost-effectiveness assumptions and impacts to residential and commercial/industrial/irrigation programs. She asked the group for their feedback on a future presentation of the low-income programs billing analysis and evaluations. The consensus was that this would be a valuable presentation.

Kathy provided an overview of the three Energy Efficiency Kits and the two Buy-Down offerings; Simple Steps, Smart Savings and Energy Efficient Lighting. In 2021 energy savings for LED lightbulbs in the kits will be reduced significantly after the first year. Idaho Power is proposing to sunset the Mail by Request Kits in its current format. The New Customer Kit is not cost effective, but the company thinks there is opportunity to offer it in a different format. Energy savings for the Student Kits are custom calculated based on information provided by students, parents, and teachers. These will still be offered but they could be impacted by an uncertain school year due to COVID.

Bonneville Power Administration (BPA) is ending the Simple Steps, Smart Savings program on September 30, 2020. The residential programs presentation will cover the next steps.

Kathy next highlighted the Cohort offerings and Irrigation Menu within the Commercial, Industrial, and Irrigation programs. Persistence is a major assumption within the Cohort offering. Employees leave the company; equipment changes which can impact cost effectiveness. The company will continue to monitor this program. The Irrigation Efficiency program may still be cost effective because of the custom projects. The prescriptive or menu offering has been impacted by RTF savings assumptions. The company will still provide this program and is still actively participating with the RTF on measure savings assumptions. There isn't a specific timeline when this work will be complete. Idaho Power along with other utilities are gathering customer survey information and the intent of that data will be used to inform research. It is an ongoing project.

There were questions and comments around water savings associated with the Irrigation programs and how those are considered non-energy benefits, using less water means less electricity is used for pumps. One member commented that they would like to see the water savings message highlighted in marketing tactics and as an educational component. One member asked if savings from a capital project that originated from the cohort could be allocated to the cohort. Quentin answered that cohort savings is reported within the Custom offering. A member suggested the company continue to look at the kit or giveaway method of delivery to keep energy savings high.

10:22 am C&I&I Programs—Juliet Petersen

Juliet provided updates and year-to-date savings for the commercial, industrial, and irrigation programs. She updated the group on COVID-19 impacts and adaptations to programs. She highlighted the New Construction program and Retrofits and requested feedback from EEAG on proposed changes.

The Commercial New Construction program has experienced a decrease in energy savings compared to this time last year and based on the number of projects in the pipeline. The team is exploring ways to increase participation in this program. One opportunity that has been identified is an increase to the professional assistance incentive. This incentive is available for the third-party architect or engineer who supports the participant in the application process. This incentive is separate from the project incentive and does not impact the participant incentive. Juliet used MentiMeter to obtain feedback and suggestions from EEAG members.

There were questions regarding the current state of the commercial new construction market during COVID and if the company has seen changes in the market and in participation in the program. The Program Specialist answered that there doesn't appear to be any disruption in new construction. There could be impacts in the future in how the current building spaces are utilized. There may be less new construction and more remodeling of existing spaces.

Juliet asked the group- "How long do you think the trial period should last to evaluate effectiveness of changes?"

- The majority of EEAG members preferred a 12-month timeframe.

Several EEAG members commented that it will take time to communicate these changes to the architect and engineers and support the 12-month timeframe.

Feedback from EEAG members- "Proposed changes to the new construction program."

- Seeing no slowdown of people moving to Idaho. Getting these buildings built correctly the first time is key. We can't count on building codes in the residential sector to ensure conservation.

- Several members commented that this was a "good idea" and that it's important to track the impact / evaluate the program.

- I'd be interested in the professional feedback on a flat incentive for the professional assistance vs based on a percentage.

The Retrofit program participation has seen a decline in projects submitted. Part of this decline could be due to COVID-19 impacts. Several peer utilities have temporarily increased their incentives for their lighting programs.

Idaho Power is proposing a temporary increase to drive participation. Juliet highlighted the measures that are being considered. Increasing incentives on a short-term basis will allow the company to pause and evaluate the impact of the changes and share those with EEAG before a permanent change is implemented.

Juliet asked the group- "What feedback do you have about the proposed changes to the retrofits lighting program?"

- The standard of the IPUC is to "pursue all cost-effective energy efficiency." If you can increase the incentive and remain cost effective, then the standard requires this

- I think that testing various option on a temporary basis is reasonable. It could help to identify more long-term opportunities and help with short term challenges

- No objection but a lot of this lighting is going to happen anyway. Will need to consider the role of the markets vs. the program

- The length of time could drive people based on "expiring deal"

11:00 am Residential Programs—Andrea Simmonsen/Shawna Potter

Andrea provided preliminary year-to-date energy savings by program and customer participation. Several programs that require site visits; Energy House Calls, Home Energy Audits, Multifamily Direct Install, have been impacted by COVID-19. Idaho Power is still taking those enrollments and will follow-up with customers when it becomes safe to do so**.** Wil Gehl provided an update on weatherization and the agencies that provide that service. They are reprioritizing their work in areas where it is safe to do so. Their main concern is the health and safety of their clients.

The slide from the May EEAG meeting that highlights the programs impacted by COVID-19 was reviewed. A question was asked if the company has considered using AMI data for virtual energy audits or explored that possibility due to COVID. Andrea answered that some companies have started doing that and she is collecting data on the mechanics of that technology. One EEAG member encouraged the company to lean into this opportunity and not be put off by those who don't participate but rather, focus on the early adopters and use that to encourage other who may be hesitant to participate in virtual audits.

Normally this time of year, our Education & Outreach Energy Advisors would be visiting local senior centers to provide in-person educational events. Due to COVID-19, the company needed to come up with different ways to reach these customers. Working with the coordinators and directors of different senior centers, the Energy Advisors assembled giveaway bags at home and dropped them off at senior centers in lieu of hosting in-person events.

The company also added a new line on the AC Cool Credit postcard that reminds customers to let Idaho Power know if they have recently had their air conditioners replaced or serviced. The company has received positive feedback from customers.

Shawna provided an update on the Shade Tree offering. The spring and fall events for 2020 have been cancelled due to COVID-19. The program specialist is researching options for next year. She also provided an update on the Educational Distributions: Welcome Kits, Student EE Kits, and the Energy Savings Kits (mail-by-request kits). As was mentioned in Kathy's presentation, the Welcome Kits may not be cost effective in 2021. With school attendance uncertainty, certain logistics will need to be addressed, which could impact the Student EE kits offering. As Kathy reviewed in her presentation, the Energy Savings Kits will not be cost effective next year. Because of this, the company is proposing to sunset the Energy Savings Kits offering with a plan to offer a last push in October using a postcard. She asked EEAG for ideas on language the company could use to promote this.

One member suggested the "last chance" tactic is effective because people are incented by not wanting to miss out on an opportunity.

Shawna informed the group that Bonneville Power Administration (BPA) is ending the Simple Steps, Smart Savings program as of September 30, 2020. Idaho Power's Energy Efficient Lighting program will be impacted. In Kathy's presentation, she mentioned how lighting savings has decreased which is why BPA is ending this program. She also mentioned that showerhead savings were recently deactivated by the Regional Technical Forum, so there is no savings that Idaho Power can claim for those. Idaho Power is exploring alternatives to this program. There were questions and comments about cost effectiveness of a local program vs. the cost sharing of a regional program. One member commented that they are glad to see Idaho Power pursuing a possible replacement for this program.

11:47 am Marketing—Tracey Burtch/Annie Meyer

Tracey and Annie updated the group on the marketing efforts the company is pursuing while also being empathetic to our customers during COVID-19. A new Tip Tuesday design was implemented to focus on saving energy and money while we all spend more time in the home. The company also promoted a summer contest between July 24-August 2 within My Account. As of this presentation, there have been approximately 7300 entries and a lot of positive customer feedback. The company also transitioned the Business Tips on social media to focus on training opportunities that are available.

12:00 pm Wrap-up/Open Discussion

- Will the evaluation presentation happen at the November meeting or later? Quentin answered that hasn't been decided, he was looking for feedback at this time.
- I do like the shorter meetings. Today's meeting content good. Having a small break would have been helpful.
- I agree, I do like the shorter meetings.

Quentin thanked the group for their participation and feedback. The next EEAG meeting will be Thursday November 12th.

12:00 pm Meeting Adjourned

Energy Efficiency Advisory Group (EEAG)
Webinar Notes
October 8th, 2020

Present:

Haley Falconer-City of Boise	
Wil Gehl–Community Action Partnership Assoc of Idaho	Ben Otto-Idaho Conservation League
Diego Rivas–Northwest Energy Coalition	Katie Pegan–Office of Energy & Mineral Resources
Connie Aschenbrenner–Idaho Power	Donn English–Idaho Public Utilities Commission
Anna Kim–Public Utility Commission of Oregon	Quentin Nesbitt*-Idaho Power
Lynn Tominaga–Idaho Irrigation Pumpers Association - sitting in for Sid Erwin	Tina Jayaweera-Northwest Power & Conservation Council

Not Present:

Selena O'Neal-Ada County
Don Strickler–Simplot
Jim Hall-Wafd

Guests and Presenters*:

Shawna Potter-Idaho Power	Paul Goralski–Idaho Power
Cheryl Paoli–Idaho Power	Theresa Drake–Idaho Power
Becky Arte-Howell–Idaho Power	Brad Iverson-Long-Idaho Public Utilities Commission
Juliet Petersen*–Idaho Power	Rachelle Farnsworth-Idaho Public Utilities Commission
Kevin Keyt-Idaho Public Utilities Commission	Tyler Lehman*-Nexant
George Jiang*-Nexant	
Becky Arte-Howell-Idaho Power	

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:32am

Rosemary started the meeting with introductions of EEAG members.

9:38 am- Evaluation of WAQC & Weatherization Solutions—Ty Lehman & George Jiang-Nexant

Tyler and George presented the WAQC & Weatherization Solutions evaluation results. They provided a brief overview of the programs, the 2018 program summary statistics, the ex-post methodology, and the savings results.

There were questions and comments regarding types of homes weatherized, types of heat pumps used, and if weatherized homes had air conditioning. Weatherization was completed on apartments and multi-family homes that were multi-level. The type of heat pump installed depended on the type most suitable to the building and the space. They were sized using Manual J heat load calculator. Most of these properties typically have air conditioning window units. Once a heat pump is installed and if they have a window unit, it would be removed and the old window would be replaced by a new, more efficient one. One member asked how these evaluation results compare to other utility weatherization programs. Nexant answered that they are seeing similar results, although it depends on the size of the weatherization program. Across the U.S it is around 20% of savings and Idaho Power is 15%, so it is close. One member asked about the requirement that a home must be electrically heated to participate. The program specialist answered that in order to participate in this program, a home must be electrically heated. Customers that have gas heated homes would qualify and be processed through the state program. One member added that weatherization opportunities for gas heated homes is typically lower due to the lower cost of that fuel.

Theresa thanked the group for the great discussion and asked Quentin to recap. Quentin stated that the weatherization evaluation was a billing analysis, which is completed to verify the energy savings being claimed or to know what the savings values are. They also help identify any potential processes improvements.

10:24 am-WAQC & Weatherization Solutions Discussion—Quentin Nesbitt

Quentin opened up the discussion saying Idaho Power would like to explore ways to improve program cost-effectiveness and proposed three potential ideas: Move WAQC to acceptable measures list with prescriptive savings & incentives, give weatherization managers guidance on payment amounts per measure based on cost effectiveness, and adjust installation criteria to align better with cost effectiveness. Wil Gehl spoke to the group about the State Energy Audit Tool (EA5) and the function of the tool. At the end of October 2021, EA5 will no longer be used. The State of Idaho doesn't have the funding or bandwidth to maintain its own tool so it will be using an "off the shelf" product. Other utilities in the state use a deemed measure list. If Idaho power is unable to pay 100% of a measure, this approach of having an acceptable measure list with prescriptive savings and incentives is an effective way to move the program closer to cost-effective.

There were questions and comments on types of measures being installed in the home, funding sources and how those are leveraged, and how weatherization managers determine which measures should be installed in a home. An EEAG member commended Idaho Power for exploring ways to improve program cost-effectiveness. Making changes makes it easier to approve funding and to defend that increase. Theresa suggested a future presentation to provide a more in-depth review of these two programs.

11:05 am-DSM Program Evaluation Schedule—Quentin Nesbitt

Quentin highlighted the evaluation schedule that was posted in the 2019 annual report. He explained the different types of evaluations and the status of evaluations taking place so far in 2020. He presented the planned 2022 evaluation schedule and informed EEAG the company intends to move the evaluations for the New Construction and Retrofit programs to 2022. These evaluations were originally planned for 2021.
One member asked about the Direct Install program being delayed due to COVID-19 and when an evaluation could be done on that program. Quentin answered that by March of 2021 enough time will have passed to get the processes streamlined for an evaluation.

11:17 am-Program Status Update––Juliet Petersen

Juliet provided an update of the programs that have been impacted by COVID-19. As it has been discussed during previous EEAG meetings, many of the programs were not impacted. In response to the pandemic, the company did suspend in-person customer work early in the year. On location work for impacted programs has resumed. A plan was developed to safely resume on location work this week for the commercial, industrial, and irrigation programs. The guidelines for resuming this work include:

- Wearing face masks always
- Social distancing when possible
- Completing a self-assessment check list prior to each engagement
- Hand sanitizing immediately prior to entering and exiting a location
- Educating employees and contractors on the symptoms of COVID-19

At the EEAG meeting in August, the company discussed implementing an increase to the New Construction programs professional assistance incentive (PAI). The goal is to incent engineering and architecture firms to help more customers with filling out the paperwork to participate in the program. Based on EEAG recommendations and approval from the Public Utility Commission of Oregon, Idaho Power has implemented an increase to the PAI across its service area.
One member complimented the company on the quick turnaround of this proposal.

Before the meeting adjourned, one member suggested that it would be helpful for the company to share its thoughts on the prescriptive changes to the weatherization programs. Quentin stated that the company will provide that at a future meeting. The company is researching ways to improve the program despite the lowered cost-effectiveness.

Energy Efficiency Advisory Group (EEAG) Notes
November 12th, 2020

Present:

Haley Falconer-City of Boise	Tina Jayaweera-Northwest Power & Conservation Council
Wil Gehl–Community Action Partnership Assoc of Idaho	Ben Otto-Idaho Conservation League
Don Strickler-Simplot	Katie Pegan–Office of Energy & Mineral Resources
Diego Rivas–Northwest Energy Coalition	Quentin Nesbitt*-Idaho Power
Connie Aschenbrenner–Idaho Power	Donn English-Idaho Public Utilities Commission
Nadine Hanhan–Public Utility Commission of Oregon-sitting in for Anna Kim	Lynn Tominaga–Idaho Irrigation Pumpers Association-sitting in for Sid Erwin

Not Present:

Jim Hall–Wafd

Guests and Presenters*:

Chellie Jensen*-Idaho Power	Paul Goralski–Idaho Power
Kathy Yi*–Idaho Power	Theresa Drake–Idaho Power
Shawna Potter*–Idaho Power	Don Reading-ICL
Peter Richardson–ICL	Kevin Keyt-Idaho Public Utilities Commission
Steve Hubble-City of Boise	John Chatburn-OER
Terri Carlock-Idaho Public Utilities Commission	Chris Pollow-Idaho Power
Dahl Bietz-Idaho Power	Zeke VanHooser-Idaho Power
Denise Humphreys-Idaho Power	Sheree Willhite-Idaho Power
Tracey Burtch-Idaho Power	Melissa Thom-Idaho Power
Shelley Martin-Idaho Power	Mindi Shodeen-Idaho Power

Note Takers:

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

Meeting Facilitator: Rosemary Curtin

Meeting Convened at 9:30 am

Rosemary started the meeting with EEAG members and guest introductions. There were no comments or questions on the August or October meeting notes. Theresa introduced Chellie Jensen and informed the group that she has stepped in to cover for Juliet Petersen in her absence.

9:40 am-Announcements

Quentin went over the Agenda for the meeting and briefly described each subject. Connie thanked EEAG members for their attendance at today's meeting and for their continued engagement. EEAG plays a crucial role for the company in achieving its energy efficiency targets. She provided an update on the Idaho Public Utilities Commission's final decision of the prudence determination that was filed for 2019. The company also submitted a filing in August of 2020 to request an increase to the Idaho Rider.

9:43 am-YTD Financials & Savings—Quentin Nesbitt

Quentin highlighted the portfolio energy savings and expenses, savings by sector, and the Oregon and Idaho Rider balances thru September 30th, 2020. There were questions regarding the rider balance and why the August projections for the balance showed a higher deficit. Connie answered that when the company submitted the filling for the rider balance increase, the anticipated under collected balance at the end of 2020 would be $12.7 million, less than the anticipated $14.6 million year-end under collected balance shared with EEAG in August. The balance at the end of September was $8.5 million. There have been some large commercial and industrial incentives that have been paid, but incentives ended up being lower than what was projected in those months because the timing of incentive payments changed.

9:55 am-Commercial, Industrial & Irrigation programs—Chellie Jensen

Chellie provided an update on the overall performance of the commercial, industrial, and irrigation programs thru the end of September along with the marketing updates She highlighted how the company has adapted to COVID-19 impacts and how it is working with customers and contractors. She also covered several proposed measure changes to the Retrofit program. The company is working with a third-party contractor to develop an energy management commercial audit tool. The final draft has been received and is being reviewed. Internal training on the tool will begin soon.

There were questions about Idaho Power's efforts to work with customers who are seeing an increase in energy usage because of COVID and needing to increase outside air exchanges. Chellie answered that the company is researching, in conjunction with the Integrated Design Lab (IDL), best options for customer in these situations. One member commented that there is still a lot of new commercial construction in Idaho, does the company know the percentage of new projects that have applied for incentives in the New Construction program. The Program Specialist answered that she has seen an increase in new pre-applications, but that she doesn't have an exact percentage. She did state that the company frequently engages with local architects and engineers to get projects submitted. One member commented that Idaho Power had a system peak on August 18th, outside of the demand response (DR) season. They suggested that the company should consider extending the season. Quentin thanked the member for that comment and mentioned that the company is considering it.

10:45 am-Residential Programs—Shawna Potter

Shawna provided preliminary year-to-date energy savings by program and customer participation**.** She reminded the group which residential programs have been impacted by COVID-19. Some utilities have implemented virtual audits and the company is exploring ways to implement these into the Home Energy Audit program. The company is also looking into creative delivery or drive thru models for the Shade Tree events. She provided updates and changes that have been made to marketing and customer communications. One member complemented the company on providing marketing materials in Spanish and encouraged them to continue.

One meeting participant commented that they have received multiple home energy reports on their home, and they find them helpful. They received a second report after they made some HVAC system changes and they could see those changes reflected in the report in how their usage was analyzed. They also installed their own smart thermostat now that the DIY option is approved and thanked the company for making that change.

At the August meeting the company informed EEAG that the it will be sunsetting the Energy Savings Kits on December 31st. The company has engaged in three marketing campaigns to ensure that all eligible customers have received invitations to participate. The company will still maintain the Welcome Kits, for new residents and the Student Energy Efficiency Kits. Idaho Power is exploring alternative kit options moving forward. A decrease in residential lighting savings will have an impact on the Multifamily Energy Savings Direct Install program. The company is exploring a model where it can calculate savings and has reached out to other utilities that are doing this. Their installers collect additional information that can provide additional savings potential. Idaho Power has reached out its group of installers and they have indicated that they are willing to spend the extra time needed to gather additional information to increase program savings. One meeting participant expressed their appreciation of the company exploring ways to keep this program cost effective, especially since those that live in multi-family units are typically lower income.

During the October webinar meeting, Idaho Power and a third-party consultant, Nexant, reviewed the two low-income programs; WAQC and Weatherization Solutions. EEAG requested that Idaho Power provide a presentation that covers the background and logistics of these two programs. With a deeper dive, it could then effectively consider the information provided in Nexant's presentation and help inform next steps on potential program enhancements to increase cost-effectiveness. The company will be scheduling that in the next couple of months and looks forward to EEAG participation. One member asked if this deep dive would look at the relationship with other funding sources and other programs within Idaho. Shawna stated that it could be weaved into the discussion and she will make a note for the program specialist. Another member commented that there may be other metrics that Idaho Power could use to analyze the cost effectiveness of these programs. Connie pointed out that these programs have not been cost effective for some time, but the company is mindful of being prudent with all customer funds and it will continue to communicate with the Commission regarding program cost-effectiveness. Another member asked Idaho Power how EEAG can support the continuation of these programs. Connie mentioned that continued involvement and participation as individual organizations that intervene in cases, or by providing direct feedback to the commission through comments when the DSM prudence cases are filed.

11:25 am-Future Retail Lighting Savings—Kathy Yi

Kathy provided an overview of how Idaho Power calculates energy savings for LEDs, how the Regional Technical Forum (RTF) is now calculating savings in period 1 vs. period 2, and how the Energy Trust of Oregon's (ETO) is evaluating their current lighting program. Idaho Power reached out to the ETO and they shared their findings. ETO is continuing with their buy-down program but only in areas that have not naturally transitioned to LEDs; grocery, dollar stores, mass merchandise stores. Most of the savings for lighting in the current program is from the larger retailers or box stores like Costco or Home Depot. One member asked if Idaho Power and ETO analysis looked at the mix of bulb types in the 250-1049 lumen range. Kathy answered that the numbers on slide 17 are preliminary and ETO does change market share by lumen bins, so Idaho Power is doing more research on that.

Shawna stated that Idaho Power has been exploring alternatives to its buy down program. ETO is doing targeted market approach and the company has heard other utilities are doing a similar targeted market approach. Idaho Power would like feedback from EEAG on continuing to explore this option. One member stated that the RTF has looked at integral fixtures and asked if Idaho Power has considered doing a buy down on those types as a next step. Kathy stated that fixtures were part of Simple Steps, but she wasn't sure about integral fixtures, where the bulb and fixture are all one piece. She stated that it could be considered based on vendor proposal. Another member complemented Idaho Power and thinks this is a smart way to manage this transition. They also acknowledged Kathy's hard work in putting together this deep dive lighting presentations and keeping EEAG up to date.

Wrap Up

- Thank you for the presentations. I want to make sure that, with Idaho's continued growth, we are not missing any opportunities.

- I appreciated the deep dive on the lighting program and look forward to the weatherization presentation.

- Thank you and I miss seeing everyone in person. Let's continue to look for ways that we can work together, especially keeping our low-income population top of mind.

- Thank you for the meeting.

- Thank you and I look forward to further information that will be developed.

- I appreciate the presentations and agree with most of the comments from EEAG members.

- Thank you for another great meeting especially around the lighting. I think maintaining the lighting program especially in those low-income retailers is very important and would encourage looking for those opportunities to help people having the hardest time right now.

- Connie stated that she appreciates EEAG participation and engagement. It isn't just limited to EEAG meetings. If anyone has ideas feel free to contact Idaho Power at any time.

12:00 pm Meeting Reconvened

NEEA Market Effects Evaluations

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
NEEA Q4 2020 Emerging Technology Newsletter	Commercial and Industrial (C&I) and Residential	NEEA	NEEA	Quarterly update on emerging technology projects
2017 Oregon Residential Specialty Code Energy Efficiency: Impact Assessment	Residential	Ecotope	NEEA	Code Saving Analysis
NEEA Q3 Quarterly Report	NEEA	NEEA	NEEA	Performance Report
2019 Non-residential Lighting Annual Survey Report	C&I	Cadeo Group	BPA	Annual Survey
2019-2020 Luminaire Level Lighting Controls Market Assessment	C&I	NMR Group, Energy Futures Group	NEEA	Market Evaluation
NEEA Q3 2020 Emerging Technology Newsletter	C&I and Residential	NEEA	NEEA	Quarterly update on emerging technology projects
Air Cleaner Unit Savings Review	Residential	Apex Analytics	NEEA	Savings Forecast Model Review for Retail Product Portfolio Program
Air Cleaner Specification and Baseline Assessment Review	Residential	Apex Analytics	NEEA	Savings Forecast Model Review for Retail Product Portfolio Program
NEEA Q3 Codes, Standards and New Construction Newsletter	C&I and Residential	NEEA	NEEA	Newsletter
2019 Oregon Commercial Energy Code - Energy Savings Analysis	C&I	Mike D. Kennedy, Inc.	NEEA	Code Saving Analysis
Heat Pump Water Heater Qualified Products List	Residential	NEEA	NEEA	Qualified Products List for Heat Pump Water Heater program
HVAC Market Actor Profile Report	C&I	Apex Analytics	NEEA	Market Research for commercial HVAC market actors
HVAC/ Very High Efficiency Dedicated Outside Air Systems Specifier Focus Groups Report	C&I	Sparrow Strategy	NEEA	Market Research for commercial HVAC program
Energy Savings from Networked Lighting Control Systems With and Without Luminaire Level Lighting Controls	C&I	Mike D. Kennedy, Inc.	NEEA	Savings study for Luminaire Level Lighting Program
Washington State Commercial Energy Code Technical Roadmap Report	C&I	Noresco	NEEA	Code Research Study
2019 Reduced Wattage Lamp Replacement Program Long-Term Monitoring and Tracking Report	C&I	Evergreen Economics	NEEA	Program Evaluation for Reduced Wattage Lamp Replacement Program

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2019 Alliance Cost Effectiveness Model Review for Heat Pump Water Heaters	Residential	Ecotope, Larson Energy Research	NEEA	Savings Forecast Model Review for Heat Pump Water Heater Program
Q4 2020 Market Research and Evaluation Newsletter	C&I and Residential	NEEA	NEEA	Newsletter
2019 Alliance Cost Effectiveness Model Review for Ductless Heat Pumps	Residential	Ecotope, Larson Energy Research	NEEA	Savings Forecast Model Review for Ductless Heat Pump program
Luminaire Level Lighting Controls Replacement vs. Redesign Comparison Study	C&I	University of Oregon	NEEA	Limited field study to measure energy savings between two different products.
2019 Annual Report Snapshot	NEEA	NEEA	NEEA	Performance Report
Northwest Ductless Heat Pump Initiative: Market Progress Evaluation #8 Addendum - Ductless Heat Pumps in Cold Climates Installer Research	Residential	Cadmus Group	NEEA	Market Evaluation
NEEA Q2 2020 Emerging Technology Newsletter	C&I and Residential	NEEA	NEEA	Quarterly update on emerging technology projects
NEEA Q2 2020 Codes, Standards and New Construction Newsletter	C&I and Residential	NEEA	NEEA	Newsletter
EXP07:19 Load Based and Climate-Specific Testing and Rating Procedures for Heat Pumps and Air Conditioners	Residential	Bruce Harley Energy Consulting	NEEA	Consulting for test procedure development
Q3 2020 Market Research and Evaluation Newsletter	C&I and Residential	NEEA	NEEA	Newsletter
2019-2020 Washington Residential New Construction Code Study	Residential	CLEAResult	NEEA	Market Evaluation
2019 Residential Lighting Market Analysis	Residential	Apex Analytics	NEEA	Market Evaluation
Cycle 5 (2015-2019) Market Progress Report	NEEA	NEEA	NEEA	Performance Report
Power Drive Systems - Energy Savings and Non-Energy Benefits in Constant & Variable Load Applications	C&I	Cadeo Group	NEEA	Savings study for pump systems
Building Commissioning - 2019 Long Term Monitoring and Tracking (LTMT) Report	C&I	Cadmus Group	NEEA	Market Evaluation
Market-Ready High Performance Walls: Phase 2 Report	Residential	Earth Advantage	NEEA	Market Assessment
Market-Ready High Performance Walls: Phase 1 Report	Residential	Earth Advantage	NEEA	Market Assessment
Home Energy Metering Study Public Data User Guide	Residential	Evergreen Economics	NEEA	Test procedure

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
RBSA End Use Load Shape Data Year 1 (1 of 4)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 1 (2 of 4)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 1 (3 of 4)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 1 (4 of 4)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 2 (1 of 5)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 2 (2 of 5)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 2 (3 of 5)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 2 (4 of 5)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
RBSA End Use Load Shape Data Year 2 (5 of 5)	Residential	Ecotope	NEEA	Residential Building Stock Assessment
Commercial Building Stock Assessment 4 Presentation	C&I	NEEA	NEEA	Study
CBSA 4 Data Files	C&I	Cadmus Group	NEEA	Commercial Building Stock Assessment
CBSA 4 Database User Manual	C&I	Cadmus Group	NEEA	Commercial Building Stock Assessment
CBSA 4 Database Dictionary	C&I	Cadmus Group	NEEA	Commercial Building Stock Assessment
CBSA 4 (2019) Final Report	C&I	Cadmus Group	NEEA	Commercial Building Stock Assessment
CBSA 4 Appendix Tables (Weighted)	C&I	Cadmus Group	NEEA	Commercial Building Stock Assessment
Drive Power Initiative - 2019 Long Term Monitoring and Tracking Report	C&I	Cadmus Group	NEEA	Market Evaluation of Extended Motor Product program
NEEA Q1 2020 Emerging Technology Newsletter	C&I and Residential	NEEA	NEEA	Quarterly update on emerging technology projects
Energy Modeling of Commercial Gas Rooftop Units in Support of CSA P.8 Standard	C&I	Cadeo Group	NEEA	Study to support new test procedure standard
HVAC/Very High Efficiency Dedicated Outside Air Systems Specifier Interview Report	C&I	Cadeo Group	NEEA	Market Research
Thin Triple Pane Windows: A Market Transformation Strategy for Affordable R5 Windows	Residential	Stephan Selkowitz Consultants	NEEA	White paper on strategies for advanced primary windows

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
NEEA Q1 2020 Codes, Standards and New Construction Newsletter	C&I and Residential	NEEA	NEEA	Newsletter
2019 BOC Program Dataset Analysis	Commercial	BrightLine Group	NEEA	Market Evaluation
Commercial Window Attachments: Secondary Window Market Characterization	C&I	Evergreen Economics	NEEA	Market Characterization
Advanced Water Heating Specification	Residential	NEEA	NEEA	Technical Specification
Q2 2020 Market Research and Evaluation Newsletter	C&I and Residential	NEEA	NEEA	Newsletter
Oregon Residential Specialty Code: Energy Efficiency Analysis	Residential	Ecotope	NEEA	Code study
Robur Heat Pump Trial	C&I	Energy 350	NEEA	Field study
Natural Gas Advanced Water Heating Specification	Residential	NEEA	NEEA	Technical Specification
Gas Tankless Water Heater Combined Research Report	Residential	ILLUME Advising, LLC	NEEA	Market Characterization study
NEEA 2020 Marketing Calendar	C&I and Residential	NEEA	NEEA	Calendar
NEEA Q4 2019 Emerging Technology Newsletter - February Update	C&I and Residential	NEEA	NEEA	Newsletter
A Christmas Carol: How Visions Past and Present Help Plan for the Future	Residential	NEEA	NEEA	Analysis of Residential Building Stock Study
A Realistic Measure of Residential Clothes Dryer Performance	Residential	NEEA, Sam Diego Consulting	NEEA	Savings study
Market Transformation Strategies for Commercial Code Enhancement	C&I	NEEA	NEEA	White paper describing Commercial Code Enhancement program
Paving the way for new market transformation programs: building a bridge from resource acquisition	Residential	NEEA	NEEA	White paper describing ENERGY STAR Retail Products Platform (ESRPP)
New Homes Rater Focus Groups Research Report	Residential	ILLUME Advising, LLC	NEEA	Market Research
NEEA Q4 2019 Codes, Standards and New Construction Newsletter	C&I and Residential	NEEA	NEEA	Newsletter

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
2020 Task 1: Foundational Services	Commercial	IDL	Idaho Power	EE Assistance & Education
2020 Task 2: Lunch and Learn	Commercial	IDL	Idaho Power	EE Training & Education
2020 Task 3: BSUG	Commercial	IDL	Idaho Power	EE Training & Education
2020 Task 4: New Construction Verifications	Commercial	IDL	Idaho Power	EE Verifications
2020 Task 5: Energy Resource Library	Commercial	IDL	Idaho Power	EE Assistance & Education
2020 Task 6: Building Energy Analytics	Commercial	IDL	Idaho Power	EE Assistance & Education
2020 Task 7: RTU Control Retrofits for Small Commercial Facilities	Commercial	IDL	Idaho Power	EE Research

2020 TASK 1: FOUNDATIONAL SERVICES

SUMMARY OF PROJECTS

IDAHO POWER COMPANY EXTERNAL YEAR-END REPORT

December 31, 2020

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 2001_001-01

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Prepared by:
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IDL Director:
Ken Baker

Author:
Damon Woods

Prepared for:
Idaho Power Company

Contract Number:
IPC KIT # 5277

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DISCLAIMER

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

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Acronyms and Abbreviations

AIA	American Institute of Architects
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
DOAS	Dedicated Outdoor Air System
EMS	Energy Management System
EUI	Energy Use Intensity [kBtu/ft^2/yr]
HVAC	Heating Ventilation and Air Conditioning
IDL	Integrated Design Lab
IPC	Idaho Power Company
IR	Infrared
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
NEEA	Northwest Energy Efficiency Alliance
RTU	Rooftop Unit
UI	University of Idaho
UVGI	Ultraviolet Germicidal Irradiation
VAV	Variable Air Volume
VRF	Variable Refrigerant Flow

1. Introduction

The University of Idaho Integrated Design Lab (UI-IDL) provided technical design assistance in 2020 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.

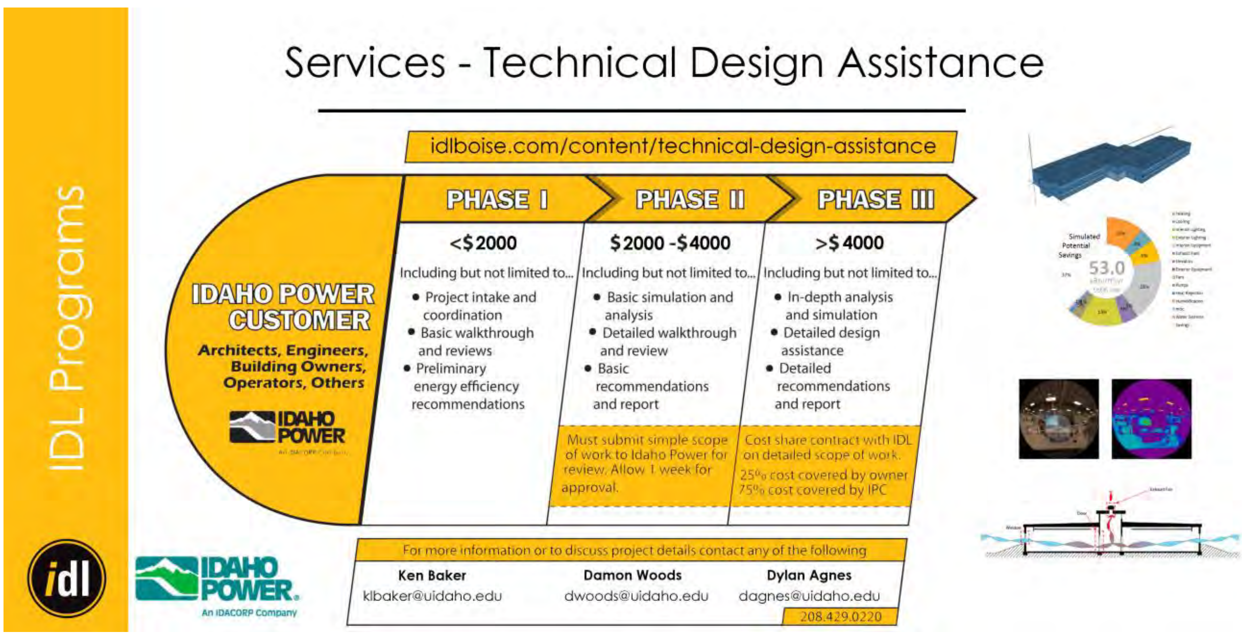

Figure 1: Foundational Services Flyer Outlining Phases

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 16 Foundational Service projects in 2020 (a 23% increase from last year). Two project requests came from municipalities, while the majority were requested by private companies. In total, there were ten Phase I projects, five Phase II projects, and one Phase III project. While five projects were focused on new construction, the majority of assistance was requested for retrofits. The full list of projects is shown in Table 1 below. Details on the projects that resulted in a memo or report are included in the individual project reports submitted to IPC. In 2020, the IDL assisted with approximately 385,000 ft^2 of buildings. This is more than the 275,000 ft^2 of buildings worked on in 2019 and the 250,000 ft^2 worked on in 2018.

Table 1: 2020 Foundational Services Project Summary

Projects	Phase	Status	Notes	Retro/ New	Ft	Location	Type
Fire Station	1	Complete	Assisted on energy modeling for VRF	New	23,000	Boise	Civic
Community School	2	Complete	Energy treasure hunt - virtual consulting	Retro	121,725	Ketchum	Education
Charter School	2	In progress	Energy modeling training for team	Retro	25,000	Boise	Community
Public Works Department	2	In progress	Ventilation upgrade options	Retro	5,000	McCall	Civic
Senior Center	1	Complete	Converting room to walk-in cooler	Retro	5,000	Twin Falls	Community
Assembly Hall	1	Complete	Questions on COVID-19 and ventilation	Retro	8,000	Boise	Assembly
Visitor's Center	3	In progress	Minimizing energy use in design	New	5,000	Picabo	Community
Chapel	1	Complete	Restoration with desire for radiant system and potential envelope upgrades	Retro	7,000	Pocatello	Community
Municipal Building	2	In progress	Remote collaboration w/CSHQA when design phase begins	Retro	15,600	Ketchum	Civic
Community	1	In progress	Ventilation upgrades for COVID	Retro		Ketchum	Mix
Office Building	1	Complete	Propane vs electric heating costs	new	7,500	Marsing	Office
College	1	Complete	Ventilation recommendations for COVID	Retro	11,000	Nampa	Education
Barracks	1	Complete	Infiltration energy impact	New	24,000	Boise	Civic
Dairy Expansion	2	Complete	Radiant cooling for warehouse expansion	New	2,000	Gooding	Dairy
Weather Normalization	1	Complete	HDD and CDD methods for normalizing EUI	Retro		Ada County	Civic
UV Germ Irradiation	1	Complete	Energy impact and UV levels required for COVID19 removal from return air	Retro	125,000	Boise	Office

2020 Task 2: Lunch and Learn

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2020

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 2001_002-01

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Authors:
Dylan Agnes

Prepared for:
Idaho Power Company

Contract Number:
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ACRONYMS AND ABBREVIATIONS

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

1. 2020 SUMMARY AND CUMULATIVE ANALYSIS

Table 1: 2020 Lunch and Learn Summary

	Date	Title	Presenter	Group / Location	Attendees
1	5/7	Radiant System Design Considerations	Damon	Architecture Firm 1	2
2	7/29	Covid 19 in Buildings	Kevin	Open Webinar	97
3	8/11	VRFs & Heat Pumps	Damon	Open Webinar	27
4	8/12	Daylighting Multipliers – Increasing Daylight Harvesting Efficiency	Dylan	Architecture Firm 2	4
5	8/25	High Performance Classrooms	Damon	Open Webinar	21
6	8/25	The Architect's Business Case for Energy Performance Modeling	Ken	Architecture Firm 3	8
7	9/1	Radiant System Design Considerations	Damon	Architecture Firm 3	7
8	9/8	Daylighting Multipliers – Increasing Daylight Harvesting Efficiency	Dylan	Open Webinar	18
9	9/22	Indoor Air Quality (IAQ) and Energy Efficiency in Buildings	Ken	Open Webinar	46
10	10/20	High Performance Classrooms	Damon	Open Webinar	21
11	10/22	High Performance Classrooms	Damon	Architecture Firm 4	9
12	10/29	Daylight in Buildings - Getting the Details Right	Dylan	Architectural Organization 1	13
13	11/3	Luminaire Level Lighting Controls	Dylan	Open Webinar	17
14	11/4	VRFs & Heat Pumps	Damon	Architectural Organization 2	11
15	11/9	Indoor Air Quality (IAQ) and Energy Efficiency in Buildings	Ken	Architectural Organization 1	1
16	11/12	The Architect's Business Case for Energy Performance Modeling	Ken	Architecture Firm 4	6
17	11/17	Dedicated Outdoor Air Systems (DOAS) Integration	Damon	Open Webinar	16
18	12/1	Chilled Beams	Damon	Open Webinar	15
19	12/15	Future of Lighting Controls	Dylan	Open Webinar	14
20	12/16	Hybrid Ground Source Heat Pump System	Damon	Architectural Organization 2	13
				Total Attendees	**366**

Table 1 on the previous page summarizes all Lunch and Learn presentations given in 2020. 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.

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:	127	Electrician:	2
Engineer:	73	Contractor:	
Mech. Engineer:	5	Other:	156
Elec. Engineer:		None Specified:	3
Total (Online):	366		

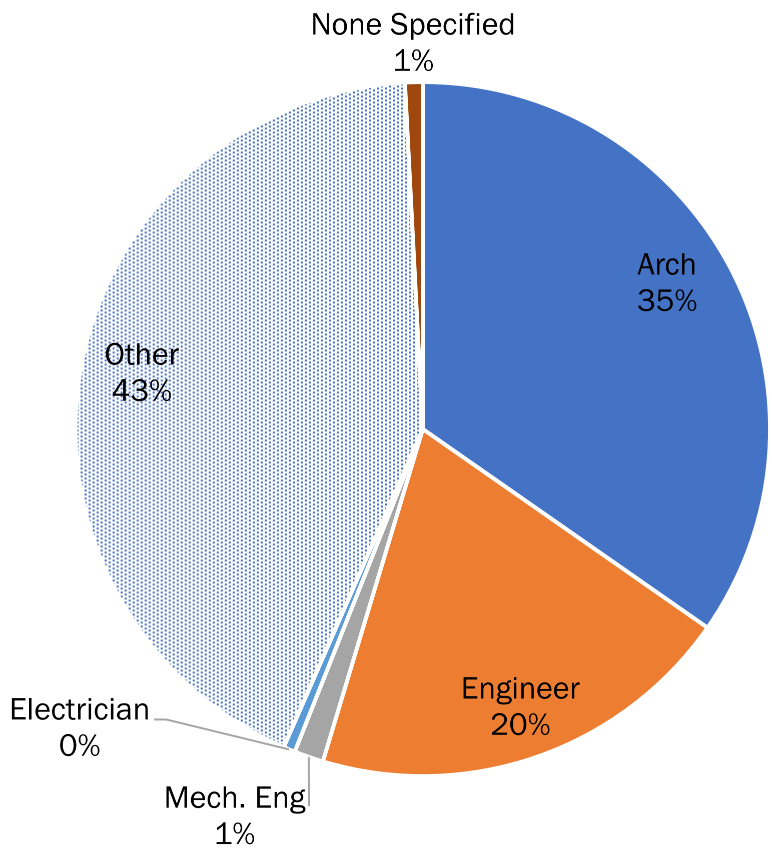


Figure 1: Attendee Profession

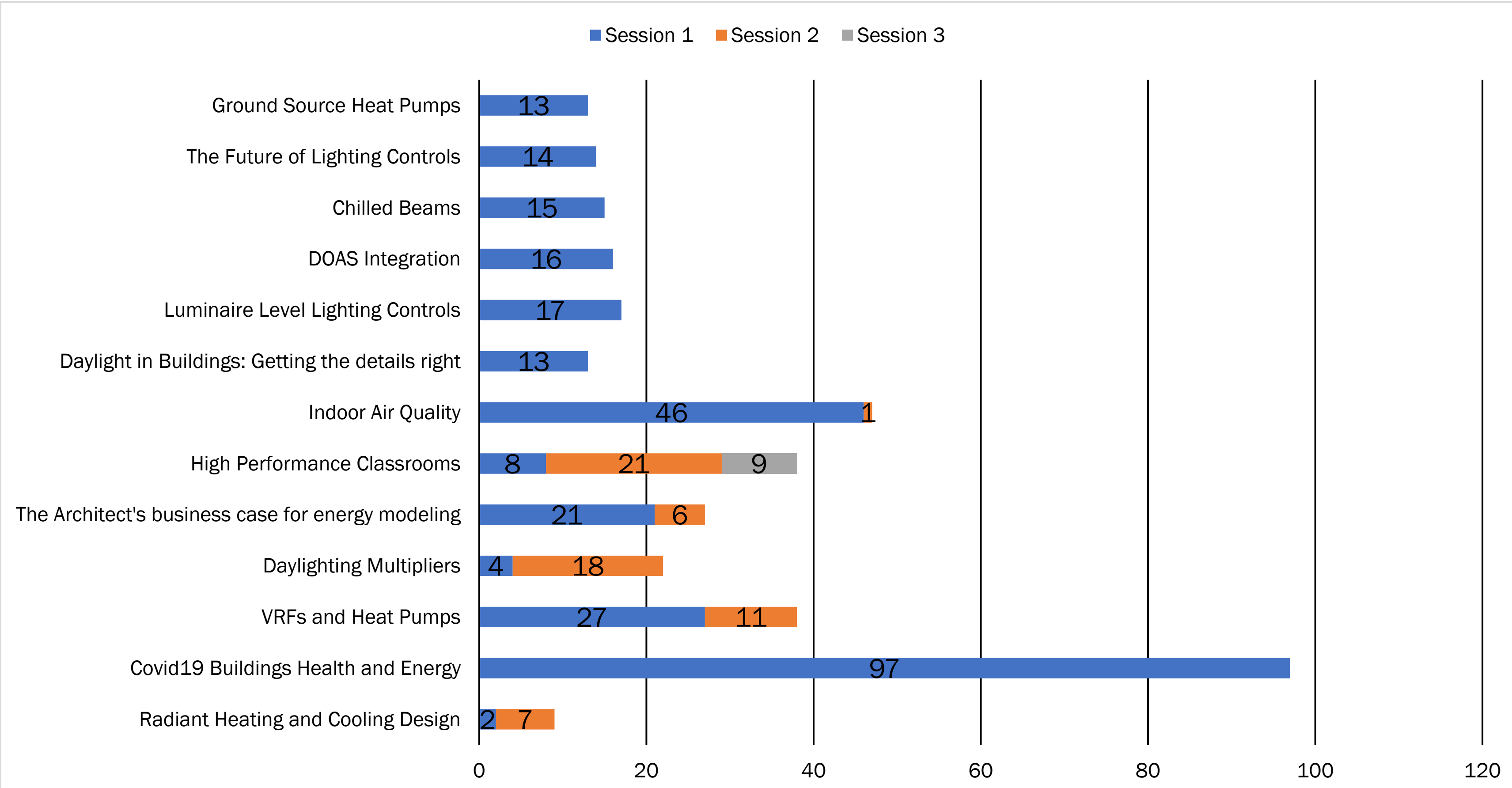


Figure 2: Attendee Count by Title and Number of Session

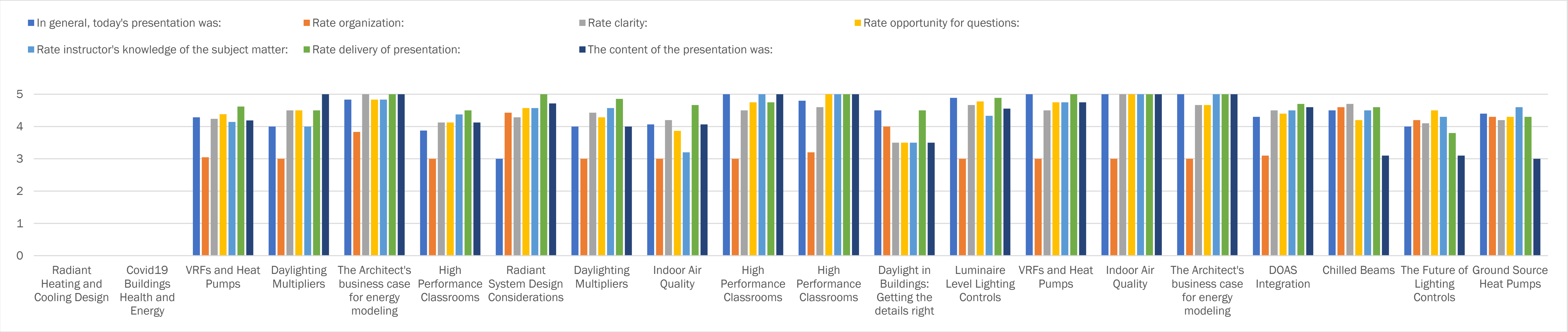
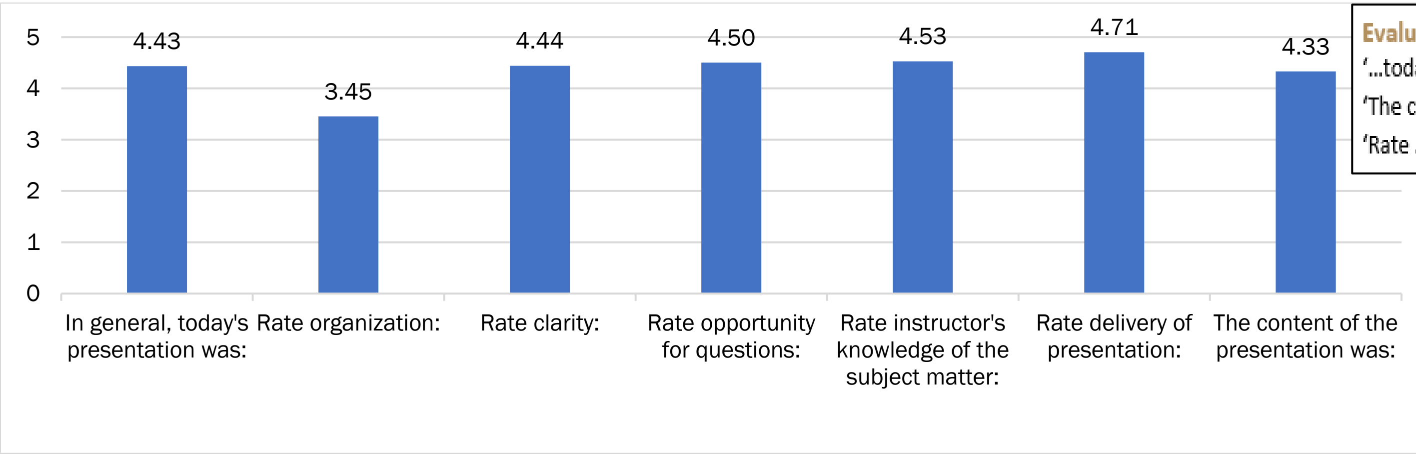


Figure 3: Average Evaluations by Session Title



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 via Zoom in the form of poll to each participant. The Zoom platform only allows for multiple choice responses in their polling feature which limited our typical evaluation data collection. In addition, the first two sessions have no feedback due to technical difficulties with the ZOOM platform. The feedback will be used to improve future sessions. The feedback received from participants is generally constructive criticism used to keep sessions updated but also to propose future potential topics and questions to the Integrated Design Lab.

2.1 SESSION 1: RADIANT HEATING AND COOLING DESIGN (05/07/2020)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building 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:	05/07/20
Location:	Architectural Firm 1 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	2		

2.2 SESSION 2: COVID-19 BUILDINGS HEALTH AND ENERGY (07/29/2020)

Title: Covid-19 Building Health and Energy

Description: COVID19 has immediately impacted building design and operation and the results will transform architecture, commissioning, and building operation practices for decades to come. It is also shifting the conversations and priorities around human health, energy efficiency, and non-energy benefits. Dr. Van Den Wymelenberg is an expert in indoor air quality and directs the University of Oregon Biology and the Built Environment (BioBE) Center that has been studying the indoor microbiome with funding from the Alfred P. Sloan Foundation. He will contextualize the current pandemic with regard to historic changes to architectural design following previous pandemics, summarize a decade of discovery about the indoor microbiome (including information about fungi, bacteria, and viruses), present results from testing buildings for the novel coronavirus over the last four months. He will provide insights into how to reopen and operate buildings to support human health as we move forward through and beyond COVID19, and facilitate a discussion about the balance (conflicts and synergies) between health and energy in buildings.

Presentation Info:

Date:	07/29/20
Location:	Open Webinar
Presenter:	Kevin Van Den Wymelenberg

Attendance:

Architect:	26	Electrician:	
Engineer:	16	Contractor:	
Mech. Engineer:		Other*:	54
Elec. Engineer:		None Specified:	1
Total (Online):	97		

2.3 SESSION 3: VRF'S AND HEAT PUMPS (08/11/2020)

Title: VRF's 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:	08/11/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	8	Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		Other*:	10
Elec. Engineer:		None Specified:	1
Total (Online):	**27**		

2.4 SESSION 4: DAYLIGHTING MULTIPLIERS (08/12/2020)

Title: Daylighting Multipliers

Description: This session will cover the role that daylighting multipliers play when trying to increase the efficiency of daylight harvesting in a building through design applications, such as, light shelves, manufactured glazing, and material specification. Participants will learn about the rate of return and energy efficiency cost effectiveness for daylighting strategies, building form, location, and multipliers. The class will explain how the layers of daylighting/electric lighting strategies and control systems and how they add or subtract to the overall efficiency of the design.

Presentation Info:

Date:	08/12/20
Location:	Architectural Firm 2 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

2.5 SESSION 5: THE ARCHITECT'S BUSINESS CASE FOR ENERGY MODELING (08/25/2020)

Title: The Architect's Business Case for Energy 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:	08/25/20
Location:	Open Webinar
Presenter:	Ken Baker

Attendance:

Architect:	6	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other*:	11
Elec. Engineer:		None Specified:	
Total (Online):	**21**		

2.6 SESSION 6: HIGH PERFORMANCE CLASSROOMS (08/25/2020)

Title: High Performance Classrooms

Description: Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state over the last 50 years of school design will introduce the problems faced by designers. This session will highlight several case studies of high-performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

Presentation Info:

Date:	08/25/20
Location:	Architecture Firm 3 - Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	7	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	1
Total (Online):	**8**		

2.7 SESSION 7: RADIANT SYSTEM DESIGN CONSIDERATIONS (09/01/2020)

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:	09/01/20
Location:	Architecture Firm 3 - Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	1
Elec. Engineer:		None Specified:	
Total (Online):	7		

2.8 SESSION 8: DAYLIGHTING MULTIPLIERS (09/08/2020)

Title: Daylighting Multipliers

Description: This session will cover the role that daylighting multipliers play when trying to increase the efficiency of daylight harvesting in a building through design applications, such as, light shelves, manufactured glazing, and material specification. Participants will learn about the rate of return and energy efficiency cost effectiveness for daylighting strategies, building form, location, and multipliers. The class will explain how the layers of daylighting/electric lighting strategies and control systems and how they add or subtract to the overall efficiency of the design.

Presentation Info:

Date:	09/08/20
Location:	Open Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	7	Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other:	6
Elec. Engineer:		None Specified:	
Total (Online):	18		

2.9 SESSION 9: INDOOR AIR QUALITY (09/22/2020)

Title: Indoor Air Quality

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:	09/22/20
Location:	Open Webinar
Presenter:	Ken Baker

Attendance:

Architect:	9	Electrician:	
Engineer:	13	Contractor:	
Mech. Engineer:		Other:	24
Elec. Engineer:		None Specified:	
Total (Online):	**46**		

2.10 SESSION 10: HIGH PERFORMANCE CLASSROOMS (10/20/2020)

Title: High Performance Classrooms

Description: Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state over the last 50 years of school design will introduce the problems faced by designers. This session will highlight several case studies of high-performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

Presentation Info:

Date:	10/20/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	7	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other:	10

Elec. Engineer:		None Specified:	
Total (Online):	21		

2.11 SESSION 11: HIGH PERFORMANCE CLASSROOMS (10/22/2020)

Title: High Performance Classrooms

Description: Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state over the last 50 years of school design will introduce the problems faced by designers. This session will highlight several case studies of high-performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

Presentation Info:

Date:	10/22/20
Location:	Architectural Firm 4 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		Other:	2
Elec. Engineer:		None Specified:	
Total (Online):	9		

2.12 SESSION 12: DAYLIGHT IN BUILDINGS: GETTING THE DETAILS RIGHT (10/29/2020)

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:	10/29/20
Location:	Architectural Organization 1 – Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	6	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**13**		

2.13 SESSION 13: LUMINAIRE LEVEL LIGHTING CONTROLS (11/03/20)

Title: Luminaire Level Lighting Controls

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. 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. Some LLLCs can be connected by gateway to transfer information collected. This data is analyzed, usually through manufacturer's software, to provide a user interface different from a typical text editor. From there users are able to identify trends in occupancy and lighting energy consumption that can then be used to refine the building schedules for occupancy and lighting and, if applicable, for the buildings' HVAC schedule programming.

Presentation Info:

Date:	11/03/20
Location:	Open Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	7	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		Other:	8
Elec. Engineer:		None Specified:	
Total (Online):	**17**		

2.14 SESSION 14: VRF'S AND HEAT PUMPS (11/04/2020)

Title: VRF's 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:	11/04/20
Location:	Architectural Organization 2 – Webinar
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	5
Elec. Engineer:		None Specified:	
Total (Online):	**11**		

2.15 SESSION 15: INDOOR AIR QUALITY (11/09/2020)

Title: Indoor Air Quality

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:	11/09/20
Location:	Architectural Organization 1 – Webinar
Presenter:	Ken Baker

Attendance:

Architect:	1	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	**1**		

2.16 SESSION 16: THE ARCHITECT'S BUSINESS CASE FOR ENERGY MODELING (11/12/2020)

Title: The Architect's Business Case for Energy 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:	11/12/20
Location:	Architecture Firm 4 – Boise, ID
Presenter:	Ken Baker

Attendance:

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

2.17 SESSION 17: DOAS INTEGRATION (11/17/2020)

Title: DOAS Integration

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:	11/17/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**16**		

2.18 SESSION 18: CHILLED BEAMS (12/01/2020)

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:	12/01/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**15**		

2.19 SESSION 19: THE FUTURE OF LIGHTING CONTROLS (12/15/2020)

Title: The 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:	12/15/20
Location:	Open Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	3	Electrician:	1
Engineer:	2	Contractor:	
Mech. Engineer:		Other*:	8

Elec. Engineer:		None Specified:	
Total (Online):	**14**		

2.20 SESSION 20: GROUND SOURCE HEAT PUMPS (12/15/2020)

Title: Ground Source Heat Pumps

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:	12/16/20
Location:	Architectural Organization 2 – Webinar
Presenter:	Damon Woods

Attendance:

Architect:	5	Electrician:	1
Engineer:	3	Contractor:	
Mech. Engineer:		Other*:	4
Elec. Engineer:		None Specified:	
Total (Online):	**13**		

3. FUTURE WORK

Feedback was gathered from the 141 Lunch and Learn evaluations received throughout 2020. The comments from these were valuable but were limited in the type of response that could be given, therefore, there are no recommended topics for 2021. If the online format of presentations continues into 2021, the IDL will investigate alternative evaluations options to collect data.

4. APPENDICES

APPENDIX A: SESSION SUMMARIES

At the conclusion of each lunch and learn session, an evaluation poll via Zoom was presented to each participant. The feedback was used to improve future sessions. Below are summaries of session information, attendance counts, and the feedback received from the evaluation forms. It should be noted that comments recorded from evaluations were not collected due to limitations with the ZOOM platform which only allows for multiple choice polling to participants.

4.1.1 SESSION 1: RADIANT HEATING AND COOLING DESIGN (05/07/2020)

Title: Radiant Heating and Cooling Design

Description: Designing for radiant systems and thermally active surfaces represents a key opportunity for integrated design and high-performance buildings. While radiant systems can be inherently more energy efficient than air-based systems, their success requires close collaboration between architects and engineers to ensure that the building 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:	05/07/20
Location:	Architectural Firm 1 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	2		

Evaluations: No evaluations were collected due to technical difficulties with the ZOOM platform.

		Scale
In general, today's presentation was:	**0.0**	1 Not Useful - 5 Very Useful
Rate organization:	**0.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**0.0**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**0.0**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**0.0**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**0.0**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**0.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

4.1.2 SESSION 2: COVID-19 BUILDINGS HEALTH AND ENERGY (07/29/2020)

Title: Covid-19 Buildings Health and Energy

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

Presentation Info:

Date:	07/29/20
Location:	Engineering Firm 1 – Boise, ID
Presenter:	Kevin Van Den Wymelenberg

Attendance:

Architect:	26	Electrician:	
Engineer:	16	Contractor:	
Mech. Engineer:		Other*:	54
Elec. Engineer:		None Specified:	1
Total (Online):	**97**		

Evaluations: No evaluations were collected due to technical difficulties with the ZOOM platform.		**Scale**
In general, today's presentation was:	**0.0**	1 Not Useful - 5 Very Useful
Rate organization:	**0.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**0.0**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**0.0**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**0.0**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**0.0**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**0.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments:

4.1.3 SESSION 3: VRF'S AND HEAT PUMPS (08/11/2020)

Title: VRF's 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:	08/11/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	8	Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		Other*:	10
Elec. Engineer:		None Specified:	1
Total (Online):	**27**		

Evaluations: No evaluations were collected for this webinar.

		Scale
In general, today's presentation was:	**4.3**	1 Not Useful - 5 Very Useful
Rate organization:	**4.2**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.4**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.1**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.6**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.2**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.4 SESSION 4: DAYLIGHTING MULTIPLIERS (08/12/2020)

Title: Daylighting Multipliers

Description: This session will cover the role that daylighting multipliers play when trying to increase the efficiency of daylight harvesting in a building through design applications, such as, light shelves, manufactured glazing, and material specification. Participants will learn about the rate of return and energy efficiency cost effectiveness for daylighting strategies, building form, location, and multipliers. The class will explain how the layers of daylighting/electric lighting strategies and control systems and how they add or subtract to the overall efficiency of the design.

Presentation Info:

Date:	08/12/20
Location:	Architectural Firm 2 – Boise, ID
Presenter:	Dylan Agnes

Attendance:

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

Evaluations:

		Scale
In general, today's presentation was:	**4.0**	1 Not Useful - 5 Very Useful
Rate organization:	**3.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.5**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.5**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.0**	1 Needs Improvement - 5 Excellent

Rate delivery of presentation:	**4.5**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**5.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.5 SESSION 5: THE ARCHITECT'S BUSINESS CASE FOR ENERGY MODELING (08/25/2020)

Title: The Architect's Business Case for Energy 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:	08/25/20
Location:	Open Webinar
Presenter:	Ken Baker

Attendance:

Architect:	6	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other*:	11
Elec. Engineer:		None Specified:	
Total (Online):	**21**		

Evaluations:		**Scale**
In general, today's presentation was:	**3.9**	1 Not Useful - 5 Very Useful
Rate organization:	**3.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.1**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.1**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.4**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.5**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**4.1**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.6 SESSION 6: HIGH PERFORMANCE CLASSROOMS (08/25/2020)

Title: High Performance Classrooms

Description: Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state over the last 50 years of school design will introduce the problems faced by designers. This session will highlight several case studies of high-performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

Presentation Info:

Date:	08/25/20
Location:	Architecture Firm 3 - Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	7	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	1
Total (Online):	**8**		

Evaluations:		**Scale**
In general, today's presentation was:	**4.8**	1 Not Useful - 5 Very Useful
Rate organization:	**3.8**	1 Needs Improvement - 5 Excellent
Rate clarity:	**5.0**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.8**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.8**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**5.0**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**5.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.7 SESSION 7: RADIANT SYSTEM DESIGN CONSIDERATIONS (09/01/2020)

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:	09/01/20
Location:	Architecture Firm 3 - Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	1
Elec. Engineer:		None Specified:	
Total (Online):	7		

Evaluations:

		Scale
In general, today's presentation was:	3.0	1 Not Useful - 5 Very Useful
Rate organization:	4.4	1 Needs Improvement - 5 Excellent
Rate clarity:	4.3	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.6	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.6	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	5.0	1 Needs Improvement - 5 Excellent
The content of the presentation was:	4.7	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.8 SESSION 8: DAYLIGHTING MULTIPLIERS (09/08/2020)

Title: Daylighting Multipliers

Description: This session will cover the role that daylighting multipliers play when trying to increase the efficiency of daylight harvesting in a building through design applications, such as, light shelves, manufactured glazing, and material specification. Participants will learn about the rate of return and energy efficiency cost effectiveness for daylighting strategies, building form, location, and multipliers. The class will explain how the layers of daylighting/electric lighting strategies and control systems and how they add or subtract to the overall efficiency of the design.

Presentation Info:

Date:	07/09/20

Location:	Open Webinar		
Presenter:	Dylan Agnes		

Attendance:

Architect:	7	Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other:	6
Elec. Engineer:		None Specified:	
Total (Online):	**18**		

Evaluations:		**Scale**
In general, today's presentation was:	**4.0**	1 Not Useful - 5 Very Useful
Rate organization:	**3.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.4**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.3**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.6**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.9**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**4.0**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.9 SESSION 9: INDOOR AIR QUALITY (09/22/2020)

Title: Indoor Air Quality

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:	09/22/20
Location:	Open Webinar
Presenter:	Ken Baker

Attendance:

Architect:	9	Electrician:	
Engineer:	13	Contractor:	
Mech. Engineer:		Other:	24
Elec. Engineer:		None Specified:	
Total (Online):	**46**		

Evaluations:

		Scale
In general, today's presentation was:	4.1	1 Not Useful - 5 Very Useful
Rate organization:	3.0	1 Needs Improvement - 5 Excellent
Rate clarity:	4.2	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	3.9	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	3.2	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.7	1 Needs Improvement - 5 Excellent
The content of the presentation was:	4.1	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on evaluations collected.

4.1.10 SESSION 10: HIGH PERFORMANCE CLASSROOMS (10/22/2020)

Title: High Performance Classrooms

Description: Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state over the last 50 years of school design will introduce the problems faced by designers. This session will highlight several case studies of high-performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

Presentation Info:

Date:	10/22/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	7	Electrician:	
Engineer:	4	Contractor:	
Mech. Engineer:		Other:	10
Elec. Engineer:		None Specified:	
Total (Online):	21		

Evaluations:

		Scale
In general, today's presentation was:	5.0	1 Not Useful - 5 Very Useful
Rate organization:	3.0	1 Needs Improvement - 5 Excellent
Rate clarity:	4.5	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.8	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent

Rate delivery of presentation:	4.8	1 Needs Improvement - 5 Excellent
The content of the presentation was:	5.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.11 SESSION 11: HIGH PERFORMANCE CLASSROOMS (10/22/2020)

Title: High performance Classrooms

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:	10/22/20
Location:	Architectural Firm 4 – Boise, ID
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:	1	Contractor:	
Mech. Engineer:		Other:	2
Elec. Engineer:		None Specified:	
Total (Online):	9		

Evaluations:		**Scale**
In general, today's presentation was:	4.8	1 Not Useful - 5 Very Useful
Rate organization:	3.2	1 Needs Improvement - 5 Excellent
Rate clarity:	4.6	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	5.0	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	5.0	1 Needs Improvement - 5 Excellent
The content of the presentation was:	5.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.12 SESSION 12: DAYLIGHT IN BUILDINGS – GETTING THE DETAILS RIGHT (10/29/2020)

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:	10/29/2020
Location:	Architectural Organization 1 – Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	6	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**13**		

Evaluations: No evaluation were handed out		**Scale**
In general, today's presentation was:	**4.5**	1 Not Useful - 5 Very Useful
Rate organization:	**4.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**3.5**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**3.5**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**3.5**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.5**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.5**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.13 SESSION 13: LUMINAIRE LEVEL LIGHTING CONTROLS (11/03/20)

Title: Luminaire Level Lighting Controls

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. 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. Some LLLCs can be connected by gateway to transfer information collected. This data is analyzed, usually through manufacturer's software, to provide a user interface different from a typical text editor. From there users are able to identify trends in occupancy and lighting energy consumption that can then be used to refine the building schedules for occupancy and lighting and, if applicable, for the buildings' HVAC schedule programming.

Presentation Info:

Date:	11/03/20
Location:	Open Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	7	Electrician:	
Engineer:	2	Contractor:	
Mech. Engineer:		Other:	8
Elec. Engineer:		None Specified:	
Total (Online):	**17**		

Evaluations: No evaluations were handed out

		Scale
In general, today's presentation was:	**4.9**	1 Not Useful - 5 Very Useful
Rate organization:	**3.0**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.7**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.8**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.3**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**4.9**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**4.6**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.14 SESSION 14: VRF'S AND HEAT PUMPS (11/04/2020)

Title: VRF's 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:	11/04/20
Location:	Architectural Organization 2 – Webinar
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	5
Elec. Engineer:		None Specified:	
Total (Online):	11		

Evaluations:		**Scale**
In general, today's presentation was:	5.0	1 Not Useful - 5 Very Useful
Rate organization:	3.0	1 Needs Improvement - 5 Excellent
Rate clarity:	4.5	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.8	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.8	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	5.0	1 Needs Improvement - 5 Excellent
The content of the presentation was:	4.8	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.15 SESSION 15: INDOOR AIR QUALITY (11/09/2020)

Title: Indoor Air Quality

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:	11/09/20
Location:	Architectural Organization 1 – Webinar
Presenter:	Ken Baker

Attendance:

Architect:	1	Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other:	
Elec. Engineer:		None Specified:	
Total (Online):	1		

Evaluations: No evaluations were handed out		**Scale**
In general, today's presentation was:	5.0	1 Not Useful - 5 Very Useful

Rate organization:	3.0	1 Needs Improvement - 5 Excellent
Rate clarity:	5.0	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	5.0	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	5.0	1 Needs Improvement - 5 Excellent
The content of the presentation was:	5.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.16 SESSION 16: THE ARCHITECT'S BUSINESS CASE FOR ENERGY MODELING (11/12/2020)

Title: The Architect's Business Case for Energy 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:	11/12/20
Location:	Architecture Firm 1 – Boise, ID
Presenter:	Ken Baker

Attendance:

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

Evaluations:

		Scale
In general, today's presentation was:	5.0	1 Not Useful - 5 Very Useful
Rate organization:	5.0	1 Needs Improvement - 5 Excellent
Rate clarity:	4.7	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.7	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	5.0	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	5.0	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.17 SESSION 17: DOAS INTEGRATION (11/17/2020)

Title: DOAS Integration

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:	11/17/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	6	Electrician:	
Engineer:	5	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	**16**		

Evaluations:

		Scale
In general, today's presentation was:	4.3	1 Not Useful - 5 Very Useful
Rate organization:	4.6	1 Needs Improvement - 5 Excellent
Rate clarity:	4.5	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.4	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.5	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.7	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.1	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.18 SESSION 18: CHILLED BEAMS (12/01/2020)

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:	12/01/20
Location:	Open Webinar
Presenter:	Damon Woods

Attendance:

Architect:	2	Electrician:	
Engineer:	8	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	
Total (Online):	15		

Evaluations:

		Scale
In general, today's presentation was:	4.5	1 Not Useful - 5 Very Useful
Rate organization:	4.6	1 Needs Improvement - 5 Excellent
Rate clarity:	4.7	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.2	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.5	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.6	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.1	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.19 SESSION 19: THE FUTURE OF LIGHTING CONTROLS (12/15/2020)

Title: The 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:	12/15/20
Location:	Open Webinar
Presenter:	Dylan Agnes

Attendance:

Architect:	3	Electrician:	1
Engineer:	2	Contractor:	
Mech. Engineer:		Other*:	8
Elec. Engineer:		None Specified:	
Total (Online):	**14**		

Evaluations:

		Scale
In general, today's presentation was:	**4.0**	1 Not Useful - 5 Very Useful
Rate organization:	**4.2**	1 Needs Improvement - 5 Excellent
Rate clarity:	**4.1**	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	**4.5**	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	**4.3**	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	**3.8**	1 Needs Improvement - 5 Excellent
The content of the presentation was:	**3.1**	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

4.1.20 SESSION 20: GROUND SOURCE HEAT PUMPS (12/16/2020)

Title: Ground Source Heat Pumps

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:	12/16/20

Location:	Architectural Organization 2 – Webinar
Presenter:	Damon Woods

Attendance:

Architect:	5	Electrician:	1
Engineer:	3	Contractor:	
Mech. Engineer:		Other*:	4
Elec. Engineer:		None Specified:	
Total (Online):	13		

Evaluations:

		Scale
In general, today's presentation was:	4.4	1 Not Useful - 5 Very Useful
Rate organization:	4.3	1 Needs Improvement - 5 Excellent
Rate clarity:	4.2	1 Needs Improvement - 5 Excellent
Rate opportunity for questions:	4.3	1 Needs Improvement - 5 Excellent
Rate instructor's knowledge of the subject matter:	4.6	1 Needs Improvement - 5 Excellent
Rate delivery of presentation:	4.3	1 Needs Improvement - 5 Excellent
The content of the presentation was:	3.0	1 Too Basic - 3 Just Right - 5 Too Advanced

Comments: No comments were made on the evaluations collected.

APPENDIX B: LUNCH AND LEARN 2020 TOPICS OFFERED

HIGH PERFORMANCE CLASSROOMS (TOPIC 2001)

Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state over the last 50 years of school design will introduce the problems faced by designers. This session will highlight several case studies of high-performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

OPENSTUDIO – PARAMETRIC ANALYSIS TOOL (TOPIC 2002)

This session will cover the parametric analysis tool (PAT) within OpenStudio. PAT removes the need to hand edit each model to try out different architectural design, energy efficiency measures, or mechanical systems. Participants will learn the fundamental concepts of measure writing for OpenStudio, simulation parameters, running a simulation with PAT, and how firms can utilize this feature to inform early design decisions in regards to building performance.

DAYLIGHTING MULTIPLIERS – INCREASING DAYLIGHT HARVESTING EFFICIENCY (TOPIC 2003)

This session will cover the role that daylighting multipliers play when trying to increase the efficiency of daylight harvesting in a building through design applications, such as, light shelves, manufactured glazing, and material specification. Participants will learn about the rate of return and energy efficiency cost effectiveness for daylighting strategies, building form, location, and multipliers. The class will explain how the layers of daylighting/electric lighting strategies and control systems and how they add or subtract to the overall efficiency of the design.

HIGH EFFICIENCY HEAT RECOVERY (TOPIC 1903)

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.

FUTURE OF LIGHTING CONTROLS (TOPIC 1901)

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.

THE ARCHITECTS' BUSINESS CASE FOR ENERGY PERFORMANCE MODELING (TOPIC 1902)

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.

Luminaire Level Lighting Controls (LLLCs) (Topic 1904)

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. 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. Some LLLCs can be connected by gateway to transfer information collected. This data is analyzed, usually through manufacturer's software, to provide a user interface different from a typical text editor. From there users are able to identify trends in occupancy and lighting energy consumption that can then be used to refine the building schedules for occupancy and lighting and, if applicable, for the buildings' HVAC schedule programming.

Daylight in Buildings: Getting the Details Right (HSW) (Topic 1409)

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.

Radiant Heating and Cooling Design (HSW) (Topic 1407)

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.

HYBRID GROUND SOURCE HEAT PUMP SYSTEM (HSW) (TOPIC 1420)

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.

INDOOR AIR QUALITY (IAQ) AND ENERGY EFFICIENCY IN BUILDINGS (HSW) (TOPIC 1702)

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.

CHILLED BEAMS (TOPIC 1801)

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

VRFS & HEAT PUMPS (TOPIC 1802)

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

.

2020 Task 3: BSUG

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2020

Prepared for:

Idaho Power Company

Author:

Dylan Agnes

Report Number: 2001_003-01

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Prepared for:
Idaho Power Company

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IPC KIT # 5277

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DISCLAIMER

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

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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 2020 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. Added this year was the IDL launch of a new website (http://www.idlboise.com/content/bsug-20).

3. 2020 Summary and Cumulative Analysis

In 2020, six sessions were coordinated and hosted. Sessions are summarized below with details in the following sections. The February session was held in-person while the remaining sessions were held as online only.

Table 1: Overall Summary of Sessions

Date	Title	Presenter	Presenter Company	RSVPs		Attendees	
				In-person	Online	In-person	Online
2/13	Trends: Buildings, Technologies and Tools	Dru Crawley	ASHRAE	16	-	12	0
7/30	The State of Autodesk Simulation Software – Revit	Dylan Agnes	IDL	-	41	0	15
8/26	Utilizing Grasshopper and Ladybug in the Design Process	Ryan Schwartz	Cushing Terrell	-	56	0	28
9/30	Revit's Insight Daylighting Analysis	Dylan Agnes	IDL	-	12	0	9
10/28	Energy Modeling for Code Compliance	Tim Johnson	Cushing Terrell	-	51	0	26
11/18	High Performance Classrooms	Damon Woods	IDL	-	43	0	15
			Total:	**16**	**203**	**12**	**93**
				219		**105**	

3.1 2020 Attendance

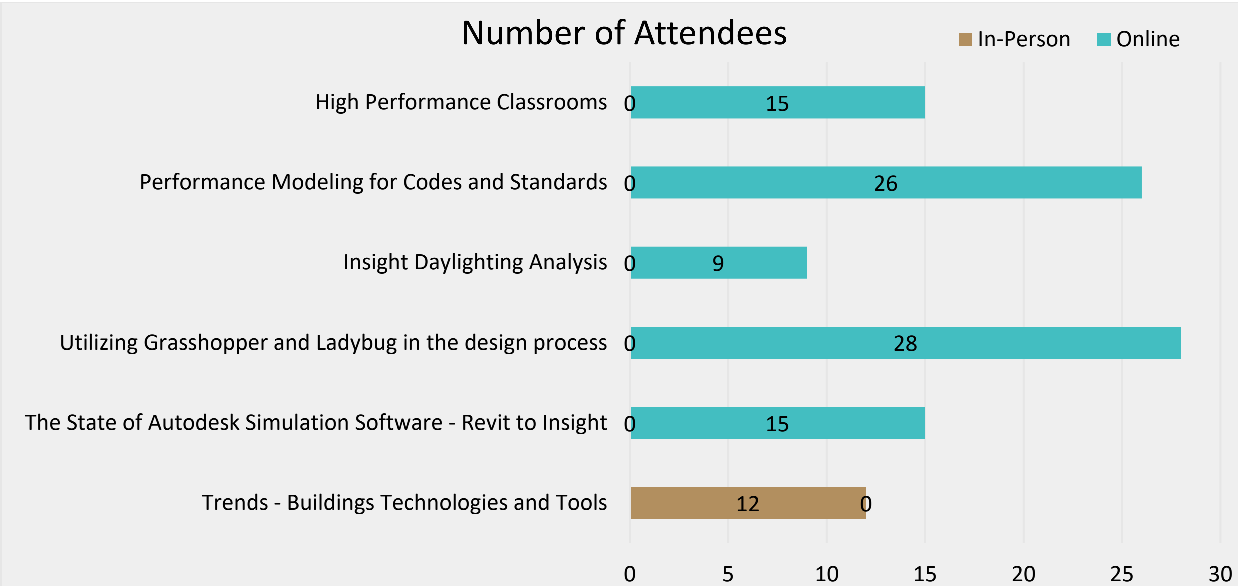


Figure 1: Attendee Count by Session and Type

Table 2: Overall Attendance Breakdown

Architect:	7	Electrician:	
Engineer:	18	Contractor:	
Mech. Engineer:	7	Other:	15
Elec. Engineer:	1	None Specified:	57
Total (In-Person):	**12**		
Total (Online):	**93**		
Total (Combined):	**105**		

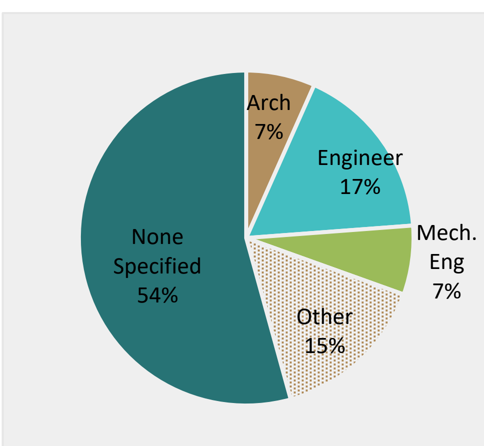


Figure 2: Attendee Profession Breakdown

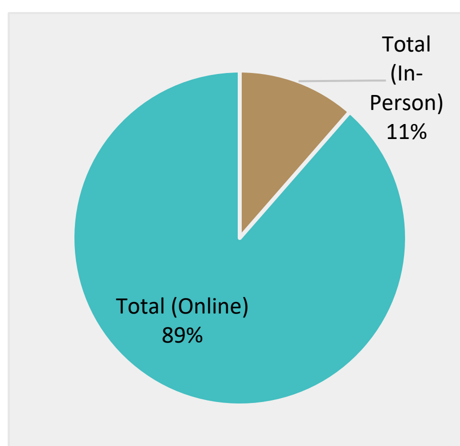


Figure 3: Attendee Type Breakdown

3.2 2020 Evaluations

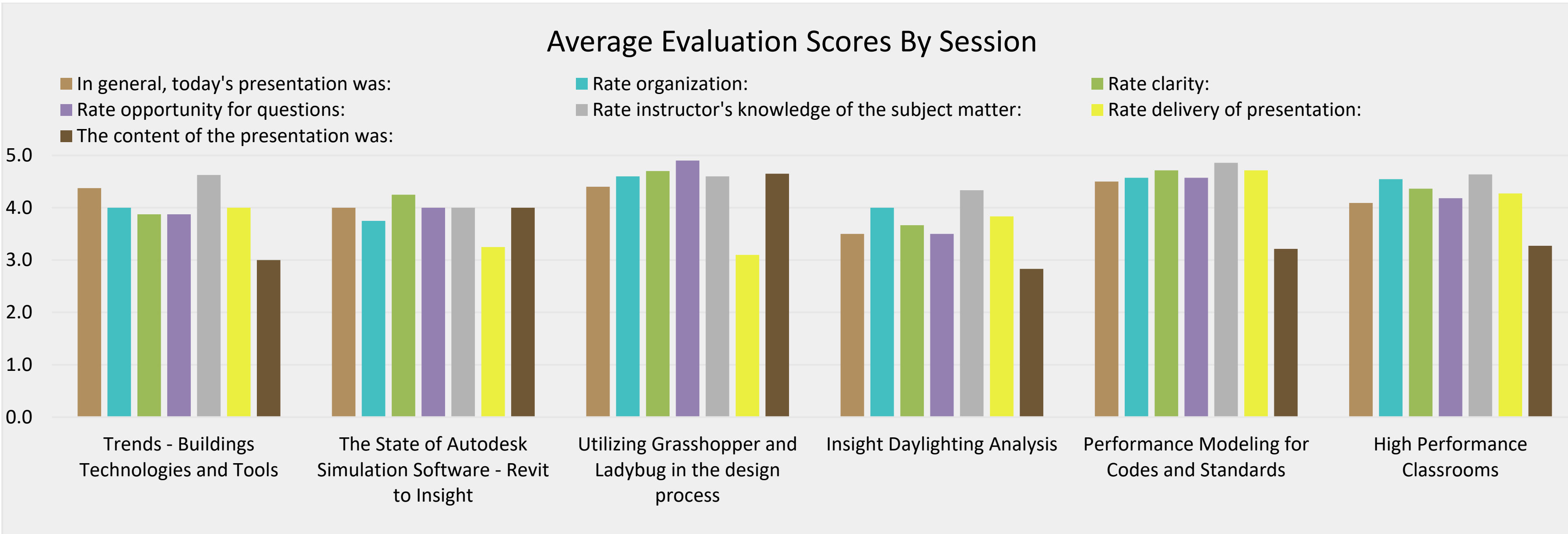
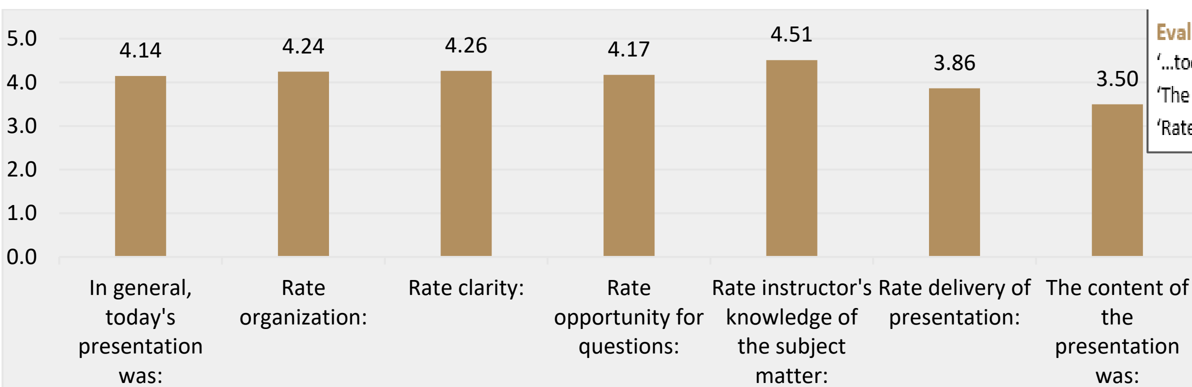


Figure 4: Average Evaluations by Session



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: Trends – Buildings Technologies and Tools (2/13/20)

Title: Trends – Buildings Technologies and Tools

Date: 02/13/20

Description: The buildings industry faces many challenges and opportunities over the next few decades. Over the next ten years, changes in building technology—particularly wireless controls and solid-state lighting—will profoundly alter how our buildings are designed, built, and operated. Building energy simulation (SIM) has evolved into a powerful tool for evaluating the energy performance of potential or existing buildings. Building simulation allows easy comparison of the energy and environmental performance of many hundreds of design or retrofit options. The buildings touted today as 'net-zero energy' or 'sustainable' would not be possible without energy simulation—but no single simulation tool can model all aspects of our buildings today. This presentation provides an overview of trends and drivers affecting the building industry as well as the simulation tools of tomorrow.

Presenter: Dru Crawley

Attendance:

Architect:	1	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:	7	Other*:	
Elec. Engineer:	1	None Specified:	
Total (In-Person):	**12**		
Total (Online):			
*If 'Other' was noted:			

4.2 Session 2: The State of Autodesk Simulation Software (07/30/20)

Title: The State of Autodesk Simulation Software

Date: 07/30/20

Description: In this presentation will we review the state of Autodesk simulation software, Insight and how it compares to the traditional energy model workflow of EnergyPlus and Open Studio. Insight is a cloud-based analysis tool which evolved from a previous Autodesk software, Green Building Studio, and focuses on energy and environmental performance as well as improving BIM workflow integration. Insight is an overlay type of integration with Revit models of various detail from conceptual massing to detailed Architectural models so that design decisions can be analyzed to measure the impact on the overall building performance through the design process. Insight simulation and analysis focuses on the following three areas: energy, daylighting, and solar analysis. We will review in detail the workflow, types of simulation engines, simulation parameters, and results analysis for Autodesk Insight which will then be compared against EnergyPlus and Radiance models.

Presenter: Dylan Agnes

Attendance:

Architect:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	15
Total (In-Person):	**0**		
Total (Online):	**15**		
*If 'Other' was noted:			

4.3 Session 3: Utilizing Grasshopper and Ladybug in the Design Process (08/26/20)

Title: Utilizing Grasshopper and Ladybug in the Design Process

Date: 08/26/20

Description: As we look to design more sustainable buildings, energy models must be nimble enough to influence design rather than simply document performance. Utilizing energy simulation tools to explore hundreds of options during early design helps the design team focus on the features that have the greatest impact on performance. This presentation will introduce Grasshopper visual scripting and the many plugins that can be used to inform design decisions through parametric energy modeling.

Presenter: Ryan Schwartz

Attendance:

Architect:	2	Electrician:	
Engineer:	9	Contractor:	
Mech. Engineer:		Other*:	5
Elec. Engineer:		None Specified:	12
Total (In-Person):	**0**		
Total (Online):	**28**		
*If 'Other' was noted:	Energy Consulting/Manager/Modeler		

4.4 Session 4: Insight Daylighting Analysis (09/30/20)

Title: Insight Daylighting Analysis

Date: 09/30/20

Description: In this presentation will we review the state of Autodesk simulation software, Insight and how it compares to the traditional model workflow of Daylighting with Radiance. Insight is a cloud-based analysis tool which evolved from a previous Autodesk software, Green Building Studio, and focuses on energy and environmental performance as well as improving BIM workflow integration. Insight is an overlay type of integration with Revit models of various detail from conceptual massing to detailed Architectural models so that design decisions can be analyzed to measure the impact on the overall building performance through the design process. Insight simulation and analysis focuses on the following three areas: energy, daylighting, and solar analysis. We will review in detail the workflow, types of simulation engines, simulation parameters, and results analysis for Insight's Daylighting (via Revit Model) which will then be compared against Radiance models (SketchUp).

Presenter: Dylan Agnes

Attendance:

Architect:	2	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other*:	4
Elec. Engineer:		None Specified:	
Total (In-Person):	**0**		
Total (Online):	**9**		
*If 'Other' was noted:	Designer, Sustainability Specialist, Director, and Building System Analysist		

4.5 Session 5: Performance Modeling for Codes and Standards (10/28/20)

Title: Performance Modeling for Codes and Standards

Date: 10/28/20

Description: Do you ever wonder what happens if you design an efficient building, but it doesn’t meet all the prescriptive requirements of the IECC or ASHRAE 90.1? This session will explore the performance compliance paths for the IECC and ASHRAE 90.1. We’ll discuss building systems that often require performance based compliance, like mass walls, high window to wall ratios, and economizers, as well as strategies to keep your energy targets on track as you progress through the design. This session will help you not only comply with code, but also employ strategies to make your building as efficient and economical as possible. Remember, energy code is the lowest building efficiency allowed by law.

Presenter: Tim Johnson

Attendance:

Architect:	2	Electrician:	
Engineer:	3	Contractor:	
Mech. Engineer:		Other*:	6
Elec. Engineer:		None Specified:	15
Total (In-Person):	**0**		
Total (Online):	**26**		
*If 'Other' was noted:	Energy Manager/Modeler and Designer		

4.6 Session 6: High Performance Classrooms (11/18/20)

Title: High Performance Classrooms

Date: 11/18/20

Description: Student enrollment in Ada County is projected to grow by 1,000 students per year for the next ten years and at least six capital projects are planned in the West Ada District alone to meet this demand. This session will cover a variety of issues facing the design of an efficient, healthy, and productive classroom environment. A quick look at the state of the last 50 years of school design will give an introduction to the problems faced by designers. This session will highlight several case studies of high performance schools in the Northwest to address daylighting, natural ventilation, and integration of mechanical systems. Each passive strategy will be addressed in detail with regional examples and performance research.

Presenters: Damon Woods

Attendance:

Architect:		Electrician:	
Engineer:		Contractor:	
Mech. Engineer:		Other*:	
Elec. Engineer:		None Specified:	15
Total (In-Person):			
Total (Online):	**15**		
*If 'Other' was noted:			

5. Website Maintenance and Statistics

The Google site "BSUG 2.0" was retired this year and is being integrated into the new idlboise.com website. Each month, details about the upcoming presentations were posted to the 'EVENTS and NEWS' pages. These pages also included links to both webinar and in-person registration, however, due to Covid-19 restrictions operations moved to online only. 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 video archive.

While the launch of the new idlboise.com website was planned for the second half of the year the incorporation of BSUG into the infrastructure was a reaction to the social distancing requirements per the Covid-19 pandemic. Therefore, we were unable to track our typical user data, but, we have been migrating content throughout the year to the development website which will be posted before the end of the calendar date. The IDL will build out the necessary structure and tools to track user data as it relates to BSUG content going forward into 2021. Content that will be migrated consists of training and modeling resources as well as the introduction of a blog to discuss past lecture topics and emerging building technologies or practices.

6. Other Activities and Suggestions for Future Improvements

We saw a increase in average attendance for each session this year, however, overall attendance is down from 2019. We believe this reduction is due to the switch to online webinar only format for 5 of the 6 sessions. Despite the decrease in attendance this year was successful for the BSUG task with 6 sessions completed and 105 total attendees – 12 in-person and 93 online. Feedback was provided by attendees via the ZOOM platform by conducting polls at the end of lecture or when the Q&A portion started. We received 72 responses with a response rate of 68% while in 2019 we receive 77 evaluations with a response rate of 52%. The ZOOM platform does not allow participants to give written comments as a form of feedback for polling. The IDL will investigate other methods of online evaluations if the webinar only format continues into 2021.

The IDL held its second round table discussion where participants review the topics and feedback for the year. Once the review of the year is complete the discussion shifts to what participants would like to presented at BSUG next year in the form of topics or preferred speakers. The following suggestions were made at this year round table:

- Passive Design Strategies
    - Climate design tools
- OpenStudio with Revit?
- Software tutorial to help with early design workflow
- The state of OpenStudio
    - Big Ladder?
    - Where is the program going?
- Revit with Dynamo
    - Exporting the Revit model properties for energy modeling
    - Possibly pair with OS in Revit?
- Autodesk University speakers
    - Ian Molloy
- Data Visualization
    - Carlos Duarte – Berkley

- LLLCs with live demo
- Air Quality for EE
  - Tam Duffy
- IBPSA Partnership

2020 Task 4: New Construction Verifications

Summary of Projects

Idaho Power Company External Year-End Report

December 31, 2020

Prepared for:
Idaho Power Company

Author:
Dylan Agnes

Report Number: 2001_004-01

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Prepared for:
Idaho Power Company

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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 2020. 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. However, due to the Covid-19 pandemic the NCV task was delayed for the first half of the year, in addition, no site-visits were conducted this year for any project. 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. 2020 New Construction Verification Projects

The UI-IDL completed thirteen New Construction Verification projects in 2020. 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 2020 were finalized and paid in 2020 and resided under the 2018 program format. The specific incentives for this program are outlined in Table 1 and 2.

Table 3 summarizes the thirteen projects and respective qualified incentive measures which were verified by UI-IDL. For the projects listed, more than 69% were located 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
18-047	Medical (Non-Hospital)	Boise, ID	L1	-
18-150	Industrial – Mid	Payette, ID	R5a, R5b	-
18-172	Retail (Non-Food)	Caldwell, ID	L1, L2	-
18-177	Other	Nampa, ID	CA1, CA2, CA4	-
18-186	School	Parma, ID	L1, L2, L5, A1, B1	-
18-203	Other	Pocatello, ID	L1, A1, B1	-
18-234	Office Building	Meridian, ID	L1, L2, L5	-
18-245	Other	American Falls, ID	CA1, CA2	-
18-282	Recreational Facility	Meridian, ID	L1, L2, L5, A1, A4, B1	-
18-295	Other	Hailey, ID	L1, L2, L4, L5, A1, W1, D1	-
18-384	School	Caldwell, ID	B1	-
18-401	Manufacturing	Caldwell, ID	CA1	-
18-446	Retail	Meridian, ID	A6	-

3. 2020 Photo Controls Review Projects

In 2020, the UI-IDL received at least six inquiries regarding the New Construction photo controls incentive review, however, only two qualified for an incentive. Documentation was received and final letters of support were submitted to IPC for photo controls incentive applications for two projects.

2020 Task 5: Energy Resource Library

Summary of Effort and Outcomes

Idaho Power Company External Year-End Report

December 31, 2020

Prepared for:
Idaho Power Company

Authors:
Dylan Agnes

Report Number: 2001_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
ERL	Energy Resource 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 Energy Resource Library (ERL) is a resource supported by Idaho Power Company (IPC) and managed by the University of Idaho Integrated Design Lab (UI-IDL). The ERL 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 ERL 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 ERL. 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 submit a resource questionnaire and fill out a form describing their intent and project information. Customers can also add tools to their “cart” and complete a checkout process if they don’t require the IDL assistance. When completing a resource questionnaire or the checkout process, the customer includes basic background information, project and data measurement requirements, and goals. When a request is submitted, UI-IDL staff members are alerted of a request 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. In addition, this year because of the Covid-19 pandemic we added a contactless pick-up and drop-off system. Initially, the IDL closed the ERL due to health and liability concerns at the end of March 2020, however, it was reopened mid May 2020 with the new contactless procedure. For more details on this process please see: http://www.idlboise.com/content/energy-resource-library-contact-less-pick-drop

2. Marketing

Marketing for the ERL was done at various UI-IDL and IPC activities throughout 2020, as well as on the new idlboise.com website. The flyer layout was retired during 2019 and replaced with a brochure format. The new brochure for the ERL, Figure 1 and 2, reflects the changes to the ERL overall structure as it relates to checking out tools and new categories/organization. In addition, a catalog was created that contains the full directory of tools available for check out as well as information about other Idaho Power sponsored programs. It's intended use was for distribution at various lectures so firms would have an on-hand reference for the ERL, however, due to Covid-19 the catalog has only been made available as a pdf for download and view on the idlboise.com website. You can find the catalog here: http://www.idlboise.com/content/erl-catalog-2020

The ERL 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 ERL flyer and program slides direct potential users to the ERL website for more information about the library. The main UI-IDL website hosts the ERL portal where customers can submit a resource questionnaire for assist or a request for specific tools, all online. In

2020, the ERL home page had 1,169 visitors. Changes and progress on the ERL homepage can be found in Appendix D. (http://www.idlboise.com/about-erl)

Energy Resource Library

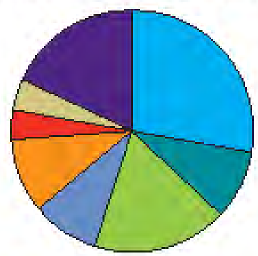
The Energy Resource Library is a free resource for Idaho Power customers. The library provides users with an easy way to assess and explore a building or systems energy performance.

These free tools and guides are available to help individuals or businesses learn more about their energy use patterns and identify opportunities for energy-saving improvements.

Typical uses for the Energy Resource Library

- Preliminary investigation: audit or study to identify energy efficiency measures (EEMs)
- Pre-implementation: baseline measurements of EEMs
- Post-implementation: verification measurements of EEMs
- Literature review

Resource Loans By Industry



28% Commercial Real Estate
9% Food Processing
18% Industrial
9% Education
10% Residential
4% Office
4% Wastewater
18% Other

Contact Us

Visit **idlboise.com** and select "Energy Resource Library" to learn more.

Integrated Design Lab
306 S. 6th Street Boise, ID 83702
208-429-0220

idl@uidaho.edu

Hours:
Monday through Thursday 8 a.m. to 4 p.m.
and Friday 10 a.m. to 3 p.m.

IDAHO POWER.
An IDACORP Company

INTEGRATED idl DESIGN LAB

Energy Resource Library

The library provides users with free tools and guides to help individuals and businesses identify opportunities for energy-saving improvements.

Energy Resource Library

Sponsored by:

FIGURE 1: ERL BROCHURE FRONT

Resource Categories

Flow Meters

Flow meters measure the velocity of a fluid with ultrasound to calculate flow rate of liquids or suspended solids traveling through a pipe by attaching to the outside. Flow data allows you to see the loads and demands on the associated system, and helps identify operational and control issues.

Data Loggers

Collecting data over an extended period of time is essential for tracking performance of a building, space or system to identify trends or anomalies. Data loggers are portable and have built in sensors that can measure and record temperatures, light levels, electrical current and more.

Current Transformers (CT)

CT's are typically used to measure alternating current. They can be easily and safely installed by slipping over electrical power wiring without interrupting service. When used in conjunction with a voltage meter, power (kW) and energy (kWh) can be calculated for a variety of applications.

Guides

A variety of guides are available to provide a better understanding of building systems and their performance, as well as the standards and codes that govern those energy performance criteria (i.e., ASHRAE handbooks and standards).

Other

Other resource categories include light, air, energy, sound, temperature and more. A complete listing of tools, guides, literature and instructions is available at idlboise.com/erl.

How to use the Energy Resource Library

First, if you do not already have one, you will need to create an account at idlboise.com. After you have an account, fill out the loan request form with the information about the location and type of project you are working on. You do not need to know what specific tools you will need. Simply describe the information you want to collect and the IDL will make sure you have the appropriate resources for your project.

If you require a tutorial or need to know how to use a specific tool, contact the IDL to set up an appointment.

Loan Request Status

You will receive the following email updates with the status of your resource loan.

Pending

Your loan request has been received and is being reviewed by the IDL. Please note that all requests require one business day for processing.

Additional Review (if applicable)

If there is a problem or clarification is needed, the IDL will contact you for additional information to accurately fulfill your request.

Approved

Once your loan request is approved, an approval email will be sent, and the resource may be picked up from the Integrated Design Lab. To request a specific pick-up time, email the IDL or mention it in the note section of the loan request form. Please note, if resources are to be shipped, the customer is responsible for all shipping charges.

Your resource loan will typically be provided in an Idaho Power mesh bag unless the tool has its own housing/storage case.

You will also receive a printed copy of your loan request form. Please save this as it's required when you return the resources.

Completed

When you are done with your resources, please return or ship them to the Integrated Design Lab at 306 S. 6th Street Boise, ID 83702. Please include your printed loan request form so that the IDL can process your return in a timely manner.

Figure 2: ERL Flyer Back

3. New Tools & Tool Calibration Plan

In 2020, thirty-four new tools were added to the ERL to replace old data logging models, to create fill gaps in tool kits as well as additional analog connectors for the XC power logger series as it was discovered the previous series connectors are not compatible.

While the goal of the ERL is energy efficiency promotion due to the Covid-19 pandemic we would like to recommend a temporary shift in our outlook when adding new tools to the library in the coming year. Specifically, we should consider, adding tools that deal with indoor environment or air quality and HVAC efficiency. While these tools will not directly measure or assist in EEM's they will add to a holistic building diagnostic as well as verifying the function of an HVAC upgrade or retrofit which may have EEM's.

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. 2020 Summary of Loans

In 2020, loan requests totaled 17 with 13 loans completed, 0 loans are on-going. The first quarter had the highest volume of loans at 6 total. Loans were made to 7 different locations and 10 unique users and 3 new ERL 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. The four loans that were not fulfilled because they requested tools the ERL does not have, such as, a O-zone meter.

Table 1 and the following figures outline the usage analysis for ERL in 2020.

TABLE 1: PROJECT AND LOAN SUMMARY

	Request Date	Location		Project	Type of Loan	# of Tools Loaned
1	1/9/2020	Salmon	ID	SETT	Verification of EEMs	13
2	1/13/2020	Boise	ID	ESLI	Verification of EEMs	1
3	1/30/2020	Boise	ID	RVDW	Audit	1
4	1/31/2020	Boise	ID	GASTR	Audit	3
5	2/19/2020	Boise	ID	TSAND	Audit	1
6	3/4/2020	Boise	ID	THPEW	Audit	11
7	6/2/2020	Eagle	ID	NHHBK	Baseline measurement of EEMs	11
8	6/11/2020	Boise	ID	CLMDI	Audit	1
9	6/15/2020	Meridian	ID	EAKM	Verification of EEMs	1
10	6/23/2020	Hailey	ID	HEADT	Audit	8
11	6/24/2020	Rexburg	ID	READT	Audit	8
12	7/15/2020	Boise	ID	IESDR	Verification of EEMs	5
13	9/15/2020	Sun Valley	ID	SVCSSR	Audit	19

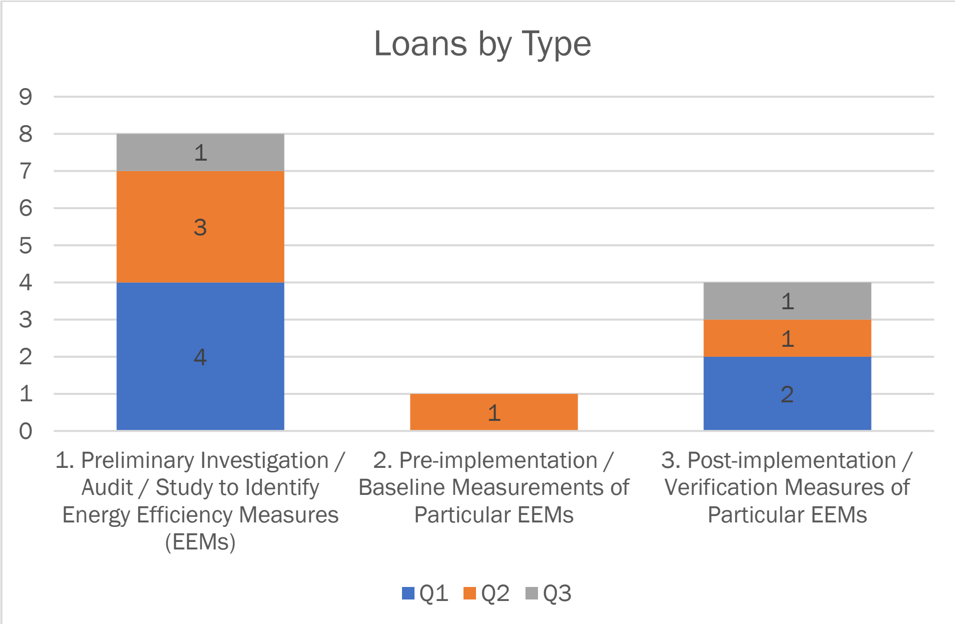


FIGURE 3: LOANS BY TYPE

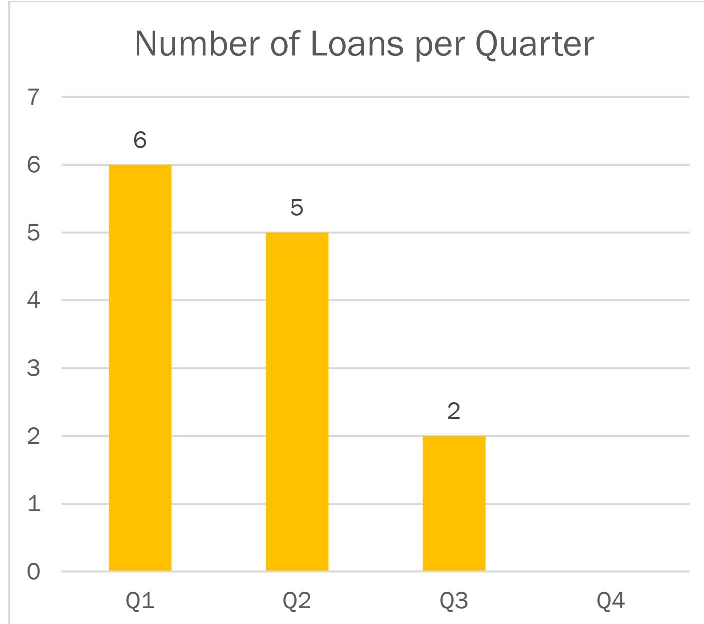


FIGURE 4: NUMBER OF LOANS PER QUARTER

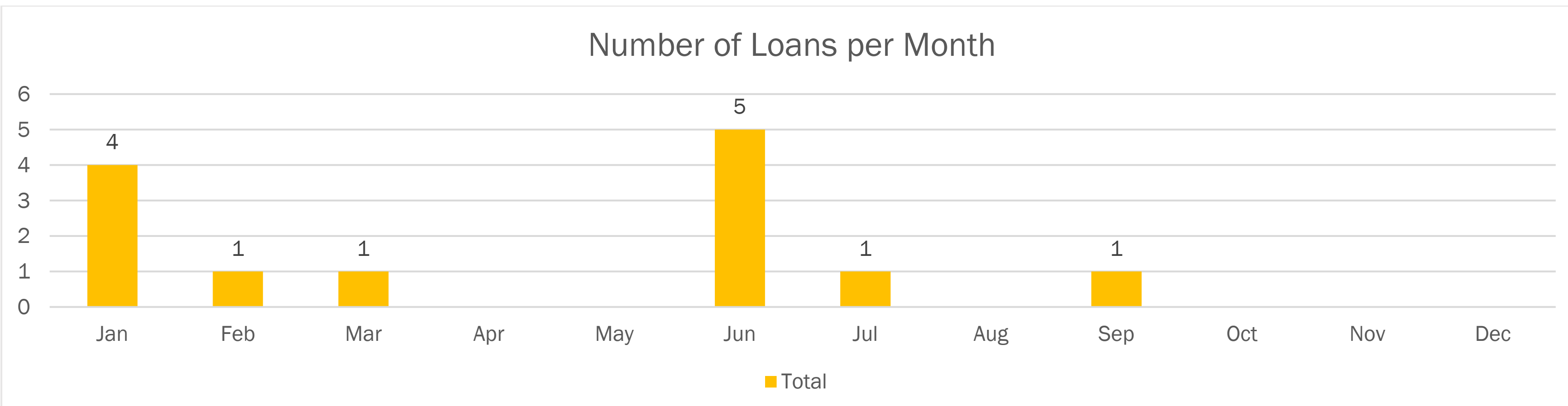


FIGURE 5: NUMBER OF LOANS PER MONTH

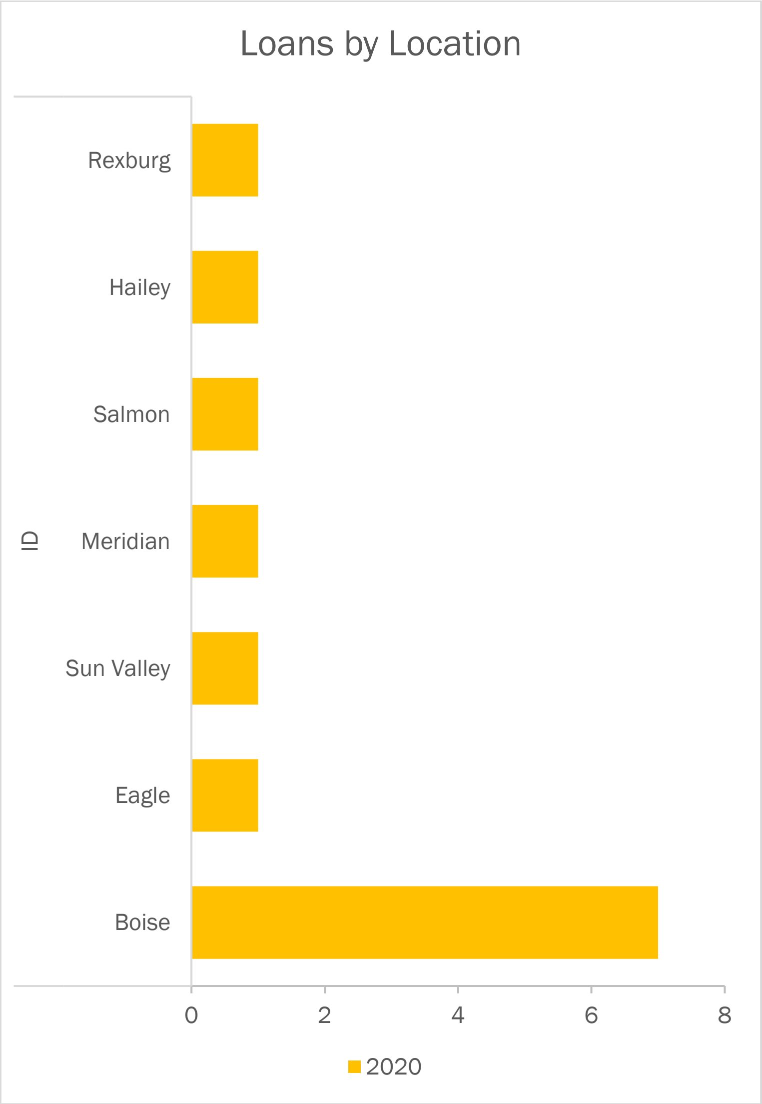


FIGURE 6: NUMBER OF LOANS BY LOCATION

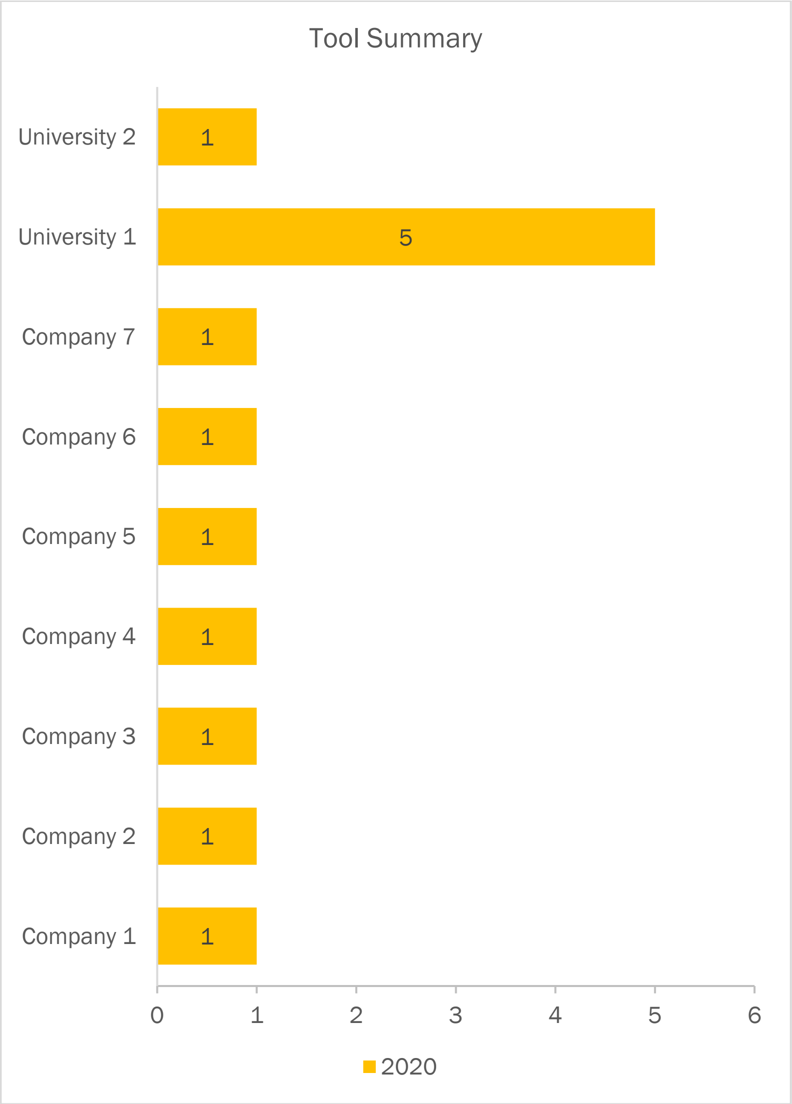


FIGURE 7: NUMBER OF LOANS BY USER

TOTAL TOOLS LOANED: **83**	Q1=30	Q2=29	Q3=24	Q4=00

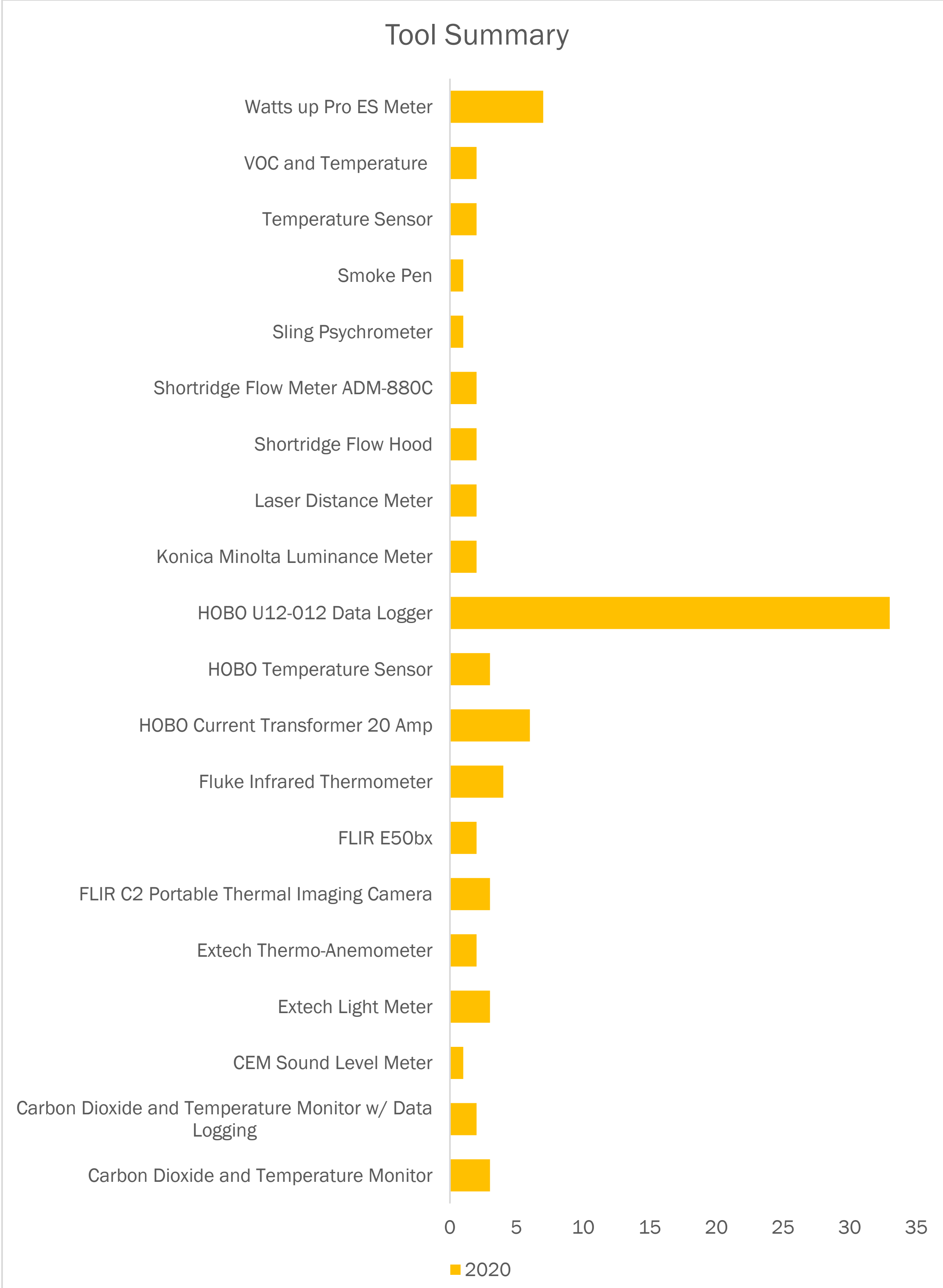


FIGURE 8: SUMMARY OF TOOLS LOANED

5. Appendices

APPENDIX A: Equipment List

The equipment in the library is tracked via excel, website, and in ERL Catalog. The website inventory is organized through several webpages but a complete listing can be found here: http://www.idlboise.com/erl

In addition, the ERL Catalog can be found on the idlboise.com website and is available for download here: http://www.idlboise.com/content/erl-catalog-2020

APPENDIX B: Website Progress

The new idlbosie.com website was launched in July of this year. ERL online platform was reorganized to account for two types of uses, returning and new customers. Customers can fill out a request form if they are new and unfamiliar with the ERL while returning customers can add tools to their cart and checkout to complete a request. The application process has been streamlined by populating fields from a user profile information. In addition, tools can now be sorted and view according to categories. Only a minor portion of development remains for the ERL website and moving forward the majority of work will shift to maintenance.

2020 Task 6: Building Energy Analytics Case Study

Summary of Work

Idaho Power Company External Year-End Report

December 31, 2020

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 2001_001-06

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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
CDD	Cooling Degree Days
DCV	Demand Control Ventilation
DDC	Direct Digital Control
DOAS	Dedicated Outdoor Air System
EMS	Energy Management System
HDD	Heating Degree Days
HVAC	Heating Ventilation and Air Conditioning
IDL	Integrated Design Lab
IPC	Idaho Power Company
NOAA	National Oceanic and Admospheric Administration
NCDC	National Climatic Data Center
PBC	Predictive Building Controls
UI	University of Idaho

1. Introduction

The original goal of this task was to implement a 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 and minimize HVAC energy consumption. This concept was explored in 2019 and the plan was to implement the technology at a site in 2020 that would serve as a case study. The plan was to compare operations under the new controls to the baseline performance recorded the year before – particularly for the cooling season. However, due to the COVID-19 pandemic, the building occupancy and operations changed dramatically. The outdoor airflow at the site was increased and the building occupancy dropped by more than 50%. Implementing the predictive control technology at the site and having it serve as a case study was no longer viable. The shift in occupancy and airflow made a direct comparison with past operations infeasible. The predictive controls rely on occupant feedback through thermostat adjustments and with several floors fully unoccupied, there could not be any feedback.

Therefore, the IDL turned our attention to building analytic strategies for future sites. The lab developed a tool to normalize operational history based on weather and locate anomalies in building energy usage. Rather than use weather forecasts, the lab applied historical records of weather and utility bills to develop a template that any building operator or owner can use. The user may enter the latest usage in Excel and receive visual feedback from the spreadsheet. Unlike a full analytic software package e.g. BuildingIQ, SkySpark, or EnergyCap, the IDL spreadsheet is a simplified method to identify when building operations drift from normal performance. This tool will be made available as a free resource to Idaho Power customers.

2. Work Summary

2.1 Importing Data

The analysis began at the monthly level as even owners without Energy Management Systems (EMS) are familiar with their monthly utility bills. The IDL began by using a set of municipal buildings as a pilot for the tool. The buildings were split into three categories based on their heating source: geothermal, gas, or electric. Differentiating the building heating types allowed the correlations between use and weather patterns to show up more clearly. The more records the user has, the better the spreadsheet can identify trends.

The user can then import weather history – specifically the monthly Heating Degree Days (HDD) and Cooling Degree Days (CDD) with a base of 65°F. Instructions are provided in the user guide (see appendix) on how to collect this information from weather.gov. The spreadsheet template is currently set up for Boise, but users may follow the instructions to find this information for any location in the US. The user then matches the months of weather history to the months of utility history. The spreadsheet separates the combined utility and weather data into two different columns: heating and cooling seasons. This does not mean that the energy used during these different seasons is necessarily used directly for HVAC. For example, gas consumption may be tied to domestic hot water production in either the heating or the cooling season. Similarly the electrical use may be tied to lighting in the evenings, showing an inverse trend with the outdoor temperature. However, differentiating the seasons may provide unexpected insights on energy use patterns. The spreadsheet default assumes a cooling season of May through September and a heating season of October through April, but the user can alter these months if desired.

One of the challenges of performing analytics is accounting for operation anomalies. For example, if a boiler at the site is shut down for repairs or if a tenant moves out of a space for a month. Including such anomalies adversely impacts the weather to usage correlation. Therefore, if the owner knows when these events occurred, they may remove those months from the analysis. The analytics workbook includes a sheet called “Regression Visualization” that allows the user to quickly identify certain months they wish to exclude. This is a subjective determination made at the discretion of the user. Once the user is satisfied with their selections, they can click on the “finished figures” sheet to see trends in their energy consumption differentiated by energy source and heating or cooling season.

The tool uses linear regressions to predict how historical usage changes based on the HDD and CDD in a year. These “expected usages” are shown as black outlines on the charts, while the actual use is shown as a solid color-coded bar. The tool generates separate charts for overall usage as well as seasonal and source uses. These allow a user to quickly and easily identify during what season their use might be trending upward or downward and which systems may need to be recommissioned. Examples of these regressions and total consumption profiles are shown in figures 1 – 6.

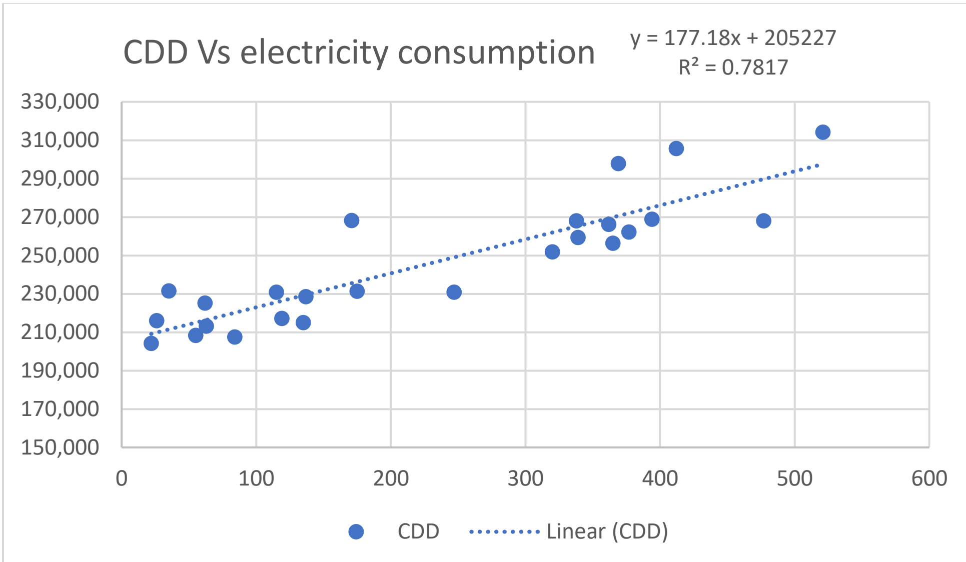


Figure 1: Regression for summer electrical use

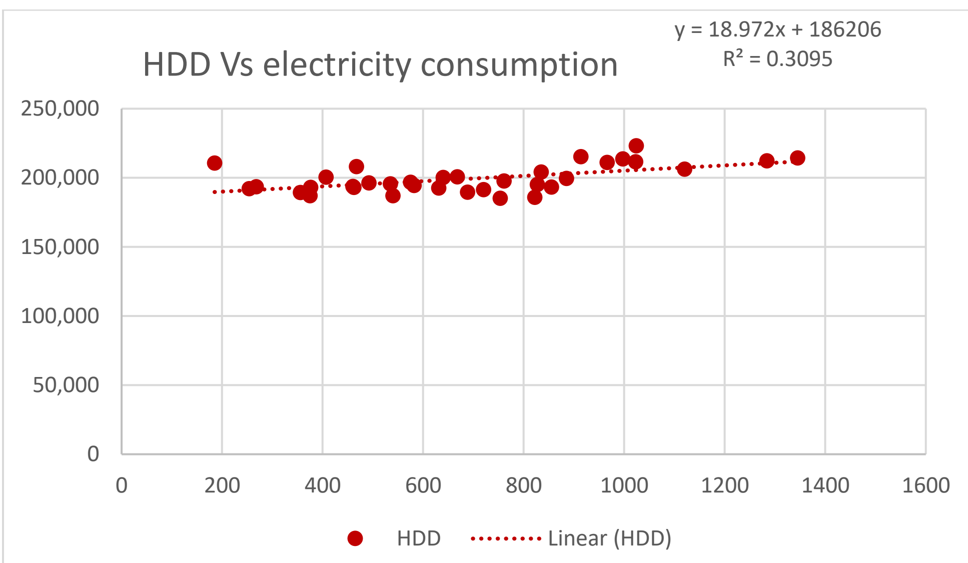


Figure 2: Linear regression for winter electrical use

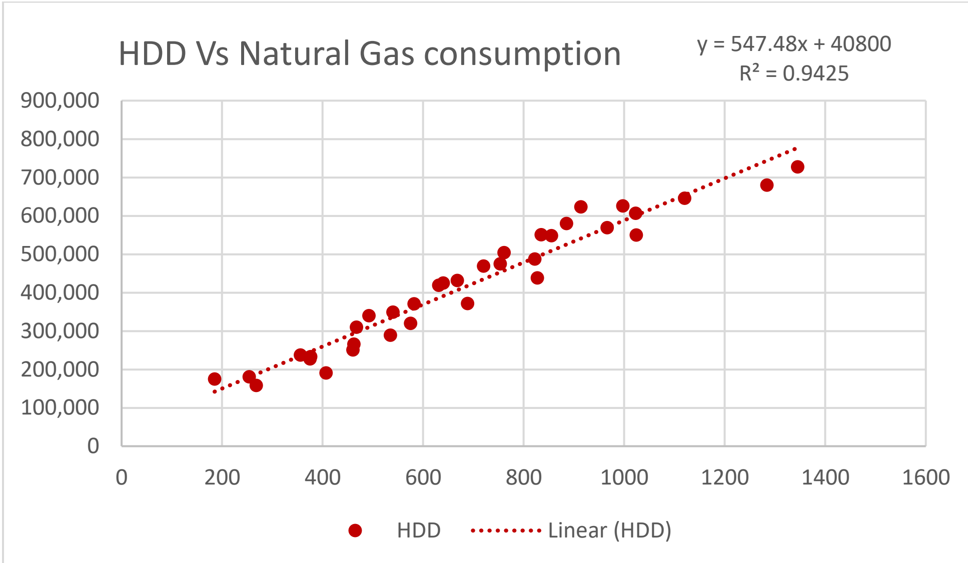


Figure 3: Regression for natural gas consumption during winter

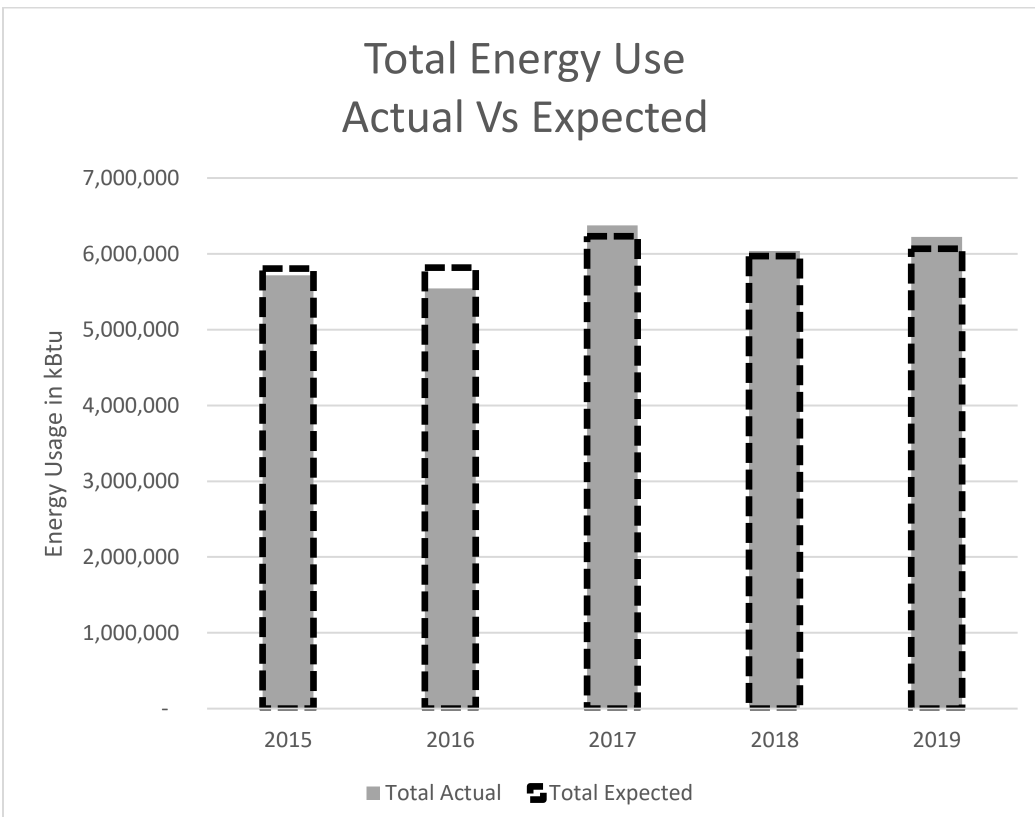


Figure 4: Expected vs actual total consumption based on the previous regressions

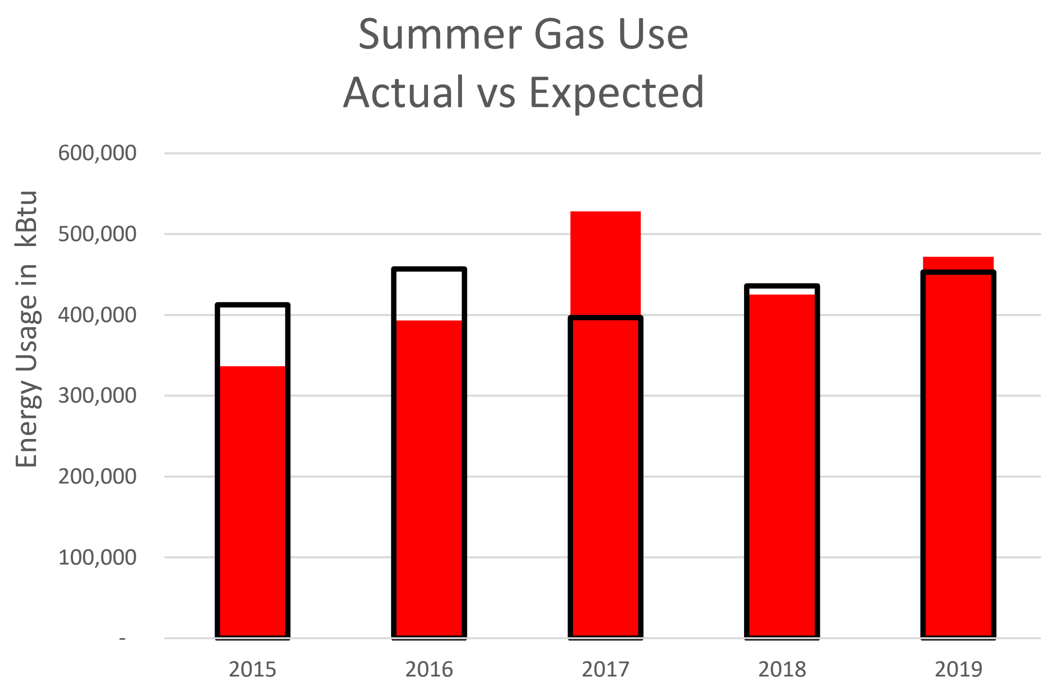


Figure 5: Summer gas consumption vs expected based on regression for that year

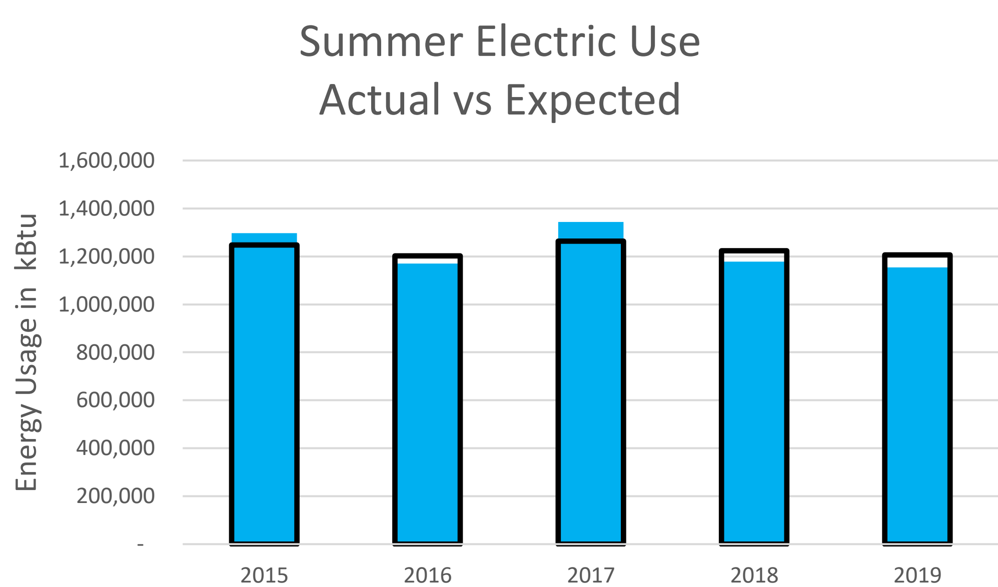


Figure 6: Annual difference between actual consumption vs weather normalized expected use

From the example charts shown, one can see from the total energy use (figure 4) that when normalized for weather the total energy use for this example site has been creeping up over the last three years. If occupancy or usage have stayed the same, it's an indication that there are operational savings to be gained. The second item of note occurs in 2017, when one can see the summer gas usage spiking well beyond what was anticipated for this building based on the weather. The summer electrical use also shows a spike that same year. This could be due to a one-time use, or it could be that a heater was left on all summer requiring extra cooling to compensate. While this seems to have been corrected the next year, the summer of 2019 shows a similar if smaller rise in summer gas and it may be worth a nighttime walkthrough at this site to ensure that non-essential equipment is shutoff and thermostat setbacks are in place.

2.2 Hourly electricity analysis

After putting together monthly templates for each energy source, the IDL developed an hourly analytics sheet for electrical consumption to identify daily anomalies. This can help building managers identify specific building events that cause energy spikes. The goal for this tool is to provide recent analysis for actionable operational improvements.

The first sheet in the workbook allows a user to copy and paste in hourly historical data received from Idaho Power. This is converted from a block format into a single column so it can be lined up with the hourly temperature. Temperature data can be accessed from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Collection (NCDC) site. The spreadsheet indexes the time to ensure that the hour of consumption matches the hour of recorded energy use. From this, regressions are developed for both heating degree days and cooling degree days. With thousands of data points, the correlations do not stand out as clearly as the monthly trends. However, they do provide a helpful average to compare against. One of the advantages of having more granular data is that occupied vs. unoccupied daily hours can be analyzed separately as can weekends vs weekdays. An example of the hourly regressions and finished charts are shown in figures 7 - 10.

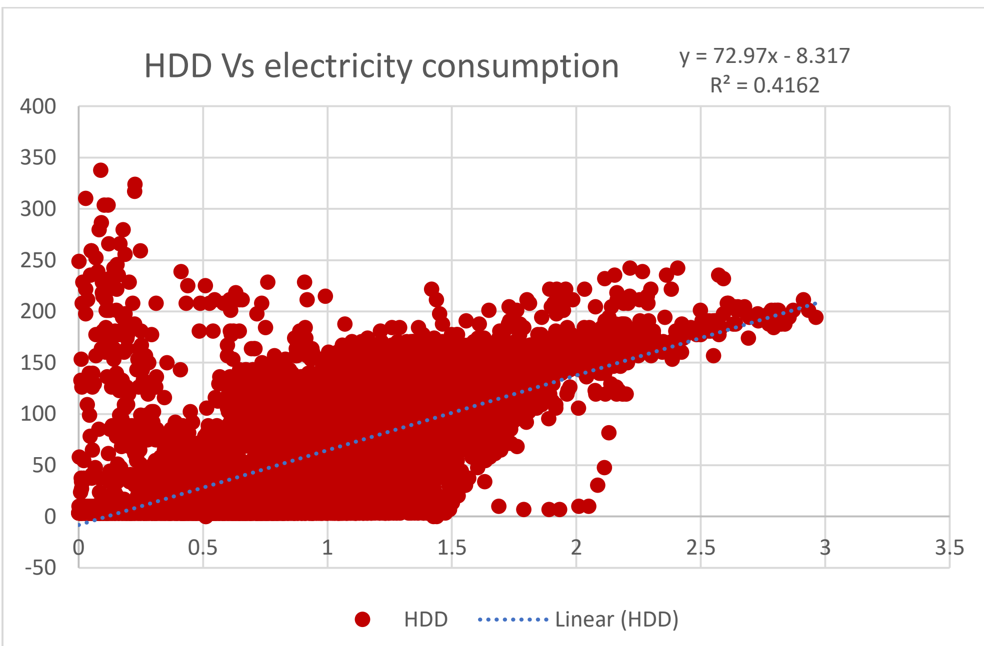


Figure 7: Linear regression of electricity use vs heating degree days

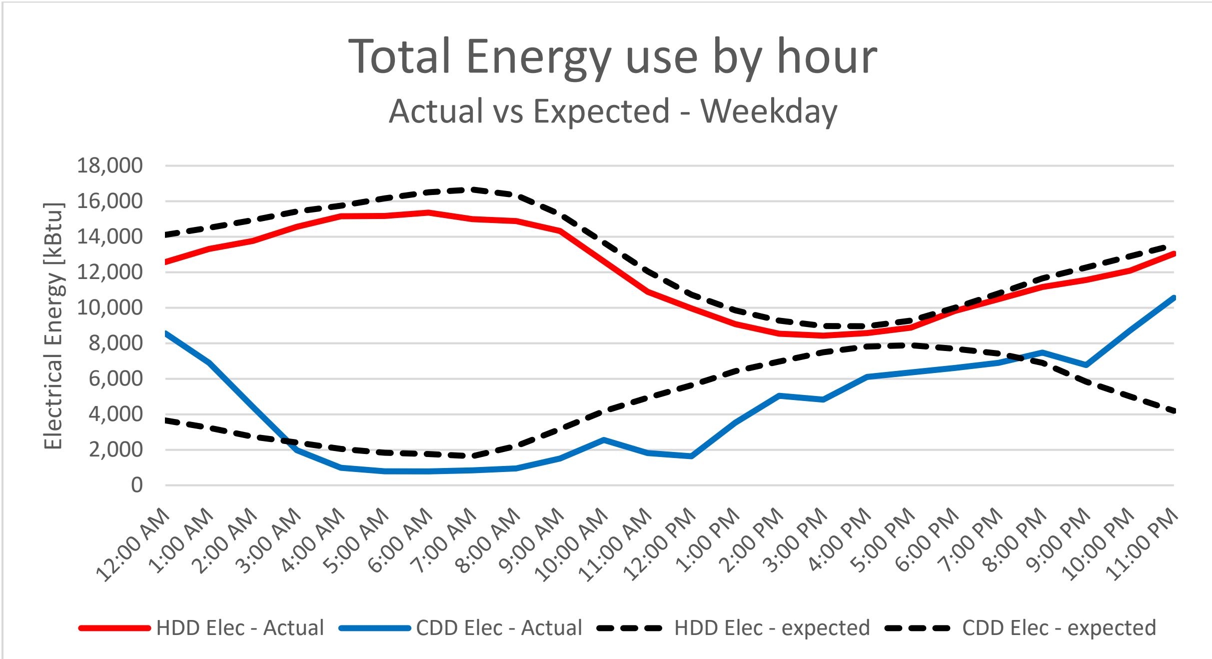


Figure 8: Weekday electricity trends for summer and winter

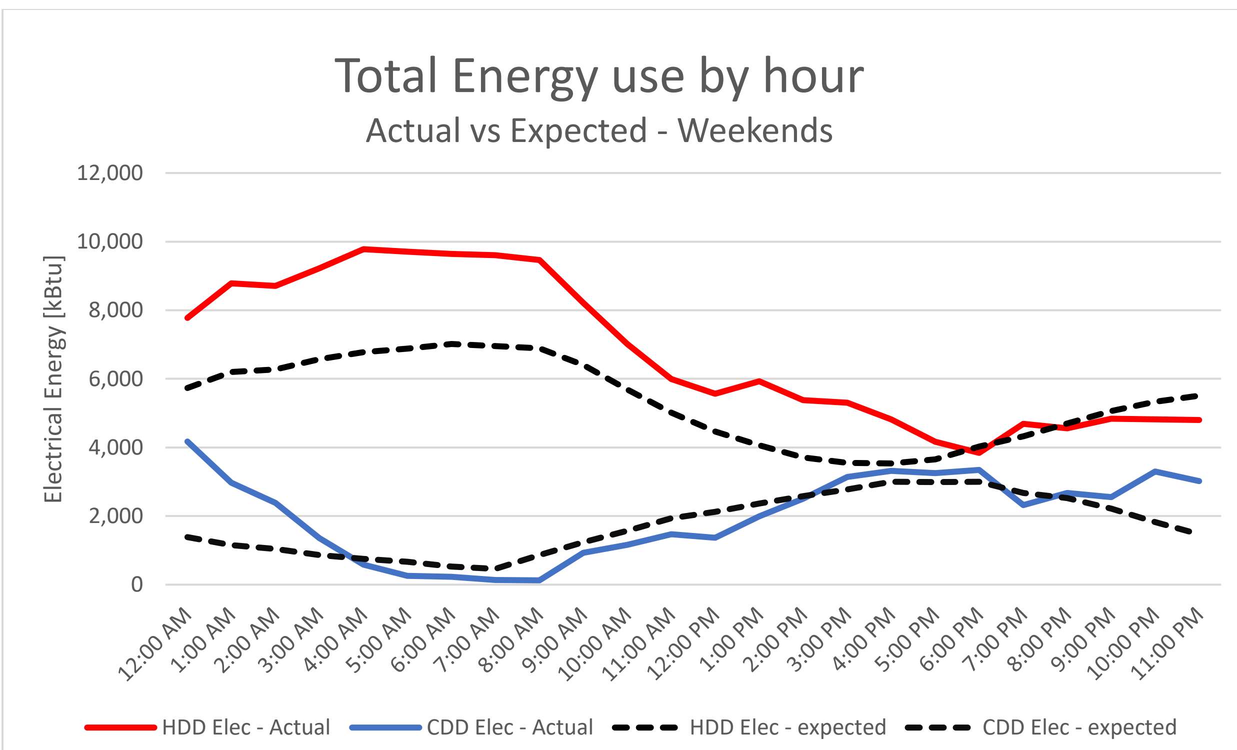


Figure 9: Weekend electricity trends for summer and winter

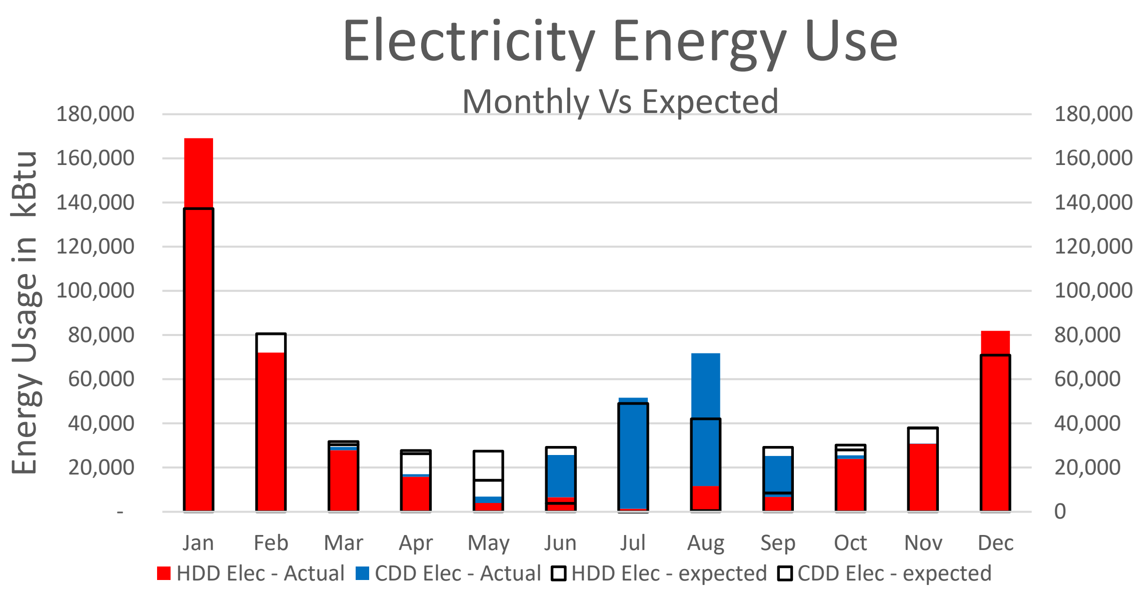


Figure 10: Monthly trends for energy use for both cooling degree days and heating degree days

The red bars indicate any electricity use that occurs during Heating Degree Days when the outdoor temperature is below 65^{o}F. The blue icons indicate any electricity use that occurs during Cooling Degree Days when the outdoor temperature is greater than 65^{o}F. Individual buildings will vary on when they switch from heating to cooling modes depending on their balance point. Electricity consumption during either period is not necessarily tied to heating or cooling – it may be tied to lighting or plug loads.

The user has the option to narrow the timeline of data under observation. However, even these year-long profiles shown in the examples above provide some insight. For example, in figure 8 one can see a large uptick in electricity during summer weekday evenings for this site. This information may lead the operator to ensure proper thermostat setbacks are being followed in the evenings and that lights are being turned off when not in use. The fan energy may also be reduced if the HVAC system allows for a change in outdoor air flow. If not, this building may be a candidate for Demand Control Ventilation (DCV).

2.3 Summary and next steps

The next steps for the IDL will be to share these resources with clients either upon request or by inclusion on the IDL website. With feedback from users, the tools can be modified and improved in terms of ease of use and providing information on potential operational changes. Users should be aware that these tools do not guarantee savings, but are instead intended merely to start discussions on potential areas of investigation – such as particular hours or days when the energy use trends differently.

3. APPENDIX A – USER GUIDE

Instructions for using the weather normalization spreadsheet

There is an accompanying step by step guide that shows the results of each section for all of the following utility connections:

- Electricity
- Electricity and Natural Gas
- Electricity, Natural Gas and Geothermal

1. Steps to Normalize Energy Usage with Respect to Weather.

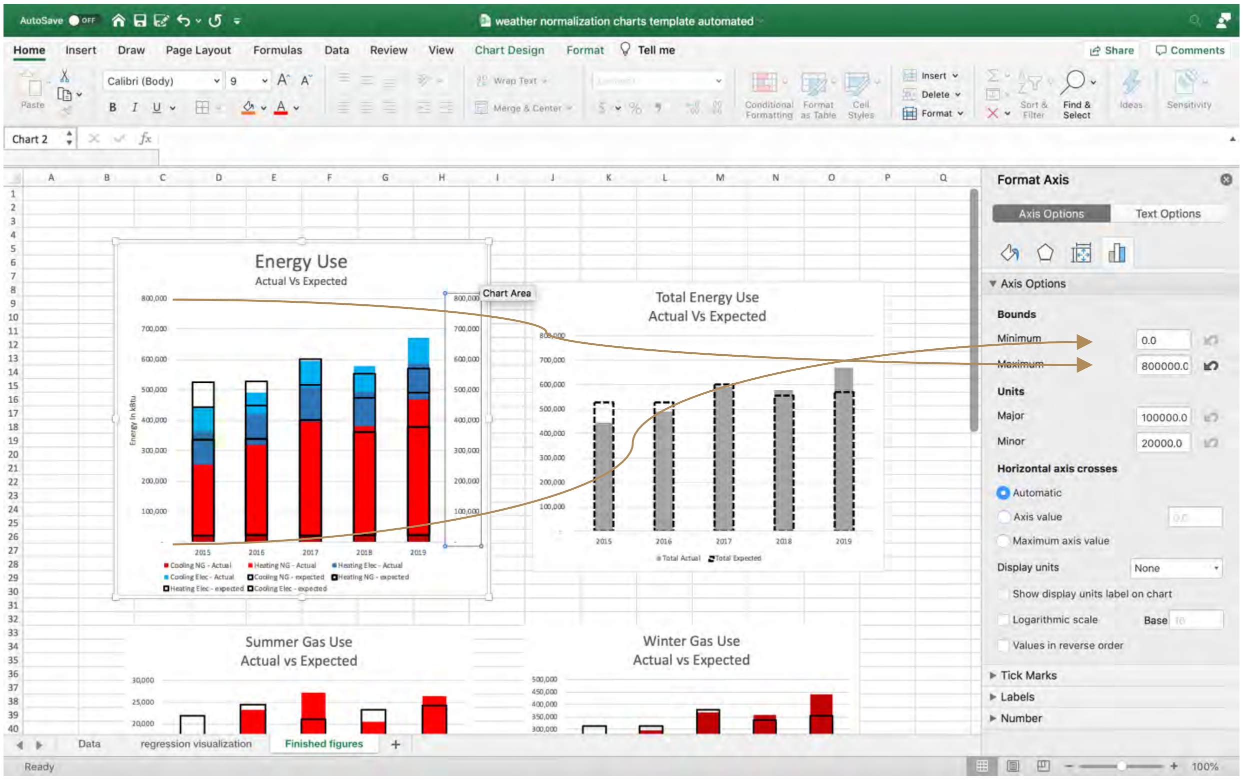
1. Input energy information into spreadsheet.
    a. Input the date of the billing cycle, electricity usage in kWh, Natural Gas Usage in Therms, and geothermal usage in gallons of water (if applicable).
        i. Note: The Boise city geothermal system uses hundreds of gallons as the units on their billing information.
2. Add the Heating Degree Days (HDD) and Cooling Degree Days (CDD) for each month in the adjacent columns.
    a. Go to the website and collect Heating Degree Days (HDD) and Cooling Degree Days (CDD) : https://w2.weather.gov/climate/xmacis.php?wfo=boi
        i. Select the "NOWData" tab and select the following options:
            1. Boise area
            2. Monthly Summarized Data
            3. Variable: year, HDD/CDD base 65
            4. Summary: Sum
        ii. Copy data table into excel sheet
        iii. Match up the dates to the dates of the energy bills (see excel sheet for example)
3. Separate the combined Data table into two different columns: cooling and heating Seasons.
    a. The cooling season is normally May through September
    b. The Heating Season is normally October through April
        i. There now should be two similar lists with the format shown above. See excel sheet for example.

4. Copy the data into the spreadsheet template
    a. Copy the created data lists into the "Data" sheet in the provided templates. These areas will be marked by white boxes
    b. Look over the gray cell and make sure they auto generated. There are 4 charts in the "Data" sheet: Heating season table, Summer Season table, Regression table, and Yearly summary table.
    c. Save the file as a separate document before making any adjustments.

5. Correct model for outlying data points
    a. Click on the "Regression Visualization" sheet and check each graph for outlying points within the set.
        i. If there are no outlying points, then proceed to step 6.
    b. If there is an outlier that needs to be taken out, follow the following steps:
        i. Find all outlying points. One easy way to do this is hover the cursor over the point. Then locate that point in the "Data" sheet in the gray "actual energy usage" column for the respective season and energy type. Record this value and the respective date on a scrap piece of paper.
            1. Note: This will be a subjective determination. In some instances, the data will closely match the trend line in the graphs. in other instances, it will not resemble the trend line. This is the result of weather not playing a big role in the energy consumption of a building.
        ii. After writing the value of the outlier point on a piece of paper, delete the outlying data points within the set, CAUTION: these values will be put back into the actual usage set at the end of this process.
        iii. Go to the "Regression Visualization" sheet. Record the equation shown in the top right-hand corner of the graph on the scrap piece of paper. The equation should be in the form "Y = Mx + B", where M is the slope of the line and B is the y-intercept of the line. The values for the equation will be different for each building, season, and energy type.
        iv. Go to the "Data" Sheet and locate the regression table. Input the recorded values from the recorded equation into the regression table for the respective energy type and season. Also Change outlier status to Yes to keep track of changes made to the model.
            1. At this point, the expected data table should fill back with numbers.
        v. Put the outlying data point deleted in step i. back into the actual energy use column.
        vi. Repeat the process for all the charts in the "Regression Visualization" sheet if there is significant outliers.

6. Adjust axis on the finished charts.
    a. On the "finished figures" sheet, you may need to readjust the minor axis to match the primary axis on the energy use, actual Vs expected. Select the right label column and

change it to match the left hand axis as shown in the picture below. Repeat for all applicable charts.



2020 Task 7: RTU Control Retrofits for Small Commercial Facilities

Summary of Work

Idaho Power Company External Year-End Report

December 31, 2020

Prepared for:
Idaho Power Company

Author:
Damon Woods

Report Number: 2001_001-07

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Contract Number:
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Table of Contents

Acronyms and Abbreviations

ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
ACH	Air Changes per Hour
BPA	Bonneville Power Administration
CBECS	Commercial Building Energy Consumption Survey
DOAS	Dedicated Outdoor Air System
DOE	Department of Energy
EMS	Energy Management System
HEPA	High Efficiency Particulate Air
HVAC	Heating Ventilation and Air Conditioning
IDL	Integrated Design Lab
IECC	International Energy Conservation Code
IPC	Idaho Power Company
NEEA	Northwest Energy Efficiency Alliance
NPBI	Needle Point Bipolar Ionization
MERV	Minimum Efficiency Reporting Value
PNNL	Pacific Northwest National Laboratory
RTU	Rooftop Unit
UI	University of Idaho
UVGI	Ultraviolet Germicidal Irradiation
VHE	Very High Efficiency

1. Introduction

The goal of the 2020 Rooftop Unit (RTU) task was to assess the energy savings of a variety of control upgrades in a case study. RTU's are used as the primary HVAC system 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 IDL had located a facility to use as a case study in 2020 and had collected data in 2019 that could serve as a baseline comparison. The site considered used gas heating and Direct Expansion (DX) refrigerant coils for cooling. The focus of the control upgrades was to minimize the cooling electrical consumption during the summer by improving the scheduling implementing night flush capabilities. However, with the arrival of COVID-19, the building shut down its operations and did not allow visitors for much of the summer. Many employees in the building began working from home and the summer energy use would not have been a realistic point of comparison for measuring savings from the control upgrades.

In lieu of a control study at a site, the IDL redirected our research efforts to study the impact of COVID-19 precautions on virtual RTU's. The American Society of Heating and Refrigeration Engineers (ASHRAE) published a list of recommendations that building operators could make at their sites to reduce the spread of COVID-19 in buildings. The main recommendations were to increase outdoor air flow as much as possible and to filter or treat any return air.

The IDL modeled these specific recommendations for a typical small office in climate zone 5B. While scientific study on the most efficacious mitigation strategies for

COVID are still ongoing, one can compare the mitigation strategies based on their energy impact for RTU's. The three studies carried out for RTU's in this study included upgrading the filter ratings, increasing the percentage of Outdoor Air, and increasing the amount of time that RTU's are in ventilation mode.

2. Work Summary

2.1 Literature Review

While the COVID-19 virus is a recent phenomenon, the IDL looked to past resources on HVAC mitigation of other flu-like viruses including common influenza and SARS. A selection of these resources is available in the bibliography. As this is a matter of immediate concern, many journals are allowing pre-publication of some studies while the peer-review process is ongoing. One of the most widely referred-to guides was a position document developed by ASHRAE that outlines some of the major HVAC operational changes that can be made. The main recommendations include:

- Increase outdoor air ventilation
- Disable demand-controlled ventilation (DCV)
- Further open minimum outdoor air dampers as high as 100% (if possible) to limit re-circulation
- Improve central air filtration to MERV-13 or the highest compatible with the filter rack and seal the edges of the filter to limit bypass
- Keep systems running longer hours, if possible 24/7
- Consider portable room air cleaners with HEPA filters
- Consider UVGI (ultraviolet germicidal irradiation)

2.2 Preparing the energy model

The IDL used the Department of Energy's (DOE) prototype building model developed by Pacific Northwest National Lab (PNNL). Specifically, we used the small office prototype as its default HVAC system is a set of packaged RTU's. This prototype model is based on the DOE reference building, which serves as an approximation of a typical small office. The model choices were informed by the Commercial Building Energy Consumption Survey (CBECS) and code requirements from ASHRAE's 90.1 standard. There are five zones in the building (four perimeter zones and a core). Each zone has its own associated RTU. The RTU's are air-source heat pumps with gas furnace back-ups. The geometry and zone layout of the prototype model is shown in figures 1 and 2.

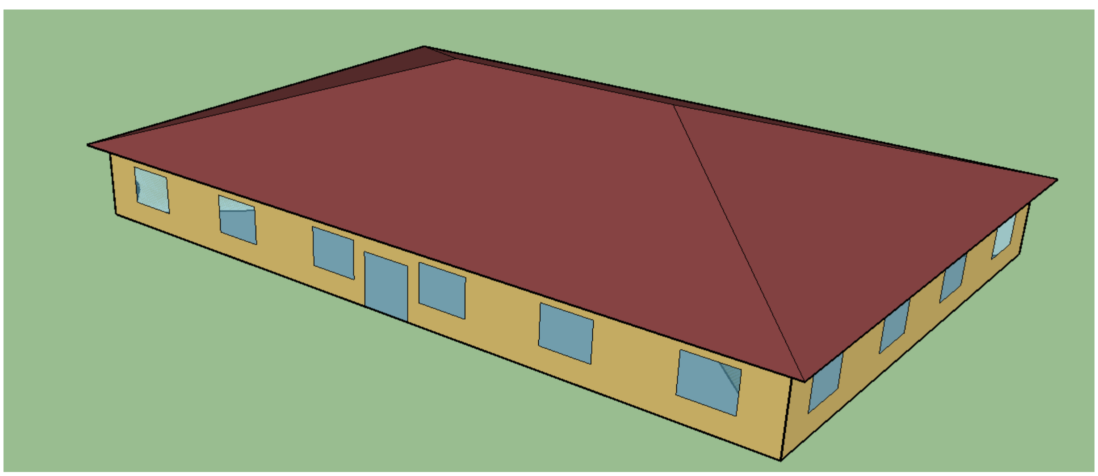

Figure 1: View of the small office prototype model geometry from PNNL

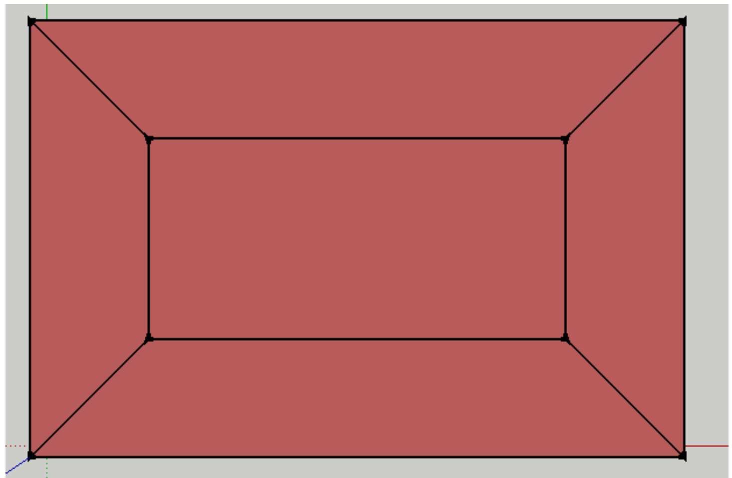

Figure 2: Top view of prototype model showing the partitions between zones; each zone has its own RTU

More details on the models are available in the Appendix and online through the PNNL prototype scorecard. Since the IDL could not do site visits during the summer due to COVID, the single-story prototype served as the case study for this analysis. In 2021, the scope of this research will be expanded to include different building types and mitigation strategies.

2.3 Increasing filter ratings

The ASHRAE ventilation standard for Acceptable Indoor Air Quality (standard 62.1) requires filtration of the supply air to remove particulates before passing across the heating and cooling coils. The standard requires a Minimum Efficiency Reporting Value (MERV) of 8 or greater upstream of any cooling coil or devices with wetted surfaces unless those coils provide sensible cooling only (62.1-5.8).

One of the COVID-19 mitigation recommendations was to increase the MERV filter rating to 13 or higher. As the MERV filter rating increases, the amount of pressure drop across the filter can also increase. According to International Energy Conservation

Code 2018 (IECC), fan power limitation pressure drop adjustments vary depending on the MERV rating.

Table 1: Excerpt of IECC 2018 Table C403.8.1 (2) Fan Power Adjustment

MERV Filter Rating	Pressure Adjustment
9 – 12	0.5” H_2O
13 – 15	0.9” H_2O
16+	2x clean filter pressure drop at design condition

The pressure drop across a filter varies greatly depending on the manufacturer and shape of the filter. There is not a linear relationship between MERV ratings and pressure drops or fan power increases. In general, high-MERV filters do tend to have a higher pressure drop. One way to reduce pressure drops is to increase the face area of the filter, but this is not necessarily feasible with the hardware constraints of RTU’s where the filter is located inside a metal case of fixed dimensions. To study the effects of increased pressure drops, the IDL ran a sensitivity analysis on the prototype model. The baseline assumption is for a fan generating a pressure rise of 2.5“H_2O. The fan has an 85% motor efficiency and a total efficiency of 56% based on ASHRAE 90.1-2010 baseline code assumptions. Because each RTU filter replacement is unique and manufacturer-specific, the IDL looked at the increase in energy versus a relative increase in filter pressure drop. The baseline (MERV 8) was assumed to have a pressure drop of 0.5” as part of the total 2.5” of pressure rise that the supply fan must overcome. The DIL tracked electricity costs and energy consumption across a range of increases and filter pressure drops from 0.5” (baseline) up to 3” (a 500% increase). These results are shown in figures 3 and 4.

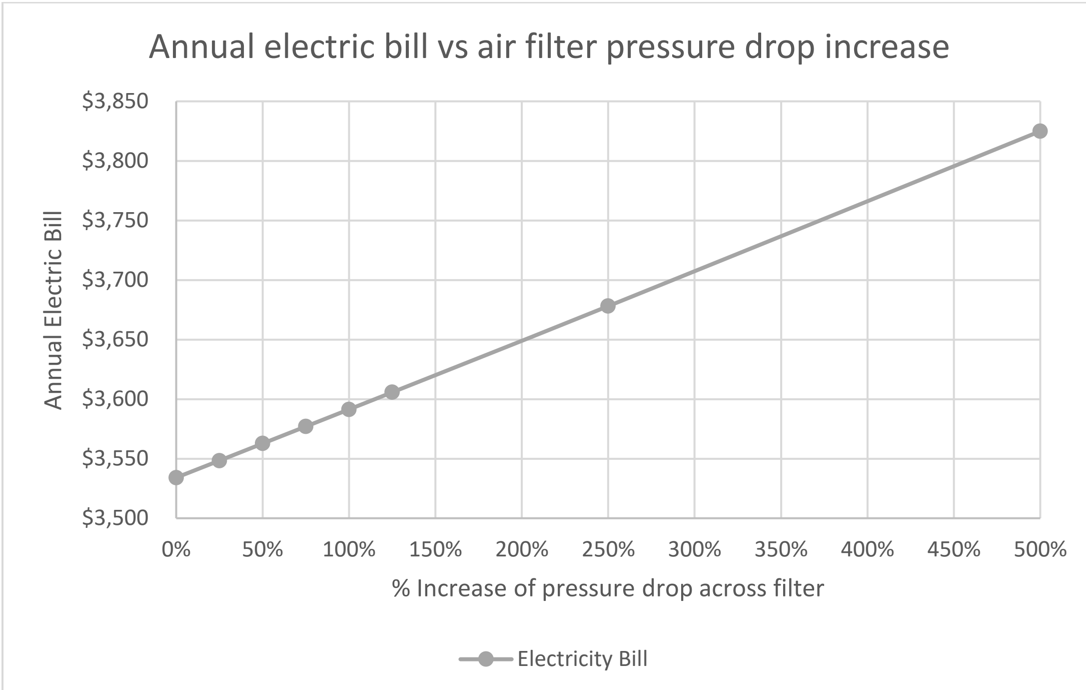

Figure 3: Simulation results showing effect of filter pressure drop increase vs bills

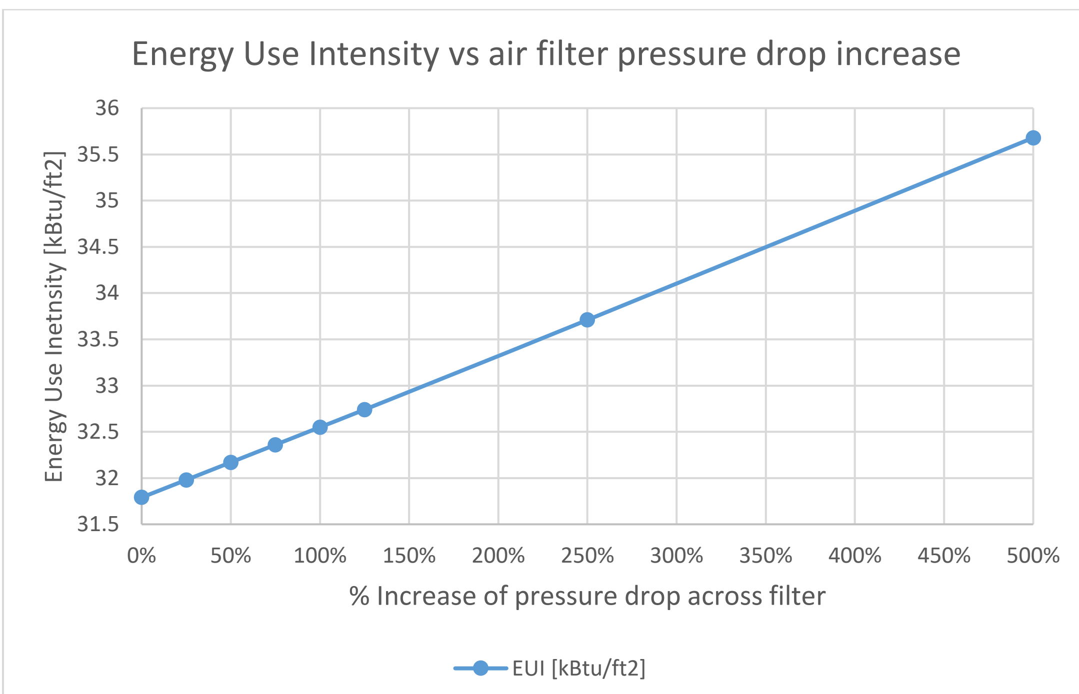

Figure 4: Simulation results showing effect of filter pressure drop increase vs annual energy

One can see from figures 3 and 4 that increasing the pressure drop across the air filter has a very linear relationship with both total annual electric bills and overall energy use. The impact remained relatively small. Even doubling the pressure drop across the filter (a 100% increase) resulted in an additional 1,260 kWh or approximately $57 in electrical costs over the course of the year. Not considered were the additional costs of the filters or the effect on the air distribution and diffuser velocity if the fans are of a fixed capacity. These are questions the IDL hopes to explore in 2021 under the wider Indoor Air Quality research scope.

2.4 Increasing the fraction of outdoor air

A second recommendation from ASHRAE includes increasing the fraction of outdoor air. Outdoor air rates are specified in Standard 62.1. Based on the occupancy and usage, for the prototype model, the minimum outdoor air provided is 0. 85 cfm/ft2 of occupied zones. The specific fraction of outdoor air delivered to each zone depends on the capacity of the RTU that manages that zone. The baseline average is an outdoor air fraction of 14%. This ratio was increased fractionally for each zone. In general, there was once again a linear relationship between electricity consumption and increasing fractions of outdoor air. However, there is a negligible change with a 25% increase to the outdoor air fraction.

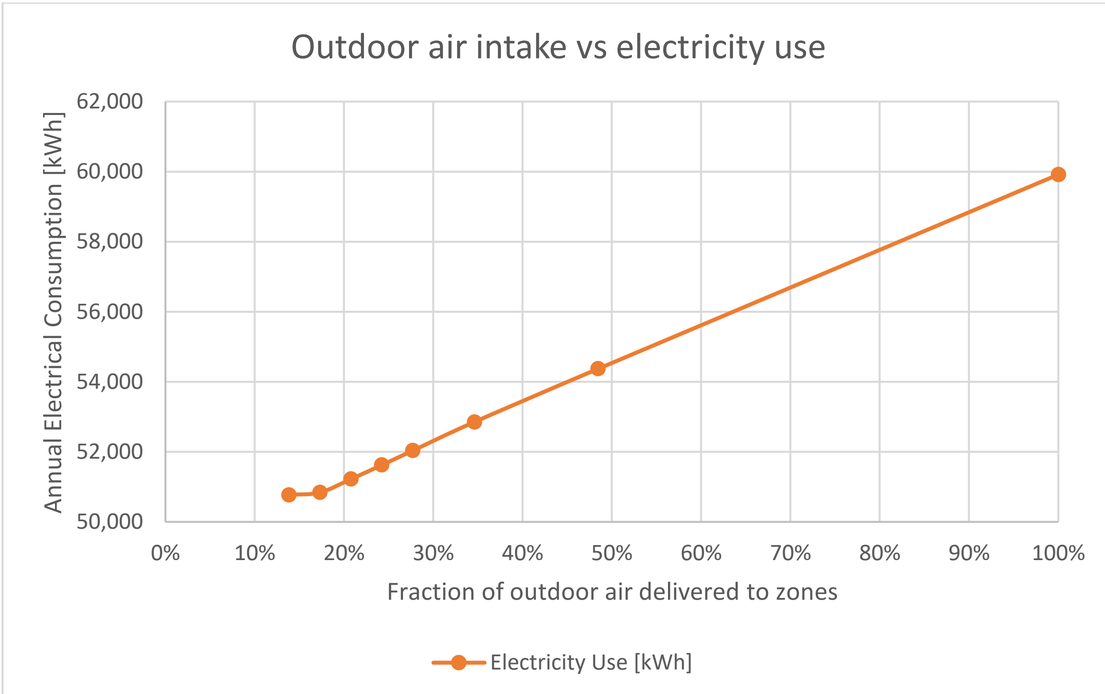

Figure 5: The effect of increasing the fraction of outdoor air on annual electricity use

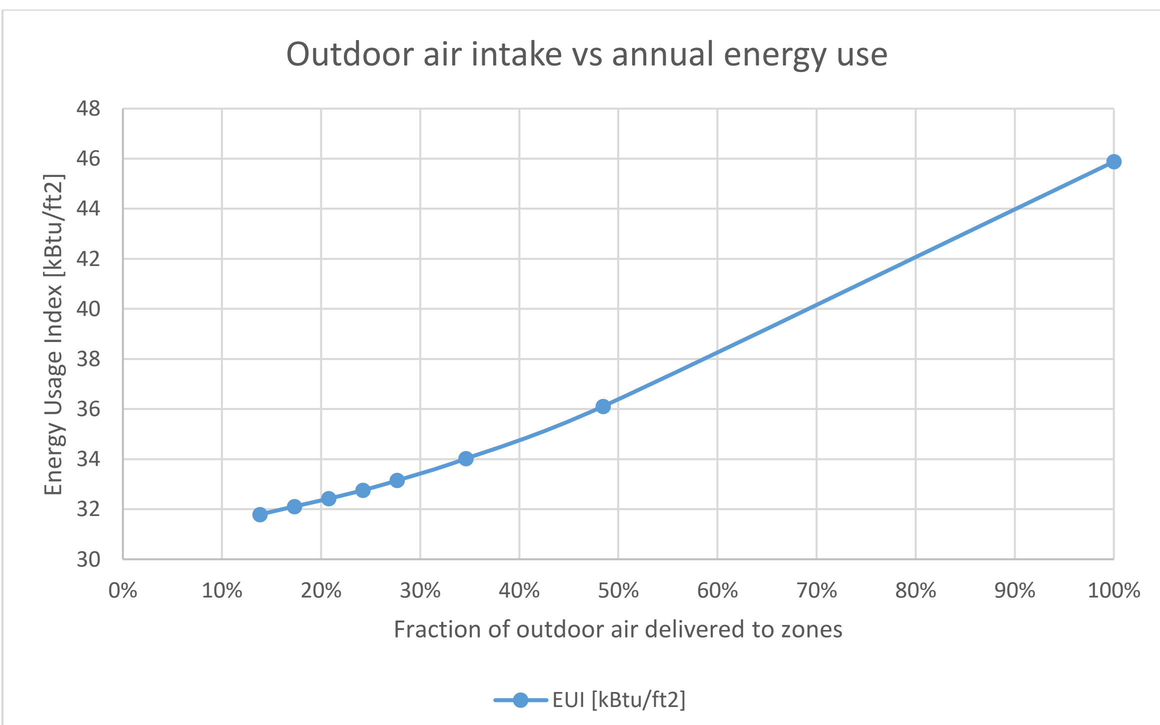

Figure 6: The effect of increasing the fraction of outdoor air on total energy use

While the electrical use increased linearly, the overall energy use increased in a slightly more parabolic manner. This was due to the increased heating demands, which relied on the gas backups in the RTUs. Switching from the baseline 62.1 required minimum ventilation rate to 100% outdoor air during occupied hours increases the annual electricity use by 9,146 kWh and increases annual electrical costs by $405 for a typical small office in Boise. The simulation engine automatically upsizes the RTU equipment to account for the increased load. However, for retrofits, this may not be an option for some owners and supplemental equipment may be required to handle the extra heating and cooling loads. One future research option would be to lock in the baseline RTU size and explore the increase in discomfort in the interior zones.

2.5 Increasing the ventilation operation time

The ASHRAE recommendations from Scheon et al. include increasing the ventilation time from only during occupied hours to running 24/7. The IDL ran a sensitivity analysis by changing the outdoor air fraction during evenings and weekends from 0% (OA damper closed) up to 100% (OA damper fully open and no recirculation). The results are shown in figures 7 and 8.

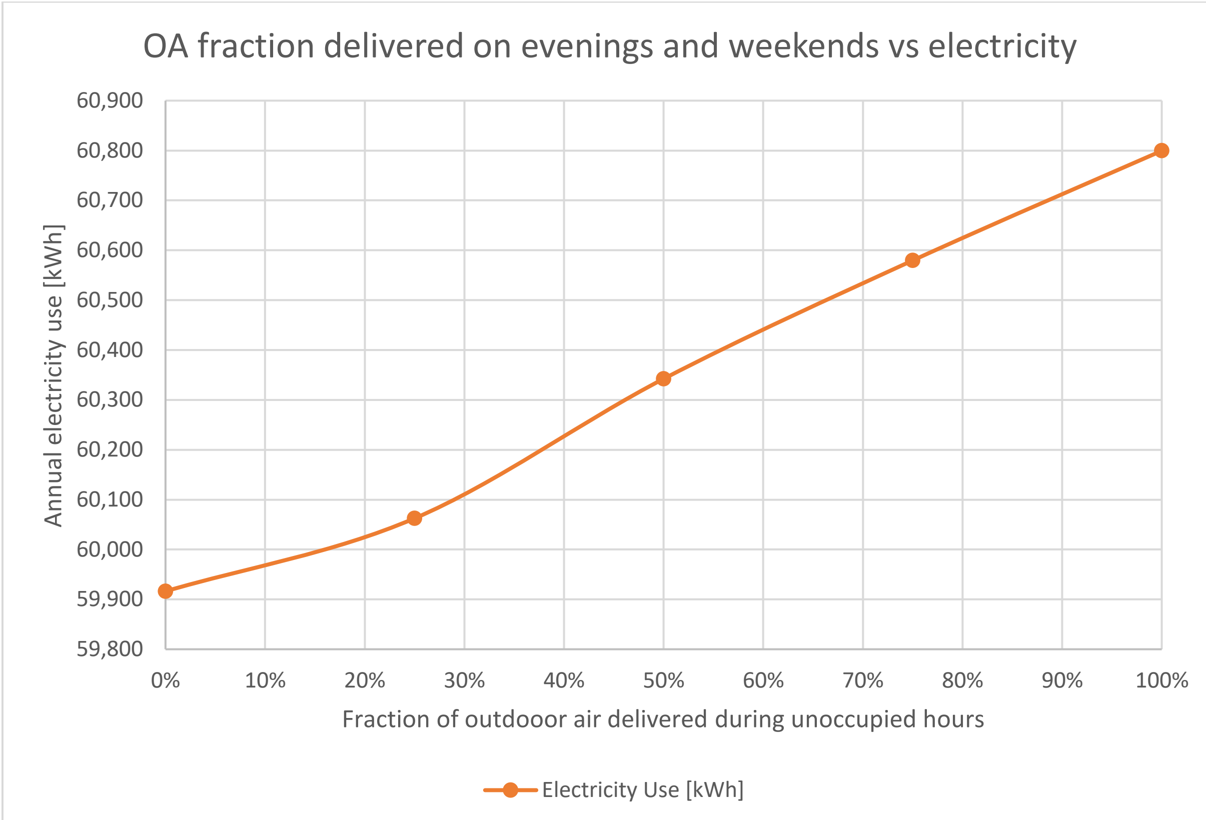

Figure 7: The effect of increasing the outdoor air ratio during unoccupied hours on electrical consumption

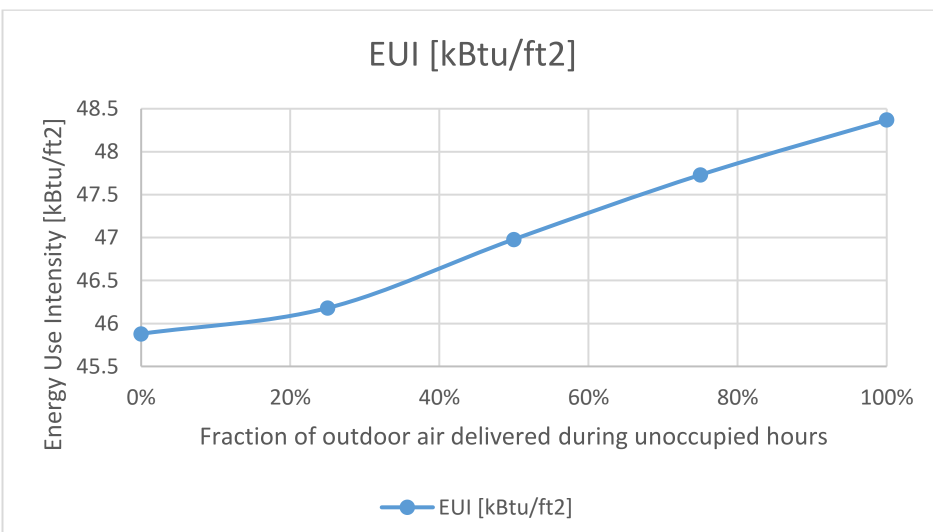

Figure 8: The effect of increasing the outdoor air ratio during unoccupied hours on annual energy use

As one can see from figures 7 and 8, there is once again a non-linear trend. Increasing the outdoor air fraction by 25% during the unoccupied hours has proportionally smaller effect than completely opening the outdoor air damper. Yet even increasing the outdoor air fraction during unoccupied hours would only increase the electricity use by 880 kWh, and increase the annual energy bill by $108. This is due to the thermostat setbacks reducing fan operation during these times. The effect would be much greater if the fans are kept on 24/7.

2.6 Increasing fan operation time

The prototype model assumes RTU fans without variable speed drives. They are on/off devices that are fully loaded during occupied hours and fully off on evenings and weekends. One of the ASHRAE recommendations includes increasing the Air Changes per Hour (ACH) of each room. As the fans in the model could not increase in capacity, the IDL modeled the effects of turning these fans on 24/7, without changing the outdoor air fraction. Turning on the fans to be on constantly, increased the electricity use by 9,900kWh, and raised the annual electricity bill by $450.

2.7 Combining the strategies

Some building owners may wish to implement all of the strategies, or some combination thereof. While the IDL did not run a full parametric analysis of every possible combination, the IDL did look at two of the most likely combinations. Combination 1 included an upgrade of the filter to one that increased the pressure drop by 0.5” H2O and increased the fan operation to 24/7 without changing the outdoor air fraction. This strategy could be used by those RTUs that are not set up to increase the current outdoor air fraction due to hardware constraints. The second combination (Combination 2 in the table) increases the outdoor air fraction, adding outdoor air during unoccupied hours, and running the fans constantly. The idea of combination #2 is to block any recirculation of the air and simply run as much fresh air through the building as possible. Not considered is whether the heating and cooling coils are capable of handling this increased load and what sort of supplemental equipment would be required. For the simulation, EnergyPlus automatically up-sizes the coils to meet the increased load from the outdoor air. The results of each individual mitigation strategy and the combinations are compiled in the following table.

Table 2: List of energy impacts of different HVAC strategies for COVID mitigation

	EUI [kBtu/ft^2]	Electricity Use [kWh]	Electricity Bill	Gas Bill	Energy Bill
Baseline small office prototype 90.1-2010	31.8	50,800	$ 3,530	$ 120	$ 3,660
Increasing filter effectiveness (2x pressure drop)	32.6	52,100	$ 3,590	$ 120	$ 3,720
Increasing OA fraction to 100%	45.9	59,900	$ 3,940	$ 420	$ 4,370
Increasing OA time to 24/7	34.3	51,700	$ 3,570	$ 190	$ 3,770
Increasing fan time to 24/7	37.8	60,700	$ 3,980	$ 120	$ 4,100
Combination 1: Increasing filter drop and fan time	39.8	64,000	$ 4,130	$ 120	$ 4,250
Combination 2: Increasing OA fraction and fan time	68.7	81,200	$ 4,880	$ 760	$ 5,650

Adding filtration and increasing the amount of air changes per hour without adjusting the outdoor air had the smallest energy impact. This scenario (Combination 1) only increased the electricity bills by about $600 per year. The second scenario of increasing the outdoor airflow as much as possible (Combination 2) had a significant impact on the energy consumption – more than doubling the EUI and increasing the electricity bills by $1,350 (38%) per year. Some of the energy impacts are ranked in the following table:

Table 3: Ranking the energy impacts (increases over baseline) of each mitigation strategy

	EUI [kBtu/ft^2]	Electricity Use [kWh]	Electricity Bill	Gas Bill	Energy Bill
Increasing filter effectiveness (2x pressure drop)	2%	2%	2%	-1%	2%
Increasing OA time to 24/7	8%	2%	1%	55%	3%
Increasing fan time to 24/7	19%	19%	13%	-3%	12%
Combination 1: Increasing filter drop and fan time	25%	26%	17%	-4%	16%
Increasing OA fraction to 100%	44%	18%	11%	242%	19%
Combination 2: Increasing OA fraction and fan time	116%	60%	38%	516%	54%

3. Discussion

Of the mitigation strategies that were studied, the measure with the largest energy impact was increasing the outdoor air fraction, while upgrading the filters had the least impact on energy. Combining the outdoor air fraction increase with the fan schedule caused the most significant energy expenses. Which strategy is most effective at preventing the spread of the virus is still an area of ongoing research and beyond the scope of this study. However, the findings do point to which strategy has the lowest energy impact on existing RTUs.

In 2021, the IDL will expand the scope of this research to include different building types and further mitigation strategies such as UVGI, NBPI, and adding in-room HEPA filters. As peer-reviewed research emerges, we will be able to quantify the predicted impact each of these measures might have on a building's energy use.

During the 1918 pandemic, many New York residents were encouraged to leave their windows open as much as possible. The radiators installed in the buildings during this time were significantly over-sized to account for the increased heating load of the cold air. That legacy lives on as some of these radiators are still in place over 100 years later. As we look to the future of building designs, it is important to be mindful of the long-term impact some of these strategies might have on business owners and IPC ratepayers. If filtration is effective, it has a much smaller energy impact than increasing outdoor airflow.

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RESEARCH/SURVEYS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
2020 Idaho Power Weatherization Assistance for Qualified Customers Program Survey	Residential	Idaho Power	Idaho Power	Survey
2020 Idaho Power Weatherization Solutions for Eligible Customers Program Survey	Residential	Idaho Power	Idaho Power	Survey
2020 Retrofits Program Survey	Residential	Idaho Power	Idaho Power	Survey
Commercial ESK Survey 2020	Residential	Idaho Power	Idaho Power	Survey
Irrigation Hardware Maintenance Survey, 2020	Residential	Idaho Power	Idaho Power	Survey
Idaho Power Small Business Direct Install Customer Survey	Commercial	DNV GL	DNV GL	Survey

2020 Idaho Power Weatherization Assistance for Qualified Customers Program Survey

Job Number.
Answered: 94

Agency/contractor name:

Answer Choices	Percent	Responses
Metro Community Services	1.06%	1
Eastern Idaho Community Action Partnership	0.00%	0
El Ada Community Action Partnership	70.21%	66
South Central Community Action Partnership	17.02%	16
Southeastern Idaho Community Action Agency	11.70%	11
	Answered	**94**

Idaho Power program name:

Answer Choices	Percent	Responses
Weatherization Assistance for Qualified Customers	100.00%	94
Weatherization Solutions for Eligible Customers	0.00%	0
	Answered	**94**

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

Answer Choices	Percent	Responses
Agency/Contractor flyer	21.59%	19
Idaho Power employee	3.41%	3
Idaho Power web site	14.77%	13
Friend or relative	38.64%	34
Letter in mail	6.82%	6
Other	14.77%	13
	Answered	**88**

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

Answer Choices	Percent	Responses
Reduce utility bills	79.55%	70
Improve comfort of home	30.68%	27
Furnace concerns	39.77%	35
Water heater concerns	5.68%	5
Improve insulation	14.77%	13
Other	5.68%	5
	Answered	**88**

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	92.94%	79
Somewhat	5.88%	5
Not at all	1.18%	1
	Answered	**85**

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	73.56%	64
How insulation affects energy usage	66.67%	58
How to program the new thermostat	36.78%	32
How to reduce the amount of hot water used	20.69%	18
How to use energy wisely	52.87%	46
How to understand what uses the most energy in my home	41.38%	36
Other	1.15%	1
	Answered	**87**

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	73.56%	64
Somewhat likely	24.14%	21
Not very likely	0.00%	0
Not likely at all	2.30%	2
	Answered	**87**

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

Answer Choices	Percent	Responses
All of it	62.92%	56
Some of it	13.48%	12
None of it	0.00%	0
N/A	23.60%	21
	Answered	**89**

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	53.93%	48
Somewhat likely	17.98%	16
Somewhat unlikely	3.37%	3
Very unlikely	0.00%	0
N/A	24.72%	22
	Answered	**89**

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	70.59%	60
Washing full loads of dishes	57.65%	49
Turning off lights when not in use	61.18%	52
Unplugging electrical equipment when not in use	54.12%	46
Turning the thermostat up in the summer	52.94%	45
Turning the thermostat down in the winter	56.47%	48
Other		4
	Answered	**85**

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

Answer Choices	Percent	Responses
Significantly	94.32%	83
Somewhat	5.68%	5
Very little	0.00%	0
Not at all	0.00%	0
	Answered	**88**

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

	Excellent	Good	Fair	Poor	Responses
Courteousness	95.51%	4.49%	0.00%	0.00%	89
Professionalism	97.73%	2.27%	0.00%	0.00%	88
Explanation of work to be performed on your home	93.18%	6.82%	0.00%	0.00%	88
Overall experience with Agency/Contractor	93.18%	6.82%	0.00%	0.00%	88
				Answered	**89**

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

Answer Choices	Percent	Responses
Yes	80.68%	71
No	19.32%	17
	Answered	**88**

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

Answer Choices	Percent	Responses
Very satisfied	98.88%	88
Somewhat satisfied	1.12%	1
Somewhat dissatisfied	0.00%	0
Very dissatisfied	0.00%	0
	Answered	**89**

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

Answer Choices	Percent	Responses
Improved	89.77%	79
Stayed the same	10.23%	9
Decreased	0.00%	0
	Answered	**88**

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

Answer Choices	Percent	Responses
0	34.83%	31
1	22.47%	20
2	12.36%	11
3	10.11%	9
4	7.87%	7
5	5.62%	5
6 or more	6.74%	6
	Answered	**89**

How long have you been an Idaho Power customer?

Answer Choices	Percent	Responses
Less than 1 year	5.75%	5
1 - 10 years	24.14%	21
11 - 25 years	28.74%	25
26 years or more	41.38%	36
	Answered	**87**

Please select the category below that best describes your age:

Answer Choices	Percent	Responses
Under 25	1.14%	1
25 - 34	12.50%	11
35 - 44	18.18%	16
45 - 54	10.23%	9
55 - 64	18.18%	16
65 - 74	29.55%	26
75 or older	10.23%	9
	Answered	**88**

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

Answer Choices	Percent	Responses
Less than High School	8.99%	8
High School graduate or GED	44.94%	40
Some College or Technical School	31.46%	28
Associate Degree	4.49%	4
College Degree (including any graduate school or graduate degrees)	10.11%	9
	Answered	**89**

2020 Idaho Power Weatherization Solutions for Eligible Customers Program Survey

Job #:

Answered: 11

Agency/Contractor Name:

Answer Choices	Percent	Responses
Metro Contractor Services	9.09%	1
Home Energy Management	0.00%	0
Savings Around Power	36.36%	4
Power Savers	54.55%	6
Energy Solutions	0.00%	0
	Answered	**11**

Idaho Power program name:

Answer Choices	Percent	Responses
Weatherization Solutions for Eligible Customers	100.00%	11
	Answered	**11**

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

Answer Choices	Percent	Responses
Agency/Contractor flyer	18.18%	2
Idaho Power employee	0.00%	0
Idaho Power web site	9.09%	1
Friend or relative	18.18%	2
Letter in mail	54.55%	6
Other (please specify)	0.00%	0
	Answered	**11**

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

Answer Choices	Percent	Responses
Reduce utility bills	81.82%	9
Improve comfort of home	27.27%	3
Furnace concerns	27.27%	3
Water heater concerns	0.00%	0
Improve insulation	9.09%	1
Other (please specify)	9.09%	1
	Answered	**11**

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%	7
Somewhat	22.22%	2
Not at all	0.00%	0
	Answered	**9**

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	72.73%	8
How insulation affects energy usage	45.45%	5
How to program the new thermostat	9.09%	1
How to reduce the amount of hot water used	18.18%	2
How to use energy wisely	54.55%	6
How to understand what uses the most energy in my home	54.55%	6
Other (please specify)	0.00%	0
	Answered	**11**

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	80.00%	8
Somewhat likely	20.00%	2
Not very likely	0.00%	0
Not likely at all	0.00%	0
	Answered	**10**

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

Answer Choices	Percent	Responses
All of it	72.73%	8
Some of it	9.09%	1
None of it	0.00%	0
N/A	18.18%	2
	Answered	**11**

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	45.45%	5
Somewhat likely	27.27%	3
Somewhat unlikely	9.09%	1
Very unlikely	0.00%	0
N/A	18.18%	2
	Answered	**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	70.00%	7
Washing full loads of dishes	40.00%	4
Turning off lights when not in use	80.00%	8
Unplugging electrical equipment when not in use	50.00%	5
Turning the thermostat up in the summer	70.00%	7
Turning the thermostat down in the winter	70.00%	7
Other (please specify)		1
	Answered	**10**

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

Answer Choices	Percent	Responses
Significantly	81.82%	9
Somewhat	18.18%	2
Very little	0.00%	0
Not at all	0.00%	0
	Answered	**11**

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

	Excellent	Good	Fair	Poor	Responses
Courteousness	81.82%	18.18%	0.00%	0.00%	11
Professionalism	72.73%	27.27%	0.00%	0.00%	11
Explanation of work to be performed on your home	81.82%	9.09%	9.09%	0.00%	11
Overall experience with Agency/Contractor	81.82%	18.18%	0.00%	0.00%	11
				Answered	**11**

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

Answer Choices	Percent	Responses
Yes	100.00%	11
No	0.00%	0
	Answered	**11**

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

Answer Choices	Percent	Responses
Very satisfied	100.00%	11
Somewhat satisfied	0.00%	0
Somewhat dissatisfied	0.00%	0
Very dissatisfied	0.00%	0
	Answered	**11**

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

Answer Choices	Percent	Responses
Improved	72.73%	8
Stayed the same	27.27%	3
Decreased	0.00%	0
	Answered	**11**

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

Answer Choices	Percent	Responses
0	18.18%	2
1	27.27%	3
2	27.27%	3
3	9.09%	1
4	18.18%	2
5	0.00%	0
6 or more	0.00%	0
	Answered	**11**

How long have you been an Idaho Power customer?

Answer Choices	Percent	Responses
Less than 1 year	0.00%	0
1 - 10 years	45.45%	5
11 - 25 years	18.18%	2
26 years or more	36.36%	4
	Answered	**11**

Please select the category below that best describes your age:

Answer Choices	Percent	Responses
Under 25	0.00%	0
25 - 34	9.09%	1
35 - 44	18.18%	2
45 - 54	9.09%	1
55 - 64	36.36%	4
65 - 74	27.27%	3
75 or older	0.00%	0
	Answered	**11**

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

Answer Choices	Percent	Responses
Less than High School	0.00%	0
High School graduate or GED	18.18%	2
Some College or Technical School	54.55%	6
Associate Degree	18.18%	2
College Degree (including any graduate school or graduate degrees)	9.09%	1
	Answered	**11**

2020 Retrofits Program Survey

How did you learn about the Retrofits program?

Answer Choices	Responses	Percent
Idaho Power employee	7	17.95%
Contractor	19	48.72%
Equipment supplier	7	17.95%
Other business owner	1	2.56%
Other (please specify)	5	12.82%

Overall, how satisfied are you with the Idaho Power Retrofits incentive program?

Answer Choices	Responses	Percent
Very satisfied	35	89.74%
Somewhat satisfied	3	7.69%
Neither satisfied nor dissatisfied	0	0.00%
Somewhat dissatisfied	1	2.56%
Very dissatisfied	0	0.00%

How satisfied are you with the contractor that you hired to install the equipment?

Answer Choices	Responses	Percent
Very satisfied	35	89.74%
Somewhat satisfied	2	5.13%
Neither satisfied nor dissatisfied	1	2.56%
Somewhat dissatisfied	0	0.00%
Very dissatisfied	1	2.56%

How satisfied are you with the equipment that was installed?

Answer Choices	Responses	Percent
Very satisfied	34	87.18%
Somewhat satisfied	2	5.13%
Neither satisfied nor dissatisfied	2	5.13%
Somewhat dissatisfied	1	2.56%
Very dissatisfied	0	0.00%

How likely are you to recommend the contractor who installed your equipment to other business owners?

Answer Choices	Responses	Percent
Very likely	35	89.74%
Somewhat Likely	1	2.56%
Neither likely nor unlikely	2	5.13%
Somewhat unlikely	0	0.00%
Very unlikely	1	2.56%

How likely are you to recommend Idaho Power's Retrofits program to other business owners?

Answer Choices	Responses	Percent
Very likely	35	92.11%
Somewhat Likely	2	5.26%
Neither likely nor unlikely	0	0.00%
Somewhat unlikely	1	2.63%
Very unlikely	0	0.00%

COMMERCIAL ESK SURVEY 2020

Restaurant ESK

Which of the following best describes the water heating source you use at your business?

Water Heating Source	Responses	Percent
Electric	20	54.05%
Gas	17	45.95%
Other fuel source	0	0.00%

Of the items included in the kit you received, have you installed the following items at your business:

Item / Answer	Responses	Percent
Pre-rinse spray valve		
Yes	25	73.53%
No	9	26.47%
LED lightbulb #1		
Yes	34	94.44%
No	2	5.56%
LED lightbulb #2		
Yes	32	91.43%
No	3	8.57%
LED lightbulb #3		
Yes	28	90.32%
No	3	9.68%
LED exit sign #1		
Yes	16	57.14%
No	12	42.86%
LED exit sign #2		
Yes	16	55.17%
No	13	44.83%
Kitchen aerator #1		
Yes	21	63.64%
No	12	36.36%
Kitchen aerator #2		
Yes	16	51.61%
No	15	48.39%
Bathroom aerator #1		
Yes	24	75.00%
No	8	25.00%
Bathroom aerator #2		
Yes	19	63.33%
No	11	36.67%

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?

Answer	Responses	Percent
Yes	7	18.92%
No	30	81.08%

Office ESK

Which of the following best describes the water heating source you use at your business?

Water Heating Source	Responses	Percent
Electric	154	61.60%
Gas	93	37.20%
Other fuel source	3	1.20%

Of the items included in the kit you received, have you installed the following items at your business:

Item / Answer	Responses	Percent
LED lightbulb #1		
Yes	236	90.42%
No	25	9.58%
LED lightbulb #2		
Yes	218	88.98%
No	27	11.02%
LED exit sign #1		
Yes	75	35.21%
No	138	64.79%
LED exit sign #2		
Yes	59	28.92%
No	145	71.08%
Power Strip		
Yes	230	93.50%
No	16	6.50%
Kitchen aerator		
Yes	87	39.91%
No	131	60.09%
Bathroom aerator #1		
Yes	111	50.23%
No	110	49.77%
Bathroom aerator #2		
Yes	61	31.61%
No	132	68.39%

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?

Answer	Responses	Percent
Yes	84	31.58%
No	182	68.42%

Retail ESK

Which of the following best describes the water heating source you use at your business?

Water Heating Source	Responses	Percent
Electric	15	60.00%
Gas	10	40.00%
Other fuel source	0	0.00%

Of the items included in the kit you received, have you installed the following items at your business:

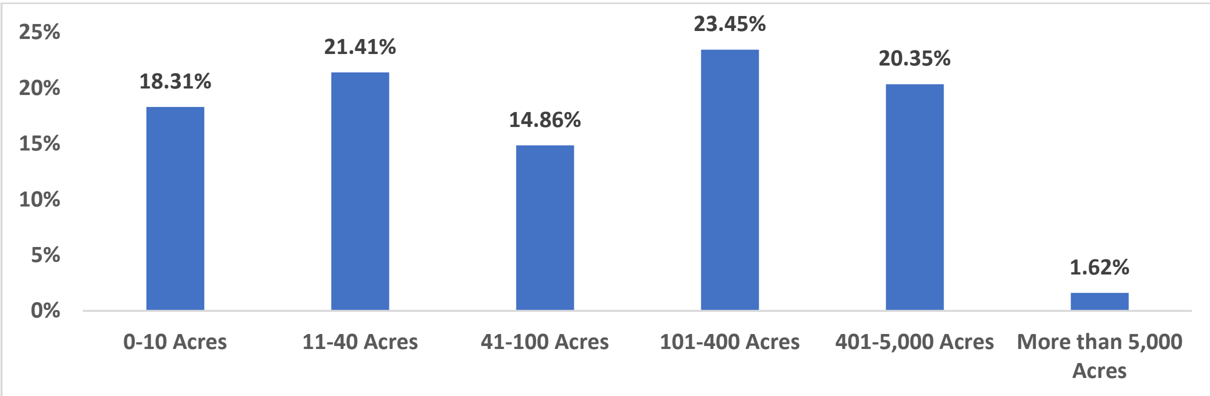
Item / Answer	Responses	Percent
LED lightbulb #1		
Yes	23	85.19%
No	4	14.81%
LED lightbulb #2		
Yes	21	84.00%
No	4	16.00%
LED exit sign #1		
Yes	7	36.84%
No	12	63.16%
LED exit sign #2		
Yes	2	11.76%
No	15	88.24%
BR30 reflector LED lightbulb #1		
Yes	13	65.00%
No	7	35.00%
BR30 reflector LED lightbulb #2		
Yes	12	60.00%
No	8	40.00%
Bathroom aerator		
Yes	9	50.00%
No	9	50.00%

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?

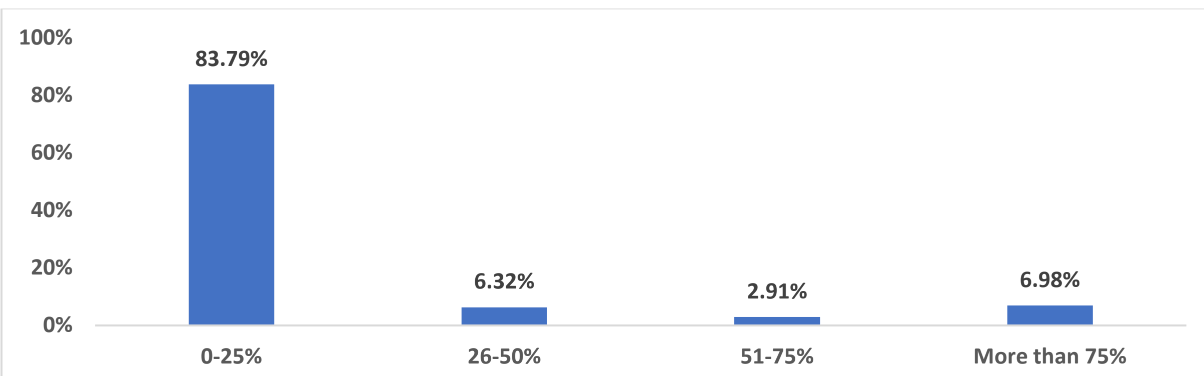
Answer	Responses	Percent
Yes	4	15.38%
No	22	84.62%

Irrigation Hardware Maintenance Survey, 2020

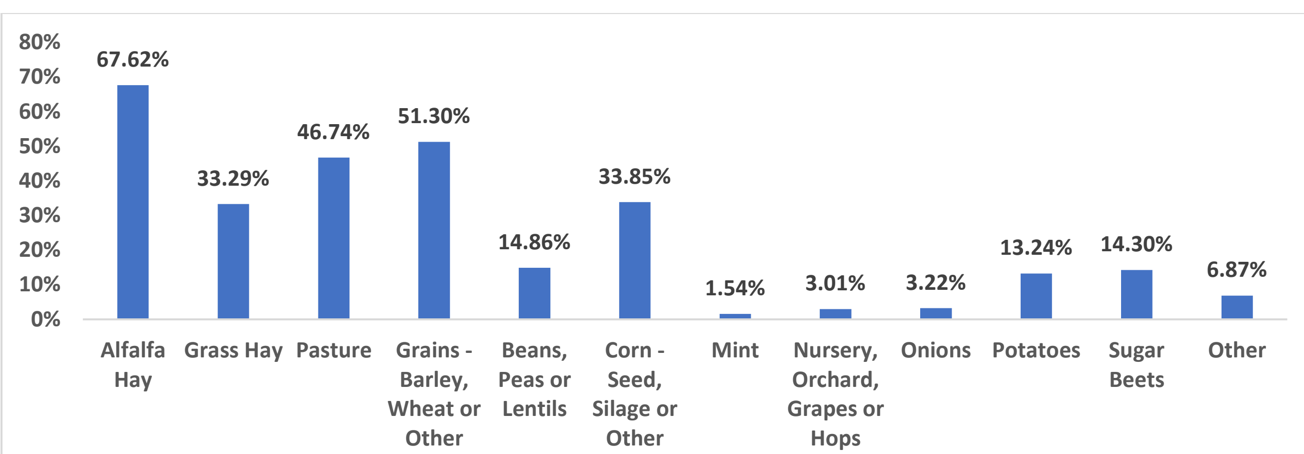
Approximately how many total acres do you water with some type of sprinkler irrigation? (select the best response)



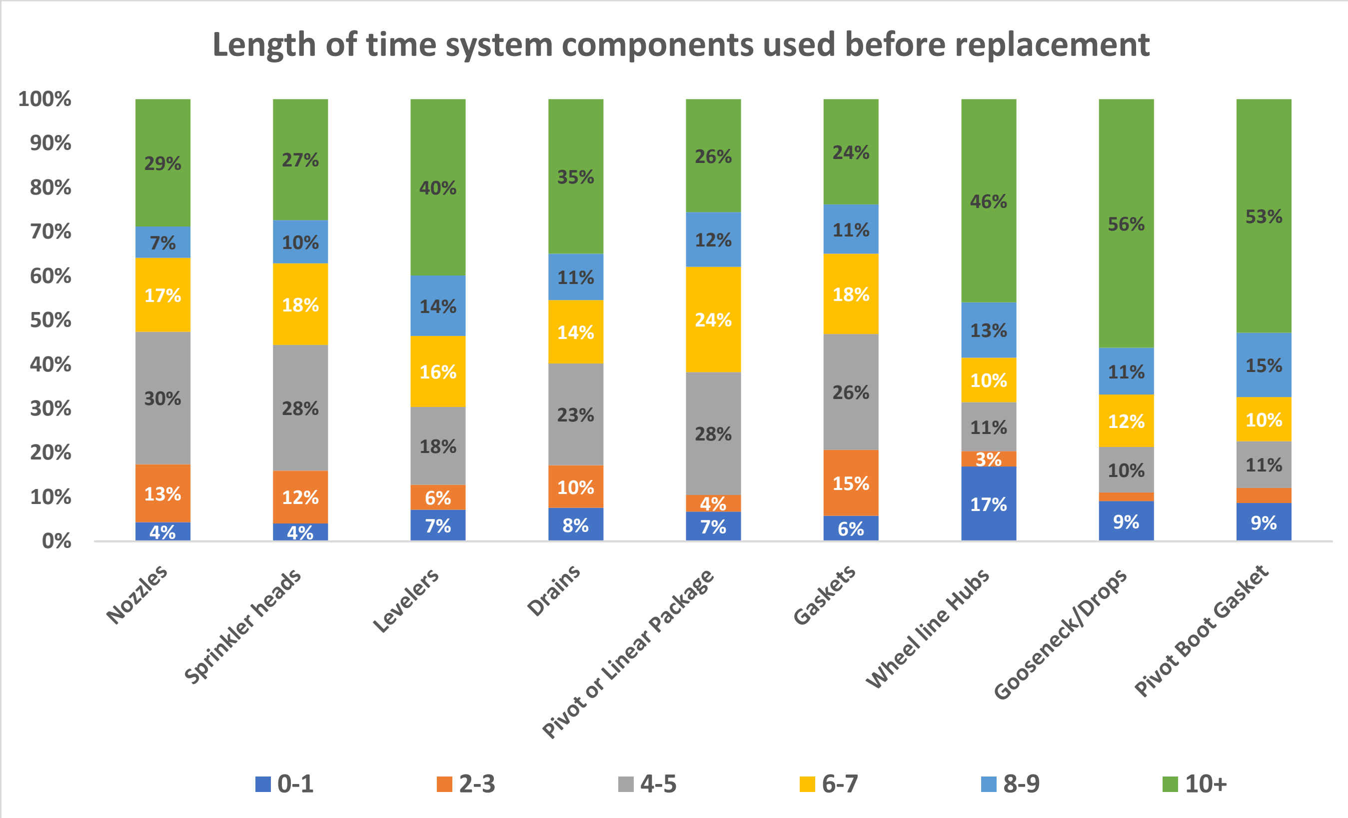
What is the approximate percentage of your acreage irrigated with a lift greater than 200 ft? (We are defining lift as the amount of elevation from the pumping water level either in a well or from surface water to the highest elevation in the irrigated field) (select one)



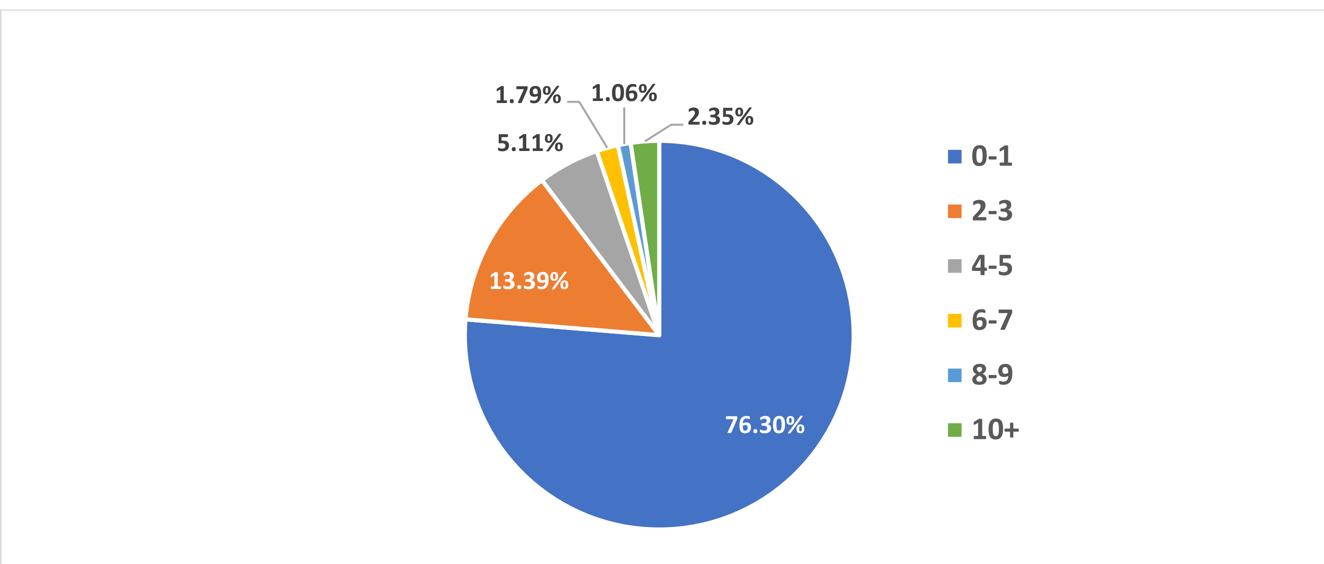
Which of the following crops are typically in your rotation? (Select all that apply)



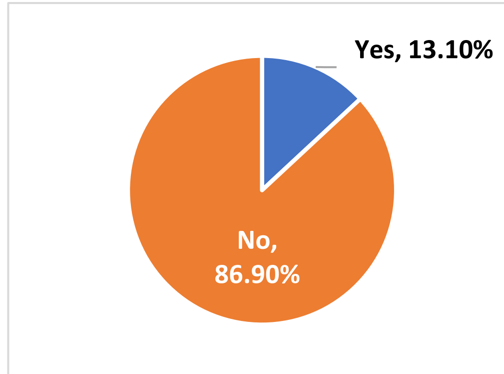
How long (in years) do you typically use or operate each of the following sprinkler irrigation system components before replacing them? (Select the appropriate number of years for each component you replace)



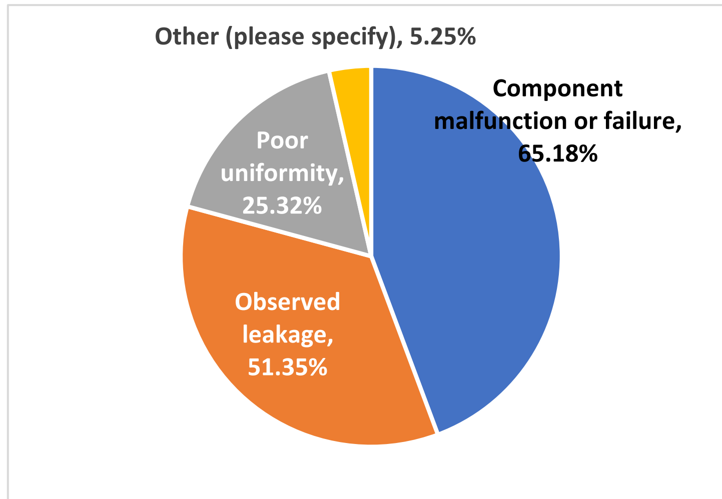
How long (in years) do you typically continue to irrigate with small cracks, breaks and splits in your aluminum hand lines and wheel lines?



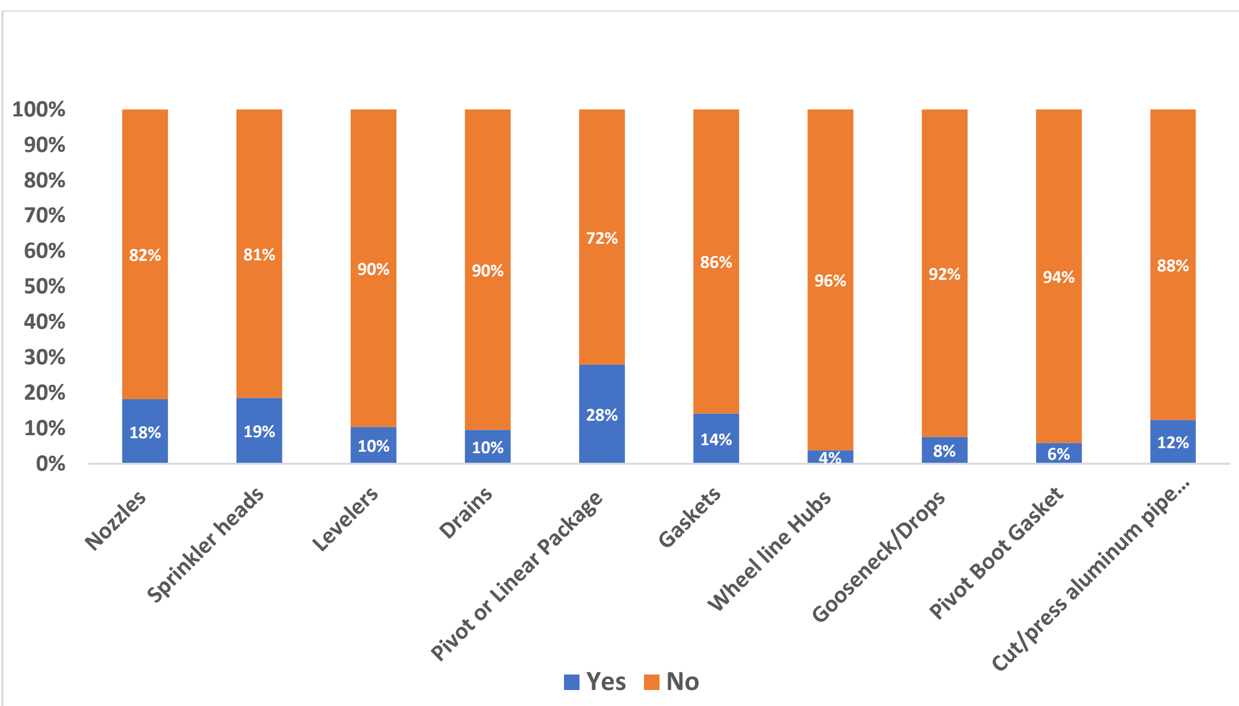
Do you typically replace your irrigation components on a predetermined schedule?



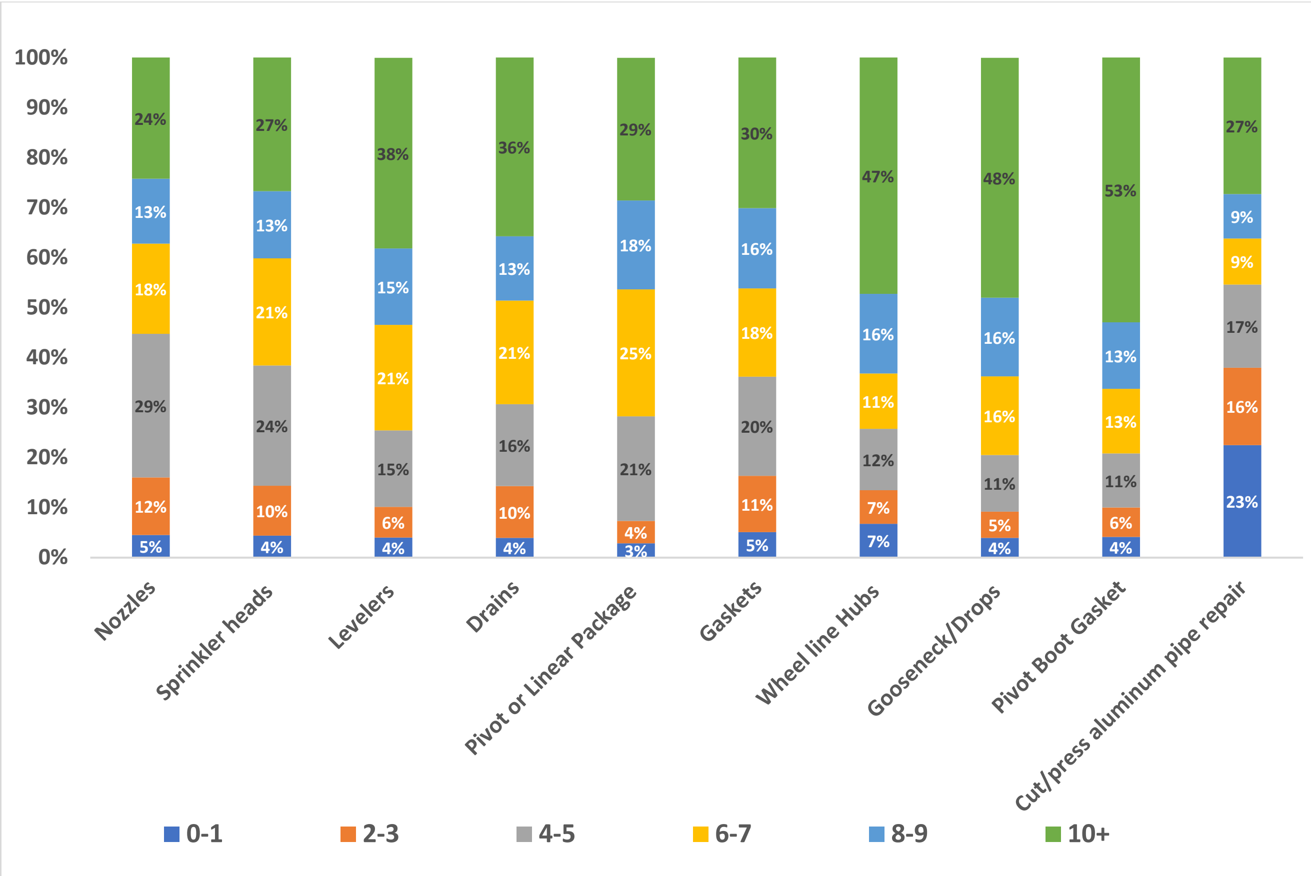
What description below most accurately answers the question "What triggers the replacement of your irrigation components?"



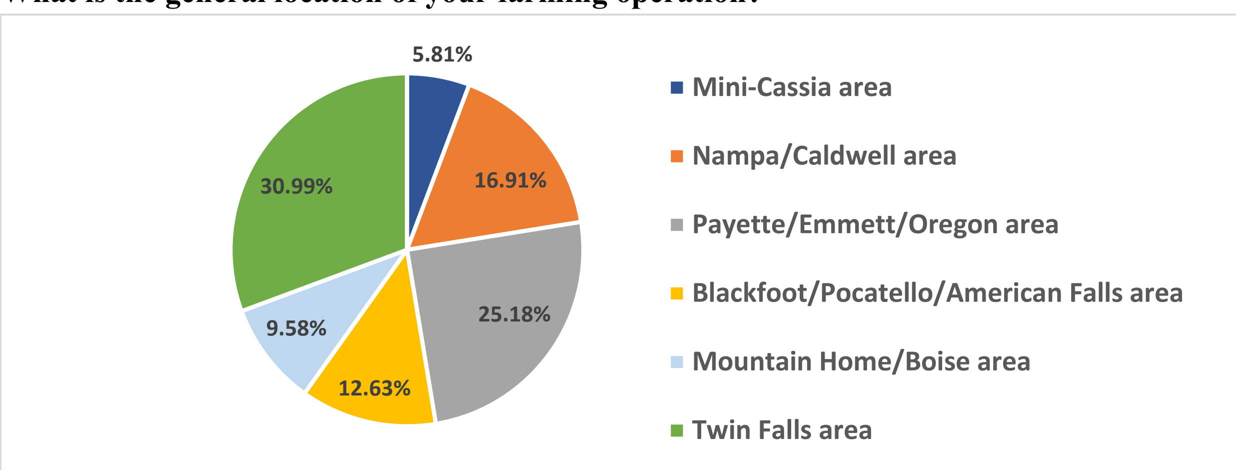
Indicate if you have you received any rebates/incentives from the Idaho Power irrigation menu efficiency program on the maintenance components listed below.



If you answered "Yes" to any of the components listed in the previous question, how frequently (in years) would you have replaced your irrigation components without Idaho Power's irrigation efficiency program?



What is the general location of your farming operation?



Idaho Power Direct Install Customer Survey

Idaho Power Direct Install Customer Survey

Overall, how satisfied are you with the program?

	Response percent	Response total
Very satisfied	88.89%	24
Somewhat satisfied	7.41%	2
Somewhat dissatisfied	0%	0
Very dissatisfied	3.7%	1
If somewhat or very dissatisfied, why?		0

Statistics based on **27** respondents;

How easy was it to participate in the program?

	Response percent	Response total
Very easy	92.59%	25
Somewhat easy	7.41%	2
Somewhat difficult	0%	0
Very difficult	0%	0
If somewhat or very difficult, why?		0

Statistics based on **27** respondents;

Based on your experience with this Direct Install program, how likely are you recommend this program to other small businesses?

	Response percent	Response total
Very likely	92.59%	25
Somewhat likely	7.41%	2
Not very likely	0%	0
Not likely at all	0%	0
If not very likely or not likely at all, why?		0

Statistics based on **27** respondents;

How satisfied are you with the equipment that was installed?

	Response percent	Response total
Very satisfied	100%	26
Somewhat satisfied	0%	0
Somewhat dissatisfied	0%	0
Very dissatisfied	0%	0
If somewhat or very dissatisfied, why?		0

Statistics based on **26** respondents;

How satisfied are you with the customer service provided by the company installing the equipment?

	Response percent	Response total
Very satisfied	92.31%	24
Somewhat satisfied	7.69%	2
Somewhat dissatisfied	0%	0
Very dissatisfied	0%	0
If somewhat or very dissatisfied, why?		1

Statistics based on **26** respondents;

How did you learn about Idaho Power's Small Business Direct Install Program?

	Response percent	Response total
Idaho Power Energy Advisor	34.62%	9
Idaho Power Customer Service	3.85%	1
Email from Idaho Power	0%	0
Postal Mailing from Idaho Power	23.08%	6
Vendor or Contractor	38.46%	10
Idaho Power Website	0%	0
Other Business Owner or Employee	0%	0

Statistics based on **26** respondents;

How, if at all, has your opinion of Idaho Power changed since participating in this program?

		Response percent	Response total
More favorable opinion of Idaho Power		48.15%	13
No change in opinion of Idaho Power		51.85%	14
Less favorable opinion of Idaho Power		0%	0

Statistics based on **27** respondents;

Which of the following best describes your business?

		Response percent	Response total
Agriculture, Forestry and Fishing		11.11%	3
Finance, Insurance and Real Estate		14.82%	4
Manufacturing		0%	0
Mining		0%	0
Public Administration		0%	0
Retail Trade		14.82%	4
Services		29.63%	8
Transportation, Communications, Electric, Gas and Sanitary Services		3.7%	1
Wholesale Trade		0%	0
Other (please specify)		25.93%	7

Statistics based on **27** respondents;

EVALUATIONS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
Idaho Power Educational Distributions Impact and Process Evaluation	Residential	DNV GL	Idaho Power	Impact and Process
Idaho Power Weatherization Programs Analysis	Residential	Nexant, Inc.	Idaho Power	Other (Billing Analysis)
Irrigation Efficiency Rewards	Irrigation	Tetra Tech	Idaho Power	Impact and Process
Rebate Advantage PY2019 M&V Report	Residential	ADM Associates, Inc	Idaho Power	Impact

FINAL REPORT

Idaho Power Educational Distributions

Impact and Process Evaluation

Date: February 5, 2021

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1 EXECUTIVE SUMMARY

DNV GL conducted an impact and process evaluation for the Educational Distributions effort administered through Idaho Power Company's (IPC's) Residential Energy Efficiency Education Initiative. This effort seeks to use low-cost and no-cost channels to deliver energy efficiency items with energy savings directly to customers. As with the broader initiative, the goal of Educational Distributions is to change customer behavior and create awareness of and demand for energy efficiency programs in IPC's service area.

The key objectives of the impact evaluation were to:

- Determine and verify the energy (kWh, kW) impacts attributable to the 2019 Educational Distributions effort.
- Provide credible and reliable program energy and non-electric/non-energy (e.g. avoided emissions, water savings, transmission/distribution benefits) impact estimates and ex-post realization rates attributed to each of the effort's four programs for the 2019 program year. The four programs are Welcome Kits, Energy-Savings Kits (ESK), Student Energy Savings Kits (SEEK), and Giveaways—including Giveaway Kits and LEDs.
- 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 evaluations were to:

- Evaluate program design including program mission, logic, and use of industry best practices.
- Evaluate program implementation including quality control, operational practice, outreach, and ease of customer participation.
- Evaluate program administration including program oversight, staffing, management, training, documentation, and reporting.
- Report findings, observations, and recommendations to enhance program effectiveness.

1.1 Key Findings

1.1.1 The program's overall savings realization rate is 97.2%.

Welcome Kits had an RR of 100%. ESK savings decreased due to reductions in savings to water heating measure savings (RR=96.9%)because the vendor sent electric kits to approximately 1000 customers without confirmed electric water heating. SEEK savings decreased due to lower LED savings because of a lower assumed baseline wattage for "Other" bulbs (RR=96.5%). This decrease was slightly counteracted by a 101% realization rate for showerheads due to a slight reduction in post-install flow rates to match the response options on the student surveys. If the program claimed evaluated savings for nightlights for welcome kits and ESK, realization rates would increase to 106.7%

1.1.2 The realization rate for number of kits was 100%.

DNV GL verified the program tracking accounte for all of the delivered kits. The kits delivered to customers without confirmed electric water heating slightly reduced the savings realization rate, but this did not affect the realization rate for the number of kits sent.

1.1.3 Lifetime non-energy impacts (NEIs) for the 2019 program measures are approximately $1.16 million.

Almost all of these savings come from the LEDs. Additional NEIs for which DNV GL could not assign a monetary value include increased customer satisfaction and increased knowledge and awareness of energy efficiency.

1.1.4 Idaho Power reported that they plan to stop sending ESKs because they will not remain cost-effective in 2021.

1.1.5 Program materials are well-produced and contain the recommended information.

1.1.6 QA/QC processes are satisfactory with a few opportunities to improve.

1.1.7 Participants are satisfied with the Welcome Kits.

1.1.8 IPC could claim a small amount of savings from the Welcome Kit nightlights.

Based on survey responses, DNV GL estimates approximately 12 kWh annual savings per year per kit from the nightlights. Across all welcome kits and ESKs this would add 1,025,700 kWh to evaluated savings.

1.2 Recommendations

1.2.1 For SEEK lighting saving calculations, assume 13W for baseline wattage for "Other" bulbs.

The SEEK program's savings calculations are based on the difference in wattage between a baseline bulb and the LED bulb included in the kit. Students are instructed to replace incandescent bulbs and to note the wattage of the replaced bulb on their survey form. The form provides responses for 40W, 60W, 100W, and "Other." The interview with the program vendor confirmed that they assumed a 40W baseline for the "Other" option. However, DNV GL recommends a more conservative assumption of 13W to cover the possibility that students did not perfectly follow the instructions and replaced a (60W equivalent) CFL rather than an incandescent.

1.2.2 Ask the SEEK vendor to provide a spreadsheet or code used to calculate savings.

Putting the supporting calculations into a standardized calculator would document assumptions such as which point-value within the ranges of each response option on the student survey the calculation used. It would also facilitate QA/QC by Idaho Power and help evaluators verify program savings.

1.2.3 Continue to not claim savings from the shower timers.

DNV GL did not find sufficient evidence that this measure results in measurable savings.

1.2.4 Consider additional research to better estimate the number of Welcome Kit recipients who take kit measures with them when they move.

Some people will take the LEDs with them when they move; however, there are no readily available estimates of how common this is. Additional research would be needed to estimate a frequency and establish a discount factor for energy savings claims if a customer moved out of Idaho Power service area.

1.2.5 For SEEK, if practical, consider allowing students to take pictures of the replaced/baseline equipment as a way of confirming/vetting the answers they provide on the survey.

This would provide an opportunity to vet the answers the students provided on their surveys as well as help determine the best wattage assumption to use for the “Other” category.

2 INTRODUCTION

2.1 Program overview

Designated as a specific program in 2015, the Educational Distributions effort is administered through the Residential Energy Efficiency Education Initiative. It seeks to use low-cost and no-cost channels to deliver energy efficiency items with energy savings directly to customers. As with the initiative, the goal of the Educational Distributions effort is to change behavior and create awareness of and demand for energy efficiency programs in IPC's service area.

Idaho Power selects items for distribution if the initial analysis indicates the measure is either currently cost-effective or expected to be cost-effective. Typically, selected items have additional benefits beyond traditional energy savings, such as educating customers about energy efficiency, expediting the opportunity for customers to experience newer technology, or allowing Idaho Power to gather data or validate potential energy savings resulting from behavior change.

Idaho Power recognizes the need to educate and guide customers to promote behavior change and awareness and plans program activities accordingly. Items may be distributed at events and presentations, through direct-mail, or during home visits conducted by energy advisors.

The Educational Distributions effort is made up of four programs: Welcome Kits, Energy-Saving Kits (ESK), Student Energy Savings Kits (SEEK), and Giveaways.

- ***Welcome Kits****:* Idaho Power uses a vendor to mail Welcome Kits to brand-new customers between 35 and 45 days after electric service begins at their residence. Each kit contains four LED lightbulbs, a nightlight, a greeting card, and a small flipbook containing energy-saving tips and information about Idaho Power's energy efficiency programs. The kits are intended to encourage first-time customers to adopt energy-efficient behaviors early in their new homes. In 2019, Idaho Power sent 30,099 Kits with savings of 1,040,221 kWh.
- ***Energy-Saving Kits****:* Idaho Power works with a kit vendor to offer two versions of its free ESKs: one for homes with electric water heaters and one for homes with alternate-source water heaters. Customers enroll at www.idahopower.com/save2day, by calling 800-465-6045, or by returning a postcard. A kit is sent directly to the customer's home. Each ESK contains nine LED lightbulbs (six 800-lumen lightbulbs and three 480-lumen lightbulbs), a digital thermometer (to check refrigerator, freezer, and water temperatures), a shower timer, a water flow-rate test bag, an LED night light, and educational materials. In addition, the kit for homes with electric water heaters contains a high-efficiency showerhead with a thermostatic shower valve and three faucet aerators—one for the kitchen and two for bathrooms. Idaho Power also gives away limited quantities of energy kits at presentations and small events to gather interest in energy efficiency.

  In 2019, Idaho Power sent 41,710 ESKs with savings of 7,484,734 kWh. This sub-program is currently scheduled to sunset at the end of 2020. It has very high saturation rates, and it is projected to not remain cost-effective in 2021.
- ***Student Energy Efficiency Kits****:* The SEEK program provides fourth- to sixth-grade students in schools in Idaho Power's service area with quality, age-appropriate instruction regarding the wise use of electricity. Each child who participates receives a take-home kit. The products in the kit are selected specifically to encourage energy savings at home and engage families in activities that support and reinforce the concepts taught at school.

Once a class enrolls in the program, teachers receive curriculum and supporting materials. Students receive classroom study materials, a workbook, and a take-home kit containing the following: three LED lightbulbs, a high-efficiency showerhead, an LED nightlight, a furnace filter alarm, a digital thermometer for measuring water and refrigerator/freezer temperatures, a water flow-rate test bag, and a shower timer.

At the conclusion of the program, students and teachers return feedback to Idaho Power's vendor indicating how the program was received and which measures were installed. The vendor uses this feedback to provide a comprehensive program summary report showing program results and savings.

Unlike most residential programs offered by Idaho Power, SEEK results are reported on a school-year basis, not by calendar year. For the 2018-2019 school year, Idaho Power sent 10,053 Kits with a savings of 2,113,543 kWh.

- ***Giveaways****:* Giving away energy efficiency measures is an effective way to connect Idaho Power with its customers and begin productive conversations around energy efficiency. Idaho Power field staff and energy efficiency program specialists seek opportunities to educate customers about about savings opportunities and offer customers free Giveaway Kits or a free lightbulb to use immediately in their own homes. In 2019, Idaho Power gave away 12,946 LED lightbulbs with a savings of 111,853 kWh and 720 kits with a savings of 55,123 kWh.

2.2 Evaluation overview

DNV GL conducted an impact and process evaluation for this program. Table 2-1 lists the evaluation tasks.

The key objectives of the impact evaluation were to:

- Determine and verify the energy (kWh, kW) impacts attributable to the 2019 program.
- Provide credible and reliable program energy and non-electric/non-energy (e.g. avoided emissions, water savings, transmission/distribution benefits) impact estimates and ex-post realization rates attributed to each program for the 2019 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 evaluations were to:

- Evaluate program design including program mission, logic, and use of industry best practices.
- Evaluate program implementation including quality control, operational practice, outreach, and ease of customer participation.
- Evaluate program administration including program oversight, staffing, management, training, documentation, and reporting.
- Report findings, observations, and recommendations to enhance program effectiveness.

Table 2-1. Evaluation Tasks by Program

Task	Education Distributions
Program staff interviews	✓
Tracking system review	✓
In-depth Interviews	2*
Welcome Kit recipient surveys	153
Non-energy impacts	✓
Program theory review	✓
Program materials review	✓
Reporting	✓

* DNV GL had several detailed conversations with program staff as part of the regular evaluation check-ins that provided information DNV GL needed from a program staff interview.

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 Key findings 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 Data collection

3.1.1 Surveys

To conduct the surveys, DNV GL started by drafting instruments and providing them to IPC for review. After revising the instrument based on feedback, DNV GL programmed the survey into its online survey administration platform and conducted several test runs to verify the accuracy of the programming. Next, DNV GL conducted a “soft launch” of the survey where DNV GL sent email invitations to only 50 Welcome Kit participants. After reviewing the outcomes of the soft launch to verify respondents were able to understand the survey and ensure there were no programming errors, DNV GL conducted a full launch of the survey to the entire primary sample.

The soft launch occurred on November 30, 2020. The response rate for the soft launch was low enough that DNV GL decided to release both the primary and backup samples on December 2. DNV GL sent reminder emails on December 7 and December 10. DNV GL sent two reminders to participants who had not yet responded. One occurred on December 9th and the other was after December 10th. The maximum number of touches any participant received was three. DNV GL ended data collection on December 28. At that time, 153 participants responded for a final response rate of 5.5%. This is within the typical range DNV GL saw for residential surveys in 2020.

The survey instrument can be found in APPENDIX C. It was designed to check program awareness, experience, and satisfaction. The survey also asked measure verification questions to gather information on installation rates and uses for the Welcome Kit’s LED nightlight.

3.1.2 Survey sampling

Using statistical results from prior surveys DNV GL completed for Idaho Power evaluations last year to estimate expected variances, DNV GL determined that 100 completed surveys would be large enough to provide 90/10 statistical precisions.[1] DNV GL generated a primary sample of 300 customers and a backup sample of 100. DNV GL stratified the samples by region, and then selected a sample in each region proportional to the percentage of the participant population. Out of the 400 selected customers, 313 (22%) were missing email addresses, and approximately 33% were listed as inactive customers. DNV GL retained the customers without email addresses but filtered out the inactive customers. The final primary sample contained 190 customers and the backup sample contained 62.

Because of low initial response rates, to achieve the target of 100 responses, DNV GL selected an additional sample of 2,800 from the population of active accounts, stratified by region and proportionally allocated.

3.1.3 In-depth interviews

DNV GL uses in-depth interviews to obtain a fuller, richer, and more tangible understanding of the complex issues associated with program delivery than close-ended surveys provide. Such interviews help devise solutions to participation barriers and allow us to explore how various market factors could impact future program design and delivery. DNV GL design semi-structured interviews to be flexible. This allows the interviewer to probe for depth and go “off script” when interesting and useful information comes up. When

[1] 90% confidence that the true value is within 10% of the value derived from the survey responses.

interviewers have the flexibility and training to persist and politely probe a little deeper, more relevant information can surface.

DNV GL's process for developing and fielding the in-depth interviews was similar to that of the surveys. DNV GL first designed instruments and provided them to Idaho Power for review. After revising the instruments, DNV GL conducted phone calls with the program managers and the program vendors using those instruments as guides. Sampling for the in-depth interviews was unnecessary because of their qualitative nature and the very limited number of respondents to contact. The interview guides can be found in APPENDIX A and APPENDIX B. DNV GL conducted an in-depth interview with the SEEK program vendor. During the evaluation, DNV GL had several conversations with the IPC program manager and were able to answer all questions from the interview guide during those conversations.

3.2 Tracking system and project file review

The tracking system review verifies the tracking data broadly. During the tracking system review DNV GL:

- Confirmed that the database savings match program reporting
- Confirmed that the database includes all variables needed to calculate and evaluate program savings
- Verified that the required variables contain usable data in consistent formats
- Checked the accuracy of any programmed formulas used to calculate savings and incentives
- Confirmed that the line-by-line records match specifications from the reference material such as the Regional Technical Forum (RTF) savings workbooks

3.3 Program theory review

The program theory review is the primary means of determining if the program design meets industry best practices. It provides a check that the program has been well thought out, is reasonably designed to achieve its goals given reasonable assumptions, and has considered short and long-term consequences of the program. Questions DNV GL explored during this task included:

- Has the program enumerated the market barriers it is trying to overcome?
- Is the program designed to effectively lower those market barriers?
- Will lowering those market barriers lead to the outcomes the program seeks?
- Are assumptions and external factors considered and accounted for?
- Have negative consequences and unintended consequences been considered?
- Are key stakeholder interests reflected or taken into account?

The program did not have a written logic model, so DNV GL produced one.

3.4 Program materials review

The information gathered during the program materials review was used to assess program design, administration, and implementation. DNV GL reviewed the following materials:

- Marketing materials and websites
    - **ESK Marketing Materials**. DNV GL evaluated all ESK marketing and education materials, including marketing postcards and emails, ordering instructions, educational guides, and kit packaging.
    - **SEEK Marketing Materials and Website**. DNV GL also reviewed SEEK program content sheets, which are used to recruit new teachers and schools for the program. The program website was

tested and reviewed to ensure there were working hyperlinks and appropriate and necessary program information.

- Participant instructions, tools, worksheets
    - **Welcome Kit Materials**. DNV GL assessed the Welcome Kit educational booklet, greeting card, and kit packaging.
    - **2018-2019 SEEK Student and Teacher Materials**. DNV GL looked at the teacher lesson plans and student workbooks, including measure installation instructions.
- **2018-2019 SEEK report by Resource Action Programs (RAP)**. RAP implemented the program and prepared this report on the program outcomes. Rather than reimplement the data collection and analysis represented in this report, DNV GL received the raw survey data from Idaho Power and vetted the calculations and conclusions made in the report. DNV GL also reviewed the formulas and assumptions used for energy savings calculations and verified that ex ante savings calculations applied those formulas accurately.

3.5 QA/QC review

DNV GL reviewed quality assurance and quality control practices as described during in-depth interviews and discussions with program managers.

3.6 Non-energy impacts

DNV GL maintains a database of non-energy impacts (NEIs) published in publicly available reports. NEIs are associated with specific measures in specific contexts. DNV GL assigns rankings of confidence and plausibility for each value, which DNV GL used to discount values from lower quality or older studies. Each value in the database is assigned a multi-level categorization to match with the measure for which NEIs are sought. The lower levels of categorization classify broad aspects like sector (residential or non-residential), and the higher levels of categorization capture detailed measure characteristics from the study. DNV GL used the highest categorization possible to identify NEI matches for these residential measures. Once all potential studies were identified, DNV GL chose the most applicable NEI types and values based on study confidence. In the case of these measures for Idaho Power, there was only a single NEI for each measure in residential contexts.

4 IMPACT FINDINGS

This section provides detailed findings on Education Distribution program savings.

4.1 Impact summary

The ex-post savings values for all measures utilized the same deemed values and custom calculation methodologies as ex-ante. The overall Realization Rate (RR) for electric savings (kWh) is 97.2%. (Table 4-1).

Key impact findings

1. *The Overall program's overall RR=97.2%.*
2. *ESK savings decreased due to reductions in savings to water heating measure savings to customers, RR=96.9%.*
3. *SEEK savings decreased due to lower LED savings, RR=96.5%.*
4. *Welcome Kits had an RR of 100%.*
5. *The RR for number of kits was 100%.*
6. *Lifetime NEIs for the 2019 program measures are approximately $1.16 million.*

Table 4-1. Impact evaluation summary

Kit Type	Tracked Ex-Ante Savngs (kWh)	Verified Ex-Post Savings (kWh)	RR% (kWh)	Tracked Quantity of Kits	Verified Quantity of Kits	RR% (Kits)
Energy Savings Kits (ESK)	7,484,734	7,255,455	96.9%	41,710	41,710	100%
Welcome Kits (WK)	1,040,221	1,040,221	100%	30,099	30,099	100%
Giveaway Kits (GK)	166,977	166,977	100%	13,666	13,666	100%
Student Energy Efficiency Kits (SEEK)	2,113,566	2,040,467	96.5%	10,053	10,053	100%
Total	**10,805,498**	**10,503,120**	**97.2%**	**95,528**	**95,528**	**100%**

There are two types of kits for which ex post savings differed from ex ante savings. Ex post savings for ESK were lower than ex ante savings because approximately 1,000 records received electric kit savings; however, it is unknown if those customers had an electric water heater because the customer did not specify their water heater type when they signed up for a kit. While some customers may have an electric water heater, the number is unknown. Programmatically, the customer should have received the non-electric version of the kit so any electric savings associated with the water saving kit items should not have been included. For SEEKs, the showerhead ex post savings were greater than the ex ante savings because of a miscalculation by the vendor. However, LED ex post savings were lower than ex ante savings in the SEEKs because of an assumption the vendor made about the wattage of the "other" replaced bulbs. The details of the savings adjustments for ESK are summarized in Table 4-2 and SEEK in Table 4-3. Additional details are discussed in the following sections.

Table 4-2. ESK savings adjustment

Quantity of Records Impacted	Tracked (kWh)	Verified (kWh)	RR% (kWh)	Details
1,014	310,882	78,460	25%	Records with unknown water heaters that received electric kit savings. Savings adjusted to reflect the non-electric kit savings.

Table 4-3. SEEK savings adjustments

Kit Measures	Tracked (kWh)	Verified (kWh)	RR% (kWh)	Details
Showerhead	926,688	936,659	101.1%	Values for baseline and efficient showerhead flowrates from survey responses were higher than the ex ante values. For verified savings, DNV GL used the responses that had values for both the baseline and efficient cases. Additionally, DNV GL found that the ex ante calculations assumed the largest bin for the efficient case to have a range of 1.6gpm to 1.8 gpm instead of the 1.6 to 1.75 that was indicated on the survey instrument. These minor changes resulted in greater verified savings.
LED	760,331	677,274	89.1%	Ex ante savings assigned a baseline value of 40 watts to responses of "Other" in the student surveys. This aligns with the lowest wattage option in the survey. However, for verified savings, DNV GL assigned a value of 13 watts for this response. There may be several reasons why "Other" is used, but DNV GL think it is reasonable to take a more conservative estimate and assign a wattage that is consistent with a 60 watt equivalent CFL. This resulted in reduced evaluated savings.

4.2 Tracking data review

Idaho Power provides tracking data for all four distribution channels (ESK, Welcome Kits, SEEK, and Giveaways). Evaluation review of 95,528 records found that tracked quantities of kits distributed, in all channels, were accurate. The only errors identified were in the ESK data:

- 1,014 electric kits were sent to households with an unknown water heater fuel type, which led to a potential overestimation of electric savings by 232,422 kWh.

4.3 Savings calculation review

Ex ante savings values and calculation methods were provided and reviewed. All of the program kits used a selection of the measures detailed in Table 4-4.

Table 4-4. Educational Distributions measures and ex ante savings

Measure	Kit Type	Energy Savings	Calculation Type	Savings Source
LED Bulb	ESK, Welcome Kit, Giveaway	8.6 kWh per unit	Deemed	Regional Technical Forum
	SEEK	50.3 kWh per unit	Custom Calculation	Resource Action Plan, student survey
LED Nightlight	SEEK	28.5 kWh per unit	Custom Calculation	Resource Action Plan. No savings claimed for ESK, Welcome Kit, and Giveaway
Showerhead	ESK	147.8 kWh per unit	Deemed	Regional Technical Forum (With reduced installation rate)
	SEEK	233.8 kWh per unit	Custom Calculation	Resource Action Plan, student survey
Shower Timer*	ESK, Giveaway	N/A	N/A	No savings claimed for this measure
	SEEK	84.9 kWh per unit	Custom Calculation	Illinois Super Savers Program; no savings claimed for this measure
Faucet Aerators	ESK	27.0 kWh per unit	Deemed	Regional Technical Forum
FilterTone Alarm	SEEK	78.2 kWh per unit	Custom Calculation	Resource Action Plan, student survey

*Idaho Power has not claimed savings for shower timer measures in any kit offering.

All of the ex ante deemed savings values were reviewed and no errors were identified. The SEEK ex ante savings are calculated with inputs from student survey responses. DNV GL used the raw student responses to verify the SEEK savings calculations and identified some discrepancies in the inputs used for ex ante savings for the LED bulb, showerhead, and shower timer measures. Ex ante and ex post savings calculations and realization rates are in Table 4-5.

The realization rate for LEDs was less than 100% because the SEEK vendor assumed a baseline of 40W for the “Other” type of bulb in the student surveys. DNV GL used an assumption of 13W for this case because it is both more conservative and would cover situations where students replaced CFLs rather than incandescent bulbs.

The realization rate for showerheads is greater than 100% because the ex ante calculations used a range for the post-install flow rates that was wider than the option listed in the survey. The ex post calculation used the midpoint of the range listed on the survey. This reduced the post-install flow rate slightly, resulting in slighting increased savings.

Table 4-5. Ex ante and ex post inputs for SEEK measures

Measures	Ex ante input values	Ex post input values	Ex ante savings	Ex post savings	Realization rate
LED Bulb	First LED Baseline Wattage: 58.6	First LED Baseline Wattage: 53.57	50.9 kWh per unit	45.7 kWh per unit	89.8%
	Second LED Baseline Wattage: 57.7	Second LED Baseline Wattage: 52.5	50.0 kWh per unit	44.6 kWh per unit	89.3%
	Third LED Baseline Wattage: 57.7	Third LED Baseline Wattage: 51.69	49.9 kWh per unit	43.8 kWh per unit	87.7%
Showerhead	Baseline Gallons per Minute: 2.0	Baseline Gallons per Minute: 2.0	233.8 kWh per unit	336.4 kWh per unit	101.1%
	Efficient Gallons per Minute: 1.3	Efficient Gallons per Minute: 1.25			
Shower Timer*	Average Gallons per Minute: 1.65	Average Gallons per Minute: 1.66	85.0 kWh per unit	85.9 kWh per unit	101.2%

* Idaho Power has not claimed savings for shower timer measures.

Ex ante savings are calculated for the Shower Timer measure. However, the program does not claim these savings due to uncertainty in savings concerns. DNV GL reviewed this measure to assess if savings should be claimed in the future. Based on its review, DNV GL found limited TRM coverage of this measure outside of Idaho and only one impact evaluation.[2] That impact evaluation conducted participant surveys and found that only 21% of respondents that had the shower timer installed actually used the timer. The impact evaluation calculates savings similar to the ex ante savings but applies the 21% usage factor, reducing savings. Therefore, DNV GL agree with the decision to not claim savings for this behavioral measure.

[2] Elementary Energy Education GPY4 Evaluation Report, Nicor Gas Company, Navigant. 2016.

4.4 Non-energy impacts

Table 4-6 shows the NEI, value, and unit for each of the measures for which DNV GL had residential values in its NEI database. Table 4-7 shows the application of those NEIs to the measures distributed by the program. The resulting total lifetime NEIs for the program measures distributed in 2019 are $1,161,279.90.

The kits also produce customer satisfaction and increased awareness and education about energy and energy efficiency. These NEIs are real, but not readily convertible to a monetary value.

Table 4-6. NEIs per measure

Measure	NEI	Value	Unit
Faucet aerator	Avoided pollution - Societal	$2.55*10^{-5}$	$/kWh/yr
LED	Lighting quality and lifetime - Participant	3	$/installed measure/lifetime
Low flow showerhead	Avoided pollution - Societal	$2.55*10^{-5}$	$/kWh/yr

Table 4-7. Program NEI estimates by measure

Measure	2019 verified results (kWh or installed measures)	Measure life (years)*	Lifetime NEI value
Faucet aerator	1,501,335 kWh	10	$383
LED	386,654 installed	n/a	$1,159,962
Low flow showerhead	3,666,717 kWh	10	$935
Total NEIs			$1,161,280

* Measure lives are based on RTF estimates retrieved 12/09/2020: https://nwcouncil.app.box.com/v/Aeratorsv1-0; https://nwcouncil.app.box.com/v/ResComShowerheadsv4-3; Measure life is n/a for LEDs because the NEI is already in lifetime units.

5 PROCESS FINDINGS AND TARGETED RECOMMENDATIONS

This section provides detailed findings on program operations and materials. The evaluation included in-depth interviews, review of program logic and materials, QA/QC review, and program participant surveys.

Key process findings

1. *Program materials are well-produced and contain the recommended information*
2. *QA/QC processes are satisfactory with a few opportunities to improve*
3. *Participants are satisfied with kit programs*
4. *IPC could claim a small amount of savings from the Welcome Kit nightlights (12 kWh/kit). If these evaluated savings are added to the program, realization rate will increase to 106.7%.*

5.1 In-depth interviews

The in-depth interview with the SEEK vendor and conversations with program staff revealed the following:

SEEK

- According to vendor staff, the SEEK program has been successful and highly regarded among participating schools and teachers.
- The SEEK program's success relies on teachers to not only administer the program but provide accurate information in the materials that are returned and later used to calculate energy savings. There is continuous outreach effort throughout the program year to ensure teachers have support from program administrators and their Education and Outreach Energy Advisors (EOEAs)
- The ex ante savings calculations for the SEEK kits use the midpoints in the ranges for showerhead flow rate and assumed 40W for baseline wattage of "Other" bulbs. This informed DNV GL's impact evaluation.
- Idaho Power decides the measures to include in SEEK-based on cost-effectiveness determined using savings calculated by RAP based on the survey results, practicalities on shipping and box size, leftover supplies from the previous program year, and whether or not the measure is self-installable. The measures are reviewed on an annual basis during a kickoff meeting between the utility and vendor staff.
- As a result of the COVID-19 pandemic, the SEEK program has boosted its online presence by putting materials onto the website and allowing for the survey to be done using an online scantron. The program has also implemented direct-to-student shipping, which can be done through an enrollment using a teacher's identification code. However, this option has not yet been utilized. The original enrollment target for the 2021 program year was 10,000 participants, and the fall 2020 semester has so far done better than expected. At the time of the interview, 9,800 kits had been sent to teachers. Due to this, the target participant goal for the 2021 program year has been updated to 12,500.

ESK

- Idaho Power reported they plan to stop sending the ESKs in 2021 because lighting baseline changes and reduced savings from the thermostatic shower valve and showerhead combination units prevent the kits from achieving cost-effectiveness.

Overall

- QA/QC processes are generally good. Idaho Power may wish to consider minor improvement opportunities as practicable.

5.2 Program logic review

To support the process evaluation, DNV GL developed logic models for the SEEK and Welcome Kit programs using program materials and information gathered during the in-depth interviews. The logic models are shown in Figure 5-1 and Figure 5-2.

Figure 5-1. SEEK program logic model

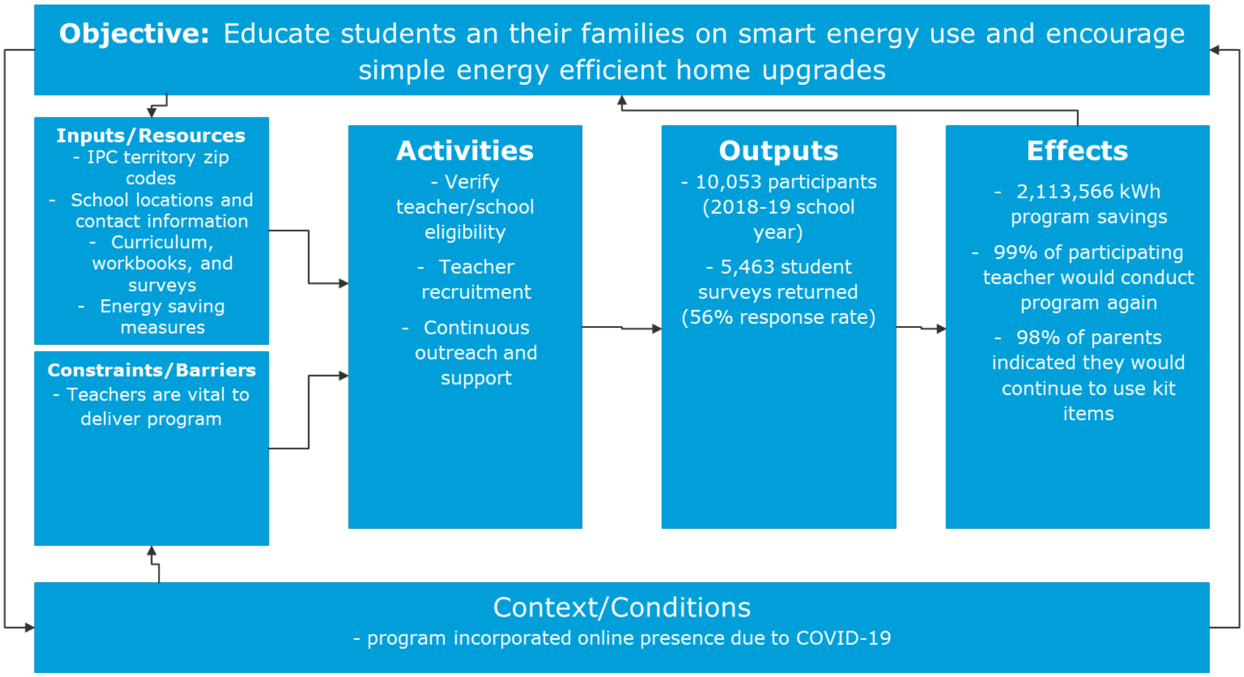
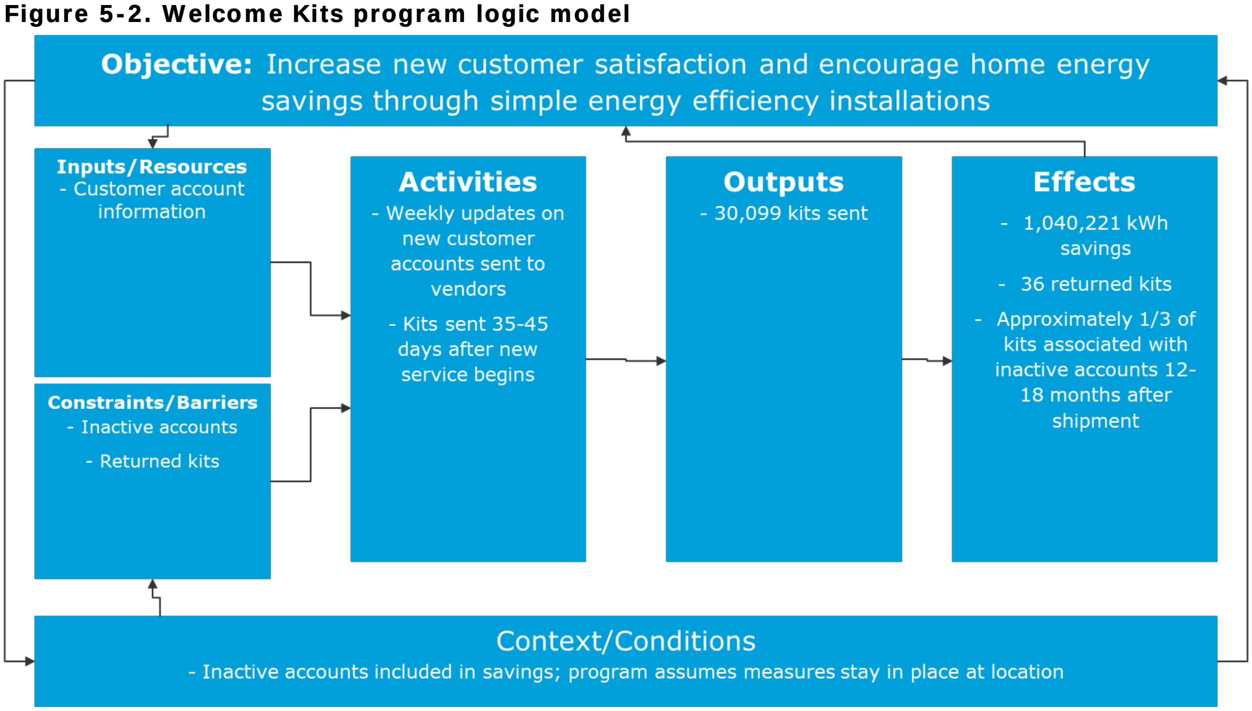


Figure 5-2. Welcome Kits program logic model



5.3 Program materials review

5.3.1 Marketing materials and websites

The marketing materials were visually appealing and user-friendly. The various flyers, flipbooks, and guides displayed utility branding and conveyed the appropriate and relevant information.

The SEEK program website is also visually appealing and conveys the necessary program information for program participants, including program overview, contact information, and working links to further information for students, parents, and teachers.

With the closing of the ESK program, the website now redirects customers to learn more about other energy efficiency programs through Idaho Power. The landing page also allows customers to request a free copy of the *30 Simple Things You Can Do to Save Energy* booklet. This is a good way to continue to provide information to interested customers after the program ends.

5.3.2 Participant instructions, tools/worksheets

DNV GL reviewed the instructions and worksheets/books for the 2018-2019 SEEK program. The materials used for both teacher instruction and student learning were comprehensive and intuitive. Like the marketing materials, the guides and student workbooks were visually appealing, engaging, and displayed appropriate utility branding. The teacher book included extensive information as well as tips and relevant, grade-appropriate graphics. Overall, all instructions and guides were clear, succinct, and easy to understand.

5.3.3 2018-2019 SEEK report

The 2018-2019 SEEK Report by RAP included a thorough evaluation of the program, DNV GL evaluated the report to assess and verify the findings. A random sampling of program satisfaction survey data and energy savings calculations were vetted. Raw survey data were analyzed to confirm satisfaction percentages and calculations were correct. DNV GL found the report information to be accurate and complete.

5.4 QA / QC review

DNV GL assessed the quality assurance and control mechanisms related to program delivery and energy savings calculations.

5.4.1 Energy Saving Kits and Welcome Kits

The quality control processes for the ESK and Welcome Kits programs are satisfactory with a few opportunities to improve. The program staff interview revealed that address information is provided by the utility's customer information system. This current customer information is sent to both vendors every week. Processes for identifying new customers have been automated and allow the vendor to ship Welcome Kits promptly. Shipment deliveries for the ESK program arrive promptly with most kits arriving in less than half the business days that are stated on the website.

Approximately 140 ESKs were returned due to undeliverable mail. Idaho Power investigated these situations. The vendor validates addresses with software and reported this quantity is similar to what they expected to see. Idaho Power determined that some kits were being forwarded by the USPS and asking for postage due on delivery. ESKs are supposed to be free to customers and are not supposed to be shipped outside of the IPC service area, so the vendor implemented a code on the shipping label to cease forwarding. This caused kits to be returned. The vendors refunded Idaho Power all costs for returned kits.

During the evaluation, DNV GL found that approximately one-third of Welcome Kits were associated with accounts that went inactive 12 to 18 months after the kits shipped. These situations are most likely due to renters moving out between the time that IPC shipped the kit and the evaluation. IPC assumes the measures stay behind and remain installed per RTF installation rates. This assumption may be overly optimistic – it is likely that some people take at least some of the measures with them when moving. Thus, the assumption could result in a slight overestimation of energy savings, particularly if customers move out of the Idaho Power service area.

There were 36 Welcome Kits that Idaho Power could not verify delivery to the customers' address. Part of Idaho Power's QA process was to negate any savings resulting from these kits. DNV GL approves of this conservative approach.

5.4.2 Student Energy Efficiency Kits

Overall, the SEEK program has good quality control in its program design and implementation. The vendor researches and verifies participant eligibility before sending out any marketing materials for the program year. The vendor tracks each school's participating grades and rules the following grades ineligible for subsequent years until students who participated are no longer in the program eligible grades. DNV GL learned that program outreach is proactive and continuous, and the outreach team guarantees a response within two business days. While the ideal program implementation would include installation verification, DNV GL understands the difficulty in doing so.

DNV GL found an opportunity to improve quality assurance for the SEEK ex ante savings calculations. As already mentioned in the impact section, when completing the survey, students are given the option to select "other" for the wattage of the incandescent bulb they replaced (see APPENDIX B). The energy calculations use savings assumptions for a 40-watt incandescent. However, since the vendor does not get the student workbooks back, there is no process in place to ensure that the lightbulb being replaced is really an incandescent.

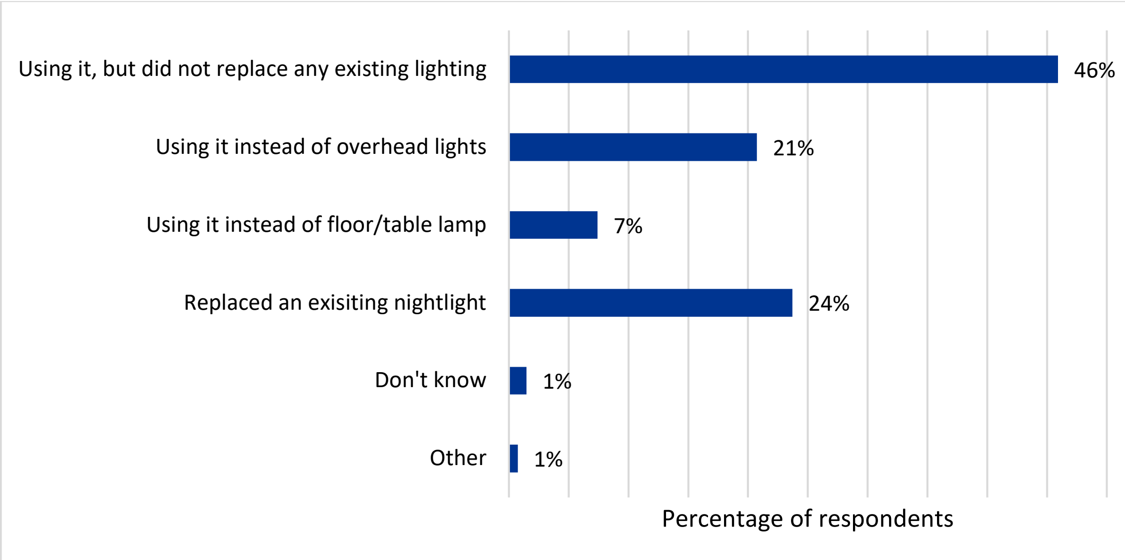
5.5 Program participant surveys

DNV GL sent surveys to Welcome Kit recipients. The surveys asked about nightlight installations and satisfaction with the program.

5.5.1 LED nightlight installations

Almost all (92%) of respondents stated they installed the included LED nightlight. Nearly half of these (42% of all respondents; 46% of those who installed) said the nightlight did not replace any existing lighting. Of those who did replace existing lighting, 23% said they replaced an old nightlight with the new LED nightlight (Figure 5-3), 21% said it replaced overhead lights, and 7% said it replaced a floor or table lamp.

Figure 5-3. Welcome Kit LED nightlight use



An overwhelming majority of the respondents who used the new kit nightlight to replace an existing nightlight replaced a nightlight with an incandescent bulb. Figure 5-4 displays the full results of the type of nightlight bulbs that were replaced with the kit's LED nightlight. Figure 5-5 displays the type of bulbs in floor/table and overhead lights that were replaced with the LEDs. Approximately half (55%) of the floor/table and overhead lamps were CFLs or LEDs.

Figure 5-4. Welcome Kit LED nightlight bulb type replacement for existing nightlights

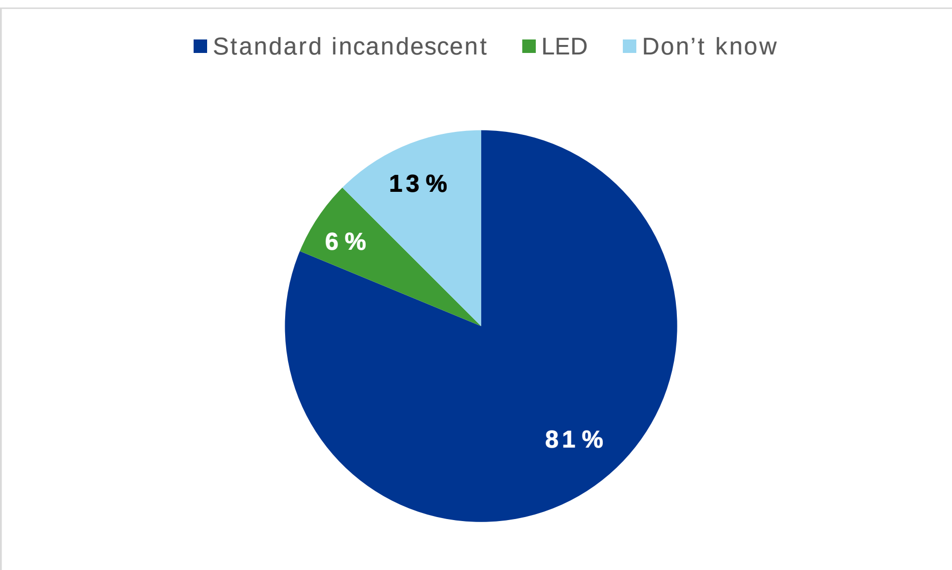
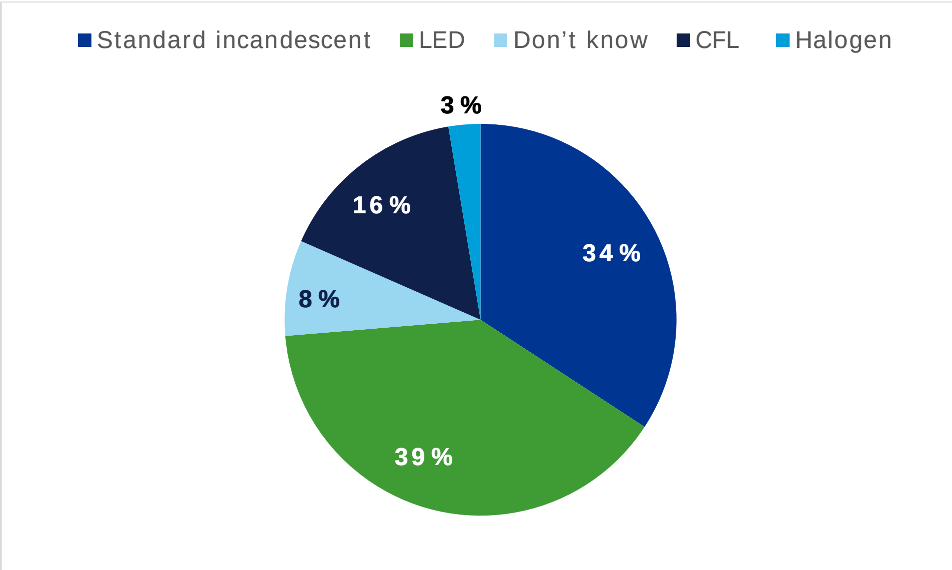


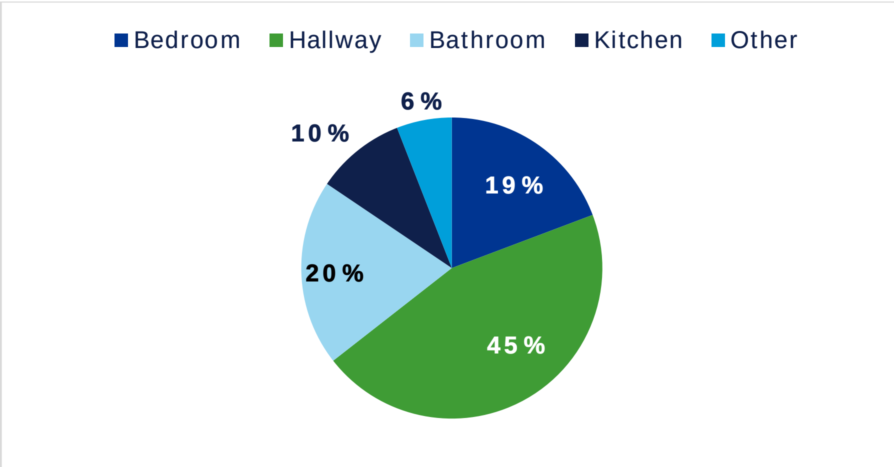
Figure 5-5. Bulb type in overhead / floor / table lighting



The 42% of respondents who said the nightlight did not replace existing lighting would represent a new load (approximately 0.5W per kit). The 17% of respondents who said it replaced an incandescent nightlight would save approximately 4W per kit. A conservative savings estimate for the 26% of respondents who said it replaced a table, floor, or overhead lamp is 15W per kit (assumes a 15.5W average for standard A-form bulbs which would skew towards existing CFLs or LEDs). Weighting these savings by the installation percentages results in an estimated 4.4W saved per kit. Assuming an 8-hour/day hours of use (2,920 hours per year), DNV GL estimates 12 kWh savings per year per kit from the nightlights. Across all welcome kits and ESKs this would add 1,025,700 kWh to evaluated savings. This would increase the realization rate to 106.7%.

More specific hours of operation estimates could be calculated from the respondents' answers to installation location questions. Figure 5-6 shows the frequency of installation locations for the 92% of respondents who reported installing the nightlight. Those reporting the installation location as "Other", stated it was installed in places such as the basement, garage, dining room, and in pantries/closets.

Figure 5-6. Welcome Kit LED nightlight installation location



5.5.2 Satisfaction

Overall, participants had a positive experience with the Welcome Kit program. 94% of respondents reported being satisfied (4 or 5 on a five-point scale) with the energy-saving measures in the kit and 97% reported that they were pleased to receive the Welcome Kit.

Unprompted verbatim responses indicated that the kits were good for developing customer relationships and positive brand imaging according to 22% of respondents who opted to provide additional comments. Including more information on where to buy similar lightbulbs, as well as the possible inclusion of smart power strips, were suggested for inclusion in future Welcome Kits.

> *"It was fantastic being able to change bulbs out with energy efficient bulbs since my apartment light bulbs were mediocre at best. These were much brighter and a very welcome gift as a new Boise resident!"*

5.5.3 Additional educational effects

A majority of respondents who read the educational booklet (80%) indicated that it helped them learn new information regarding different energy-saving tips and Idaho Power account information. Nearly one-third of respondents would consider participating in other Idaho Power programs, such as energy-efficient lighting, energy-efficient products, heating and cooling efficiency, and rebate advantage programs between now and the end of 2021.

6 KEY FINDINGS AND RECOMMENDATIONS

6.1 Key findings

6.1.1 The program's overall savings realization rate is 97.2%.

Welcome Kits had an RR of 100%. ESK savings decreased due to reductions in savings to water heating measure savings (RR=96.9%)because the vendor sent electric kits to approximately 1000 customers without confirmed electric water heating. SEEK savings decreased due to lower LED savings because of a lower assumed baseline wattage for "Other" bulbs (RR=97%). This decrease was slightly counteracted by a 101% realization rate for showerheads due to a slight reduction in post-install flow rates to match the response options on the student surveys. If the program claimed evaluated savings for nightlights for welcome kits and ESK, realization rates would increase to 106.7%

6.1.2 The realization rate for number of kits was 100%.

DNV GL verified the program tracking accounte for all of the delivered kits. The kits delivered to customers without confirmed electric water heating slightly reduced the savings realization rate, but this did not affect the realization rate for the number of kits sent.

6.1.3 Lifetime non-energy impacts (NEIs) for the 2019 program measures are approximately $1.16 million.

Almost all of these savings come from the LEDs. Additional NEIs for which DNV GL could not assign a monetary value include increased customer satisfaction and increased knowledge and awareness of energy efficiency.

6.1.4 Idaho Power reported that they plan to stop sending ESKs because they will not remaincost-effective in 2021.

6.1.5 Program materials are well-produced and contain the recommended information.

6.1.6 QA/QC processes are satisfactory with a few opportunities to improve.

6.1.7 Participants are satisfied with the Welcome Kits.

6.1.8 IPC could claim a small amount of savings from the Welcome Kit nightlights.

Based on survey responses, DNV GL estimates approximately 12 kWh annual savings per year per kit from the nightlights. Across all welcome kits and ESKs this would add 1,025,700 kWh to evaluated savings.

6.2 Recommendations

6.2.1 For SEEK lighting saving calculations, assume 13W for baseline wattage for “Other” bulbs.

The SEEK program’s savings calculations are based on the difference in wattage between a baseline bulb and the LED bulb included in the kit. Students are instructed to replace incandescent bulbs and to note the wattage of the replaced bulb on their survey form. The form provides responses for 40W, 60W, 100W, and “Other.” The interview with the program vendor confirmed that they assumed a 40W baseline for the “Other” option. However, DNV GL recommends a more conservative assumption of 13W to cover the possibility that students did not perfectly follow the instructions and replaced a (60W equivalent) CFL rather than an incandescent.

6.2.2 Ask the SEEK vendor to provide a spreadsheet or code used to calculate savings.

Putting the supporting calculations into a standardized calculator would document assumptions such as which point-value within the ranges of each response option on the student survey the calculation used. It would also facilitate QA/QC by Idaho Power and help evaluators verify program savings.

6.2.3 Continue to not claim savings from the shower timers.

DNV GL did not find sufficient evidence that this measure results in measurable savings.

6.2.4 Consider additional research to better estimate the number of Welcome Kit recipients who take kit measures with them when they move.

Some people will take the LEDs with them when they move; however, there are no readily available estimates of how common this is. Additional research would be needed to estimate a frequency and establish a discount factor for energy savings claims if a customer moved out of Idaho Power service area.

6.2.5 For SEEK, if practical, consider allowing students to take pictures of the replaced/baseline equipment as a way of confirming/vetting the answers they provide on the survey.

This would provide an opportunity to vet the answers the students provided on their surveys as well as help determine the best wattage assumption to use for the “Other” category.

APPENDIX A. **PROGRAM STAFF INTERVIEW GUIDE**

INTRODUCTION

These are our outstanding process-related questions for the kits. For each question, we will want to know if the answer is the same for all types of kit or if there are different answers for different kits. By type of kit, we mean Energy Saving Kits, Welcome Kits, School Kits, and Giveaways.

KIT CONTENT

K1. How do you decide what energy savings measures are included in the kits? *Self-install, shipping, cost-effectiveness?*

K2. What other measures have you thought about including in the kits? *Smart power strips?*

K3. Are the cost-effectiveness tests based only on energy savings? Can you include any non-energy impacts?

KIT QUALITY CONTROL

Q1. Where do you get the customer address information from? ***The service and mailing address information comes from our Customer Information system.***

Q2. (For Welcome Kits) **What is the process for how a customer should receive a Welcome Kit?** *New account event? Move out event? Start service triggered by a stop service in a building?*

Q3. There were ~140 ESK kits returned due to undeliverable mail? How does that happen?

Q4. Were any Welcome Kits returned?

Q5. Under what conditions is somebody eligible for a second kit?

Q6. How do you recalculate energy savings if someone receives a second kit? Is this accurate?

Q7. Why are they so many inactive accounts?

Q8. How do you calculate energy savings if an account goes inactive?

Q9. Who oversees packing and sending the kits?

Q10. When a kit is requested to be sent, how long of a period is it before the kit is shipped to the customer?

COVID-19

C1. Has the COVID-19 pandemic resulted in any changes to the timing of deliveries?

C2. Has the COVID-19 pandemic resulted in any changes to the volume of kits being requested?

C3. Are there any other changes that were made as a result of the COVID-19 pandemic?

C3a. How long will any of the changes implemented as a result of the COVID-19 pandemic continue?

THANK YOU AND TERMINATE

END. Those are all the questions I have for you today. Thank you for your time.

APPENDIX B. **SEEK VENDOR INTERVIEW GUIDE**

INTRODUCTION

We are conducting a process evaluation of the school kit program for Idaho Power. We have a few questions about how you administer the program.

KIT CONTENT

K1. How do you decide what energy savings measures are included in the kits?

K2. What other measures have you thought about including in the kits?

PARTICIPANT SELECTION

PS1. How are schools recruited to participate in the program?

PS2. Does recruitment for the program happen year-round? *(Teachers request the month they would like to receive their materials)*

PS3. How do you determine what grades qualify to participate in the program?

PS4. How do you ensure a school that participates in the program for two consecutive years does not do the program with the same group of students?

ENERGY CALCULATIONS

EC1. What wattage do you assume for the OTHER selection when you calculate the savings?

[PROBE: Do you ever look in the student workbooks to determine that wattage?]

[PROBE: Are you able to confirm they replace an *incandescent* bulb rather than a CFL or other technology?]

10. If you answered "yes" to question 9, what was the wattage of the incandescent bulb you replaced?
(Found in the box on page 11 of the Student Workbook)

O 40-watt
O 100-watt
O 60-watt
O Other
O 75-watt

EC2. When you do the energy savings calculations, what value from within each range do you use?

1. What is the flow rate of your old showerhead?
(Found on page 5 of the Student Workbook in the box "What is the flow rate of your old showerhead?")

O 0 - 1.0 GPM
O 2.1 - 2.5 GPM

3. If you answered "yes" to question 2, what is the flow rate of your new showerhead?
(Found on page 6 of the Student Workbook in the box labeled, "What is the flow rate of your new High-Efficiency Showerhead?")

O 0 - 1.0 GPM
O 1.6 - 1.75 GPM
O 1.1 - 1.5 GPM

EC3. How did you calculate the flow rates that you used in the shower timer savings calculation?

QUALITY CONTROL

QC1. Please describe your quality control process. [PROBES: Accuracy of info in handouts, Accuracy of lessons teachers deliver, Student at-home activities, Accuracy of student calculations, Accuracy of energy-saving calculations, Validity of survey responses]

COVID-19

C1. How, if at all, has COVID affected the program?

THANK YOU AND TERMINATE

END. Those are all the questions I have for you today. Thank you for your time.

APPENDIX C. PROGRAM PARTICIPANT SURVEY INSTRUMENT

EMAIL INVITATION

DNV GL is contacting you on behalf of Idaho Power Company. Your household received a Welcome Kit from Idaho Power in 2019 that included an LED nightlight, four LED lightbulbs, and an educational booklet. We would like to ask some questions about your experience with the kit.

Your responses will help Idaho Power continue to provide Welcome Kits that are useful to new customers. It will only take you about 5 minutes to respond to all of our questions.

Your responses will be kept confidential and only reported in aggregate.

To complete the questionnaire, please click the following link. <<Link to survey>>

DNV GL is a research firm operating on behalf of Idaho Power Company. If you wish to confirm the legitimacy of this survey, you can contact me at cseverson@idahopower.com or call our Customer Care Team at (800) 488-6151.

INTRODUCTION

[WEB SURVEY INTRO]

Thank you for agreeing to answer our short questionnaire about Idaho Power's Welcome Kit!

Your responses will help Idaho Power continue to provide Welcome Kits that are useful to new customers. It will only take you about 5 minutes to respond to all of our questions.

For confirmation purposes, please enter the email address where you received the invitation:
_____

NIGHTLIGHT QUESTIONS

NL1. According to program records, the kit was sent to <address>. Which of the following best describes this address?

<table>
<tr><td>1</td><td>Primary residence</td><td rowspan="5">NL2</td></tr>
<tr><td>2</td><td>Secondary residence or vacation home</td></tr>
<tr><td>3</td><td>Long term residential rental property</td></tr>
<tr><td>4</td><td>Short term residential rental property such as Airbnb</td></tr>
<tr><td>5</td><td>Prefer not to answer</td></tr>
</table>

NL2. The kit included an LED nightlight. Have you installed it at <address>?

1	Yes	NL5
2	No	NL3
3	Don't know	Next Section

NL3. Did you install it somewhere else?

1	Yes	NL4
2	No	Next Section
3	Gave Away	Next Section
4	Other	Next Section

NL4. Which of the following best describes where you installed it?

1	Primary residence	NL5
2	Secondary residence or vacation home	
3	Long term residential rental property	
4	Short term residential rental property such as Airbnb	
5	Prefer not to answer	

NL5. Where did you install the LED nightlight?

1	Bedroom	NL6
2	Hallway	
3	Bathroom	
4	Kitchen	
5	Other (Specify____)	
6	Don't know	

NL6. Which of the following best describes how you are using the nightlight?

1	Using it, but did not replace any existing lighting	Next Section
2	Using it instead of overhead lights	NL7
3	Using it instead of floor/table lamp	NL7
4	Replaced an existing nightlight	NL8
5	Other (Specify______)	Next Section
6	Don't know	Next Section

NL7. You stated you

1	Standard incandescent 	Next Section
2	Compact Fluorescent 	Next Section
3	LED 	Next Section

4	 Halogen	Next Section
5	Don't know	Next Section

NL8. What type of bulb was in the nightlight that you replaced?

1	Standard incandescent 	Next Section
2	 LED	Next Section
3	Don't know	NL9

NL9. Approximately how old was the nightlight that you replaced?

1	Less than 1 year	Next Section
2	12 to 24 months	
3	25 to 36 months	
4	Over 36 months	
5	Don't know	

Education Book

EB1. Did you read the educational booklet included with the kit?

1	Yes	EB2
2	No	Next Section
3	Don't know	Next Section

EB2. How would you describe the educational value of the booklet?

1	I learned a lot of new information	EB3
2	I learned a few new things	EB3
3	I didn’t really learn anything new	Next Section
4	Don’t know	Next Section

EB3. Which topic(s) did you learn something new about? [Select all that apply]

1	Cooling	Next Section
2	Heating	Next Section
3	Home Electronics	Next Section
4	Insulation and weatherization	Next Section
5	Kitchen Appliances	Next Section
6	Lighting	Next Section
7	Washer and Dryer	Next Section
8	Water Heating	Next Section
9	Windows, Doors, Skylights	Next Section
10	Other (Specify___)	Next Section
11	Don’t know	Next Section

SATISFACTION

Next, I have a few questions about how satisfied you were with different aspects of your Welcome Kit. 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 requesting an Energy Savings Kit
b. Wait time to receive your kit
c. Energy-saving measures that were included in your kit
d. Energy Savings Kit 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]	S3
-97	[Don’t know]	

S3. What, if any other, additional tips and information would be helpful for Idaho Power to include in future Welcome Kits?

	[RECORD VERBATIM]	S4
-97	[Don’t know]	

S4. 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, technical assurance, software, and independent expert advisory services to the maritime, oil & gas, and energy industries. We also provide certification services to customers across a wide range of industries. Combining leading technical and operational expertise, risk methodology and in-depth industry knowledge, we empower our customers' decisions and actions with trust and confidence. We continuously invest in research and collaborative innovation to provide our customers and society with operational and technological foresight. Operating in more than 100 countries, we are dedicated to helping our customers make the world safer, smarter, and greener.

IPC Weatherization Programs Analysis

Date: March 25, 2020

To: Idaho Power Company

From: Tyler Lehman and George Jiang, Nexant, Inc.

Executive Summary

This report presents an energy savings analysis of two weatherization programs for Idaho Power Company (IPC), the Weatherization Assistance for Qualified Customers (WAQC) and the Weatherization Solutions for Eligible Customers (WSOL). Both the WAQC and the WSOL provide financial assistance through CAP agencies to qualifying customers with limited incomes in IPC's service territory to help fund weatherization improvements to their electrically heated residence. This analysis estimated the electric energy savings of these programs by calculating the change in energy usage for program participants before and after the project completion date and relative to a matched comparison group. Program descriptions, the analysis methodology and findings from the WAQC and WSOL programs in 2018 are documented in this report.

The methods used in this study are based on the industry guidelines set forth in the National Renewable Energy Laboratory's (NREL) Uniform Methods Project (UMP) Chapter 8, for using whole building consumption data to estimate energy savings.

This approach leveraged a matched control group to serve as the baseline that treatment participants are measured against. This methodology differs from the “Two Stage Approach” methodology used in the previous analysis. The previous approach used past participants in the program as the control group and only produced a weather-normalized estimate. While the approach is verified by the UMP, it lacks the same level of transparency as the matched control method and requires the assumption that the past participants used as the control group are identical to the current treatment customers in the scenario without the weatherization project. As the control customers have already underwent a weatherization project, the assumption is vulnerable to omitted variable bias.

In this analysis, the matched control group acts as the counterfactual, which represents what the electric usage would have been in the absence of the weatherization measures. Control customers were selected by inspecting 12 months of pre-period usage data as well as key demographic characteristics such as geographic location, dwelling type, and heating system. Matching customers on these key observable characteristics minimizes the likelihood of creating a control group that does not accurately represent the treatment group in the absence of the weatherization program.

Additionally, a main advantage of using a matched control group is that it allows for a straightforward comparison of the treatment and control group usage to estimate energy savings. By matching participants on location, variations in weather are accounted for as both treatment and control customers experienced the same conditions. The careful design and implementation of a matched control group then allows for simple, easily interpretable models to sufficiently estimate project savings.

Lastly, a differences-in-differences econometric model was used to estimate savings and the results from these models are reported. The transparency of this approach eliminates the need to specify overly complex weather incorporated models or perform model mining activities.

Table 1 presents the estimated kWh savings per project and savings per square foot for the WAQC and WSOL projects completed during 2018. The results are segmented by home type and weatherization measure type. All segments inspected yielded positive savings. Generally, WSOL projects had larger estimated savings than the estimated savings for the corresponding WAQC project. Annual estimated savings were 1,482 kWh/project for projects that received only weatherization improvements, while projects that received weatherization and heat pumps experienced annual savings of 1,885 kWh/project. Manufactured homes had the largest estimated kWh savings for the different home types that received weatherization and heat pump projects.

Table 1: kWh Savings by Program Type, Home Type, and Weatherization Project for 2018

		All			WAQC			WSOL		
Type	Measures	Customers	kWh/project	kWh/SqFt	Customers	kWh/project	kWh/SqFt	Customers	kWh/project	kWh/SqFt
All Home Types	Weatherization only	77	1,482	1.09	36	1,489	1.16	41	1,471	1.03
All Home Types	Weatherization and Heat Pump	144	1,885	1.43	94	1,762	1.44	50	2,117	1.43
Single Family	Weatherization only	53	1,424	0.99	20	1,023	0.75	33	1,647	1.11
Single Family	Weatherization and Heat Pump	73	1,604	1.06	35	1,170	0.79	38	2,001	1.29
Manufactured	Weatherization only	19	1,325	1.06	14	1,752	1.47	5	128	0.09
Manufactured	Weatherization and Heat Pump	59	2,357	2.04	47	2,320	2.06	12	2,510	2.01
Multi-family	Weatherization only	5	2,730	3.05	2	4,167	3.77	3	1,766	2.37
Multi-family	Weatherization and Heat Pump	12	1,199	1.37	12	1,199	1.37	-	-	-

*Note: Savings estimates for small sample sizes (n<10) can yield unexpected results. For example, WAQC Multi-family weatherization only projects savings are very high due to the very small sample size (n=2) for that segment.

Program Overviews

The two programs that were evaluated for this study are the Weatherization Assistance for Qualified Customers (WAQC) and the Weatherization Solutions for Eligible Customers (WSOL). Both programs are focused on providing financial assistance to community action partnership (CAP) agencies and contractors for energy efficiency improvements to customers' dwellings that qualify.

The WAQC program exists to serve customers whose income is less than 200% of federal poverty level, while WSOL participants have incomes between 175%-250% of federal poverty level. There is an overlap in the programs to service the customers who qualify for WAQC, but may not be selected in a timely manner due to their higher income.

Weatherization projects performed vary in terms of size and actions taken. Of particular interest are projects for which dwellings received a furnace replacement in the form of an electric heat pump system installation. Electric heat pumps are more efficient than older heating systems and therefore offer the potential to have larger energy savings than other types of weatherization measures.

Table 2 shows the customer counts, heat pump replacement counts and average home size for the different home types across the two programs in 2018. A total of 280 projects out of 332 completed for the two programs were used for this study. The WAQC program completed 42 more projects than WSOL and 59 more heat pump replacements. Average home sizes are larger for customers in WSOL at 1,425 square feet compared to the average home sizes for WAQC participants of 1,214 square feet.

Table 2: 2018 Project Characteristics by Program

Program	Home Type	Customers	Heat Pump Replacements	Average Square Feet
WAQC	All	161	119	1,214
	Manufactured	75	60	1,110
	Multi-family	22	19	923
	Single-family	64	40	1,435
WSOL	All	119	60	1,425
	Manufactured	18	12	1,282
	Multi-family	4	0	753
	Single-family	97	48	1,479

Figure 1 provides a view at the pattern of project completion dates over the course of 2018. The WAQC program provides more projects than the WSOL for all months. The peak period for project completion dates is during fall while the winter months have the lowest number of completed projects.

Figure 1: 2018 Project Completions by Program

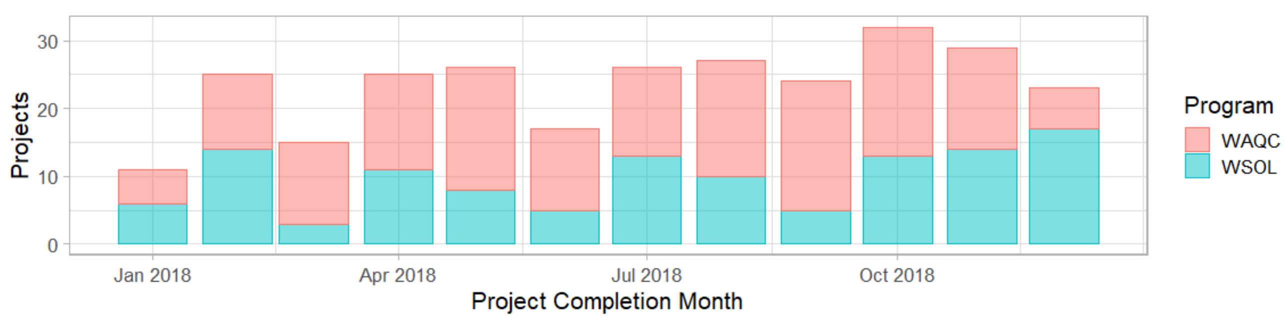
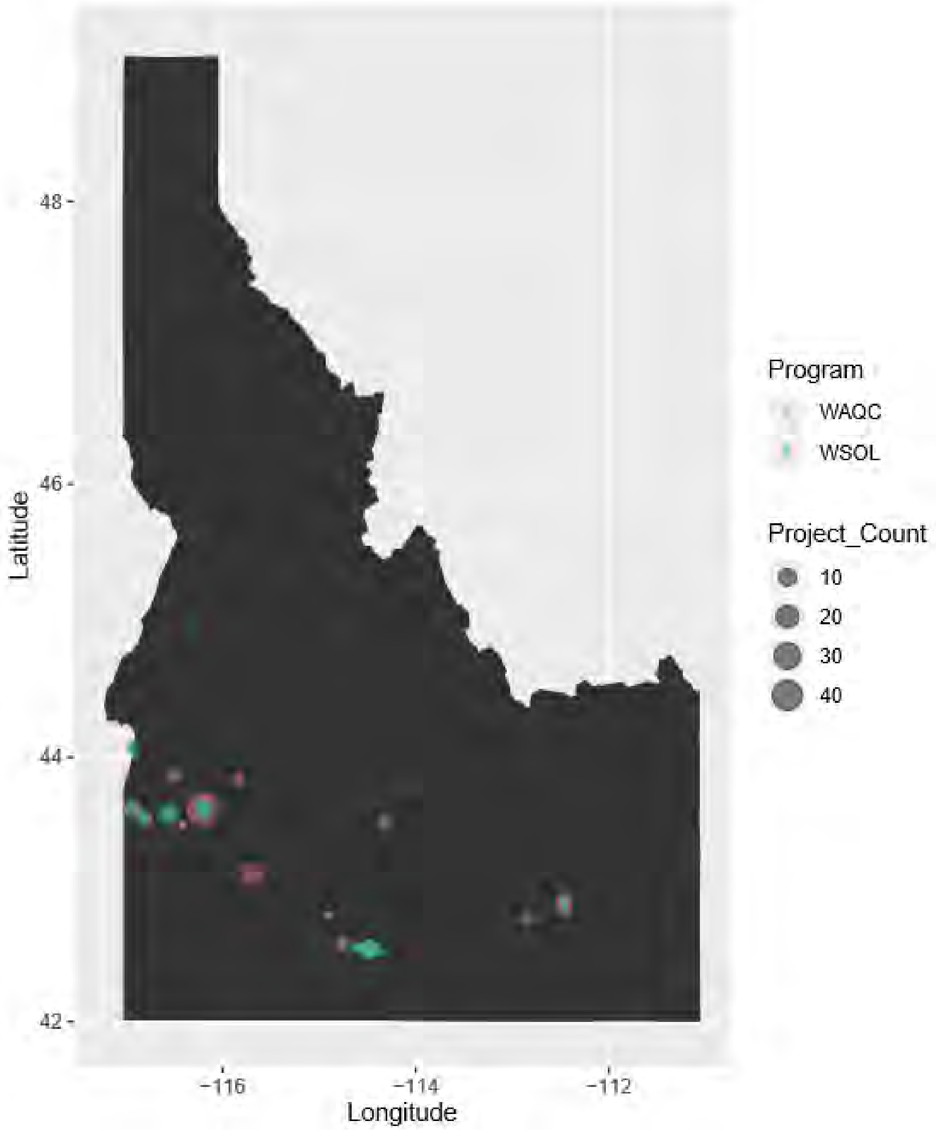


Figure 2 shows the distribution of the size and locations of projects completed in 2018 by Program relative to location in Idaho. The two programs operate in the same service areas with a correlation between population densely of an area and the number of projects completed.

Figure 2: 2018 Project Counts by Location in Idaho



*There were 3 projects in Eastern Oregon that are not included in this map. These projects were included in the analysis.

Methodology

The methods used in this study are based on the industry guidelines set forth in the National Renewable Energy Laboratory's Uniform Methods Project Chapter 8, for using whole building consumption data to estimate energy savings.

This approach leveraged a matched control group to act as the counterfactual, which in this case refers to what the electric usage would have been in the absence of the weatherization measures. Matched control customers were selected by inspecting 12 months of pre-treatment usage data as well as key demographic characteristics such as geographic location, dwelling type, and dwelling heating system. A main advantage of using a matched control group is that it allows for a straightforward comparison of the treatment and control group usage to estimate energy savings. By matching participants on location, variations in weather are accounted for as both treatment and control customers experienced the same conditions. A differences-in-differences econometric model was used to estimate savings and the results from these models are reported.

All customers in IPC's service territory were considered as potential matches for the control group. A series of screens were applied to filter out customers that would make poor matches. The process to select the sample of customers that would be the best potential match for each treatment customer used multiple filters. The first screen selected all customers which had usage data that spanned the same timeframe of the corresponding treatment customer were kept. Next, customers were filtered by geographic location, average annual electrical usage, home type and heating system types. For each treatment customer, the ten closest control customers were selected to create the pool of potential control customers.

Once the pool of potential control customers was compiled, the closest matching customer was selected for each treatment customer. Customers were once again filtered through a similar set of criteria consisting of geographic location, average monthly usage in the 12 month pretreatment period, dwelling type and dwelling heating system type. The matching process went through three iterations to ensure that the best possible matches were found. The pretreatment usage variable was tested at different levels of granularity to account for seasonal variation. The final configuration used the rolling monthly daily average usage as the key variable to match treatment and control customers on. After applying the filters, the nearest neighbor in terms of pretreatment usage was selected to be included in the matched control group.

Matches were validated by inspecting key characteristics of the treatment and matched control groups. Tests were run at two different stages during the matching implementation. The first set of tests were run after the control to treatment customer matching to check for initial match quality. Standard data validation practices were then performed on the data to ensure quality. Tests were run again on the processed data and confirm the validity of the matches.

The first data validation test removed treatment customers and the matching control customer with less than 75% of data in either the pre-treatment period or post-treatment period. This resulted in the largest reduction of customers from the analysis (21%). Although this comprises a substantial portion of the group, the high churn and variance in project timing associated with the participants in these programs is unavoidable. Most importantly, the quality of the matches remained robust after accounting for these factors. The tables and figures in the rest of this section demonstrate the results of the matching tests pre and post processing.

The first characteristic inspected is pre-period average daily usage. Figure 3 presents the accuracy of the matches across the groups for the post-processing data. Overall, the matches show similar patterns of electrical usage in the pre-period at the average daily level. These visual tests are supported by a t-test and the results are seen in Table 4. The high p-values indicates the two groups are not statistically significantly different from each other, which is ideal.

Figure 3: Box Plot of Pre-Period Average Daily kWh Usage by Treatment and Control

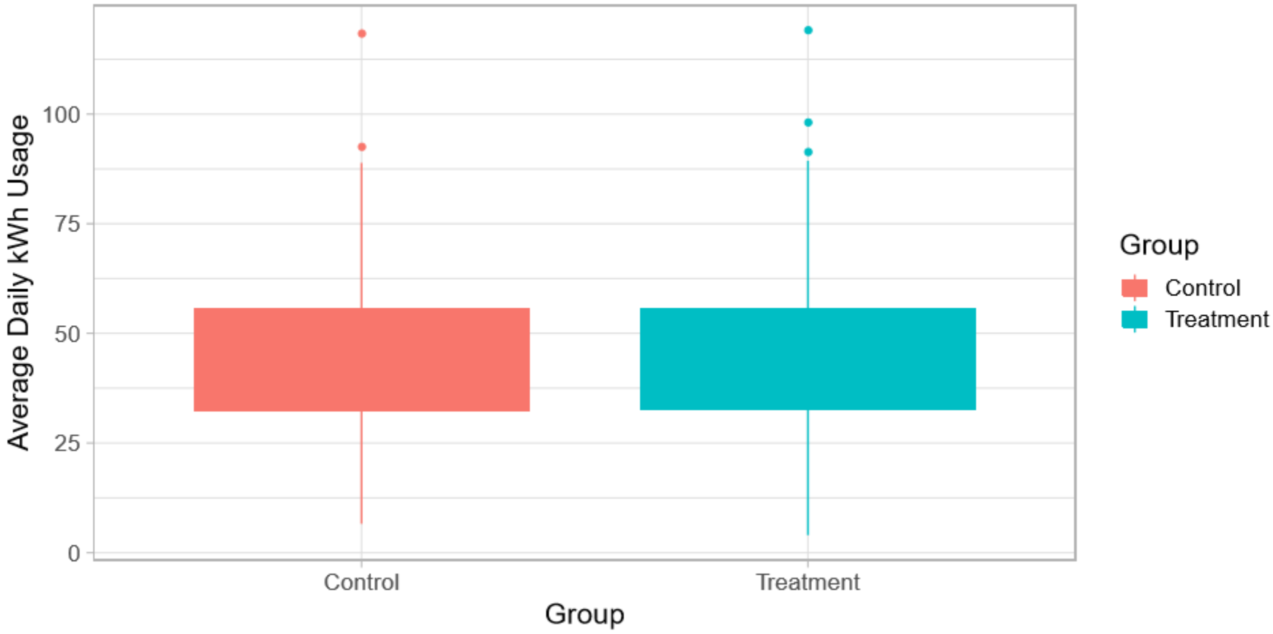


Table 3: Pre-Treatment Average Daily kWh Usage T-Test

	Customer Count		Average Daily kWh Usage		P-value
	Treatment	Control	Treatment	Control	
Post-Match Raw	280	280	44.76	44.39	0.95
Post-Match Post Processing	221	221	44.72	44.61	0.95

To validate the location mapping for treatment and control customers, the Pearson's Chi-squared test was run on the city-level distribution of the two groups. As seen in Table 4, the p-value of 1 means the null hypothesis stating the frequency distribution of city location in the two groups fails to be rejected. Ensuring that customer locations are the same across the treatment and control groups is critical as the methodology accounts for the largest driver in electrical usage– weather. Using the matched-control design and these tests support the direct comparison techniques used for measuring savings across treatment and control customers. Additionally, estimates do not need to be transformed or weather-normalized as the weather is structured into the setup.

Table 4: Pre-Treatment City-Level Chi-Squared Test

	Customer Count		Chi-squared	Degrees of Freedom	P-value
	Treatment	Control			
Post-Match Raw	280	280	0	94	1
Post-Match Post Processing	221	221	0	43	1

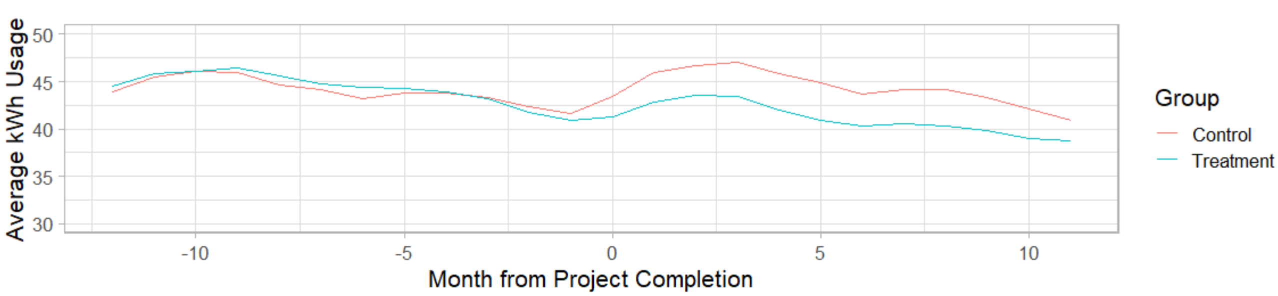
Figure 4 shows the quality of the matching for all customers in the pre-treatment kWh usage patterns and also helps visualize the modeling approach. The figure is based on projects completed from 2015 to 2019 in order to smooth out noise from smaller sample sizes for the individual years. For the treatment group, kWh usage is displayed relative to each customer's project completion date with 0 representing the month the project was completed. As control customers didn't receive the weatherization project, their kWh usage is relative to the matched treatment customer's project completion date. If a treatment customer had a project completion date of 6/1/2018, month "0" would be 6/2019 for that customer and the matched control customer.

Overall, the treatment and control customers exhibit similar kWh usage trends in the pre-treatment period leading up to the project completion date. KWh usage begins to diverge with treatment customers using less kWh than the control group starting around two months prior to the project completion date. The difference in usage is maintained through the full post-treatment period and represents the savings that are estimated.

Possible reasons why the usage begins to diverge prior to the project completion date include:

- Weatherization projects were being implemented in phases during the time period leading up project completion date. A job may be started while the agency waits for ordered materials to arrive.
- Treatment customers may have begun shifting their energy consumption between the initial meeting with the auditor and completion of the weatherization. During the initial visit, the auditors provide energy efficiency education information to the customer.

Figure 4: Average Daily kWh Usage Relative to Project Completion Date by Treatment Status



A relatively straightforward differences-in-differences model was then used to estimate average savings. The model structure used is:

$$kW_{i,t} = \alpha_i + \delta \text{treat}_i + \gamma \text{post}_t + \beta (\text{treatpost})_{i,t} + \nu_i + \varepsilon_{i,t}$$

In the above equation, the variable $\text{kW}_{\text{i,t}}$ equals daily electricity usage. The index i refers to customers and the index t refers to the time period of interest. The estimating database would contain electricity usage data during both the pretreatment and post-treatment periods for both treatment and control group customers. The variable treat is equal to 1 for treatment customers and 0 for control customers, while the variable post is equal to 1 for days after the weatherization project has been implemented and a value of 0 for days prior to the project completion date. The treat post term is the interaction of treat and post and its coefficient β is a difference-in-differences estimator of the treatment effect that makes use of the pretreatment data. The primary parameter of interest is β, which provides the estimated daily demand savings. The parameter a_{i} is equal to mean daily usage for each customer. The v_{i} term is the customer fixed effects variable that controls for unobserved factors that are time-invariant and unique to each customer. Possible examples of short-term time-invariant unobserved factors that are unique for each customer but are correlated with usage are frugalness, tolerance of temperature changes, and household temperature preferences.

Results

This section discusses the savings estimates from the difference-in-difference models on the matched-control group for projects completed in 2018, projects completed in 2016 through 2018, and compares the results to the prior analysis.

Table 5 and Table 6 present the customer counts, the estimated daily kWh savings, annual kWh project savings and annual kWh savings per square foot for the WAQC and WSOL programs for different home types and by project measure type. The customer counts are the number of treatment customers analyzed for each group. The outputs of the models are daily kWh estimates and represent the average daily impact of receiving a weatherization project. The annual kWh/project estimate is calculated by scaling the average daily kWh estimate by 365, the number of days in a year. The annual kWh/square foot estimate is calculated by scaling each segment by the average dwelling size used in the analysis.

For all home types for both programs, weatherization projects that involved replacing heat pumps had more annual savings (1,885 kWh) and annual savings per square foot (1.43 kWh) than projects without heat pump replacements (1,482 annual kWh savings per project and 1.09 annual kWh savings per square foot). Of segments that had more than 10 customers, heat pump replacement projects for manufactured homes had the largest estimated savings. Generally, WSOL projects had larger estimated savings than the estimated savings for the corresponding WAQC project.

One downside to the difference-in-differences model is that it can produce unexpected results for small sample sizes. Since the model produces an average effect, groups with small counts are more susceptible to the influence of outliers or abnormal behaviors. This phenomena is apparent for some customer segments with less than 10 customers. For example, the multifamily weatherization-only segment for WAQC only has 2 customers, showing annual savings that are nearly twice as large as the next highest savings per segment. Additionally, the lowest savings reported are 128 kWh for weatherization-only projects on manufactured homes with the WSOL program. This estimate is about 10x lower in magnitude compared to the other home types that received weatherization only projects in the WSOL program.

Table 5: Savings by Home Type, and Weatherization Project for 2018

		All			
Type	Measures	Customers	Daily kWh	kWh/project	kWh/SqFt
All Home Types	Weatherization only	77	4.06	1,482	1.09
All Home Types	Weatherization and Heat Pump	144	5.16	1,885	1.43
Single Family	Weatherization only	53	3.90	1,424	0.99
Single Family	Weatherization and Heat Pump	73	4.40	1,604	1.06
Manufactured	Weatherization only	19	3.63	1,325	1.06
Manufactured	Weatherization and Heat Pump	59	6.46	2,357	2.04
Multi-family	Weatherization only	5	7.48	2,730	3.05
Multi-family	Weatherization and Heat Pump	12	3.28	1,199	1.37

Table 6: Savings by Program Type, Home Type, and Weatherization Project for 2018

		WAQC				WSOL			
Type	Measures	Customers	Daily kWh	kWh/project	kWh/SqFt	Customers	Daily kWh	kWh/project	kWh/SqFt
All Home Types	Weatherization only	36	4.08	1,489	1.16	41	4.03	1,471	1.03
All Home Types	Weatherization and Heat Pump	94	4.83	1,762	1.44	50	5.80	2,117	1.43
Single Family	Weatherization only	20	2.80	1,023	0.75	33	4.51	1,647	1.11
Single Family	Weatherization and Heat Pump	35	3.20	1,170	0.79	38	5.48	2,001	1.29
Manufactured	Weatherization only	14	4.80	1,752	1.47	5	0.35	128	0.09
Manufactured	Weatherization and Heat Pump	47	6.36	2,320	2.06	12	6.88	2,510	2.01
Multi-family	Weatherization only	2	11.42	4,167	3.77	3	4.84	1,766	2.37
Multi-family	Weatherization and Heat Pump	12	3.28	1,199	1.37	-	-	-	-

Table 7 and Table 8 present the kWh savings for the same segments for projects completed in 2016 and 2017 in addition to the 2018 project year. The exact same methodologies and validations were used to generate these results. The larger sample sizes across the three project years provide more stability and offer a useful comparison of the savings to only the projects completed in 2018. The savings estimates for the different segments are generally smaller for the three year analysis than the 2018 analysis. For all projects on both programs, manufactured dwelling types were found to have the largest annual savings per project for projects that involved heat pump replacements with an estimated 2,076 kWh. Multifamily homes have the smallest sample sizes of the different home types and present unexpected savings estimates on the whole. Weatherization-only projects were found to have larger savings of 1,982 kWh/project, compared to weatherization and heat pump projects with savings of 1,171 kWh/project.

Table 7: Savings by Home Type, and Weatherization Projects for 2016-2018

		All			
Type	**Measures**	**Customers**	**Daily kWh**	**kWh/project**	**kWh/SqFt**
All Home Types	Weatherization only	292	2.76	1,009	0.71
All Home Types	Weatherization and Heat Pump	479	4.35	1,588	1.23
Single Family	Weatherization only	180	2.76	1,007	0.62
Single Family	Weatherization and Heat Pump	223	3.39	1,238	0.82
Manufactured	Weatherization only	68	1.05	383	0.31
Manufactured	Weatherization and Heat Pump	203	5.69	2,076	1.76
Multi-family	Weatherization only	44	5.43	1,982	2.25
Multi-family	Weatherization and Heat Pump	53	3.21	1,171	1.47

Table 8: Savings by Program Type, Home Type, and Weatherization Projects for 2016-2018

		WAQC				WSOL			
Type	**Measures**	**Customers**	**Daily kWh**	**kWh/project**	**kWh/SqFt**	**Customers**	**Daily kWh**	**kWh/project**	**kWh/SqFt**
All Home Types	Weatherization only	140	1.85	674	0.52	152	3.61	1,316	0.87
All Home Types	Weatherization and Heat Pump	307	3.76	1,374	1.17	172	5.39	1,969	1.32
Single Family	Weatherization only	77	1.74	635	0.45	103	3.52	1,284	0.73
Single Family	Weatherization and Heat Pump	94	1.68	612	0.43	129	4.64	1,695	1.08
Manufactured	Weatherization only	50	1.36	495	0.40	18	0.18	67	0.05
Manufactured	Weatherization and Heat Pump	167	5.27	1,924	1.65	36	7.63	2,784	2.19
Multi-family	Weatherization only	13	4.33	1,581	1.65	31	5.89	2,151	2.53
Multi-family	Weatherization and Heat Pump	46	2.51	917	1.26	7	7.69	2,806	2.26

As a final form of validation, the findings from this study were compared to the WAQC savings reported in IPC's DSM 2018 Annual Report. Average savings for WAQC weatherization-only projects are comparable between the two studies – both studies showed an average of 1.16 kWh/square foot. However, the savings from WAQC weatherization and heat pump projects for single family and manufactured dwelling types differ by a large margin across studies. While both studies conclude that heat pump projects result in larger savings than non-heat pump projects, the previous analysis reported savings that are roughly two to three times larger than the savings in this study.

In terms of applying and utilizing the estimated savings going forward, the results for the 2018 project year should be used, as these results may be more reflective of the current program designs and measures. The estimated daily impacts from 2018 were found to be statistically significant in all segments except for weatherization-only projects on manufactured homes in the WSOL program (n = 5). This segment's results were also not statistically significant in the 2016-2018 analysis. Caution should be exercised in using results from groups that have small customer counts (n < 15) as they are more susceptible to the influence of the impacts of outliers. For segments with the small customer counts, the savings estimates from the project years 2016-2018 will provide a more stable estimate.

Appendix

Table A-1 provides a summary of the different R code files and a brief description of the purpose for each file. The code is commented inline as well and clear divisions are made for the different functions.

Table A-1: Code Overview

File	Description of Steps
1. Data Management	1. Load, clean and combine all treatment demographic data 2. Data Checks *Note: To recreate the map, you will need to enter a google maps API key
1.a Treatment vs Full Data Comparison	1. Inspect customers *QC only - not used in data flow
2. Control Customer Sampling	1. Manage Control Customer Data 2. Pull control sample using screen logic 3. Combine treatment and control accounts to have AMI data pulled 4. Data and mapping checks * This code file is dense and can be refactored to be more efficient.
3. Create Matching Data Set	1. Manage AMI data by treatment group (for matching) 2. Perform matching 3. Create matching mapping data 4. Data Checks
4. Post Matching Processing	1. Combine matched demographic data with AMI data 2. Make key segments 3. Data Checks
5. Create Analysis Dataset	1. Data validations to remove outliers, customers with a lot of missings or poor matches 2. Data Checks
6. Savings Analysis	1. Run diff-in-diff on segments 2. Compile results

Embedded R code:

WAQC_WSOL_EVAL
_CODE_20200219.zip

Idaho Power Company

Idaho Power Company
Irrigation Efficiency Rewards Program

2019 Impact and Process Evaluation Results

TETRA TECH

February 22, 2021

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ACKNOWLEDGEMENTS

We would like to acknowledge the many individuals who contributed to the 2019 impact and process evaluation of the Idaho Power Irrigation Efficiency Rewards program; this evaluation effort would not have been possible without their help and support.

We would like to specifically thank Chad Severson, Tonja Dyke, Dan Axness, Kathy Yi, and Quentin Nesbitt of Idaho Power, who provided invaluable insight into the program and operations. These individuals participated in ongoing evaluation deliverable reviews and discussions and graciously responded to follow-up questions and data and documentation requests. Idaho Power's regional agricultural representatives (ag reps) were also valuable sources of information and assistance during the evaluation process.

The Tetra Tech evaluation team was made up of the following individuals: Kimberly Bakalars, Mark Bergum, Graham Thorbrogger, and Laura Meyer.

1.0 EXECUTIVE SUMMARY

Tetra Tech is pleased to provide Idaho Power Company (Idaho Power) with this report covering the evaluation of current processes and 2019 program impacts for the Irrigation Efficiency Rewards (IER) program. This section of the report consists of an introduction describing the program, evaluation activities, and key findings and recommendations. Both the program's impact and process evaluations are detailed in separate sections, along with their respective findings and recommendations.

1.1 PROGRAM DESCRIPTION

Idaho Power launched the IER program as a pilot program in 2003 and included it as a full program in the 2004 Energy Plan. The IER program is designed to encourage the replacement or improvement of inefficient irrigation systems and components. It is funded through the Energy Efficiency Rider on monthly bills to Idaho Power customers, as approved by the Idaho Public Utilities Commission and the Public Utility Commission of Oregon.

The eligible irrigation sector is comprised of agricultural irrigation customers (or producers) operating water-pumping or water-delivery systems to irrigate agricultural crops or pasturage. End-use electrical equipment primarily consists of agricultural irrigation pumps and center pivots. The irrigation sector does not include water pumping for non-agricultural purposes, such as the irrigation of lawns, parks, cemeteries, golf courses, or domestic water supply.

The program is delivered by Idaho Power staff, including a program specialist, principal engineer, program leader, and analysts. Critical support for the program comes from agriculture representatives (ag reps), and the customers work with vendors, distributors, and installation contractors to purchase and install equipment.

Customers have two options for receiving incentives through the Irrigation Efficiency Rewards program: *Menu* incentives and *Custom* incentives. If a customer is repairing or replacing irrigation system parts, they can apply for incentives on specific components through the *menu* incentive option. Customers who apply with supporting invoices within one year of purchase can receive incentives.

The *Custom* incentive is for extensive retrofits of existing systems or the installation of new irrigation systems. To participate, customers submit a project proposal to Idaho Power before starting a project. The customer works with an ag rep to determine the project's energy savings and applicable incentive estimate.

In addition, customers may also benefit from a Green Rewind through the Green Motors Initiative, which pays service centers two dollars per horsepower (hp) for motors 15 to 5,000 hp receiving a Green Rewind from a verified service center. The Green Motors Practices Group certifies the shop is qualified to perform the Green Rewind under the guidelines and eligible for the incentive (one dollar to the center and one dollar to the customer). If a Green Rewind was done as part of an irrigation project, the savings are also recorded by the IER program.

Figure 1. Menu Incentives and Potential Qualifying Custom

MENU

- New flow-control-type nozzles $1.50
- New nozzles for impact, rotating or fixed head sprinklers $0.25
- New or rebuilt impact or rotating type sprinklers $2.75*
- New or rebuilt wheel line levelers $0.75
- New complete low-pressure pivot package (per sprinkler head, nozzle and regulator) $8.00
- New drains for pivots and wheel lines $3.00*
- New risercaps and gaskets for hand lines, wheel lines or portable mainline $1.00*
- New wheel line hubs (on Thunderbird wheel lines) $12.00
- New gooseneck with drop tube or boomback $1.00 per outlet
- Cut and pipe press or weld repair of leaking hand lines, wheel lines and portable mainline (invoice must show number of joints repaired) $8.00 per joint
- New center pivot base boot gasket $125.00

CUSTOM

- Low-pressure pivot or linear packages (15 psi if possible)
- Reduced-pressure nozzles with 40-foot riser spacing
- Pumps that operate zones of the system at different pressures
- Larger mainlines to reduce friction loss
- Systems designed to better fit the characteristics of field topography
- Replacing a pump with one that is more appropriate for the system
- Lowering the flow rate of a pump through increased application efficiency (savings from reduced acreage does not qualify)
- Installing multiple pumps that can run independently when part of the system is turned off
- Installing a variable speed drive (must be IEEE Standard 519 compliant)
- Installing high-efficiency motors

* These Menu incentive options are limited to the lesser of the incentive or 50 percent of invoice cost.

1.2 METHODOLOGY

The evaluation team conducted several evaluation activities, shown in Figure 2, to address the evaluation objectives. The evaluation objectives included verifying energy impacts attributable to the 2019 program, providing estimates of realization rates, suggesting enhancements to the savings analysis and reporting, evaluating program design (including implementation, management, outreach, and quality control), and program tracking.

Figure 2. Impact and Process Evaluation Activities

Impact

- Documentation and tracking review
- Verify savings amounts
- Check savings calculations
- Interview participants

Process

- Documentation and tracking review
- Ag Rep interviews (6)
- Vendor interviews (9)
- Participant interviews (6)

1.3 FINDINGS AND RECOMMENDATIONS

The IER program is a well-managed program with comprehensive support from Idaho Power staff, including a highly knowledgeable group of ag reps and responsive program staff. Communication between Idaho Power staff is working well, and vendors rely heavily on ag reps for Custom incentive project design and application support, which they feel is provided. The program provides valuable support to the market, encouraging the use of more efficient equipment and system designs and sometimes lower-cost construction.

IER program materials are professional, informative, and educational. An electronic program manual, which is best practice, has been developed. Vendors heavily use the program brochure, and marketing messages appear to be reaching customers. The Menu option of the program is streamlined and easily understood. The Custom option savings are highly customized and calculated by the ag reps and program engineer.

In 2019, the IER program had 1,114 participants with claimed savings of 10,118,160 kWh and a budget of $2,661,263 with the inclusion of the Green Motors Initiative projects. Excluding the Green Motors initiative, the IER program had 1,080 projects and 10,073,455 kWh of savings.[1] The program's overall realization rate, excluding the Green Motors savings, was 97.4 percent, with a relative precision of 7.8 percent at 90 percent confidence.

Table 1: Program Realization Rate

Program option	Projects	kWh			Peak kW		
		Claimed	Evaluated	Realization rate (%)	Claimed	Evaluated	Realization rate (%)
Menu	924	4,355,031	4,355,031	100	852.3	852.3	100
Custom	156	5,718,424	5,456,520	95.42	1,482.3	1,476.0	99.58
TOTAL	**1,080**	**10,073,455**	**9,811,551**	**97.40**	**2,334.6**	**2,328.3**	**99.73**

1.3.1 Impact Recommendations

The following impact recommendations are provided for Idaho Power's consideration:

- **Formalize data collection of system operating conditions for custom projects.** The program did a good job collecting documentation for equipment, although the system operating

[1] Demand-Side Management 2019 Annual Report (idahopower.com)

parameters were stored in multiple locations throughout the custom calculations. A single location to collect operating parameters of the existing and proposed systems would create transparency in the energy efficiency calculations.
- **Streamline custom calculations.** The current calculator focuses on the energy savings associated with equipment. A more streamlined approach would develop a comparable baseline and improved energy models with all equipment accounted for in a single calculation. Concurrently, the program can develop baseline operating assumptions that can be used to normalize equations and provide a quality assurance (QA) point to describe components of the custom systems.
- **Increase documentation for critical system components.** The program collected the pump make, model, and trim; and specific pump curves for the installed systems. However, invoices were needed to provide details to confirm operating parameters for necessary components, such as nozzles, filters, or end guns. Collecting a make and model or specification sheets of critical components of the irrigation systems outside the pump would support QA and review by individuals other than the Idaho Power representative.

1.3.2 Process Recommendations

Tetra Tech has a few process recommendations for Idaho Power's consideration:

- **Continue to develop the electronic program manual.** In response to 2016 evaluation recommendations, Idaho Power has a good draft program manual available electronically. Program staff should continue updating and expanding this document to serve as a guide for consistency and a resource for redundancy. This reference document is particularly important given the significant amount of program knowledge that is retained by experienced Idaho Power staff. While this is beneficial now, a risk exists if staffing changes.
- **Continue creating an electronic filing system for all project records.** Although Idaho Power is making the transition over to electronic files, a few projects are still in paper form that needed to be scanned for evaluation. Electronic project files should include calculators, maps, system descriptions, and program applications.
- **Consider a more systematic method for reviewing vendor activity levels**. Idaho Power tracks the vendors working with participating producers. Given that some vendors are highly active, and others are not, reviewing vendor participation levels can help focus ag rep outreach efforts and the types of Menu and Custom projects they are supporting. For instance, vendors driving more Menu projects to the program will need a more frequent refresh of Menu applications and brochures.

2.0 INTRODUCTION

2.1 PROGRAM OVERVIEW

The Irrigation Efficiency Rewards (IER) program is designed to encourage the replacement or improvement of inefficient irrigation systems and components. It is funded through the Energy Efficiency Rider on monthly bills to Idaho Power customers, as approved by the Idaho Public Utilities Commission and the Public Utility Commission of Oregon. The eligible irrigation sector is comprised of agricultural customers operating water-pumping or water-delivery systems to irrigate agricultural crops or pasturage. End-use electrical equipment primarily consists of agricultural irrigation pumps and center pivots.

Customers have two options for receiving incentives through the IER program: *Menu* incentives and *Custom* incentives. If a customer is repairing or replacing irrigation system parts, they can apply for incentives on specific components through the Menu incentive option. Customers who apply with supporting invoices within one year of purchase may receive incentives. The Custom incentive is for extensive retrofits of existing systems or the installation of new irrigation systems. To participate, customers submit a project proposal to Idaho Power before starting a project. The customer works with an ag rep to determine the project's energy savings and applicable incentive estimate.

2.1.1 Menu Incentives

The Menu incentive option's total incentive amount is calculated by multiplying the qualifying items purchased by the pre-determined incentive amount. The incentive paid is the lesser of the incentive or the actual amount paid, unless otherwise restricted by the 50 percent cost limitation on particular items (noted in Figure 1 above). All measures are limited to a two-per-acre quantity and three years between invoice date and incentive eligibility.

The Menu incentive application process is outlined below.

1. Customers review the sprinkler parts covered by the Menu incentive to determine which apply to their system. Idaho Power agricultural representatives and the program specialist are available for assistance.
2. Customers purchase and install the parts on their irrigation system.
3. Customers complete the Menu incentive application within one year from the date of purchase and mail or email it to Idaho Power, including receipts and invoices showing proof of purchase. The program specialist reviews each receipt and item to verify applicability. The data entry program has built-in safeguards to check for limitations.
4. Idaho Power pays customer incentives by check once they have determined that customers have complied with the Irrigation Efficiency Rewards program's terms.

2.1.2 Custom Incentives

Although there are examples of eligible projects in Figure 1, Idaho Power considers all proposals to reduce an irrigation system's energy use. Compared with Menu incentive projects, Custom incentive projects and applications are more involved. Idaho Power agricultural representatives are available to conduct free energy evaluations to help customers determine the changes or improvements that can make their system more energy efficient. Necessary customer steps for a Custom Incentive application are outlined below.

1. Customers determine how or if their irrigation system could be more energy efficient. Customers can request an evaluation or planning assistance from an Idaho Power ag rep in their area.
2. Customers develop a plan with their ag rep to address their specific needs and provide the most energy savings and the largest incentive.
3. Customers contact irrigation equipment or pump dealers to obtain an itemized bid to modify or install the irrigation system.
4. Customers work with their ag rep to complete the Custom incentive application, which should include the following supporting documentation:
    - an itemized bid from the supplier (including make, model, and specifications of all the equipment);[2]
    - a drawing of the irrigation system, including the location of water sources and pumps;
    - a topographical map of the irrigated area with intake/well elevation, critical pressure locations, and elevations showing mainline pipe lengths, sizes, and pressure ratings;
    - an aerial photo or map of the irrigated area (acres) showing mainline pipe lengths, sizes, and pressure ratings; and
    - the make and model of the pump (noting the number of stages and impeller diameter(s))
5. Idaho Power reviews customer applications and documentation, calculating energy (kWh) and demand (kW) savings based on the proposed improvements or new system.

    Idaho Power calculates the average annual estimated energy savings based on past energy usage data for the service location and compares it to the calculated energy usage of the system with the proposed changes submitted.

    The estimated incentive is calculated by:
    - multiplying the average annual energy savings estimate by $0.25 per kWh or $450 per kW;
    - calculating the maximum payment of 75 percent of the total project cost of a system retrofit or 10 percent of the total new system cost;
    - comparing the two incentives (choose the larger of the kW or kWh incentive) and
    - comparing the larger of the two incentives above with the maximum payment (choose the smaller).
6. Qualifying projects receive a letter or a discussion along with an Irrigation Efficiency Rewards Program Agreement, which must be signed by the customer and returned to Idaho Power.
7. After the customer installs the pre-approved system, they submit the following to Idaho Power:
    - copies of invoices,
    - a map of the installed system,
    - a verbal description of any changes to the pre-approved design, and
    - additional documentation as requested by the customer's ag rep.

[2] This item is listed on the website as a requirement but has since been dropped.

When the installation information has been submitted, Idaho Power calculates energy and demand savings for the installed irrigation system. Upon verification, the incentive check is mailed to the customer. The incentive can change if the final invoices vary from the original estimate.

2.1.3 Marketing and Outreach

Idaho Power uses a wide variety of marketing and outreach methods to inform irrigation vendors and customers about IER opportunities. The primary methods include the Idaho Power ag reps and irrigation vendors.

Idaho Power's ag reps offer customer education, training, and irrigation-system assessments and audits across the service area. Ag reps also engage agricultural irrigation equipment dealers in training sessions to share expertise about energy-efficient system designs and increase awareness about the program. Ag reps and the irrigation segment coordinator, a licensed agricultural engineer, participate in annual training to maintain or obtain their Certified Irrigation Designer and Certified Agricultural Irrigation Specialist accreditation.

In 2019, Idaho Power provided ten workshops promoting the IER program. Approximately 200 customers attended workshops in American Falls, Blackfoot, Caldwell, Eden, Gooding, Leadore, Mountain Home, Parma, Picabo, and Salmon, Idaho. The company displayed exhibits at regional agricultural trade shows, including the Idaho Irrigation Equipment Association Winter Show, Eastern Idaho Agriculture Expo, Western Idaho Agriculture Expo, and the Agri-Action Ag Show.

In addition to the ag rep outreach and Idaho Power workshops, promotional outreach included:

- a fall edition of Irrigation News (an Idaho Power newsletter), mailed to all irrigation customers in Idaho Power's service area;
- numerous ads in print agricultural publications to reach the target market in smaller farming communities;
- radio advertising to promote its presence at the Agri-Action show and to show support of Future Farmers of America and Ag Week conferences;
- collaboration with the Twin Falls County Pest Abatement District on a TV commercial and digital ads to promote irrigation equipment efficiency while educating the public on mosquito abatement;
- a new tabletop display to showcase at irrigation-specific trade shows and highlight specific equipment incentives; and
- the distribution of program brochures, Menu applications, and postage-paid envelopes to irrigation vendors.

Throughout 2019, changes to program brochures and other marketing collateral made the materials more consistent with each other and other Idaho Power publications. In 2019, a campaign geared towards irrigation customers included marketing the efficiency program. The utility's customer solutions advisors were trained to answer questions, walk customers through the Menu application, and refer interested customers to ag reps for assistance.

2.1.4 Tracking and Reporting

Idaho Power uses their CLRIS system to manage all the applicant's data, create vendors, and pull reports for all pending and paid projects. The annual IER budget is based on expected kWh savings for the year, which are built up and claimed using Regional Technical Forum (RTF) inputs. The program incentives are the largest portion of the program expenses.

Savings are calculated based on inputs from the RTF, a few of which have changed significantly with an update in March 2018. Idaho Power continued to work with the RTF on assumptions and conducted an irrigation hardware survey of its customers in 2020 to collect results to provide information to the irrigation subcommittee.

Quality control (QC) is conducted monthly to review the expenditures of the program for accuracy. The review is designed to make corrections and ensure all payments and accruals have been correctly charged and budgeted. Program activities, marketing, budgets, and goals for the upcoming year are reported annually and posted on Idaho Power's website.

2.2 EVALUATION OVERVIEW

The evaluation goals for the 2019 IER program include:

- reviewing program documentation regarding allocation methods;
- comparing RTF savings to program tracked savings for Menu measures;
- verifying whether reported savings and tracked savings match and discuss with Idaho Power any variances between RTF savings and program tracked savings that emerge based on the data and program documentation;
- identifying ways Idaho Power can improve the project approval and application process, if any;
- providing feedback on program processes and effectiveness; and
- evaluating communication effectiveness between program staff, ag reps, customers, and vendors or installation contractors.

2.2.1 Evaluation Activities

The evaluation activities for the IER Program are summarized in Table 2. Researchable issues and the sampling strategy are also discussed in this section.

Table 2. Irrigation Efficiency Rewards Program Evaluation Activities

Activity	Objective
Program manager interviews	Understand key delivery options, how savings are claimed, and how the program is tracked.
Review marketing materials	Assess brochures, publications, table toppers, etc., to inform communications with ag reps and vendors.
Interview agricultural representative staff	Determine outreach methods and participation barriers and identify communication methods that work best when reaching out to participants.
Interview vendors and installation contractors	Investigate program awareness and understanding, interactions with customers, application assistance, and their markets.
Analyze the tracking database: Menu measures	Review the program tracking system to document participation, data availability, and savings. This task includes replicating the impacts of prescriptive measures using the RTF deemed savings for the Menu measures.
Analyze the tracking database: Custom measures	Review the program tracking system to document participation, data availability, and savings. This task will inform the sampling for the engineering review.

Activity	Objective
Engineering review and calculations	Review measures and engineering assumptions, calculations, and models used to estimate equipment or measure savings for accuracy and consistency with prescriptive sources and engineering calculations. For measures where a program manual or RTF workbook exists, impact results from the program will be compared to RTF unit energy savings impacts. Additionally, the Tetra Tech team will take more site- or territory-specific analyses into account if Idaho Power provides scope and documentation. For the measures where a program manual or RTF workbook does not exist, the Tetra Tech team will (1) review the existing measure and site-specific analyses, (2) check them for consistency and accuracy, and (3) apply engineering calculations based on equipment and documented or standard operating conditions.
Virtual site reviews	Assess equipment and operating parameters of the irrigation system to verify equipment installed, program assumptions, and calculation methods. Identify the non-energy benefits and assess the quantity and value. Review the application process from the participant's perspective.

2.2.2 Sampling

Sampling was conducted at the *project ID* level. The tracking data[3] was uploaded by Idaho Power and downloaded by Tetra Tech on September 2, 2020. Tetra Tech reviewed the data and confirmed that the *project ID* provided a sufficient level of comprehensiveness per customer for sampling. A random number between 0 and 1 was assigned to each project.

The sampling was stratified to ensure that the sample would meet the evaluation goals. The stratum was selected to isolate the outlier project with savings equal to approximately 15 percent of the Custom incentive program. The remaining projects were stratified by *Idaho Power service region* and *project type* (new or existing). The results of the stratification are summarized in Table 3.

Table 3. PY2019 Irrigation Custom Stratification Summary

	Number of project IDs		Total kWh savings percentage	
Sampling stratum	New	Existing	New (%)	Existing (%)
Outlier project (Southern)	1	0	14.36	0.00
Canyon	27	16	10.91	7.90
Capital	3	9	0.96	4.72
Eastern	2	7	0.66	4.96
Southern	10	31	16.50	24.87
Western	36	15	9.99	4.18
TOTAL	**79**	**78**	**53.38**	**46.62**

[3] Custom Program: 2019_IrrigationCustom_ICI_DB_Download.xlsx and Menu Program: 2019_IrrigationMenuProgram_DB_Download.xlsx.

Fifteen 15 project desk reviews were completed, with eight of them also receiving a follow-up site-verification phone call. The outlier project was sampled for certainty. That project is in the Southern region and will reduce the normal random sample from that region down to zero. In addition, the small number of projects from the Capital and Eastern regions necessitated the combination of those two regions to ensure an adequately distributed sample. The number of sampled projects from each of the stratification groups is summarized in Table 4.

Table 4. PY2019 Irrigation Custom Sample Summary

Sampling stratum	Number of sampled project IDs	
	New	Existing
Outlier project[4]	1*	0
Canyon	3	2
Capital	1	1
Eastern		
Southern	0*	3
Western	3	1
TOTAL	**8**	**7**

*See footnote.

[4] The outlier project is in the *Southern-New* stratum and will be the sampled from there (*).

3.0 IMPACT EVALUATION RESULTS

The goals for the impact evaluation of the IER program include:

- provide feedback on program processes and effectiveness;
- evaluate communication effectiveness between program staff, ag reps, customers, and vendors or installation contractors; and
- collect qualitative information on the application process and any areas for improvement.

3.1 METHODOLOGY

The impact methodology consisted of the four primary evaluation activities shown in Figure 3. Each activity is explained in more detail below.

Figure 3. Process for Verifying Program

- **Program Tracking Review**
  The first step in evaluating the IER program was to review the program documentation and energy savings tracking system provided by Idaho Power; Tetra Tech determined that the tracking data was complete for each project. Idaho Power supplied the tracking system to the evaluation team in separate Excel spreadsheets for the Menu and Custom components, along with a data dictionary.

  A separate spreadsheet was provided that documented the quantity and energy savings associated with participants who also participated in the Green Rewind program. This information did not identify individual customers and was not included in the evaluation.

- **Verify Savings Amounts and Documentation**
  To verify the savings amounts, the evaluation team took a different approach for Menu and Custom portions of the program. The Menu program savings were verified using a census approach to recalculate savings based on tracking system data. We used the Agricultural Irrigation Hardware V4.1[5] workbook from the RTF as the basis for energy savings.

  Custom savings and documentation were verified by sampling 15 projects for a detailed review of claimed savings and documentation. The evaluation team reviewed the submitted documentation to verify the tracking system data entries for participant information, expected documentation, savings, and other data entry points.

[5] https://rtf.nwcouncil.org/measure/irrigation-hardware

- **Check Savings Calculations**
  A professional engineer with Tetra Tech reviewed the savings calculations for the 15 Custom projects sampled and recalculated the savings based on the documentation and additional verification information collected. The engineer examined the project descriptions and drawings, invoices, and engineering calculations and assumptions. Although the submitted calculations were reviewed, the evaluated savings reported results from a new calculation using the documentation. Since these are custom projects with many variables per growing season, this approach was expected to provide different savings for each project. The overall realization rate of the sample will provide the best indication of the accuracy of the project savings.

- **Interview Customers**
  Once the kWh savings were recalculated for each of the 15 sampled Custom projects, the evaluation team called the participant to verify the project equipment's installation. We were able to reach participants and verify the installations of 7 of the 15 projects. The verification phone calls included confirmation of baseline and post-install conditions, operating parameters, and discussion of the non-energy benefits realized since installation. Information from the verification phone calls was also used to refine evaluated savings calculations.

3.2 IMPACT REVIEW RESULTS

Because the Menu application and savings process are streamlined and prescriptive, a census review of the projects in the Menu tracking data was completed. The evaluation team took a more detailed look at the Custom projects, which, by nature, result in more variability in savings and will have the greatest impact on the program savings. The Green Motors component was not evaluated. Overall, the savings claimed across the two program options were accurate.

Table 5: Program Realization Rate

		kWh			Peak kW		
Program option[6]	Projects	Claimed	Evaluated	Realization rate (%)	Claimed	Evaluated	Realization rate (%)
Menu	924	4,355,031	4,355,031	100	852.3	852.3	100
Custom	156	5,718,424	5,456,520	95.42	1,482.3	1,476.0	99.58
TOTAL	**1,080**	**10,073,455**	**9,811,551**	**97.40**	**2,334.6**	**2,328.3**	**99.73**

3.2.1 Menu Option Review

The evaluation team found that the menu program tracked all the necessary project information to use the RTF calculator to claim first-year energy savings and non-energy benefits. The information was well organized and included guidance to understand each of the data entry points. The evaluation team confirmed that the claimed savings matched the RTF energy savings and non-energy benefits expected with minimal additional support from Idaho Power.

[6] The Green Motors component was removed from the impact review section; therefore, the kWh savings in this section is 44,705 kWh lower than the overall program.

The evaluation team identified the following items for clarification by Idaho Power, and they responded to each.

1. The *gooseneck* measure used the energy savings from the previous version of the RTF calculation (V3.3).
    - o The energy savings from Version 3.3 was used because the measure was removed from the Version 4.1 energy savings. RTF is reconsidering the removal of this measure. For the 2020 program, the utility used the previous version savings to provide consistency of measures from year-to-year until a final decision is provided.
2. The *gooseneck* measure energy savings is multiplied by two.
    - o The *gooseneck* measure for the IER program requires that a drop tube also be installed. The drop tube, although not listed, has equal savings to the gooseneck; therefore, the energy savings appears to be doubled but are two measures combined.
3. The *flow control* measure used the same savings as the *wheel and hand nozzle replacement* measure.
    - o These measures are the same because the RTF calculator does not differentiate between the low-flow control and nozzle install. The program used the *wheel and hand nozzle replacement* measure for new flow control nozzles and new nozzles installed on impact, rotating, and fixed-head sprinklers.
4. After these above adjustments, the evaluation found three projects that did not match the RTF Version 4.1 calculator.
    - o These three projects were originally entered in 2018 but not paid until 2019. Therefore, the previous year's assumptions (RTF calculator Version 3.3) were used, although they were logged under the evaluated year.

The evaluation team found these to be reasonable responses, and the resulting realization rate for the Menu program is 100 percent for all projects.

Table 6. Menu Option Realization Rates by Idaho Power Region

Idaho Power region	Projects	kWh			Peak kW		
		Claimed	Evaluated	Realization rate (%)	Claimed	Evaluated	Realization rate (%)
Eastern	229	1,093,839	1,093,839	100	214.1	214.1	100
Southern	516	2,012,259	2,012,259	100	393.82	393.82	100
Western	42	98,928	98,928	100	19.33	19.33	100
Canyon	58	431,577	431,577	100	84.43	84.43	100
Capital	79	718,428	718,428	100	140.59	140.59	100
TOTAL	**924**	**4,355,031**	**4,355,031**	**100**	**852.27**	**852.27**	**100**

3.2.2 Custom Option Review

Overall, findings from the Custom option impact evaluation show the program savings calculations are reasonable. The tracking system review found that the tracking system accurately reflected the applications and documentation. The evaluation found just one transcription error of a customer name in the desk reviews.

3.2.2.1 Documentation

The evaluation team reviewed the provided documentation for each sampled project compared to each project's expected documentation as detailed in the program manual. The expected documentation per project was:

- Project description
- Pump curve
- Cost estimate
- Final invoices
- Drawing of system
- Topographic map
- Aerial
- Calculations
- Product specification sheets
- Make and model of pump
- Map of the new system

The documentation provided to the evaluation team was inconsistent. Some of the inconsistencies are a result of limited access to the files during the pandemic. The IER program staff worked remotely during the evaluation, and the documentation was partially in physical files. About half of the sampled projects had paper files that needed to be scanned, and about half were fully saved digitally. The projects with paper files were less complete than the digital files. In the past year, the program has switched to digital files, which will support the accessibility of the documentation.

The documentation provided always included an aerial, pump curve, calculation spreadsheet, and final invoices. The calculation spreadsheet many times included the project description and other notes regarding the assumptions and values used in the calculations; these were the critical pieces of information required to evaluate each project. However, many of the Custom calculation components were documented by notes in the calculator, which were difficult to locate and identify. The evaluation team recommends identifying critical assumptions and operating conditions and making them easy to find for individuals accessing the files. A cover page of existing and proposed operating conditions on the calculations may be an easy location to put all the information.

There were two items consistently missing from the project documentation: (1) the cost estimate and (2) the make and model of the pump. The cost estimate was eliminated as a requirement for project submittal by the project team, although not formally removed from the required documentation list. Idaho Power removed it because the final invoice contains the necessary information to identify the project equipment. The evaluation team recommends removing the cost estimate from the required documentation list.

The other documentation consistently missing from the projects was the Product Specification Sheets. It appears that the program staff is identifying equipment installed based on conversations with the participant and inspection of the invoice. The documentation and notes available to the evaluation team required a discussion with program staff to confirm or collect additional detail for about half of the projects. Of note, program staff always had more detailed information about the project to support the analysis, but the information was not reproducible without their input. The evaluation team recommends that Idaho Power (1) include the equipment Product Specification Sheets with the application or (2) collect the make and model of critical energy savings components (e.g., flow control devices, distributors, filters) separately so their impact on the system can be identified from manufacturers' product specifications.

3.2.2.2 Custom Savings Calculation

The energy savings realization rates for each project are shown in the table below. The interim overall realization rate is 95.42 percent for electricity consumption and 99.58 percent for peak demand. While the overall realization rates are high, there is a good deal of variability in the individual project realization rates.

The variability of individual project results was expected based on the evaluation approach of developing new energy efficiency calculations built from the documentation available. The nature of individual irrigation systems leads to variable results when the evaluation calculation method is applied. This approach to the savings calculation is detailed and provides informative results confirming the general approach to existing calculation. The custom option's confidence and precision were calculated separately from the whole program to evaluate the current methods of energy savings calculation. The results were very similar; the relative precision of ±7.5 percent at 90 percent confidence means the program should have confidence in the current method of calculating energy savings, although improved documentation and simplified and annotated calculations could increase accuracy.

Table 7. Sampled Project Realization Rates

Project ID	Acres	kWh			Peak kW		
		Claimed	Evaluated	Realization rate (%)	Claimed	Evaluated	Realization rate (%)
2444	864	958,545	894,238	93	-3.7	0	0
2448	175	11,614	7,225	62	2.8	3.19	114
2466	58	33,281	18,066	54	16.6	9	54
2468	33	9,956	12,695	128	5	-2.5	-50[7]
2474	135	14,887	15,223	102	-6.1	-2.7	44
2476	33	8,914	3,464	39	4.5	1.732	38
2493	123	57,709	44,651	77	18.5	17.1	92
2504	283	212,428	249,289	117	145.8	154.3	106
2508	18	9,090	6,425	71	4.6	5.4	117
2512	58	30,988	24,874	80	-0.1	0	100
2525	75	14,901	12,431	83	-1.1	5.9	536[8]
2536	39	14,842	11,264	76	6.4	7.3	114
2545	76	7,209	3,163	44	2.9	3.5	121
2549	165	33,156	53,769	162	9.9	2.3	23
2559	34	19,799	14,687	74	6.7	7.28	109
TOTALS	**2,169**	**1,437,319**	**1,371,464**	**95.42**	**212.7**	**211.8**	**99.58**

[7] Project evaluated peak kW went from positive to negative, the realization rate is an estimation.
[8] Project evaluated peak kW went from negative to positive, the realization rate is an estimation.

The evaluation did identify several items that could mitigate risk in project calculations and improve the highly qualified staff's efficiency and effectiveness to focus on the support for participants and vendors.

- Develop a data collection sheet for existing and proposed systems that will consistently collect and organize the project's critical information. The single location for equipment and operations values and assumptions will ease calculation adjustments throughout the project and support QA. The existing program calculator has the information entered throughout the calculator, sometimes in multiple locations, making it difficult to identify whether the best values were used.
- Design a single calculation that creates a comparable energy model of the pre-install conditions, baseline condition (if it varies from pre-install), and post-install condition. The energy savings will be the difference in consumption and peak demand between these two models. The evaluation team used a calculation method similar to the variable frequency drive (VFD) calculation submitted. The pre-/post-model approach will look at the project from a system level, including interactive effects and adjustments to water pumped, hours, pressure, or crop rotation.
- Develop standard assumptions that each system uses to calculate savings; these standard assumptions should be adjusted for each project. Each adjustment should include a description of why the value was changed from the standard assumption. This process will help identify the assumption made in the calculations for more transparency.
- Irrigation system energy consumption is highly variable based upon winter and summer weather conditions, groundwater conditions, crop rotations, and producer operating conditions. This complexity makes it difficult to determine annual energy savings based on the past year's conditions. The current process of reviewing the past five years of operations on existing systems addresses those concerns but only provides electric consumption. Creating a set of normalized operating conditions for the energy efficiency calculations will reduce the reliance on assumed typical values from the participants. The evaluation team recommends using proposed inches of water on the irrigated field as the primary metric for the energy model approach.
- The use of AMI data is very powerful and was used in some projects to determine operating hours and energy consumption. The information obtained from these analyses is currently simplified. A best practice is to develop a regression analysis with independent variables to create a statistical energy model of the current system. Examples of independent variables are water records and flow meter reading, temperature, crop-growing stage, or groundwater level.
- Formalize the QA process for calculations to create expected boundaries on results such as kWh/inch of water or kWh/acre irrigated. In addition, the development of the standard assumptions will also provide a foundation for QA operating conditions and the changes attributed to the upgraded system. The current QA process is highly dependent on the individual staff and their expertise and training.

3.2.3 Non-Energy Benefits

Upgraded irrigation systems typically provide additional benefits in areas outside energy efficiency, although many of these benefits are not easily tracked or valued. The current project documentation identifies non-energy benefit categories as water use reduction, labor savings, maintenance savings, and yield improvements. Currently, an IPC ag rep works with the applicant to estimate the monetary value in each of these categories. Table 8 shows the amount of non-energy benefits claimed by the IER program in 2019.

Table 8: Claimed Non-Energy Benefits by State

Program option	Idaho				Oregon			
	Labor	Maintenance	Water	Yield	Labor	Maintenance	Water	Yield
Menu[9]	$348,379			$348,379	$1,212			$1,212
Custom	$378,921	$153,538		$1,600,301	$130,277	$46,030		$492,580
TOTAL	**$727,300**	**$153,538**	**$0**	**$1,948,680**	**$131,498**	**$46,030**	**$0**	**$493,792**

The evaluation identified that the non-energy benefit values are inconsistently estimated for projects. The Menu option non-energy benefits are prescriptively calculated at $2 per acre. The custom option savings is self-reported by the producer based on estimates of value created. The claimed results varied from zero to $5,250 per acre. Most of the non-energy benefits claimed are based upon yield improvement estimates; they account for 75 percent of all the custom project non-energy benefits claimed. The highest yield benefits per acre are attributed to projects categorized as "New" in the tracking system. The "New" category includes both newly irrigated fields and projects that upgrade an irrigation system from flood or hand lines to a pivot. Table 9 details the per acre average value of non-energy benefits for systems categorized as New or Existing.

Table 9: Claimed Non-Energy Benefits per Acre by Project Type

Project Type	Project	Area (ac.)	Labor	Maintenance	Water	Yield	TOTAL
Existing	78	13,862	$12	$9	$0	$32	$53
New	78	7,005	$49	$11	$0	$235	$295
Total	**156**	**20,867**	**$24**	**$10**	**$0**	**$100**	**$134**

Overall, the non-energy benefits claimed are reasonable. The USDA NASS provides an annual press release[10] detailing the cash rent expense and cash value of agricultural land, separating between irrigated and non-irrigated. The values for Idaho and Oregon cropland are extracted from that press release in Table 10.

Table 10: 2019 USDA Land Value Statistics from USDA NASS

Cropland type	Idaho Cropland		Oregon Cropland	
	Average Land Value per acre	Average Cash Rent Expense per acre	Average Land Value per acre	Average Cash Rent Expense per acre
Irrigated	$ 6,020	$ 216	$ 5,290	$ 215
Non-Irrigated	$ 1,650	$ 56	$ 2,220	$ 95
Difference	**$ 4,370**	**$ 160**	**$ 3,070**	**$ 120**

The difference in the annual rent expense is an approximation of the annual value provided by an irrigation system, but it does not differentiate between a flood irrigation system and a pivot system. While the majority of "New" projects will adjust from a flood system to a pivot system, the difference in

[9] The Menu savings tracks the non-energy benefits as a single line. This value is equally separated into yield and labor savings equally.

[10] https://www.nass.usda.gov/Statistics_by_State/Idaho/Publications/Crops_Press_Releases/2020/CASHRNT.pdf

value can be approximated by the difference in the average between irrigated and non-irrigated. This is because the flood systems will receive a significantly lower rent than the average irrigation system and the pivot system will receive a higher than average rent. Although the average non-energy benefits of $295 per acre for new irrigation system project types is high, the evaluation team does not recommend adjusting the claimed non-energy benefits at this time.

However, the high value of the yield improvements estimates is a natural spot to review as part of quality assurance. Requesting yield information from past participants at project locations will help develop estimates. This information will require a significant amount of effort from program staff and customers. We found that during verification calls, participants had difficulty answering questions directly about the value generated from the project in non-energy benefit categories but could provide examples of non-energy benefits that occurred. And even the yield benefit improvements were still only talked about in generalities. Some producers may have available records, but they will not be available immediately or easily accessible. If collected, plan multiple contacts with surveyed participants.

As a starting point, the yield data collected for past projects and the implementation team's engineering experience could be used to create a menu of standardized non-energy benefits for project types that can be calibrated using the USDA NASS data. Focusing the effort on the yield improvements from various project types will have the most significant impact. But the improvement in labor and maintenance categories are important to the overall performance of the improvement. The program also claimed zero water reduction benefits; but these values can also be significant and are not captured in the current process because the improvement provides limited value to the producer.

Given the amount of effort to collect primary data to calculate non-energy benefits from projects, we suggest prioritizing the following project types and sources of information:

- Flood irrigation to pivot irrigation projects.
- Wheel line to pivot irrigation projects.
- Regional water reduction benefits value.[11]
- Reductions in inches of water pumped through increased distribution efficiency, leak reduction, and other reasons will reduce the calculated water use, but the non-energy benefits can be similarly estimated as the Menu program value, currently $2 per acre.
- Utilize the annually published USDA NASS difference in average cash rent expenses for Idaho to determine the average value of non-energy benefits internalized by the producer for “New” irrigation projects claimed.

Creating standardized non-energy benefits by project type will generate more transparent results per project. The approach will recognize the small benefits of simple projects and limit the excessive values claimed by other projects. It will also reduce the ag reps' workload by reducing the need to attribute value for each project individually before start-up. However, the approach will require the team to annually revalue and document the prescribed amount based on local information, program participation, and other resources.

[11] IPC’s Grand View Sediment Reduction Program and Natural Resources Conservation Service (NRCS) regional programs use models and other methods to account for water quality improvements from reduced sediment and nutrient loading.

4.0 PROCESS EVALUATION RESULTS

The process evaluation served as a check on the program design compared with (1) industry best practices, (2) marketing and outreach, (3) the implementation process, (4) vendor engagement, and (5) program administration and tracking.

The process evaluation sought to achieve the following goals:

- provide feedback on program processes and effectiveness;
- evaluate communication effectiveness between program staff, ag reps, customers, and vendors or installation contractors; and
- collect qualitative information on program experience and the application process, and any areas for improvement.

4.1 METHODOLOGY

The process methodology consisted of the four primary evaluation activities shown in Figure 4. Each activity is explained in more detail below.

Figure 4. Process Review Steps

- **Review Program Materials**
  Program materials provided by the IER program staff were reviewed, including the program brochure, applications, publications, and conference table toppers to inform our interviews with ag reps, vendors, and producers.

  Idaho Power also provided a program manual (in electronic format) that details (1) background information on the program, (2) contact information for all program staff, (3) examples of both the Menu and Custom applications with directions for assistance, cost-effectiveness, and RTF usage directions, (4) ag rep contacts and goals, and (5) a summary of marketing and reporting activities. This document serves as a useful source of program documentation for all parties to reference.

  In addition to the documentation we reviewed, Idaho Power presented summary survey data gathered through other research efforts. The results showed generally high levels of satisfaction that were confirmed during our process evaluation.

- **Interviews with Ag Reps**
  We spoke with all six ag reps representing the five regions in Idaho Power's service area to better understand outreach methods and participation barriers and identify communication methods that work best when reaching out to vendors and participants. The interview guide can be found in Appendix A.

  Ag reps have been working with the program for 3 to 15 years and understand the types of producers in their regions and the types of systems used and projects implemented. They all attend Irrigation Association events and are all Irrigation Designer certified. They encourage vendors to do the same.

They described their role with the IER program as:

- promoting the Menu and Custom program components to customers and vendors;
- supporting vendors with customer meetings and customer events;
- holding training and program meetings with vendors and customers;
- working with vendors and customers to design, scope, and implement Custom projects; and
- assisting with Custom incentive calculations and applications

- **Interviews with Irrigation Vendors**
  We spoke with nine vendor staff representing all five regions and all six of the ag reps to investigate program awareness and understanding, interactions with ag reps and customers, the level of application assistance, and their markets. The interview guide can be found in Appendix B.

  The vendors we spoke with ranged in size from small, single locations with 8–15 staff to large firms with multiple locations and 30–50 employees. They have each been involved with the program for several years.

  About half of the vendors we interviewed had retail locations that focused on equipment rebated through the Menu option, such as sprinkler packages and pivots—the other half designed or installed systems that qualified for the Custom incentives.

- **Interview with Participating Producers**
  As part of the impact review, we contacted participating producers to verify the equipment installed and incentivized through the program and benefits realized from the new equipment. In addition, we asked them questions about their experience with ag reps and vendors, the application process, and the program in general. The interview guide can be found in Appendix C.

  The producers ranged in size from a cattle rancher who converted a pasture, to an expanding producer who is upgrading several fields per year, to a large dairy operation. Producers also ranged in their experience with irrigation. In general, they fell into three categories:

  - those who are inexperienced with irrigation technology and relied upon the vendors and ag reps to design and install the system that worked;
  - those who are experienced with irrigation technology and were involved in the design of the new system; and
  - those who were hands-off on the process and allowed the vendor to design the new system and work with the ag rep independently before seeking grower approval for the project design and budget.

4.2 PROCESS REVIEW RESULTS

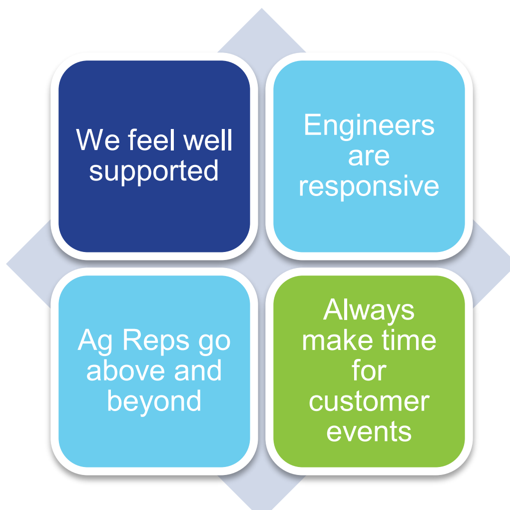
We spoke with program staff, ag reps, irrigation vendors, and program participants to get feedback from all program stakeholder perspectives. One thing that became evident is that there are many paths for irrigation producers to access the program. Multiple paths to participation could create barriers, complicate communication, or increase dissatisfaction. However, overwhelming feedback shows that the current system for outreach, assistance, and delivery is working well and communication amongst all parties is successful. In order to maintain this high level of service, ag reps and vendors will need to continue to be flexible and route customers where they need to go depending on (1) who they have already talked with, (2) their design needs, and (3) their level of technical expertise.

4.2.1 Outreach and Relationships

The Idaho Power program staff and ag reps meet weekly to discuss projects and program requirements. As field staff, the ag reps appreciate the program staff in the office making themselves available. Ag reps report that Menu questions receive an immediate response from the program specialist and the professional engineer provides needed technical assistance on the Custom projects.

Ag reps work to build strong relationships with customers and vendors in their respective regions. They also assist each other as needed. The high level of support the ag reps provide is reflected in the positive feedback we received from vendors and producers. Figure 5 shows some of what vendors have to say about their interactions with Idaho Power staff.

Figure 5. Vendor Feedback on Idaho Power Ag Reps



The producers we spoke with all discussed how the ag reps made the process of claiming incentives easier. The producers we interviewed could not identify any potential improvements for the ag reps or the incentive process. Two of the interviewed producers relied upon ag reps to support or improve the design of their irrigation systems, and three other interviewed producers relied upon the ag reps to have enough knowledge and experience to discuss detailed improvements to their designs. One of those producers said that the ag rep motivates him to continue to improve both existing systems and new designs. The ag reps are seen as individuals working to help producers weigh their trade-offs to get the system that is right for them with the lowest long-term cost.

Vendors we spoke with are happy to refer customers to the Ag Reps for assistance and have a high level of trust that the Ag Reps will provide high-quality service to their customers.

Ag reps contact vendors frequently by phone and in person. Before COVID-19, they would visit vendor offices at least quarterly, sometimes more often. During visits, they would update vendors on the Menu and Custom components of the program and leave the program brochures. Vendors reported handing out brochures to most of their customers who purchased Menu-eligible equipment. They appreciate that Idaho Power makes those brochures available to them. A few vendors thought they could use a few more of the brochures or have them replenished on a more regular basis. But one knew that they could go online and print them if needed.

Additional ag rep outreach methods to vendors include workshops with vendor sales staff, irrigation trade shows, mailings, and emails. Vendors feel that Idaho Power and the ag reps do a good job of attending events with vendors and producers to get the word out about the program. They specifically mentioned the Idaho Irrigation Association trade show as an advantageous place to interact with producers and vendors. One vendor mentioned an annual lunch held by the ag reps that was very informative, but he has not seen an invitation to that in a few years.

Seven of the vendors we spoke with felt very knowledgeable about the difference between the Menu and Custom incentive opportunities through the program, including the requirements. One vendor said he was a little unclear about the distinction between the two options but mostly hands out brochures to customers. The other vendor is not at all aware of the difference and does not get involved in the customer decision about applying for the program incentives.

Vendors report feeling that grower awareness of the program is dependent on how sophisticated the grower is and whether they have participated before in the program. A couple of the vendors estimated about 50 percent of the producers who come to them are aware of the program. Those with a good understanding are usually previous participants. Others come in having heard of a program but not understanding the specifics; in those cases, the vendor either explains the program or provides them with a program brochure. One vendor said they steer all their customers to the program and tell them about the opportunities available. Another vendor felt that the customers knew more about the program than he did.

Outreach to producers consists of newsletters, workshops, brochures, producer meetings, radio ads, letters, and emails. A couple of the vendors felt the radio ads worked well, and ag reps liked the newsletters for outreach on the Menu option. While most agreed that the outreach methods are successful and the brochures are particularly useful, two of the vendors and an ag rep suggested something that focused on why producers should upgrade—including benefits to crops, power savings, and water savings.

The producers generally had a relationship or contact with the ag rep before the custom project installation. Most had a relationship long enough that they do not know when it started. Only two of the interviewed producers did not have a previous relationship; one was referred to the ag rep by a neighbor and the other by the vendor.

> “The relationship with the Ag Rep motivates me to continue to improve my irrigation systems.”
> Ag Producer

Some producers say their neighbors are not taking advantage of the program. Without interviewing nonparticipating producers, we cannot say whether that is a result of lack of awareness or that they are not replacing equipment. Targeted outreach to producers neighboring those who participated may help with awareness. Case studies, participant testimonials, or a process for participant referrals may raise interest for neighboring producers.

4.2.2 Menu Option Processes

Producers interested in equipment that qualifies for Menu incentives typically go straight to the vendor for their projects. Some billing questions turn into projects. Vendors report that most producers purchase their equipment, collect their invoices, and apply for the incentive on their own. Ag reps feel the Menu option is strong, and producers are using it often. Vendors report high interest in the sprinkler pivot packs and generally feel that the Menu option covers good equipment. One vendor aggressively promotes the sprinkler package with the Menu incentive.

Both ag reps and vendors provided similar feedback on how Menu applications are handled. Because the Menu applications are straightforward and easy to complete, producers will typically fill them out themselves. Some producers send in individual applications, and others send theirs in batches at the end of the year. Those sending at the end of the year can make it hard for vendors (pulling all the associated project invoices).

Vendors provide the brochures explaining the program or an application and the supporting invoices. One vendor supplies their customers with an extra invoice stapled to a Menu application in case the customer wants to apply for the incentive. Another vendor mentioned notepads of tear-away Menu applications with prepaid envelopes that made the process quick and simple. Ag reps will answer questions if producers have any or assist on large projects with a high number of units purchased.

"The Menu savings are easy to communicate with the brochure that IPC provides. " Vendor

The Custom producers interviewed who had completed Menu projects in the past noted the ease of use of the program and were very happy with the level of support they are given. Several producers receiving Custom incentives had not previously claimed Menu project incentives but were aware of that portion of the program. They had not participated because of the perceived administrative barrier. Their concern could be a result of the significant support they receive from the ag reps for Custom applications and Menu incentives are typically competed by the producer themselves.

4.2.3 Custom Option Processes

Based on all the process feedback, there are multiple paths to participation for producers interested in the Custom option. Ag reps said they find out about Custom projects from producers, vendors, and Idaho Power's service request system. Customers can go to either the vendor or the ag rep when they are interested in a more complex project than what is covered through the Menu component. As a result of the vendor relationships the ag reps have developed, vendors direct customers to the ag reps for Custom projects. In return, when customers come to the ag reps first, ag reps will direct the customer to vendors. This process is similar to what we heard from the producers. Some producers went to vendors first, some went to ag reps, some contact the USDA, and some do their own design and reach out to all parties separately for the components they can provide.

"The Ag Rep was key to getting the project through" Ag Producer

"The Ag Rep was really good at explaining how the large (irrigation) system worked" Ag Producer

Most customers work with an ag rep early in the project planning stage and benefit from their design assistance. Ag reps can conduct energy evaluation for producers interested in Custom projects. Ag reps indicate that the energy evaluations for retrofit projects are very specific to each grower's need and can range from simple and quick to complex. The objective is to identify how the grower will benefit from the project and how the IER program can help.

Evaluations range from pump tests to system reviews and questions such as "does this project make sense." Not all evaluations transition to projects. Ag reps report that they can spend hours with someone, and yet the project may not qualify for the program.

Several producers mentioned that the design assistance provided by the ag reps helped them adjust the project to reduce installation costs and be more efficient. One field owner of large systems noted specifically that the ag rep was very good at explaining the dynamics of the large interconnected irrigation system. Another producer who was installing the first pivot irrigation noted how the ag rep stepped them through the small system he had and how it would work. In fact, in that example, the ag rep worked with the customer to refine the system to install a 10 hp pump instead of the planned 20 hp pump.

Vendors we spoke with have been happy with the support they and their customers get from the ag reps. Each vendor sends producers to the ag reps as soon as they can once they identify a Custom project opportunity. In some cases, the grower has already worked with an ag rep before contacting the vendor.

Most vendors send producers to the ag reps to understand the potential savings and incentives for their projects. A couple of the vendors feel comfortable from experience with several previous projects giving producers a ballpark of what they might expect, with the caveat that the ag rep will figure out the specifics.

Unlike the Menu applications, the Custom applications are more complex and typically initiated by the ag reps. Vendors are rarely involved in the Custom application process, except when supporting documentation is needed. One vendor also mentioned working with other utility programs in the area. In comparison, he said the IER process is more complicated, but Idaho Power does all the work. Other programs are easier, but the vendor is required to do most of the work.

Although the Custom application is difficult for the grower to fill out, ag reps say it is easier than Farm Service Agency (FSA) or Natural Resources Conservation Services (NRCS) applications. The most challenging area on the application is the non-energy benefits entry. Some producers have a good handle on the numbers, while others have no idea how to answer. Ag reps will try to identify benefits and a reasonable quantity to apply.

Producers feel that the Custom projects' application process is seamless, all rated the ease of use with the highest satisfaction, and no interviewed participants had recommendations on improvements. The ag reps' experience with equipment, design, and operating strategies creates an easy transition from project scoping to application and through until the check is received.

4.2.4 Incentives

Each region has its own goals for the number of projects and savings over a year. Menu projects have been a higher proportion of the program in the past. Now ag reps are more focused on Custom projects in at least three of the regions. In a couple of the regions, Menu projects are still the most common.

Ag reps understand the need for equipment to be cost-effective but know that vendors and producers would like to see higher incentives. A couple of the ag reps specifically mentioned the Menu option's importance to the overall IER program. A few others commented on the cost of equipment rising faster than the incentives, resulting in the incentives covering a lower proportion of the project cost than in the past; a message repeated by the vendors. They mentioned getting feedback from Menu customers that incentives are not increasing in line with equipment costs. Ag reps report prices are increasing 10 to 20 percent for parts and steel.

Although ag reps and vendors would like to see higher incentives, they also are keen to keep the program available to producers. They are uncertain about the level of activity next year, which they say will depend on the economy, the number of producers repairing systems, and how many decide to switch crops to those needing more irrigation.

The producers are always willing to accept higher incentives. But one producer had an interesting observation. The VFD incentive typically covers most of the incremental cost to install the VFD but does not cover the entire amount. Many of his neighbors bypass the opportunity because of the first cost difference. This producer felt that a slightly higher incentive could gain many new VFD projects.

Custom incentives vary by nature, and one of the only issues we heard of was producers comparing incentive amounts resulting in some dissatisfaction. Balancing vendor design of a system and eligibility for program incentives is a key challenge for the ag reps. Ag reps would like to fully understand why the current Menu and Custom incentive levels and options to better support vendors and producers and improve their ability to answer questions.

The vendors recognize that the incentives influence producer decisions regarding what to install and whether they can afford an energy-efficient option. But the vendors also report the program and incentives have influenced some of their sales and design practices. Vendors also believe that without the IER program, some of the projects would not happen.

> "We hope Idaho Power keeps the program, it is good for our company." Vendor

While the vendor's primary goal is to keep their customers happy, which usually means prioritizing crop growth, vendors are now also conscious of efficient options. They also realize another way to keep their customers happy is by saving them money by incorporating more energy efficiency in the projects. And the incentives and long-term savings from efficient equipment also meet that goal. Then there is the sales support that is provided by the program. One vendor said, "customers feel the efficient equipment/projects must be the right decision if Idaho Power rebates them."

The incentive caps[12] have caused a bit of confusion in the marketplace. One producer noted that others would be willing to upgrade to a VFD if more than 75 percent of the cost was provided for projects where energy savings justify it. The 10 percent cap of new system costs also can work against getting the most efficient system installed. For example, when the design is improved to reduce pump size or other equipment costs through increased efficiency, the total maximum incentive is reduced as the cost is reduced. Overall, the customer pays less money to install, but the reduced incentive is a signal that has indicated to some that they are not choosing the best option. Since program administrators develop the incentive caps to keep programs cost-effective, additional messaging to producers who see incentives reduced by the cap may help alleviate the confusion.

[12] The program limits incentives to a maximum payment of 75 percent of the total project cost of a system retrofit or 10 percent of the total cost of new system.

Producers we spoke with say they are getting what they expect from the program and the incentive. Typically, they mentioned that the irrigation system provides more benefits than they expected. Several producers noted that the new irrigation system was the "right system" and did not need much adjustment after the initial install. Additionally, a couple of the producers noted that now that they have converted from an old system and operated the pivot system for a season, they are never going back to the old way of operating. They did not remember discussing non-energy benefit improvements before the project, but that is why they are happy with the new systems.

> "I am very appreciative about how easy it was to participate. We are lucky to have the low (energy) rates and a focus on energy efficiency." Ag Producer

There were only a few suggestions for enhancements or clarifications to the incentive structure of the program. One vendor had questions regarding the fine print on the Menu application for not receiving an incentive on a service more than once every three years. Another vendor mentioned experience with another utility program that offers a VFD incentive amount per horsepower that is easy to follow. However, this vendor did understand that at this time, Idaho Power wants to measure the savings using a custom calculation.

A couple of producers had ideas about installing solar photovoltaic (PV) around the edges of their fields and whether those could coordinate with their irrigation system. One producer mentioned that filtering, when necessary, can consume 5 to 10 psi, and there may be an opportunity to install filters that have a low head loss. A second producer questioned the opportunity for incentives on telemetry. In his experience is that it identifies leaks faster and provides labor and water savings. A third producer mentioned that increasing the distribution piping size can reduce the pipe friction loss and make the pumping system more efficient. His practice is to upsize the pipe one size larger. He believes that many existing distribution pipes are undersized in his experience, creating more friction loss. The reduction in friction loss results in energy savings, even if no further equipment is installed.

APPENDIX A: AG REP INTERVIEW GUIDE

Idaho Power
Irrigation Efficiency Rewards Program Evaluation
Ag Rep Interview protocol

Introduction

Note: Because senior staff will be conducting interviews, they will be semi-structured. Therefore, the following interview protocol is only a guide to ensure certain topics are covered, but evaluators will follow the flow of the interview and modify questions as needed to fit the interviewee's circumstance.

NAME: ____

PHONE: ____

INTERVIEWER: ____

DATE COMPLETED: ________________ **LENGTH:** _____________

My name is _______, with Tetra Tech. Idaho Power has hired us to evaluate their Irrigation Efficiency Rewards Programs. We understand you work closely with customers to complete projects through the program. I'd like to ask you some questions about your experience with the program and your interaction with customers and irrigation vendors. The information you provide will assist us in assessing the program and finding ways for the program to serve the market most effectively. This interview should take approximately 30 minutes of your time.

Can we record the call for notetaking purposes please?

Program Background

B1. How long have you been involved with the program?

B2. Could you describe for me your role in the program? (A high-level overview of your interaction with customers.) How do you assist customers with Menu and Custom projects?

B3. About how many customers do you work with each year? How many complete Menu or Custom projects each year?

B4. What are your annual program goals (Menu and Custom)? How easy are they to meet?

B5. What type of interaction do you have with irrigation vendors? How does that differ for Menu and Custom projects? Do vendors typically provide equipment for one or the other or both?

B6. How do you stay updated on current technology and processes within the irrigation market? Are there specific trainings you attend or other learning opportunities?

Project Awareness

A1. How do you learn that customers are considering upgrading equipment? Is it mostly customers reaching out to you or are you identifying customers proactively?

A2. What type of outreach methods do you use to make customers aware of the Menu and Custom incentives and your assistance?

A3. What phase of project planning are customers typically in when you get involved? What types of support do you provide, depending on their proposed project?

A4. Do you work more with customer's who receive incentives through the Menu portion of the program or the Custom part of the program? What proportion of the customers you work with receive Menu or Custom incentives?

A5. What proportion of irrigation vendors are aware of the Menu and Custom rebates from Idaho Power? How well do they understand what is available?

A6. How are you working with irrigation vendors to increase their awareness of the Menu and Custom rebates? What more could be done?

Menu Incentives

(The menu incentive option pays an incentive for the purchase of specific replacement parts and upgraded components for an existing irrigation system. The incentive varies by the sprinkler component or part incorporated into the sprinkler system.)

M1. Who typically completes the Menu Incentive applications - customers, irrigation vendors, you?

M2. How easy or difficult are they to complete? What would make the applications easier to complete?

M3. What feedback do you hear from customers? What are typical mistakes made or assistance needed?

M4. Do you ever receive feedback from customers about savings achieved after participation with the menu incentives?

Custom Incentives

(The custom option pays an incentive based on an estimated annual reduction in energy use. For existing systems, the incentive is based on energy savings estimated by Idaho Power of the proposed modifications. For a new system, the incentive is based on the installation of a system Idaho Power determines to be more energy efficient than standard. Water source changes to an existing system will be treated as a new system. The incentive received is determined based on annual kilowatt-hour (kWh) or kilowatt (kW) savings.)

C1. Who typically completes the Custom Incentive applications - customers, vendors, you?

C2. How easy or difficult are they to complete? What are typical mistakes made or assistance needed? What would make the application easier to complete?

C3. Do all customers receiving a Custom incentive get a free energy evaluation? How comprehensive are the evaluations? Are the evaluations usually focused on a specific customer concern or an opportunity to save energy?

C4. What types of projects are you typically looking for during the energy evaluation?

C5. The incentives for the Custom option are either paid per kWh or kW. Are the projects designed to maximize either the peak kW reduction or the kWh reduction? How is the decision made to maximize one over the other?

C6. Do you guide the projects towards design or operations that increase the savings slightly? How often do the customers incorporate these adjustments? For the customers who do not incorporate the adjustment, what are typical reasons?

Vendors

V1. What types of questions do irrigation vendors have regarding the Menu and Custom incentive options? Are they all able to provide program-eligible equipment or services? Do some focus more on Menu than Custom or vice versa?

V2. From your perspective, what are the primary barriers that irrigation vendors face when working with agricultural customers on potential energy efficient upgrades? How does the Irrigation Efficiency Rewards program help them?

Program Involvement

P1. On a scale of 1 to 5 where 1 is 'not at all difficult' and 5 is 'very difficult', how would you rate the program's administrative burden (e.g., requirements, paperwork) for you? Why do you give this ranking? What would you do to improve the administration of the program?

P2. Do you feel adequately informed of program changes? How would you like to be better informed of program changes?

P3. How would you describe your interactions with Corporate Headquarters Customer Research and Energy Efficiency staff (minimal, helpful, very involved - probe to characterize)?

P4. What do you think is working best with the Menu incentives? With the Custom incentives?

P5. What do you think is most in need of improvement? Any changes for Menu or Custom incentives?

Those are all the questions I have. Thank you very much for your time today.

APPENDIX B: VENDOR INTERVIEW GUIDE

Idaho Power
Irrigation Efficiency Rewards Program Evaluation
Installation Vendor Interview protocol - DRAFT

Introduction

Note: Because senior staff will be conducting interviews, interviews will be semi-structured. Therefore, the following interview protocol is only a guide to ensure specific topics are covered, but evaluators will follow the interview flow and modify questions as needed to fit the interviewee's circumstance.

NAME: ____

COMPANY: ____

TITLE: ________________________**PHONE:** _________________________

INTERVIEWER: ____

DATE COMPLETED: _________________ **LENGTH:** _____________

My name is _______, with Tetra Tech. Idaho Power has hired us to evaluate its Irrigation Efficiency Rewards program. I would like to ask you some questions about your experience with the program. The information you provide will help us assess this program and find ways for the program to serve the market most effectively. This interview should take approximately 30 minutes of your time.

Firmographics

F1. To get us started, could you briefly tell me a little bit about your business.
For instance, what areas do you serve or where do you have offices? Is your office a subsidiary or branch of a bigger company? (Other options: franchise, dealer, manufacturers rep).

F2. What types of services do you offer? Do you support customers with irrigation system design?

F3. How many employees (full-time equivalents) does your company employ?

F4. Which manufacturers do you represent? (skip manufacturers question if they do not sell equipment)? Are you a single line or multi-line dealer?

Program Awareness

A1. When did you first get involved with the Irrigation Efficiency Rewards program? How did you first hear about the program?

A2. Are you familiar with the two incentive options available through the Irrigation Efficiency Rewards program - the Menu incentives for basic replacement of worn parts and the Custom incentives for design-driven projects? Do you work with customers for both options or focus on one (which one)?

A3. What percentage of your sales or projects are eligible for Menu incentives? What percentage of your sales or projects are eligible for Custom incentives? (Probe for an explanation of why projects are/are not eligible).

A4. What proportion of your projects eligible for Menu incentives utilize and receive incentives? What proportion of your projects eligible for Custom incentives utilize and receive incentives? (Probe for an explanation of why projects are/are not receiving incentives - do they not see Menu incentives if application completed by customer?)

A5. What proportion of your customers are aware of the Menu and Custom incentive options? What do you discuss with them regarding the incentive options available (eligible equipment, incentive, application)? How much detail do they understand about what the program offers?

A6. What are the reasons you have heard why customers do not take advantage of the incentives once they learn about them? What do you think Idaho Power could do to increase awareness of the Irrigation Efficiency Rewards program opportunities? What could they do to increase participation?

A7. What has been the most effective way Idaho Power communicates with you regarding the Irrigation Efficiency Rewards program? Do you feel adequately informed of program changes? How would you like to be better informed of program changes?

A8. Are there types of workshops or training events you would like to see Idaho Power sponsor to help you in your work in the program? (Probe to characterize the current state of on-the-job training.)

Program Involvement

P1. On a scale of 1 to 5 where 1 is ‘not at all active’ and 5 is ‘very active’, how would you characterize your participation level with **Menu** incentive projects in the past 12 months? (Probe for reasons for the reported level of activity.) How do you expect that to change over the next 12 months? What could Idaho Power do to involve you more in the program?

P2. On a scale of 1 to 5 where 1 is ‘not at all active’ and 5 is ‘very active’, how would you characterize your participation level with the **Custom** incentive program in the past 12 months? (Probe for reasons for the reported level of activity.) How do you expect that to change over the next 12 months? What could Idaho Power do to involve you more in the program?

P3. Could you describe for me your interaction with the Idaho Power Ag Reps? How often do you interact with your Idaho Power Ag Rep? How often does the IPC Ag Rep interact with your office (combined contact with all the employees)?

P4. At what point do you typically involve Idaho Power in your design process? What would encourage you to reach out to the Idaho Power ag rep earlier?

P5. Do you feel you can estimate the **Menu** incentive for customers before engaging with the Idaho Power Ag Rep?

P6. Do you feel you can estimate the **Custom** incentive for customers before engaging with the Idaho Power Ag Rep?

P7. What level of assistance do you provide on applications for the **Menu** option? The **Custom** option?

P8. On a scale of 1 to 5 where 1 is 'very difficult' and 5 is 'very easy', how would you rate the **Menu** option's administrative requirements for you? Why do you give this ranking?

P9. On a scale of 1 to 5 where 1 is 'very difficult' and 5 is 'very easy', how would you rate the **Custom** option's administrative requirements for you? Why do you give this ranking?

P10. What do you think are the main benefits your customers receive by participating in the program? What is the primary benefit you receive from participating in the program?

P11. Has your participation in (or involvement with) the program affected your business practices? How? (Probe specifically about changes in sales practices as well as technical techniques and practices.)

P12. What do you think is working best with the **Custom** portion of the program? What do you think is working best with the **Menu** program?

P13. What do you think is most in need of improvement for the **Menu** or **Custom** options?

P14. Is there anything else you would like to share about your experience with the Irrigation Efficiency Rewards program or Idaho Power?

Those are all the questions I have. Thank you very much for your time today.

APPENDIX C: PARTICIPANT VERIFICATION INTERVIEW GUIDE

Idaho Power
Irrigation Efficiency Rewards Program Evaluation
Participating Customer Project Verification and Interview Protocol

Note: Because senior staff will be conducting interviews, interviews will be semi-structured. Therefore, the following interview protocol is only a guide to ensure specific topics are covered, but evaluators will follow the interview flow and modify questions as needed to fit the interviewee's circumstance.

NAME: ____

COMPANY: ____

TITLE: __________________________**PHONE:** ___________________________

INTERVIEWER: ____

DATE COMPLETED: __________________ **LENGTH:** ______________

My name is _______, with Tetra Tech. Idaho Power has hired us to evaluate its Irrigation Efficiency Rewards program. I would like to ask you some questions about your experience with the program. The information you provide will help us assess this program and find ways for the program to serve the market most effectively. This interview should take approximately 30 minutes of your time.

Project Information for Interviewer (note questions or specific items from desk review to verify)

Pre-Installation Equipment

B1. What type of irrigation system did you have before the project?

B2. Prior to this project, how long since you last made significant changes?

B3. Was the pre-existing equipment fully functional, fully functioning but with significant problems, or non-functional?

Post Installation Equipment

C1. Describe your new irrigation system. Including the portions that were different from the pre-installation condition.

C2. When was the installation complete?

C3. Does the equipment operation meet your expectations?

Measure Operating Conditions

D1. Did you install a VFD? How do you have it set or controlled?

D2. What crops do you grow? How many inches of water do you apply in a typical year?

D3. Was there a need to adjust operating controls or conditions after using the new irrigation system for a few months? What adjustments were required?

D4. Do you anticipate needing to make operational adjustments this next irrigation season? If so what adjustments and why?

D5. Have there been any aspects of the new system that didn't operate the way you expected they would?

D6. Do you feel that the new irrigation system has met your goals for energy reduction? For other benefits/especially labor and water savings?

Process Questions

A1. How did you first hear about the program? Prior to this project, have you previously applied for custom incentives?

A2. You applied for and received a Custom incentive. Are you also familiar with the Menu incentives for basic replacement of worn parts? Have you ever applied for Menu incentives?

A3. Could you describe for me your interaction with the Idaho Power Ag Reps? How often do you interact with your Idaho Power Ag Rep? Have they been helpful with:

- Planning your system?
- Getting power to the site?
- Addressing irrigation/pumping problems?
- Other Electrical problems?

A4. At what point did you involve Idaho Power in your design process? What would encourage you to reach out to the Idaho Power ag rep/distribution designer earlier?

A5. Could you describe for me your interaction with the vendor that assisted you with your project? How often do you interact with that vendor (often or only for this project)?

A6. At what point do you typically involve a vendor in your design process? What would encourage you to reach out to a vendor earlier/or later?

A7. How did you decide on the equipment you were going to install? What type of efficiency or energy savings were you hoping to realize?

A8. What other benefits, besides energy efficiency, were under consideration when you were planning your project (labor reduction, water savings, improved yield, maintenance reduction, etc.…)? Have you realized those benefits as a result of the project?

A9. On a scale of 1 to 5 where 1 is 'not at all satisfied' and 5 is 'very satisfied', how would you characterize your satisfaction with your experience with the Custom incentive program? Why do you say that?

A10. On a scale of 1 to 5 where 1 is 'very difficult' and 5 is 'very easy', how would you rate the administrative requirements for you to participate in an Idaho Power energy efficiency program? Why do you give this ranking?

A11. What do you think is working best with the Custom portion of the program?

A12. What do you think is working best with the Menu program?

A13. What do you think is most in need of improvement for the Menu or Custom options?

Is there anything else you would like to share about your experience with the Irrigation Efficiency Rewards program or Idaho Power?

Those are all the questions I have. Thank you very much for your time today.

APPENDIX D: INDIVIDUAL PROJECT REVIEWS

The project documentation log for each reviewed project is listed below. Green indicates the documentation was available and sufficient, yellow indicates it was available but not sufficient to recreate the project without further knowledge, and red indicates that the documentation was not included in the package delivered to Evaluation.

Figure 6: Project Documentation Log

Project ID	Project Description	Drawing of System	Topographic Map	Aerial	Product Spec Sheets	Make and Model of Pump	Pump Curve	Cost Estimate	Calculations	Final Invoices	Map of new System
2444	Green	Yellow	Green	Green	Green	Yellow	Green	Red	Green	Green	Red
2448	Green	Green	Yellow	Green	Red	Yellow	Green	Red	Green	Green	Yellow
2466	Green	Green	Green	Green	Yellow	Green	Green	Red	Green	Green	Green
2468	Yellow	Green	Red	Green	Red	Green	Green	Red	Green	Green	Green
2474	Green	Green	Yellow	Green	Red	Green	Green	Red	Green	Green	Green
2476	Green	Green	Green	Green	Yellow	Green	Green	Red	Green	Green	Green
2493	Green	Green	Green	Green	Yellow	Green	Green	Red	Green	Green	Green
2504	Green	Red	Red	Red	Red	Yellow	Red	Red	Green	Green	Red
2508	Green	Green	Red	Green	Yellow	Yellow	Green	Red	Green	Green	Green
2512	Green	Green	Red	Green	Green	Green	Green	Red	Green	Green	Green
2525	Green	Green	Red	Green	Yellow	Green	Green	Red	Green	Green	Green
2536	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Green
2545	Yellow	Green	Green	Green	Yellow	Green	Green	Red	Green	Green	Green
2549	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Green
2559	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Green

The following pages show individual project descriptions and describe the claimed and evaluated savings' calculations.

Project ID	2444		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	958,545	894,238	93%
kW Savings	-3.7	0.0	0%
Claimed Savings Calculation Description	The VFD calculation completed on a new system connecting to canals. The peak kW reduction is calculated based on full load and added VFD efficiency loss but did not include the billing data peak reduction. The kWh calculations were completed using the increased efficiency for the time-based operations through August 2018. AMI savings from existing 5 years historical determined baseline consumption of the irrigation. The AMI data determined proposed kWh consumption from the 2018 growing season through August. Savings was calculated as the difference between 2018 season and the 5-year average. A regression analysis to one or more independent variables was not completed. This assumes that 2018 was equal to an average year. Normally this is an impactful assumption, although because the system is a soft conversion, the AMI savings is was reduced by 50% based on the assumption that a unknown fraction of time that wells will continue to supply water after the conversion to the canal based system. The assumption of 50% most likely incorporates any differences in growing seasons.		
Evaluated Savings Calculation Description	AMI meter data was only collected until the end of August for 2018. EM&V calculations determined that historically 25% of the energy consumption occurred after the August bill. Therefore, evaluated calculations assume that 25% additional consumption will occur outside the AMI data. The peak kW savings is set to zero because the system either has on the new pumping system from the canals (lower than previous kW) or the deep wells (equal to baseline kW). Therefore the annual peak demand will remain equal to the baseline unless additional control is documented for the existing deep well systems. Based on a conversation with the owner, approximately 20%-30% of the irrigation water volume is still provided by the deep wells on the new system. The AMI data was used to determine the average hours per irrigation system (2018 had 25% additional hours added to account for undocumented months). This showed that each pump had a reduction in hours ranging between 25% and 90% in 2018, which correlates to the conversation with the owner. The Evaluated saving used these variable adjustments to determine the improved average annual consumption of each existing pump based on the 5-year average. This was added to the new pump estimated average annual consumption. The total improved annual consumption is 1,618,449 kWh. Which is 36% lower than the baseline average annual consumption of 2,511,687 kWh. The VFD calculated savings is included in the AMI data and not added to the finding.		
Overall Project Notes	Overall, this was a complicated irrigation system when upgraded from wells feeding the distribution system to canals with well backup. The system map was not enough to determine the existing and new system pump locations and operating criteria without previous knowledge of the fields. But the calculations were conservative and based actual AMI data. However, the AMI data was not complete for the irrigation system for the post-install, which significantly reduced savings. The AMI data was not used to claim peak demand, which could be significant but would require additional information to confirm. In addition, the assumptions for the AMI data analysis were large and very impactful to the claimed savings. Completing a regression analysis using hour of operations or other independent variable per year (i.e. irrigation water per month) would help define annual average savings from AMI data and more certainty in claiming savings.		

Project ID	2448		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	11,614	7,225	62%
kW Savings	2.8	3.2	114%
Claimed Savings Calculation Description	The claimed savings identified the new system because it is a new pump to the meter, although an existing irrigation system is onsite. The peak kW is calculated as the difference between the theoretical baseline and the approximated peak demand in the calculator. However, the VFD calculation identifies the peak demand difference but is not included. The calculation is in two parts, an improvement for decreasing the TDH and then a second calculation for the VFD. The improvement happened on 50 acres of 175 total acres, and non-energy benefits were documented as applicable to all 175 acres. However, the claimed non-energy benefits are based on 50 acres and are correct.		
Evaluated Savings Calculation Description	Evaluation adjusted the calculation to complete a baseline and post-model using the quantities entered in the base calculation, baseline 420 gpm at 188 TDH for 2,170 hours and developed associated gpm levels based on documented pump curve and project notes. The system consumed 40,293 kWh and a peak kW of 21.3 kW while delivering 10 acre-inches of water in 2,170 hours. Evaluation did not use the baseline assumption of 80% efficient pump or continuous operation. The post-install was modeled using the same water requirement and hours except a VFD efficiency was applied and the TDH was lowered to better match system needs. The addition of 3 pivot motors increased post-install consumption prior to developing savings. This created a system that consumed 32,026 kWh and 17.7 kW demand. The two models difference is the relative savings between a base system without a VFD and the installed system. The evaluation calculation adjusted undocumented assumption used in the claimed calculation; 2,900 hours of use for the VFD was adjusted to 2,170; the design TDH of 151 feet was used over the undocumented 130 feet. The hours of use at partial flow rates were adjusted to match documentation. The peak demand increased because the evaluation included the peak demand reduction from the VFD partial operation at high flow periods.		
Overall Project Notes	Documentation was tough to follow, but it seemed because of scanning from paper. The baseline documentation did not reference many of the assumptions in the calculation.		

Project ID	2466		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	33,281	18,066	54%
kW Savings	16.6	9.0	54%
Claimed Savings Calculation Description	The calculation is not well documented, but it appears to account for the difference in TDH between a base install and the actual install connected to a water lateral at the roadway. The calculation used 2,000 hours of use at full power for calculation.		
Evaluated Savings Calculation Description	The evaluated savings calculation used the baseline pivot and big gun system to confirm the baseline 189 TDH and 545 gpm, the evaluation identified 188.9 TDH and 533 gpm. The proposed condition evaluated subtracted the 25 psi provided by the underground lateral and found 126 TDH. The submitted calculation used 80 TDH for the design point recommended by the vendor. However, the big gun provides a critical point for the peak TDH, and it is set at 60 psi. If less pressure is needed for distribution at the gun - that is not energy efficiency, but a different operating point and should be adjusted in both baseline and new systems. The higher TDH adjustment also adjusted the pump efficiency from 79% claimed to 75% evaluated. The evaluated post kW = 23.7 kW compared to 16.7 kW claimed—this reduced energy savings from the baseline. Assumed that the big guns operate the full hours of operation and therefore responsible for system pressure requirements for the entire time. Assumed that the pivot and end gun are equal in both the baseline and post-install operation, so they were removed from the calculation.		
Overall Project Notes	An overall description of the new irrigation system's operation from the vendor or Ag. Rep. would inform an IPC calculation of TDH like the baseline.		

Project ID	2468		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	9,956	12,695	128%
kW Savings	5.0	-2.5	-50%
Claimed Savings Calculation Description	Initial application stated 270 gpm at 35 psi is the design. However, the calculation uses the baseline of 310 gpm @ 47 psi (110') and a proposed at 310 gpm @33 psi (76'). No description for the change. Evaluation used 270 gpm and the BASE SYSTEM tab in the submitted calculator TDH = 105'. Evaluation created a duplicate tab of BASE SYSTEM to show the new system with 15 psi at the critical point which resulted in TDH = 82'. Overall, this reduced savings by approximately 30%. The baseline and post-install system are expected to have similar number of pivot towers and hand guns, so they were eliminated from the equation. Documentation for the baseline or new system was not included.		
Evaluated Savings Calculation Description	Evaluation confirmed system with participant, converted a flood irrigation for a pasture to a pivot system. The producer noted that he has seen an 80% reduction in the water needed to apply to the field because of the difficulty to get flood water across a pasture. The Evaluation calculation calculated savings based on a conservative 60% reduction in the volume of water pumped from the flood system and calculated from the flood system baseline as opposed to a new pivot system. Baseline was set at 300 gpm with 55 feet of head and a 70% efficient pump. The hours was calculated to be 5,000 hours based on the 60% reduction to reach 2,000 hours current. Proposed system was set to two levels, one system to match the 300 gpm @ 55 TDH and the second for the pivot system, 270 gpm and 82 TDH. In addition, the three pivot motors were added to the consumption. This was assumed to require 2,000 hours of operation for the field, or 9 inches. The difference between the two systems resulted in a decrease in annual kWh, but an increase in peak kW because of the higher TDH pressures and shorter hours of operation.		
Overall Project Notes	The claimed calculation was completed based on a new system, although it was replacing a flood system. Evaluation calculated results based on the difference between the flood and pivot system because a verification phone call identified the amount of water reduction which could be translated to energy savings.		

Project ID	2474		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	14,887	15,223	102%
kW Savings	-6.1	-2.7	44%
Claimed Savings Calculation Description	The calculation determined the maximum kW draw from the new system based on calculations. The baseline kW was based on historical. The kWh calculation process was acceptable. Pump Curve Efficiency estimation was acceptable.		
Evaluated Savings Calculation Description	The evaluated savings determined a baseline model consumption using the VFD calculations and adjusting the hours to match the documented hours (1,751 hours from 2,000 hours). The resulting baseline consumption is 147,540 kWh and 90.7 kW. The amount of water delivered is 19 inches. The post-install calculation used the same flow conditions, although adjusted the pressure delivered with the VFD. The amount of water and hours was the same as the baseline. The resulting post-install consumption is 132,318 kWh and 93.4 kW. The calculated savings is 15,223 kWh and -2.7 Peak kW. The evaluated calculation assumed that the new pivots and end guns would have been present in both the baseline and post-install and eliminated from both models. The VFD hours of operation were adjusted from 2,000 to 1,751 hours, as identified on the datasheet. The VFD efficiency was set to 97%.		
Overall Project Notes	The project was pretty simple to add a VFD to an existing pump. The calculation became more complicated by using the actual historical baseline and comparing it to the upgraded system's estimated calculation.		

Project ID	2476		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	8,914	3,464	39%
kW Savings	4.5	1.7	38%
Claimed Savings Calculation Description	The calculation is completed for 16 feet less TDH and more efficient pump operation. The assumed calculation showed a reduction from 25 psi to 15 psi required pressure at the critical point.		
Evaluated Savings Calculation Description	Claimed baseline proposed using a 10 hp pump to deliver 14.2 BHP. Evaluation adjusted the baseline motor size to 15 hp - which increased the baseline system's efficiency. This reduced the baseline pump electric demand from 11.9 kW to 8.7 kW. Claimed calculation does not include the TDH documentation; evaluation used the attached calculator to find 100 TDH baseline and 76.6 TDH new. The new TDH is 7.4 feet lower than claimed. This reduces the pump efficiency to 72% from 74% and ultimately reduces the pump electric demand from 7.4 kw to 6.9 kW. These changes reduce the kW savings to 1.73 kW and related kWh to 3,464 kWh.		
Overall Project Notes	Overall a straightforward project, although documentation of the TDH calculation is missing. The most significant adjustment was using the 15 hp pump efficiency baseline (75%), replacing the 10 hp pump efficiency baseline (55%). The project was right on the line of what size pump is needed; evaluation defaulted to the larger pump because it is most likely selected by irrigation participants.		

Project ID	2493		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	57,709	44,651	77%
kW Savings	18.5	17.1	92%

Claimed Savings Calculation Description	The calculation is multiple stage; it compares the equipment upgrades' efficiency from actual meter data to calculated equipment. Additionally, the VFD and pump removal calculation is done separately and adds kWh savings. The hours of use, 1,237 hours, are determined by dividing the 5-year historical average kW by the peak kW. This is conservative because the farm is going through continuous upgrades recently, and it is expected that the new systems will be used more often.
Evaluated Savings Calculation Description	Evaluation recalculated energy savings using a baseline energy consumption calculation and a post-install energy consumption calculation for each pump. One calculation used the AMI data to determine the average kW and average hours of the ...1512 pumps. The savings was a 95% reduction of the baseline consumption, although peak demand remained the same in both conditions. (34,255 kWh; 0 kW). The second calculation used AMI data to determine the average kW, peak kW, and average hours of the ...8453 pumps. The post-install calculation was the VFD calculation from the claimed calculation with updated hours of use and VFD efficiency. (16,310 kWh and -1.0 kW) The two separate calculations do not calculate the impact of the combined pump reduction potential at peak demand. The …1512 pump is on 5% of the time, and the …8453 pump is only at peak demand 15% of the time. The potential for coincidental peak demand to occur during the peak period is very low. Therefore, the evaluation used the …1512 pump peak demand as the amount reduced for the new system. The difference in claimed and evaluated savings is the slightly increased peak demand from the new VFD on …8453 pump.
Overall Project Notes	The energy savings calculation was broken up into parts for each pump, potentially double-counted energy savings, and one part of the calculation compared an actual baseline to a calculated post-install consumption. Evaluation created a single calculation for each meter that determined the baseline's relative energy consumption and improved savings. Although potential peak savings is zero, the likelihood that all pumps will operate concurrently has reduced significantly - therefore the coincidental peak demand of the system is much lower than claimed total peak demand reduction for each individually.

Project ID	2504		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	212,428	249,289	117%
kW Savings	145.8	154.3	106%
Claimed Savings Calculation Description	The calculation is multiple stage, it compares the efficiency of the equipment upgrades from actual meter data to calculated equipment. Additionally, the VFD calculation is done separately and adds kWh savings. 1,251 hours of operation are determined by dividing the 5-year historical average kW by the peak kW. This is conservative because the farm is going through continuous upgrades recently, and it is expected that the new systems will be used more often.		
Evaluated Savings Calculation Description	The evaluation did not have the pump curve to confirm pump efficiency levels for the VFD. The evaluation confirmed that the hours of use calculation is nearly equal to the hours determination from the AMI data. The AMI data calculation was also similar to the annual historical data - therefore the historical data was confirmed for use as the baseline. This was kept for consistency instead of adjusting to AMI provided data as other evaluation calculation have. Evaluation recalculated energy savings using post-install energy consumption estimation that included new equipment and the VFD into a single system. The pivots and end gun were included in the post-install condition because they are part of the baseline AMI analysis. The total hours were 1,251 based on the average 5-year billing history and the total water was 14 inches.		
Overall Project Notes	The energy savings calculation was broken up into parts and potentially double counted energy savings and compared an actual baseline to a calculated post-install consumption. Evaluation created a single calculation for each meter that determined the baseline's relative energy consumption and improved savings. For this project, it slightly increases energy savings.		

Project ID	2508		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	9,090	6,425	71%
kW Savings	4.6	5.4	117%
Claimed Savings Calculation Description	The calculation process for the VFD is calculated determined the savings if the system was running at 100% for baseline and new plus the savings for the portion of time that that the system is not running at 100%. This multi-stage process increases the possibility of double counting savings. The VFD calculations did not fill in the 360 gpm at 175 TDH, that amount was not counted in the baseline or post-install system. The VFD calculation did not identify the TDH requirements for the 407 gpm and 490 gpm operating points.		
Evaluated Savings Calculation Description	Evaluation adjusted savings to a baseline model and post-install model to identify the whole project savings. The baseline model assumed three-point operation at 190gpm, 407 gpm, and 360gpm. The post-install model used the same breakdown of potential flows with a TDH that varies. The evaluation calculation used the undocumented TDH provided in the submitted calculation. There is a variation between savings because the VFD improvements to peak demand reduction were not previously quantified and the claimed calculation did not include the 360 gpm operating point.		
Overall Project Notes	The claimed calculation did not use the 360 gpm operating point in the VFD calculation.		

Project ID	2512		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	30,988	24,874	80%
kW Savings	-0.1	0.0	~100%
Claimed Savings Calculation Description	The claimed calculation process identifies the system's historical average energy consumption and back calculates hours of operation. However, the energy savings calculation uses the engineering calculated peak demand to identify the difference and then adds "Other Savings," equal to 88.5% of the average annual consumption to represent the 5-year average of water availability. Evaluation identified that the Pivot Wheels and End Gun would continue to operate and consume electricity regardless of pump operation. Therefore, that value must be subtracted from the total consumption to identify the pump consumption. The baseline and new systems are identical operations; the system's savings when the pump is on should be zero. The component that adjusts the savings for the baseline and new systems seems to only pick up the difference between actual average consumption and engineering calculated consumption estimates.		
Evaluated Savings Calculation Description	Evaluated savings is the 88.5% reduction in use of the existing pump system to deliver water. It still assumed that the Pivot Wheel motors, and End Gun continue to operate the same amount of time. The Pivot Wheels are 2 kW for 1,586 hours = 3,173 kWh/yr. The End Gun is 2.3 kWh for 55% of 1,586 hours = 2,034kWh/yr. The five-year average consumption is 33,313 kWh. The average pump consumption is the total consumption minus the pivot wheels and end gun consumption = 28,107kWh/yr. Reducing 88.5% of the pump consumption = 24,874kWh/yr. There is no further difference in the system from the baseline, so no further additional savings are available in peak kW or annual kWh.		
Overall Project Notes	This project is a time-based reduction of pumped water. The claimed calculation reduced overall consumption versus only the pump consumption. This resulted in less claimed savings.		

Project ID	2525		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	14,901	12,431	83%
kW Savings	-1.1	5.9	NA
Claimed Savings Calculation Description	The submitted calculation determined savings in two-part, one for the equipment's full power and a second for the adjustment using the VFD. Calculation uses 3900 hours, which is approximately what the AMI calculation finds.		
Evaluated Savings Calculation Description	The evaluation calculated savings by defining a base case using the VFD calc and compared that to the improved case to determine all the savings. The roto phase and VFD efficiency was added to the VFD calculation, and the hours breakdown was adjusted. The baseline hours and pump power time estimated were adjusted to match the historical AMI findings. The post-install hours and pump time power estimates were adjusted based on the limited post-install AMI. The adjusted annual hours of use are lower with the new pivot system and lower flow and pressure conditions. The three new pivot wheel motors were added into the post-install system and the difference identified the saving. The peak kW increased because the VFD impact was calculated and the bins that had less than 5% total run time were not used in the assessment.		
Overall Project Notes	Evaluation calculated savings from a relative baseline install and comparative post-install. Adjustments to the VFD calculation were made to make a comparative base case and post-install case to determine relative savings. The hours breakdown was also adjusted based on the AMI data. The result is that peak kw savings increased, and the kWh decreased.		

Project ID	2536		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	14,842	11,264	76%
kW Savings	6.4	7.3	114%
Claimed Savings Calculation Description	The calculation process submitted determined the project's savings for installing the system over a baseline system and then added the VFD savings.		
Evaluated Savings Calculation Description	Evaluation adjusted the calculation to model the baseline scenario and the post-install scenario. The baseline model used TDH = 179 feet and increased the lower flow by the same percentage as the conversion to 138 feet for the 470 gpm design point. The post-install model kept the TDH steady at 138 feet for the various flow levels. The motor efficiency was adjusted to 89.5%, and the single calculation eliminated potential double counting. The peak demand increased because the VFD provided some additional peak demand benefit.		
Overall Project Notes	The program's baseline system operating point was to include system losses to provide 60 psi to the end of the irrigation systems. The vendor determined the new system operating point and provided approximately 60 psi after system losses. The majority of the claimed savings resulted from this difference, although it was acceptable based on a conversation with Dan Axness, who stated this was the customer's intention. Documentation of customer's intentions of baseline or new systems would help recreate savings.		

Project ID	2545		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	7,209	3,163	44%
kW Savings	2.9	3.5	121%
Claimed Savings Calculation Description	The submitted calculation does the savings calculation in two pieces, equipment difference and then the VFD. The claimed calculator also uses the historical kW for the base case and the calculated kW for the proposed.		
Evaluated Savings Calculation Description	They evaluated savings calculated with a relative consumption model for the base case and improved condition based on the VFD calculation. The annual hour bins were determined based on the historical AMI percentages for load bins. This increased the peak kW savings. The annual kWh decreased because of the partial loading detail's addition into the baseline model.		
Overall Project Notes	Evaluated savings used a base case and post-install consumption model to determine relative savings between the two conditions. This reduced the kWh and increased the peak kW for the project.		

Project ID	2549		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	33,156	53,769	162%
kW Savings	9.9	2.3	23%
Claimed Savings Calculation Description	The calculation process used a baseline from historical records. Although it is accurate, it is mismatched to the estimated, calculated consumption of the new system. The calculation also did not account for the apparent varied hours of operation based on the better control system.		
Evaluated Savings Calculation Description	Evaluated savings were calculated based upon a baseline model for single pump operation and the New system model based on multiple pumps with a new end gun installed. The AMI Pre and post data showed a significant decrease in pump hours from the increased controls; the hour reduction was calculated to save energy. This reduced the hours by about 50%, which increased kWh savings for the project. The peak demand compared the pump at full operation baseline to two pumps simultaneous operation with an end gun. The peak demand for the baseline pumping system was 54.6kW and the post-install of 52.3 kW; as opposed to 65 kW peak from historical. The historical kW is either the result of an inefficient existing pump or additional items consuming electricity on the meter. The new end gun was included in the savings calculation, a program policy about including new equipment without a baseline, including with a new baseline, or excluding it should be defined.		
Overall Project Notes	Overall, the claimed energy savings compared the actual consumption to the modeled system, which did not capture the improvement to just the pumping system. The evaluated savings completed a comparative modeled system to determine the energy efficiency impact.		

Project ID	2559		
kWh Savings	Claimed	Evaluated	Realization Rate
kWh Savings	19,799	14,687	74%
kW Savings	6.7	7.3	109%
Claimed Savings Calculation Description	Claimed calculation determined the energy savings separately from the full power (backflush) pumping volume and then the VFD.		
Evaluated Savings Calculation Description	Evaluated savings created a baseline pump energy model and the new system pump energy model. The evaluation modeled results assume that the drip line operates 90 percent of the time and backflush 10% of the time. The baseline assumed operation at 620 gpm with 160 TDH and a 90 percent efficient roto phase. The post-install modeled operation at 620 gpm with 130 TDH and a 98 percent efficient VFD. The evaluation would have reduced TDH for the system based on the TDH calculation provided, although insufficient detail was provided to reduce the calculation value.		
Overall Project Notes	The evaluated model approach found lower annual kWh savings and an increased peak kW savings because the VFD peak demand reduction potential was included in the calculation, and it eliminated the potential for double-counting savings.		

Rebate Advantage PY2019 M&V Report

Submitted to:

Idaho Company

Submitted on:

December 1, 2020

Submitted by:

ADM Associates, Inc.

39650 Liberty St. Suite 425

Fremont, CA 94538

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1 Executive Summary

The Rebate Advantage (RA) program encourages sales and purchase of U.S. EPA ENERGY STAR® qualified homes in conjunction with the Northwest Energy-Efficient Manufactured Housing (NEEM) Program™. All participating dealers actively promote ENERGY STAR over standard efficiency to home-buying customers. The NEEM Program collaborates with the manufactured home builders, retailers and utilities across the northwest and has certified over 240,000 of the most energy efficient manufactured homes ever built. NEEM is one of two organizations recognized by the federal EPA ENERGY STAR Program as a quality assurance provider. NEEM exceeds the ENERGY STAR savings target by 30% and offers improved indoor air quality through air sealing and ventilation fans. NEEM homes include LED lighting, ENERGY STAR refrigerator and dishwasher, smart wi-fi thermostat, added floor, ceiling, and wall insulation, high performing windows, flashing and house wrap. NEEM encourages participation in the program by highlighting the energy cost savings and higher home resale value that comes with homes that are ENERGY STAR-rated and certified trough the NEEM program.

The program provides an incentive to participants who sign a sales agreement for a new all-electric energy efficient manufactured home and initiates an Idaho Power residential account for the purchased home. All applications are submitted to Idaho Power by the dealer, including program applications, copy of the sale agreement, and ENERGY STAR Certificate of Compliance.

Incentives for the program includes the following

- $1,000 incentive to customers who purchase a new, all-electric, ENERGY STAR manufactured home and have an Idaho Power residential account
- $200 sales bonus to sales consultants for each new, all-electric ENERGY STAR manufactured home they sell to an Idaho Power customer.

1.1 Evaluation Objectives

The following activities were performed through the PY2019 EM&V effort:

- Verify program tracking data and apply the Northwest Regional Technical Forum (RTF) New Manufactured Homes and HVAC Workbook v3.4.
- Adjust program-reported gross savings using the results of evaluation research, relying primarily on tracking system and engineering desk reviews, metered data analysis, on-site verification, and equipment metering and achieve a minimum precision of ±10% of the gross realized savings estimate with 90% confidence.

1.2 Evaluation Findings

Figure 1-1 summarizes average energy savings and total participation by home certification. Table 1-1 shows total ex ante savings as well as ex ante savings for each Rebate Type and Weather Zone.

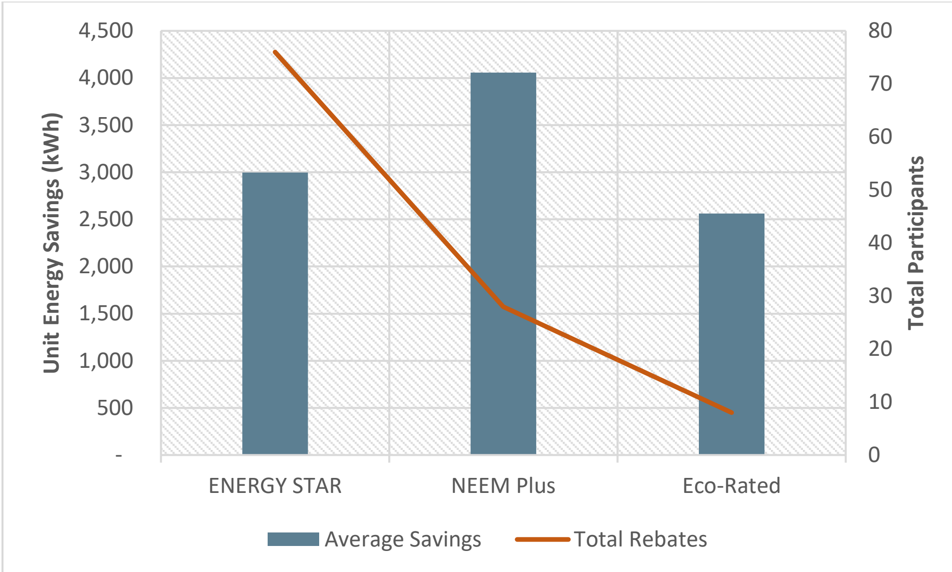


Figure 1-1 Total Participation and Savings by Rebate Type

Table 1-1 Ex Ante kWh Savings

Rebate Type	Weather Zone	Count	Ex Ante kWh
Eco-Rated	HZ 1 CZ 3	7	17,650
	HZ 2 CZ 2	1	3,573
ENERGY Star	HZ 1 CZ 3	36	82,971
	HZ 2 CZ 2	8	26,503
	HZ 2 CZ 3	13	43,089
	HZ 3 CZ 1	16	66,273
NEEM Plus	HZ 1 CZ 3	11	32,793
	HZ 2 CZ 1	1	4,171
	HZ 2 CZ 2	3	12,518
	HZ 2 CZ 3	3	12,524
	HZ 3 CZ 1	10	51,551
Total		**109**	**353,615**

Table 1-2 shows dealers program participation. There were 11 dealers that participated in PY2019. Dealer ID 452 had the most customers participate in the program, it accounted for 34.9% if participants and 39.1% of total savings.

Table 1-2 Dealer Participation

Dealer ID	Total kWh	Count
447	66,563	26
452	138,409	38
454	28,846	8
462	3,313	1
475	8,934	3
478	9,944	3
479	15,739	4
488	14,910	4
10868	7,457	2
11114	42,929	15
15154	16,573	5
Total	**353,615**	**109**

2 Impact Evaluation

The impact evaluation of the PY2019 program is intended to provide gross impact result and provide recommendations for the program.

2.1 Sampling

The program contains relatively homogenous measures, and the Evaluators conducted a simple random sample of participants. The sample size for verification surveys was calculated to meet 90% confidence and 10% precision (90/10). The sample size to meet 90/10 requirement was calculated based on the coefficient of variation of savings for program participants, defined as:

$$CV = \frac{Standard\ Deviation_x}{Mean_x}$$

Where x is the average kWh savings per participant. Without data to use as a basis for a higher value, it is typical to apply a CV of 0.5 in residential program evaluations.

The resulting sample size is estimated with the following:

$$n_0 = \left(\frac{1.645 * CV}{RP}\right)^2$$

Where:

1.645 = Z score for 90% confidence interval in a normal distribution

CV = Coefficient of Variation

RP = Required Precision, 10% in this evaluation

Through the simple random sampling process, the Evaluators' sample size for RA is 24 samples.

2.2 Evaluation Findings

2.2.1 Database review

The project tracking data base was reviewed to determine the scope of the program and ensure that there were no duplicate entries. Tracking data including the following components:

- **Participating Customer Information** – Includes all information required including customer contact information, customer identifier, location of the project, and date completed.
- **Project Specific Information** – Generally includes the rebate type (Eco-Rated, EStar, NEEM Plus), heating and cooling weather zone. Cooling equipment type was provided as 1, 2, or 3.1 defined as homes with AC, 2 defined as homes without AC, and 3 defined homes with heat pump.
- **Vendor Specific Information** – The database included dealer contact information, dealer ID, salesperson, and salesperson ID
- **Program Tracking Information** – Generally all program tracking information was provided in the database. Incentive amounts and paid dates were both included in the database.

2.2.2 Desk Review of Sampled Projects

The Evaluators reviewed project documentation provided by Idaho Power. Project documentations include the following items:

- **Program application form** – Program application includes dealer contact information, buyer contact information, sale date, manufacturer name, serial number, certificate number, heating type, and cooling type
- **ENERGY STAR certificate of compliance** – ENERGY STAR certificate of compliance includes certificate number, model number, serial number, home type, primary heating system, energy-efficient path, qualification criteria, manufacturer contact information, dealer contact information, and date entered**.**
- **Sales agreement** – Sales agreement includes dealer contact information, purchaser contact information, make, model, serial number, year of manufacture, number of bedrooms, unit size, R value for ceiling, exterior, and floors, and cost of the unit.

For each project, the Evaluators confirmed that the dealer information, buyer information, manufacturer name, and serial number is consistent throughout the documentation. Project documentation is also compared to tracking database provided by Idaho Power. Project documentation was used to verify dealer information, buyer information, equipment type, and weather zone in the database. Lastly, the Evaluators verified energy savings claimed in the databased by comparing database inputs to the RTF workbook. Energy savings are calculated based on rebate type, heating zone, cooling zone, and equipment type.

Based on the database, project documentation, and RTF workbook, the overall sample realization rate is 100%. Table 2-1 shows sampled projected and their respective savings.

Table 2-1 Sampled Project kWh Savings

Project ID	RFT Measure Name	Equipment Type	Ex Ante kWh	Ex Post kWh	Realization Rate
1256	EcoRated_electric_HZ1_CZ3	Electric Resistance	2,521	2,521	100%
1150	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1153	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1157	Estar_electric_HZ2_CZ2	Electric Resistance	3,313	3,313	100%
1160	Estar_electric_HZ2_CZ3	Electric Resistance	3,315	3,315	100%
1162	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1166	Estar_electric_HZ3_CZ1	Electric Resistance	4,142	4,142	100%
1172	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1178	Estar_electric_HZ3_CZ1	Electric Resistance	4,142	4,142	100%
1179	Estar_electric_HZ3_CZ1	Electric Resistance	4,142	4,142	100%
1180	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1184	Estar_electric_HZ3_CZ1	Electric Resistance	4,142	4,142	100%
1185	Estar_electric_HZ1_CZ4	Electric Resistance	2,305	2,305	100%
1191	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1196	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1202	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1211	Estar_electric_HZ3_CZ1	Electric Resistance	4,142	4,142	100%
1235	Estar_electric_HZ1_CZ3	Electric Resistance	2,305	2,305	100%
1244	Estar_electric_HZ2_CZ2	Electric Resistance	3,313	3,313	100%
1257	Estar_electric_HZ2_CZ3	Electric Resistance	3,315	3,315	100%
1199	NEEM2_electric_HZ1_CZ3	Electric Resistance	2,981	2,981	100%
1200	NEEM2_electric_HZ2_CZ3	Electric Resistance	4,175	4,175	100%
1217	NEEM2_electric_HZ1_CZ3	Electric Resistance	2,981	2,981	100%
1238	NEEM2_electric_HZ1_CZ3	Electric Resistance	2,981	2,981	100%

Applying sample realization rate to the population of projects, the overall saving for Rebate Advantage program is 353,615 kWh and the realization rate is 100%. Table 2-2 shows ex post savings for each rebate type as well as the overall total program savings.

Table 2-2 Ex Post kWh Savings

Rebate Type	Weather Zone	Count	Ex Ante kWh	Ex Post kWh	Realization Rate
Eco-Rated	HZ 1 CZ 3	7	17,650	17,650	100%
	HZ 2 CZ 2	1	3,573	3,573	100%
ENERGY Star	HZ 1 CZ 3	36	82,971	82,971	100%

	HZ 2 CZ 2	8	26,503	26,503	100%
	HZ 2 CZ 3	13	43,089	43,089	100%
	HZ 3 CZ 1	16	66,273	66,273	100%
NEEM Plus	HZ 1 CZ 3	11	32,793	32,793	100%
	HZ 2 CZ 1	1	4,171	4,171	100%
	HZ 2 CZ 2	3	12,518	12,518	100%
	HZ 2 CZ 3	3	12,524	12,524	100%
	HZ 3 CZ 1	10	51,551	51,551	100%
Total		**109**	**353,615**	**353,615**	**100%**

3 Conclusion

The Evaluators' conclusions for the Rebate Advantage Program are presented below. The Evaluators have found that:

- **Appropriate RTF savings estimates was applied.** The program used RTF v.3.4 for PY2019 to calculate energy savings. The new v4.1 workbook was released for QC in July 2020. Idaho power plans to review and use the v.4.1 in 2021.
- **Project documentation and tracking data contain accurate information.** Project documentation and tracking data are consistent. There are some fields in the tracking data that require references to the RTF. The tracking database should also note the RTF workbook version used.
- **ENERGY STAR manufactured homes are the most popular.** Of the 109 projects in PY2019, 76 projects or 72.4% of program projects were ENERGY STAR units.

OTHER REPORTS

Report Title	Sector	Analysis Performed By	Study Manager	Study/Evaluation Type
A/C Cool Credit	Residential	Idaho Power	Idaho Power	Other
Commercial Saving Kits Summary	Commercial/Industrial	AM Conservation Group	AM Conservation Group	Other
Energy Efficiency Potential Study	Residential, Commercial/Industrial, Irrigation	Applied Energy Group	Applied Energy Group	Other
Energy Savings Kits Summary	Residential	Franklin Energy	Franklin Energy	Other
Flex Peak Program	Commercial/Industrial	Idaho Power	Idaho Power	Other
Historical DSM Expense and Performance, 2002–2020	Residential, Commercial/Industrial, Irrigation	Idaho Power	Idaho Power	Other
Home Energy Reports Summary	Residential	Alcara	Alcara	Other
Idaho Power Energywise Program Summary Report 2019-2020	Residential	Franklin Energy	Franklin Energy	Other
Irrigation Peak Rewards	Irrigation	Idaho Power	Idaho Power	Other
Technical Reference Manual	Commercial/Industrial	ADM Associates	ADM Associates	Other

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/.

A/C Cool Credit

2020 Demand Response Analysis

Prepared by: Idaho Power

December 2020

Executive Summary

This report summarizes the impact of the three A/C Cool Credit events that were called in the summer of 2020. The number of participants in 2020 was 22,444. The three three-hour events were run July 16th, July 30th, and August 5th with calculated generation level reductions of 15.6 MW, 19.4 MW and 12.4 MW respectively. Peak generator demand reduction occurred July 30th (0.86 kW/participant, 19.4 MW). For 2020, the maximum potential capacity of the program was calculated to be 31.4 MW. This calculation is based on 1.4 kw per participant which the company has achieved in the past with 65% cycling on a very hot day.

For the 2020 events, the cycling percentage was reduced to 50% from the typical 55% level. This reduction was implemented because a greater number of residents were at home due to the COVID-19 pandemic. The decrease in cycle time was intended to minimize the impact of A/C cycling to the participants, in order to mitigate a potential increase in program dropouts.

Analysis Methodology

A/C Cool Credit participants' hourly consumption data was used to estimate demand reduction for all events. Average hourly consumption of the participants during curtailment events is compared against an adjusted 3-in-10 baseline (highest three average load days in the previous ten non-weekend, non-curtailment days). The calculated difference between the adjusted baseline load and event load is the load reduction due to curtailment. The analytical approach was established through third-party evaluations from 2014-2016 and evaluated again in 2019. The program will be evaluated through a third-party impact evaluation in fall 2021.

Data Cleaning

Participants were merged with hourly consumption data for each event day and the 10 previous non-weekend days. Error codes were pulled in for all hours and any hour that had an error code, outage flag or was marked as an estimated read during the 4-7 pm event hours, or the 3 pm hour prior to the event, was removed from the analysis. Greater than 99% of all customer sites were preserved after data cleaning. Average load reduction was calculated from this data, then applied to all participants to calculate total load reduction for the program for each event.

The sub-sections below describe the project's methodology related to the sampling plan, demand reduction analysis, and updating of the predictive model.

Table 1. 2020 Summary of events and participation

Curtailment Event	Event Hours	A/C units enrolled	Sites Analyzed for Reduction*
July 16	4pm – 7pm	22,536	22,535
July 30	4pm – 7pm	22,443	22,442
Aug 5	4pm – 7pm	22,443	22,442

Notes: Customer sites may have more than one AC unit enrolled in program.

Baseline Data

The load reduction achieved during curtailment events was calculated by comparing the average load from each curtailment day against the average load developed from non-curtailment days selected for the baseline. The "previous days" approach was used, which utilizes the average load data from the previous ten non-weekend, non-curtailment days. Baseline kW was calculated as the average of the three days with the greatest demand from these previous ten non-curtailment days, as ranked by the highest hourly demand occurring during the curtailment timeframe. Curtailment days normally occur on hot, high demand days, thus selecting high demand days for the baseline ensures a similar load profile is used for the baseline days as the curtailment days.

Offset Factor

To effectively compare baseline and curtailment day loads, the baseline load was adjusted using an offset factor. The offset factor is calculated as the difference in kW between the baseline and curtailment event day load during the hour prior to the start of the curtailment. The offset factor was applied to the baseline day to "normalize" the baseline kW to the curtailment day kW. The offset factor mitigates underlying differences in load due to slight differences in outdoor temperature or other external factors.

Results

A total of three curtailment events were completed as part of the 2020 A/C Cool Credit program. Table 2 below details the characteristics of these events, including demand reduction, high temperatures, and cycling percent. The results are broken out between the Boise area and the Twin Falls/Pocatello areas to give a sense of the event in different regions of Idaho Power's service area.

Figures 1-3 show the reduction in total participant load due to the curtailment events for July 16th, July 30th and August 5th respectively. Temperature data is shown in order to understand variations in curtailment and baseline days, as temperature is a large driver in A/C load. The max total reduction numbers represent reported reduction for event and have been increased to include system losses of 9.7 % to represent load reduction at the generation level.

Table 2. 2020 Summary Results of Curtailment Events (Reduction at generator)

Event Date and High Temp	Cycling %	Region	Avg. kW Reduction per Participant	Max kW Reduction per Participant	Avg. Total kW Reduction	Max Total kW Reduction
July 16 Boise: 94° Poc/TF: 88°	50%	All	0.63	0.69	14,145	15,574
		Boise	0.76	0.69	13,065	14,580
		Poc/TF	0.33	0.35	1,135	1,201
July 30 Boise: 104° Poc/TF: 96°	50%	All	0.82	0.86	18,366	19,392
		Boise	0.79	0.83	14,980	15,709
		Poc/TF	0.55	0.56	1,907	1,940
August 5 Boise: 98° Poc/TF: 98°	50%	All	0.53	0.55	11,979	12,380
		Boise	0.53	0.55	10,086	10,504
		Poc/TF	0.56	0.61	1,928	2,091

Figure 1. July 16th 2020

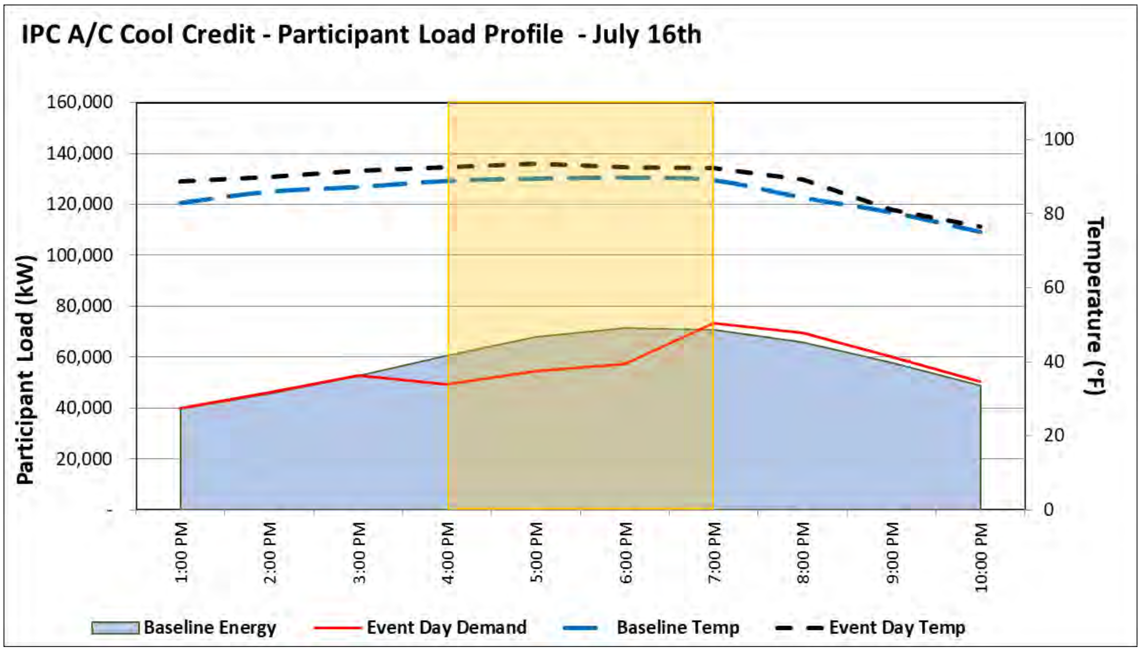


Figure 2. July 30th 2020

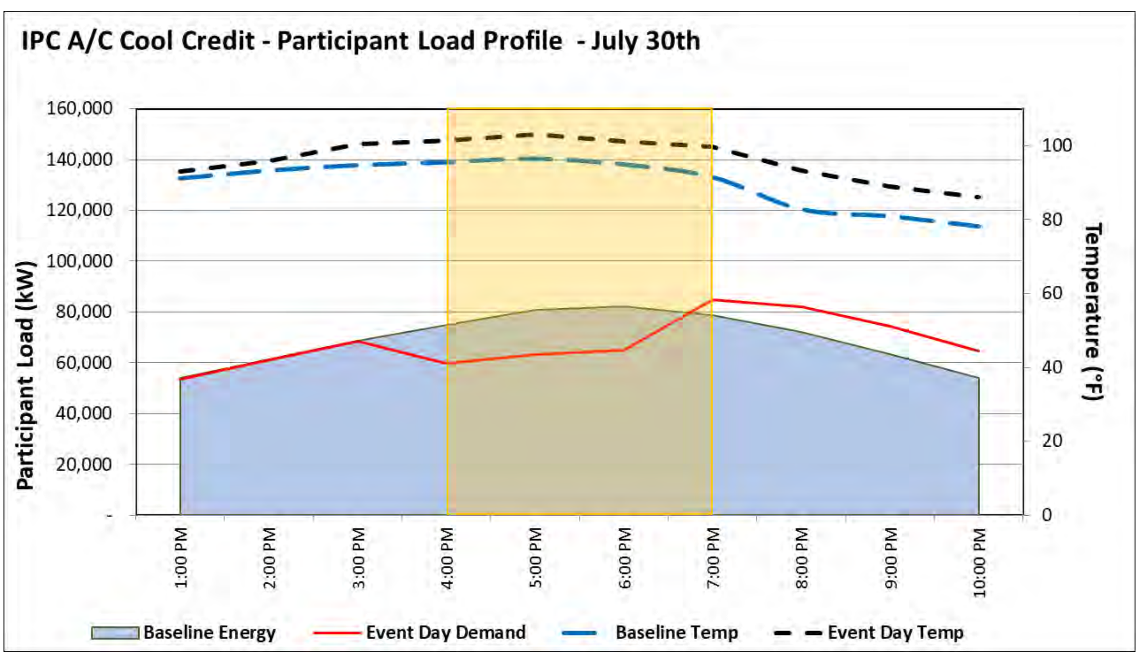
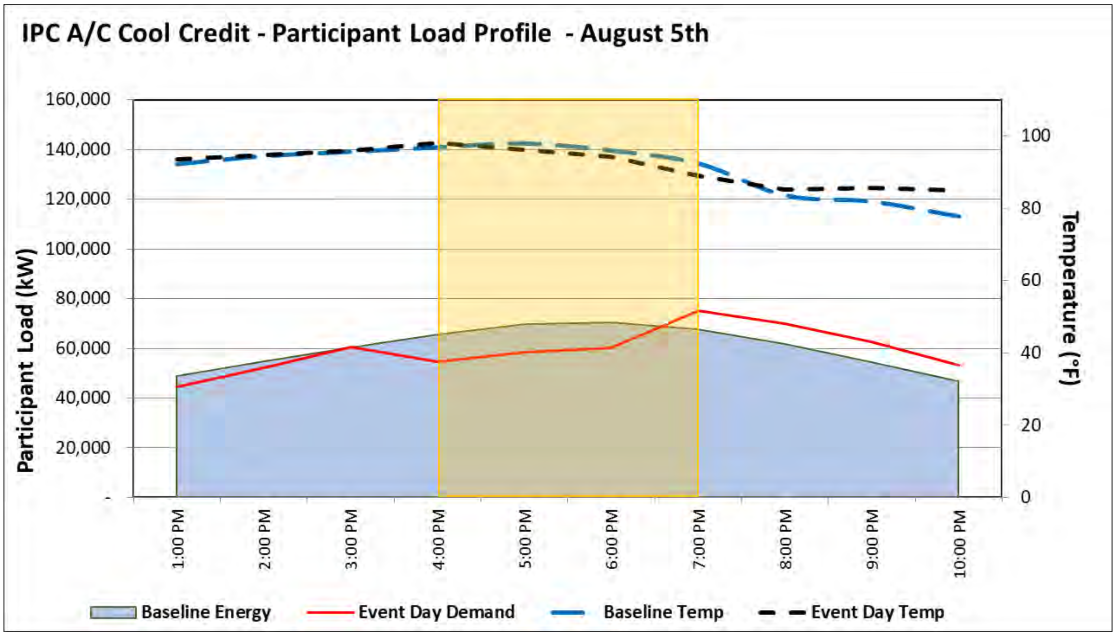


Figure 3 August 5th 2020



IDAHO POWER
COMMERCIAL ENERGY-SAVING KIT PROGRAM SUMMARY REPORT

2020

SUBMITTED BY:
AM CONSERVATION GROUP

An IDACORP Company

Idaho Power Commercial Energy-saving Kit Program Summary Report 2020

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Submitted by:

AM Conservation Group

February 2020

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Idaho Power can help you save even more energy and money with cash incentives for upgrading existing equipment, including:
WANT TO SAVE MORE?
IDAHO POWER
An IDACORP Company
LIKE THE PRODUCTS IN YOUR KIT?
Idaho Power can help you save even more energy and money with cash incentives for upgrading existing equipment, including:
Lighting
HVAC controls
We also offer incentives for new construction, major renovations, additions, expansions, change of space or custom projects. Contact your energy advisor to get started today.
idahopower.com/retail

Executive Summary

The Idaho Power Commercial Energy-saving Kit Program is designed to serve some of the hardest-to-reach customers within Idaho Power's service territory: small business customers. The program cost-effectively captures energy savings by providing high-quality measures and energy efficient education to Idaho Power commercial customers. As a result, small businesses develop efficient behaviors while reducing energy costs. The program acts as a first-point of contact, establishing a positive customer relationship, and encouraging participation in other programs within Idaho Power's commercial portfolio.

This report summarizes the 2020 Energy-saving Kit Program. The program reached a total of 1,379 small business within Idaho Power's service territory, 1,301 small businesses located in Idaho, and an additional 78 small businesses in Oregon. Funding was provided by Idaho Power.

The program achieved or exceeded expectations. Results are listed below.

Program Achievements

1. Provided commercial energy-saving measures and energy-efficiency education to 1,301 Idaho and 78 Oregon small businesses.
   - Affected all five regions of the Idaho Power service territory
   - Affected 71 cities & towns in Idaho
   - Affected 10 cities & towns in Oregon
2. Generated residential energy and water savings. Projected annual savings
   - 53,284 kWh Restaurant kit savings
   - 148,533 kWh Office kit savings
   - 56,550 kWh Retail kit savings
3. Supported Idaho Power with their diverse outreach and distribution methods.
   - Idaho Power customized enrollment portal
   - Idaho Power employee log-in and enrollment tracking
   - Multiple enrollment methods, including kits handed out and kits shipped directly to customers
4. Designed and provided complementary educational materials and incentives to maximize installation of targeted efficiency measures.
5. Maintained data collection and management services to collect and process audit ready data from participating small businesses.
6. Maintained tracking and reporting to summarize the program participation.

(continued on next page)

The Idaho Power Commercial Energy-saving Kit Program originally launched in June of 2018. The program launch consisted of developing an enrollment strategy designed to maximize small business customer satisfaction and engagement through the distribution of energy saving kits, while maintaining implementation ease for IPC employees.

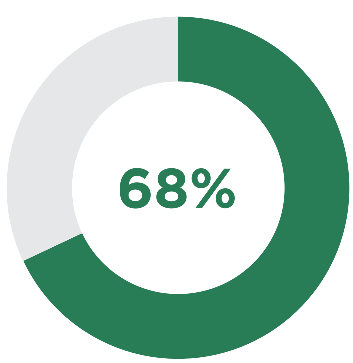
Program outreach consisted of a two-part strategy. The Idaho Power call center conducted an outreach campaign to eligible small business customers, encouraging utility customers to take part in the Energy-saving Kit Program. Enrollments were then processed by AM Conservation Group (AMCG), who shipped kits and program materials directly to participating small businesses. In addition, kits were bulk shipped to regional offices within Idaho Power's service territory to be distributed by Energy Advisors in the field to small business utility customers.

	ENROLLMENTS	%
REGIONAL OFFICES (HANDED OUT)	59	4%
CALL-CENTER (KITS SHIPPED)	1,320	80%

Of the 214 surveys received (4% response rate), customers indicated a high level of satisfaction with the program. On average, 68% of survey respondents are aware of energy efficiency programs offered by Idaho Power, and 78% are "Very Likely" to participate in additional programs in the future.

Were you aware that Idaho Power had energy efficiency and incentive programs?

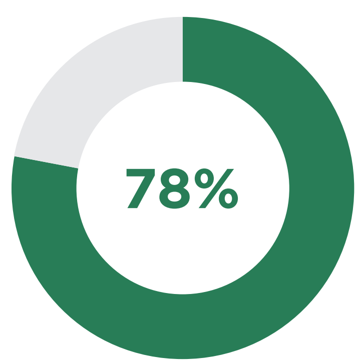
Yes - 68%



Reported businesses that were aware that Idaho Power offered energy efficiency and incentive programs.

How likely are you to participate in additional Idaho Power energy efficiency programs?

Very Likely - 78%



Reported businesses that are very likely to participate in another Idaho Power energy efficiency program.

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	
6,122,800	gallons of water saved*
258,368	kWh of electricity saved

PROJECTED LIFETIME SAVINGS	
55,335,370	gallons of water saved*
3,305,812	kWh of electricity saved

PROJECTED ANNUAL SAVINGS PER BUSINESS	
4,440	gallons of water saved*
187	kWh of electricity saved

PROJECTED LIFETIME SAVINGS PER BUSINESS	
40,127	gallons of water saved*
2,397	kWh of electricity saved

**Based on 100% installation rate.*

Restaurant Kit

From AM Conservation Group

AM Conservation Group (AMCG), a Franklin Energy Company, has been in the business of designing and implementing energy and water efficiency programs for nearly 3 decades. We have taken this time to build an expert team of industry professionals to deliver a seamless program in line with the needs of our clients.

We designed the Idaho Power Commercial Energy-saving Kit Program in our Nevada program center from the ground up. Working in conjunction with Idaho Power, we identified goals, desired outcomes of the program, and specific customization. The result is an engaging program that delivers measurable resource savings. The Idaho Power Commercial Energy-saving Kit Program features a proven blend of innovative education, comprehensive implementation services, and hands-on activities that put efficiency knowledge to work in small businesses throughout Idaho Power's service territory.

The commercial segment is an important customer group. These customers face well-known barriers to participation in energy efficiency programs, including lack of awareness, time, and capital to explore energy saving opportunities. Our solution provides a streamlined approach, making it easy for small business customers to begin enjoying the benefits of energy efficiency education and installation of measures. The ease of the program establishes a positive customer relationship, and encourages engagement in additional energy efficiency programs.

The Idaho Power Commercial Energy-saving Kit Program is a reflection of true teamwork. On behalf of the entire implementation team at AMCG, I would like to thank you for the opportunity to design and implement this innovative program for Idaho Power. It has been a pleasure working with you. I look forward to many more years of program success.

Sincerely,

Ali Powers

Alicia Powers
Program Manager, PMP®

Office Kit


SAVING ENERGY
Makes Good Business Sense
IDAHO POWER
An IDACORP Company
YOUR ENERGY SAVINGS KIT
Indirect energy-saving benefits:
Reduced operations and maintenance costs
Increased asset value
Improved safety
Enhanced employee productivity
Good return on investment
Improved customer and employee comfort
Enhanced public image
Reduced waste
TrickleStar
SURVEY
WIN a
eGift Card!
QUICK START GUIDE
IDAHO POWER
START HERE
YOU HAVE THE POWER TO SAVE
Turn Off the Lights.
IDAHO POWER

Idaho Power Energy-saving Kit Program Overview

The Commercial Energy-saving Kit Program aims to cost-effectively capture energy savings in small businesses located in Idaho Power's service territory. The program achieves immediate savings through a kit of self-install measures delivered directly to a customer's door step. A hands-on educational component provides the basis for participants to make modifications in energy use, and establish sustained energy conserving behaviors, resulting in life-long behavior change and savings. A carefully designed survey allows Idaho Power to claim savings on measure installation, and is the key component of EM&V activities.

The program was designed and targeted to reach three different small business segments: restaurant, office, and retail. Three different kit types were developed for this purpose. Each kit contained energy efficiency measures specifically curated for the small business type, as well as educational materials and installation surveys. Educational materials include a Quick Start Guide, light switch reminder stickers, an illustrated installation guide, and cross promotional inserts. Each kit and accompanying materials are customized for the targeted business type, featuring prominent and recognizable Idaho Power branding to ensure program adoption.

The program was offered throughout Idaho Power's service territory, and distributed by Idaho Power employees. Kits were distributed either through Energy Advisors in the field working with small businesses, or through the Idaho Power Customer Call Center, who conducted an outreach campaign to eligible customers. Enrollments were then submitted to AMCG, and kits were shipped directly to the customer's place of business.

Kit installation surveys were received from 214 participating small businesses, representing a response rate of 4% since program inception. A monthly drawing for a $100 eGift card provided an incentive to businesses for returning their surveys.

Quick Start Guide

Idaho Power Commercial Energy-saving Kit Program Materials

Program materials include a securely packaged kit filled with participant-focused measures and materials, Idaho Power energy efficiency program cross promotion, and Idaho Power branding.

A Quick Start Guide is included in each kit, and provides the educational component of the program. The Quick Start Guide identifies multiple tips and modifications in energy use that, when implemented, establish sustained energy conserving behaviors. The simple guide utilizes motivational tools and strategies intended to affect the consumer's energy use behaviors. The installation of the kit's measures, combined with the promoted behavioral changes, results in energy savings that are captured by the installation survey.

Included Educational Materials

Quick Start Guide

Survey

Light Switch Reminder Stickers

Idaho Power Small Business Program Cross-Promo

Installation Instructions

Included Efficiency Measures

Restaurant Kit

Pre-rinse Spray Valve

Three 9-watt LEDs

Two Exit Sign Retrofits

Two Kitchen Faucet Aerators

Two Bathroom Faucet Aerators

Office Kit

Two 9-watt LEDs

Two Exit Sign Retrofits

Advanced Power Strip

Kitchen Faucet Aerator

Two Bathroom Faucet Aerators

Retail

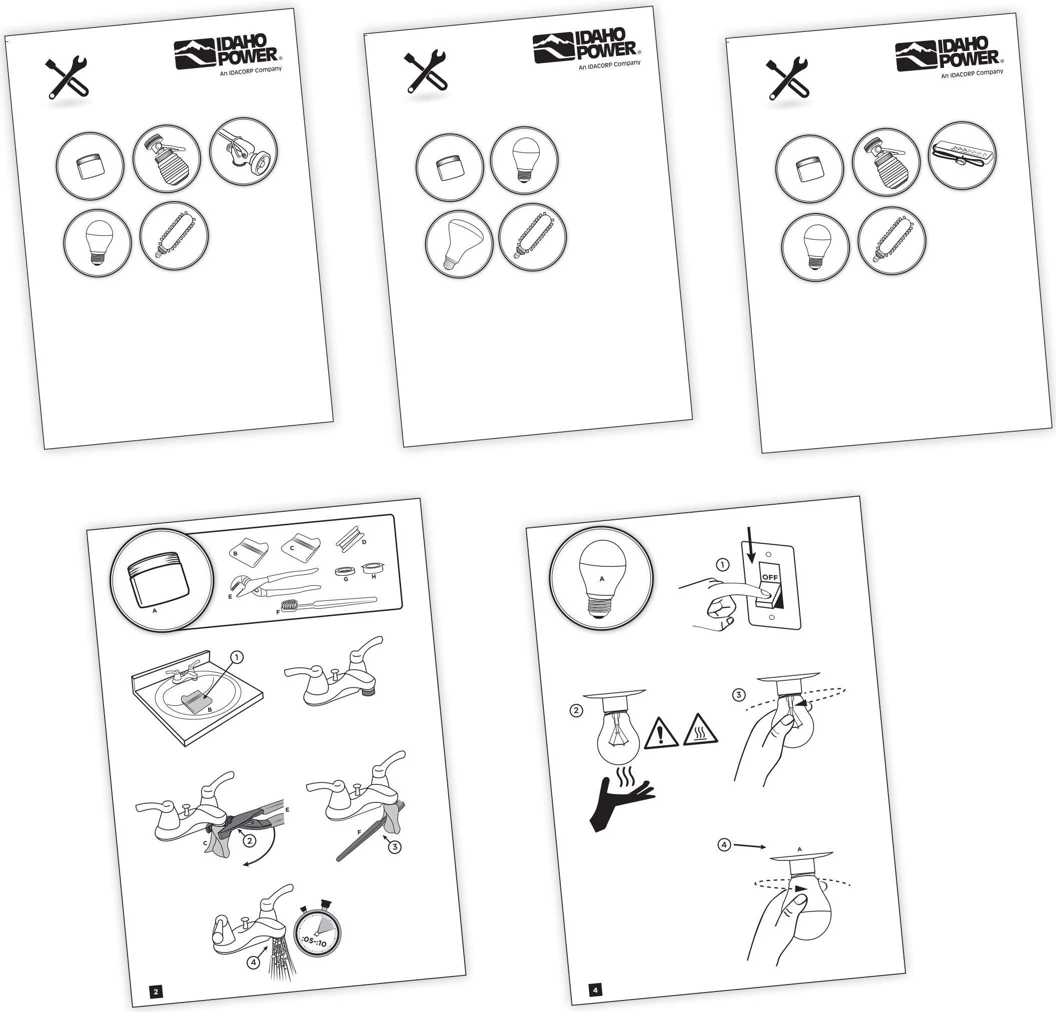
Two 9-watt LEDs

Two 8-watt LED BR30s

Two Exit Sign Retrofits

Bathroom Faucet Aerator

ILLUSTRATED INSTRUCTION GUIDES



Idaho Power Commercial Energy-saving Kit Program Implementation

An introductory outbound call campaign implemented by the Idaho Power call center, supported by the information on the Idaho Power website, merited positive results. Small business owners were able to enroll in the program with ease, resulting in a steady demand for the program.

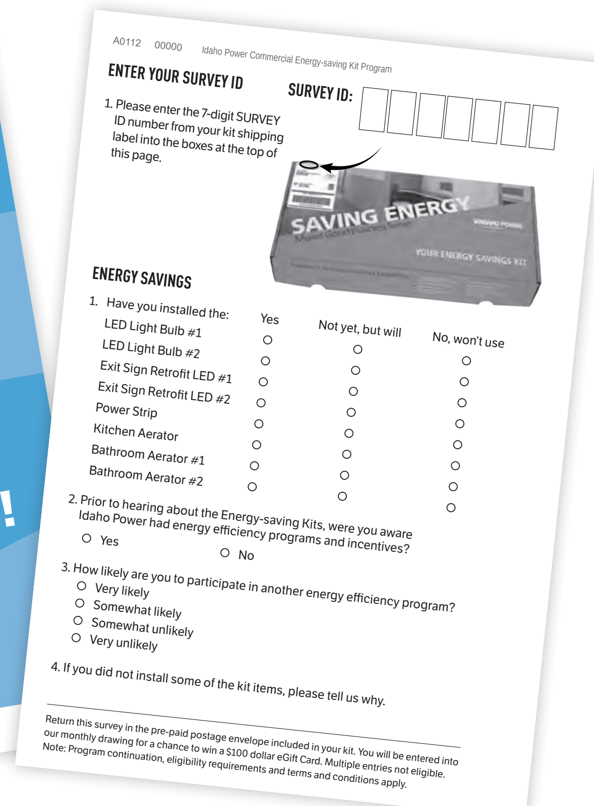
Energy-saving kit participation was processed and tracked at the AMCG program center. The program website, a toll-free number, Idaho Power Energy Advisors in the field and the Idaho Power customer service department provided convenient methods for interested small businesses to order a kit and participate in the program.

Orders were tracked and managed from all outreach and enrollment sources. Program materials and products were packaged and addressed for individual small business delivery. All program modules receive 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 AMCG's proprietary program database. In addition, surveys were completed either through the program website, or returned to AMCG where data was tabulated and included in the program database. This procedure allows for accurate reporting, which is an important element for tracking the measurements and goals of the program.

Home Survey

SAVING ENERGY
Makes Good Business Sense
IDAHO POWER
An IDACORP Company
COMMERCIAL ENERGY-SAVING KIT PROGRAM
COMPLETE AND RETURN THIS
SURVEY
FOR A CHANCE
TO WIN a
$100 eGift Card!
Complete this survey one of three easy ways:
Online at idahopower.com/businesskit
Return this pre-printed survey in the postage-paid envelope included in your kit.
Or call us at 800-465-6045
For contest details visit idahopower.com/businesskit.
118759



A0112 00000 Idaho Power Commercial Energy-saving Kit Program
ENTER YOUR SURVEY ID
SURVEY ID:
1. Please enter the 7-digit SURVEY ID number from your kit shipping label into the boxes at the top of this page.
SAVING ENERGY
YOUR ENERGY SAVINGS KIT
ENERGY SAVINGS
1. Have you installed the:
Yes
Not yet, but will
No, won't use
LED Light Bulb #1
LED Light Bulb #2
Exit Sign Retrofit LED #1
Exit Sign Retrofit LED #2
Power Strip
Kitchen Aerator
Bathroom Aerator #1
Bathroom Aerator #2
2. Prior to hearing about the Energy-saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?
Yes
No
3. How likely are you to participate in another energy efficiency program?
Very likely
Somewhat likely
Somewhat unlikely
Very unlikely
4. If you did not install some of the kit items, please tell us why.
Return this survey in the pre-paid postage envelope included in your kit. You will be entered into our monthly drawing for a chance to win a $100 dollar eGift Card. Multiple entries not eligible.
Note: Program continuation, eligibility requirements and terms and conditions apply.

Idaho Power Commercial Energy-saving Kit Program Impact

The program impacted 71 cities and towns throughout Idaho and 10 cities and towns in Oregon. As illustrated below, the program successfully educated participating small businesses about energy and water efficiency while generating resource savings through the installation of efficiency measures in small business facilities. Installation survey data was collected to track savings and gather program satisfaction data.

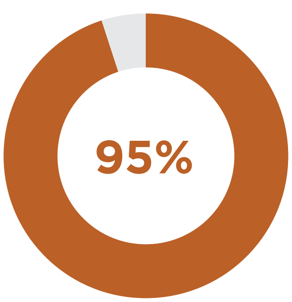
A. Small Business Survey and Retrofit Data

Upon completion of the program, participating small businesses were asked to complete a survey to assess their resource use, verify product installation, provide demographic information, and measure participation rates. Samples questions appear below and a complete summary of all responses is included in Appendix B.

Restaurants reporting that they have or will install the Pre-Rinse Spray Valve:

Yes and Not yet, but will

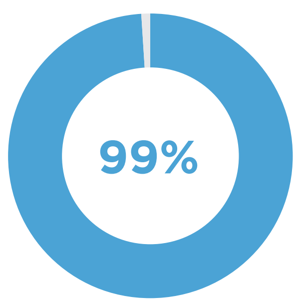
95%



Offices reporting that they have or will install the Advanced Power Strip:

Yes and Not yet, but will

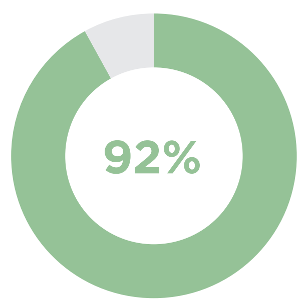
99%



Retail businesses reporting that they have or will install the LEDs and LED BR30s:

Yes and Not yet, but will

92%



B. Water and Energy Savings Summary

As part of the program, participants installed retrofit efficiency measures in their small businesses. The 1,379 participating businesses are expected to save the following resource totals. Savings from these actions and new behaviors will continue for many years to come.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

	Annual	Lifetime	
Total Number of Participants:	**1,379**		
Number of Restaurant Participants:	**206**		
Number of Office Participants:	**937**		
Number of Retail Participants:	**236**		
Projected reduction from Pre-rinse Spray Valve retrofit:	**1,178,526**	**5,892,630**	gallons*
Measure Life: 5 years	**8,802**	**44,012**	kWh
Projected reduction from Advanced Power Strip installation:	**15,179**	**60,718**	kWh
Product Life: 4 years			
Projected reduction from Exit Sign LED retrofits:	**114,760**	**1,836,166**	kWh
Measure Life: 16 years			
Projected reduction from 9-watt LED Light Bulbs:	**29,133**	**378,732**	kWh
Measure Life: 13.1 years			
Projected reduction from 8-watt BR30 LED Light Bulbs:	**27,081**	**352,053**	kWh
Measure Life: 13.1 years			
Projected reduction from Kitchen Faucet Aerator retrofit:	**1,970,321**	**19,703,213**	gallons
Measure Life: 10 years	**30,839**	**308,390**	kWh
Projected reduction from Bathroom Faucet Aerator retrofit:	**2,973,953**	**29,739,527**	gallons
Measure Life: 10 years	**32,574**	**325,742**	kWh
TOTAL PROJECTED PROGRAM SAVINGS:	**6,122,800**	**55,335,370**	gallons
	258,368	**3,305,812**	kWh
TOTAL PROJECTED PROGRAM SAVINGS PER BUSINESS:	**4,440**	**40,127**	gallons
	187	**2,397**	kWh

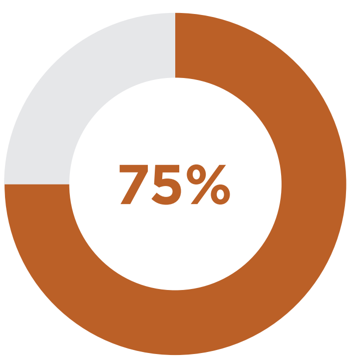
[1] *All water savings estimates are based on 100% installation rate.*

C. Participant Response

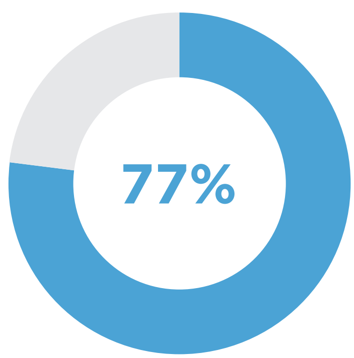
Participant response to Idaho Power's outreach methods and interpersonal communication resulted in a positive response for the program. Participants utilized the Quick Start Guide to choose which measures to install, and which savings actions to take. Illustrated instruction guides made retrofit projects easy to complete. The installation rate data and the participant satisfaction data presented in this report were provided by kit surveys.

ALL - SURVEYS RETURNED	SURVEYS	PY1-PY3 KITS	%
Restaurant	20	753	3%
Office	172	4,361	4%
Retail	22	546	4%
TOTAL	214	5,660	4%

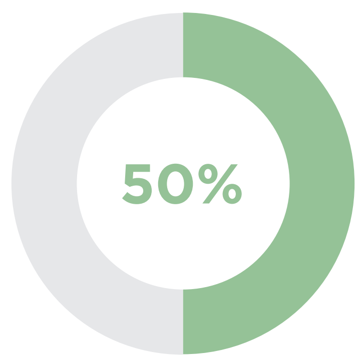
Measures Installed:



Restaurants reported installing the Pre-Rinse Spray Valves.



Offices reported installing the Advanced Power Strip.



Retail businesses reported installing the BR30 LEDs.

Retail Kit


SAVING ENERGY
Makes Good Business Sense
IDAHO POWER.
An IDACORP Company
YOUR ENERGY SAVINGS KIT
Indirect energy-saving benefits:
Reduced operations and maintenance costs
Increased asset value
Improved safety
Enhanced employee productivity
Good return on investment
Improved customer and employee comfort
Enhanced public image
Reduced waste
YOU HAVE THE POWER TO SAVE
Turn Off the Lights.
WANT TO SAVE MORE?
LIKE THE PRODUCTS IN YOUR KIT?
QUICK START GUIDE
START HERE

Appendices

Appendix A

Appendix B

Appendix C

Projected Savings from Pre-Rinse Spray Valve Retrofit

Pre-rinse Spray Valve retrofit inputs and assumptions:

Number of Restaurant participants:	**206**	
Deemed Savings:	**42.7**	kWh [1]
Estimated **annual** water savings:	**5,721**	gallons[2]
Measure life:	**5.0**	years[2]

Projected Electricity Savings:

Pre-rinse spray valve retrofit projects an **annual** reduction of:	**8,802**	kWh
Pre-rinse spray valve retrofit projects a **lifetime** reduction of:	**44,012**	kWh

Projected Water Savings:

Pre-rinse spray valve retrofit projects an **annual** reduction of:	**1,178,526**	gallons
Pre-rinse spray valve retrofit projects a **lifetime** reduction of:	**5,892,630**	gallons

1 Provided by Idaho Power. Regional Technical Forum (RTF). ComcookingPreRinseSprayValve_v2_4.xlsm. Adjusted for estimated electric water heat saturation and installation rates.

2 Based on Regional Technical Forum.

3 Pre-rinse spray valve water savings formula (Savings per year x Participants) .

Projected Savings from Advanced Power Strip (APS) Installation

Advanced Power Strip inputs and assumptions

Number of Office Participants:	**937**	
Deemed Savings:	**16.2**	kWh[1]
Product life:	**4**	years[2]

Projected Electricity Savings:

The APS retrofit projects an **annual** reduction of:	**15,179**	kWh[3]
The APS retrofit projects an **annual** reduction of:	**60,718**	kW[4]

1 Provided by Idaho Power. RTF. ComSmartPlugPower_v3_4.xlsm. Adjusted for estimated installation rate.

2 Based on Regional Technical Forum.

3 Advanced Power Strip savings formula (Deemed savings x Participants).

4 Advanced Power Strip savings formula (Deemed savings x Participants x Product Life).

Projected Savings from Exit Sign LED Retrofits

Exit Sign LED Retrofits inputs and assumptions

Lamps per participant:	**2**	
Number of Restaurant Participants:	**206**	
Number of Office Participants:	**937**	
Number of Retail Participants:	**236**	
Deemed Savings:	**41.61**	kWh[1]
Product life:	**16**	years[1]

Projected Electricity Savings:

The Exit Sign LED retrofit projects an **annual** reduction of:	**114,760**	kWh[2]
The Exit Sign LED retrofit projects an **lifetime** reduction of:	**1,836,166**	kWh[3]

1 Provided by Idaho Power. Calculated based on estimated existing fixture wattages and installation rates.

2 Exit Sign LED Retrofits savings formula (Deemed savings x Lamps per kit x Participants).

3 Exit Sign LED Retrofits savings formula (Deemed savings x Lamps per kit x Participants x Product Life).

Projected Savings from 9-watt LED Light Bulb Retrofit

9-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per Restaurant participant :	**3**	
Number of Restaurant participants:	**206**	
Deemed Restaurant savings per lamp (average kWh):	**14.40**	kWh[1]
Lamps per Office participant:	**2**	
Number of Office participants:	**937**	
Deemed Office savings per lamp (average kWh):	**7.80**	kWh[1]
Lamps per Retail participant:	**2**	
Number of Retail participants:	**236**	
Deemed Retail savings per lamp (average kWh):	**11.90**	kWh[1]
Measure life:	**13.00**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**29,133**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**378,732**	kWh[3]

1 Provided by Idaho Power. Savings calculated based on a 9W LED replacing a 13W CFL. Hours of use vary by building type. Adjusted for estimated installation rates.

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 8-watt BR30 Light Bulb Retrofit

8-watt LED BR30 Light Bulb retrofit inputs and assumptions:

Lamps per Retail participant:	**2**	
Number of Retail participants:	**236**	
Deemed savings per lamp (kWh):	**57.38**	kWh[1]
Measure life:	**13.0**	years[1]

Projected Electricity Savings:

The LED BR30 retrofit projects an **annual** reduction of:	**27,081**	kWh[2]
The LED BR30 retrofit projects a **lifetime** reduction of:	**352,053**	kWh[3]

1 Provided by Idaho Power. Savings calculated based on a 8W LED replacing a 13 W CFL. Hours of use vary by building type. Adjusted for estimated installation rates.

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 Kitchen Faucet Aerator Retrofit

Kitchen Faucet Aerator retrofit inputs and assumptions:		
Kitchen Faucet Aerators per Restaurant kit:	**2**	
Number of Restaurant participants:	**206**	
Deemed Savings Restaurant Kitchen Faucet Aerator 1:	**35.21**	kWh[1]
Deemed Savings Restaurant Kitchen Faucet Aerator 2:	**17.61**	kWh[1]
Kitchen Faucet Aerators per Office kit:	**1**	
Number of Office participants:	**937**	
Deemed Savings Office Kitchen Faucet Aerator:	**21.3**	kWh[1]
Kitchen Faucet Aerator per Retail kit (none):	**-**	
Number of Retail participants (not applicable):	**-**	
Kitchen Faucet Aerator (baseline x .83 throttling factor):	**2.08**	gpm
Kitchen Faucet Aerator (retrofit x .95 throttling factor):	**1.43**	gpm
Percent reduced:	**31%**	
Estimated **annual** water usage per fixture Restaurant:	**9,581**	gallons
Estimated **annual** water usage per fixture Office:	**2,500**	gallons
	10	years[3]
Measure life:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**30,839**	kWh[4]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**308,390**	kWh[5]
Potential Water Savings with 100 Percent Installation:		
Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**1,970,321**	gallons[6]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**19,703,213**	gallons[6]

1 *Provided by Idaho Power. Savings calculated based on the methodology in the Illinois TRM for Commercial Measures. Gallons vary by building type. Adjusted for estimated electric water heat saturation and installation rates.*

2 *From Illinois TRM for Commercial Measures. 2019 v 7 Final, Section 4.3.2. Low Flow Faucet Aerators*

3 *(March 20, 2014). Blessing Memo for LivingWise Kits for 2014, Paul Sklar, E.I., Planning Engineer Energy Trust of Oregon.*

4 *Kitchen Faucet Aerator kWh formula (Number of participants x Deemed savings x Kitchen Faucet Aerators per kit type).*

5 *Kitchen Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).*

6 *Kitchen Faucet Aerator gallons formula (Annual usage per fixture x Number of Fixtures x Participants x Percent Reduction).*

7 *All water savings estimates are based on 100% installation rate.*

Projected Savings from Bathroom Faucet Aerator Retrofit

Bathroom Faucet Aerators per Restaurant kit:	2	
Number of Restaurant participants:	206	
Deemed Savings Restaurant Bathroom Faucet Aerator 1:	24.47	kWh[1]
Deemed Savings Restaurant Bathroom Faucet Aerator 2:	12.23	kWh[1]
Bathroom Faucet Aerators per Office kit:	2	
Number of Office participants:	937	
Deemed Savings Office Bathroom Faucet Aerator 1:	14.80	kWh[1]
Deemed Savings Office Bathroom Faucet Aerator 2:	7.40	kWh[1]
Bathroom Faucet Aerator per Retail kit:	1	
Number of Retail participants:	236	
Deemed Savings Retail Bathroom Faucet Aerator:	17.85	kWh[1]
Bathroom Faucet Aerator (baseline x .83 throttling factor):	2.08	gpm[2]
Bathroom Faucet Aerator (retrofit x .95 throttling factor):	1.43	gpm[2]
Estimated **annual** water savings per fixture Restaurant:	3,001	gallons[2]
Estimated **annual** water savings per fixture Office:	783	gallons[2]
Estimated **annual** water savings per fixture Retail:	1,143	gallons
Measure life:	10	years[3]

Projected Electricity Savings:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	32,574	kWh[4]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	325,742	kWh5

Potential Water Savings with 100 Percent Installation:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	2,973,953	gallons[6]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	29,739,527	gallons[6]

1 Provided by Idaho Power. Savings calculated based on the methodology in the Illinois TRM for Commercial Measures. Gallons vary by building type. Adjusted for estimated electric water heat saturation and installation rates.

2 From Illinois TRM for Commercial Measures. 2019 v 7 Final, Section 4.3.2. Low Flow Faucet Aerators

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 Deemed Savings x Bathroom Faucet Aerators per kit type).

5 Bathroom Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).

6 Bathroom Faucet Aerator gallons formula (Annual usage per fixture x Number of Fixtures x Participants x Percent Reduction).

5 Bathroom Faucet Aerator kWh lifetime savings formula (Annual savings x Measure life).

6 Bathroom Faucet Aerator gallons formula (Annual usage per fixture x Number of Fixtures x Participants x Percent Reduction).

Restaurant Survey Response Summary *

1 Have you installed the Pre-Rinse Spray Valve?	
Yes	75%
Not yet, but will	20%
No, won't use	5%
2 Have you installed the LED Light Bulb #1?	
Yes	55%
Not yet, but will	45%
No, won't use	0%
3 Have you installed the LED Light Bulb #2?	
Yes	55%
Not yet, but will	45%
No, won't use	0%
4 Have you installed the LED Light Bulb #3?	
Yes	55%
Not yet, but will	45%
No, won't use	0%
5 Have you installed the Exit Sign Retrofit LED #1?	
Yes	35%
Not yet, but will	35%
No, won't use	30%
6 Have you installed the Exit Sign Retrofit LED #2?	
Yes	35%
Not yet, but will	35%
No, won't use	30%
7 Have you installed the Kitchen Aerator #1?	
Yes	58%
Not yet, but will	26%
No, won't use	16%
8 Have you installed the Kitchen Aerator #2?	
Yes	32%
Not yet, but will	42%
No, won't use	26%
9 Have you installed the Bathroom Aerator #1?	
Yes	55%
Not yet, but will	25%
No, won't use	20%

Due to rounding of numbers, percentages may not add up to 100%
**Survey response rate of 3% with a total 20 surveys received over the three year program duration.*

Restaurant Survey Response Summary* *(continued)*

10 Have you installed the Bathroom Aerator #2?	
Yes	53%
Not yet, but will	21%
No, won't use	26%
11 Prior to hearing about the Energy-saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?	
Yes	70%
No	30%
12 How likely are you to participate in another energy efficiency program?	
Very likely	85%
Somewhat likely	10%
Somewhat unlikely	0%
Very unlikely	5%

Due to rounding of numbers, percentages may not add up to 100%
**Survey response rate of 3% with a total 20 surveys received over the three year program duration.*

Office Survey Response Summary*

1 Have you installed the LED Light Bulb #1?	
Yes	63%
Not yet, but will	33%
No, won't use	4%
2 Have you installed the LED Light Bulb #2?	
Yes	57%
Not yet, but will	39%
No, won't use	4%
3 Have you installed the Exit Sign Retrofit LED #1?	
Yes	20%
Not yet, but will	47%
No, won't use	33%
4 Have you installed the Exit Sign Retrofit LED #2?	
Yes	17%
Not yet, but will	47%
No, won't use	36%
5 Have you installed the Power Strip?	
Yes	77%
Not yet, but will	22%
No, won't use	1%
6 Have you installed the Kitchen Aerator?	
Yes	41%
Not yet, but will	41%
No, won't use	19%
7 Have you installed the Bathroom Aerator #1?	
Yes	48%
Not yet, but will	38%
No, won't use	14%
8 Have you installed the Bathroom Aerator #2?	
Yes	35%
Not yet, but will	41%
No, won't use	23%
9 Prior to hearing about the Energy-saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?	
Yes	65%
No	35%
10 How likely are you to participate in another energy efficiency program?	
Very likely	71%
Somewhat likely	26%
Somewhat unlikely	2%
Very unlikely	1%

Due to rounding of numbers, percentages may not add up to 100%
Survey response rate of 4% with a total 172 surveys received over the three year program duration.

Retail Survey Response Summary*

1 Have you installed the LED Light Bulb #1?	
Yes	80%
Not yet, but will	20%
No, won't use	0%
2 Have you installed the LED Light Bulb #2?	
Yes	76%
Not yet, but will	24%
No, won't use	0%
3 Have you installed the BR30 Reflector LED #1?	
Yes	54%
Not yet, but will	38%
No, won't use	8%
4 Have you installed the BR30 Reflector LED #2?	
Yes	46%
Not yet, but will	46%
No, won't use	8%
5 Have you installed the Exit Sign Retrofit LED #1?	
Yes	21%
Not yet, but will	54%
No, won't use	25%
6 Have you installed the Exit Sign Retrofit LED #2?	
Yes	9%
Not yet, but will	59%
No, won't use	32%
7 Have you installed the Bathroom Aerator #1?	
Yes	48%
Not yet, but will	32%
No, won't use	20%
8 Prior to hearing about the Energy-saving Kits, were you aware Idaho Power had energy efficiency programs and incentives?	
Yes	68%
No	32%
9 How likely are you to participate in another energy efficiency program?	
Very likely	77%
Somewhat likely	18%
Somewhat unlikely	0%
Very unlikely	5%

Due to rounding of numbers, percentages may not add up to 100%
**Survey response rate of 4% with a total 22 surveys received over the three year program duration.*

Idaho Cities & Towns Served

ABERDEEN
AMERICAN FALLS
BELLEVUE
BLACKFOOT
BOISE
BRUNEAU
BUHL
CALDWELL
CAMBRIDGE
CAREY
CARMEN
CASCADE
CASTLEFORD
CHUBBUCK
COUNCIL
DIETRICH
DONNELLY
EAGLE
EDEN
EMMETT
FILER
FORT HALL
FRUITLAND
GARDEN CITY
GARDEN VALLEY
GLENNS FERRY
GOODING
GRAND VIEW
GREENLEAF
HAGERMAN
HAILEY
HAMMETT
HANSEN
HAZELTON
HOMEDALE
HORSESHOE BEND
IDAHO CITY
INDIAN VALLEY
INKOM
JEROME
KETCHUM
KIMBERLY
KING HILL
KUNA
MARSING
MCCALL
MELBA
MERIDAN
MIDDLETON
MIDVALE
MOUNTAIN HOME
MURPHY
NAMPA
NEW MEADOWS
NEW PLYMOUTH
NOTUS
OAKLEY
PARMA
PAYETTE
POCATELLO
POLLOCK
RICHFIELD
RIGGINS
SALMON
SHOSHONE
STAR
SWEET
TWIN FALLS
WEISER
WENDELL
WILDER

Oregon Cities & Towns Served

ADRIAN
HALFWAY
JORDAN VALLEY
JUNTURA
NYSSA
ONTARIO
OXBOW
RICHLAND
UNITY
VALE

Idaho Power Regions Served

REGIONS	RESTAURANT	OFFICE	RETAIL
CALL CENTER	77	518	20
CANYON WEST COC	17	6	26
CANYON WEST POC	32	18	29
CAPITAL BOC	38	40	71
EASTERN POC	4	7	35
SOUTHERN TWOC	0	13	14
UNASSIGNED	15	145	4
HEADQUARTERS	23	190	37
TOTAL	206	937	236
TOTAL ALL	1,379		

Idaho Power Enrollments

	ENROLLMENTS	%
REGIONAL OFFICES (HANDED OUT)	59	4%
CALL-CENTER (KITS SHIPPED)	1,320	80%

IDAHO POWER PRESENTS

Energy Savings made easy

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An IDACORP Company

IDAHO POWER
ENERGY-SAVING KIT PROGRAM SUMMARY REPORT

2020

SUBMITTED BY:
AM CONSERVATION GROUP

Idaho Power Energy-Saving Kit Program Summary Report 2020

Sponsored by:

IDAHO POWER®

An IDACORP Company

Submitted by:

AM Conservation Group

February 2021

"Great tools! Thanks for offering and educating us!"

– Idaho Power Energy-Saving Kit Program Participant

Table of Contents

"We used everything. Thank you so much for the kit!"

– 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 2020 Energy-Saving Kit program. 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 38,571 Idaho and 1,096 Oregon households.

- Affected all five regions of the Idaho Power service territory
- Affected 106 cities & towns in Idaho
- Affected 17 cities & towns in Oregon

REGIONS	HOUSEHOLDS	ELECTRIC KIT	NON-ELECTRIC KIT
Canyon	10,672	3,585	7,087
Capital	15,077	5,638	9,439
Eastern	4,346	2,197	2,149
Southern	4,860	2,337	2,523
Western	4,712	2,621	2,091
TOTALS	39,667	16,378	23,289

2. Generated residential energy and water savings. Projected annual savings:

- 169,707,793 gallons of water saved*
- 6,169,817 kWh of electricity saved
- 109,901 therms of gas saved

(continued on next page)

Assuming 100% Installation.

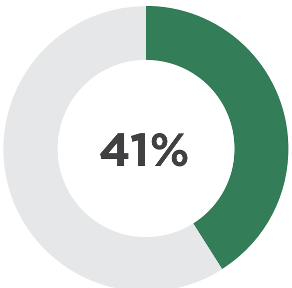
3. Idaho Power supported their customers through utilization of the following diverse marketing methods.
   - Direct Mail from Idaho Power
   - Email from Idaho Power
   - Friend or Family
   - Idaho Power employee
   - Info in bill
   - Idaho Power website
   - Direct mail from Idaho Power, Email from Idaho Power
   - Facebook/Twitter
   - Friend or Family, Email from Idaho Power
   - Direct mail from Idaho Power, Friend or Family
   - Idaho Power employee, Other: Mowla
   - Idaho Power employee, Other: CSA Hinges
   - Direct mail from Idaho Power, Info in bill, Email from Idaho Power
   - Other: Radio

OPTING-IN METHODS	HOUSEHOLDS	%
Website	**30,940**	**78%**
Postcards	**8,727**	**22%**

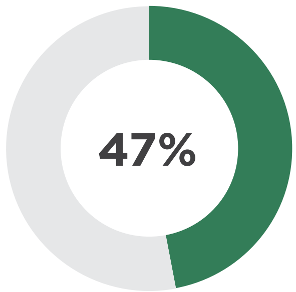
4. Designed and provided complementary educational materials and incentives to maximize installation of targeted efficiency measures (Installation rates ranged from 40 – 90 percent).
5. Maintained data collection and management services to collect and process audit ready data from participating households.
6. Maintained tracking and reporting to summarize the Program participation.
7. 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.

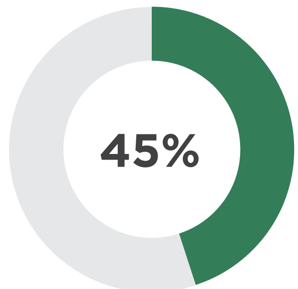
Survey responses indicated high participant satisfaction and participation in product retrofits and adoption of new energy saving behaviors. Total 9,937 households returned completed surveys and the responses were overwhelmingly positive. The increase in installation rates from the In-kit Survey results to the Follow-up Survey results show a marked improvement over time. Highlights include:



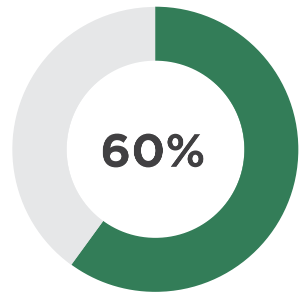
In-kit surveys reporting all 9 LED Light Bulbs installed.



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	
169,707,793	gallons of water saved*
6,169,817	kWh of electricity saved**
109,901	therms of gas saved

PROJECTED LIFETIME SAVINGS	
1,417,173,519	gallons of water saved*
69,411,935	kWh of electricity saved**
219,803	therms of gas saved

PROJECTED ANNUAL SAVINGS PER HOME	
10,362	gallons of water saved*
156	kWh of electricity saved**
3	therms of gas saved

PROJECTED LIFETIME SAVINGS PER HOME	
86,529	gallons of water saved*
1,750	kWh of electricity saved**
6	therms of gas saved

*Assuming 100% Installation rate.
**Totals do not include kWh savings from the Shower Timer measure at Idaho Power's request.

"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

AMCG Direct-to-Customer Programs

For more than 26 years, AM Conservation Group (AMCG) 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 AMCG programs feature a proven blend of innovative education and comprehensive implementation services.

AMCG 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, AMCG 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.

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 from Idaho Power	20,055	50.56%
Email from Idaho Power	14,377	36.24%
Friend or Family	1,041	2.62%
Idaho Power employee	932	2.35%
Info in bill	870	2.19%
Idaho Power website	645	1.63%
Other	483	1.22%
Direct mail from Idaho Power, Email from Idaho Power	433	1.09%
No answer	171	0.43%
Facebook/Twitter	148	0.37%
Friend or Family, Email from Idaho Power	110	0.28%
Direct mail from Idaho Power, Friend or Family	66	0.17%
Idaho Power employee, Other: Mowla	64	0.16%
Idaho Power employee, Other: CSA Hinges	51	0.13%
Other: Radio	45	0.11%
Direct mail from Idaho Power, Info in bill, Email from Idaho Power	38	0.10%
Direct mail from Idaho Power, Info in bill	34	0.09%
Info in bill, Email from Idaho Power	31	0.08%
Idaho Power website, Friend or Family	28	0.07%
Direct mail from Idaho Power, Friend or Family, Email from Idaho Power	24	0.06%
Direct mail from Idaho Power, Idaho Power website, Email from Idaho Power	21	0.05%
TOTALS	**39,667**	**100%**

Those in eligible households opting-in to receive the energy-saving kit utilized one of three primary methods:

1. AMCG 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. AMCG 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 9,937 participating households, representing an average response rate of 25% of the 39,667 energy-saving kits distributed. A monthly drawing for a $100 gift card provided the incentive for returning the household installation surveys.

ENROLLMENTS BY		%
Postcards	8,727	22%
Website	30,940	78%


QUICK START GUIDE
Español en el otro lado
IDAHO POWER
An IDACORP Company
START SAVING NOW!
1 Install the energy-efficient products in your kit.
2 Follow the energy-saving tips provided in this Quick Start Guide.
3 For additional ways to save, visit idahopower.com/save2day.
117419

Idaho Power Energy-Saving Kit Program Materials

Each participating household received an energy-saving kit containing efficiency measures for their homes and a Quick Start Guide with energy efficiency information and behavioral tips. The materials were customized for Idaho Power. Households with electric water heating received an electric kit (including water-saving measures). Households with other water heating options received a non-electric kit (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.
2. Follow the energy-saving tips provided in the quick start guide.
3. Enter your name and address below.
4. Return this survey for a chance to win a $100 gift card
(Postage-paid envelope included)
Fill in each bubble completely
Use a black pen to fill in the bubble next to the correct answer.
YES
NO
Name:
Address:
IDAHO POWER
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 AMCG 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 AMCG'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.

"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

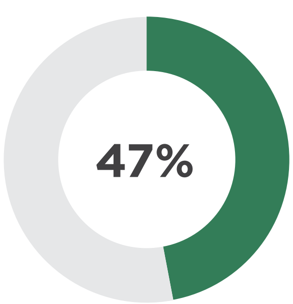
Idaho Power Energy-Saving Kit Program Impact

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.

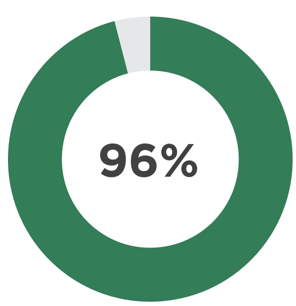
A. Home Survey and Retrofit Data

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.

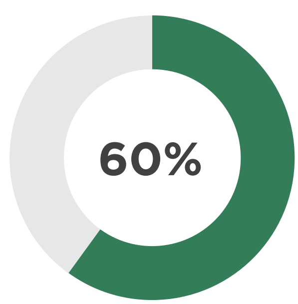
Did you install ALL 9 LED Light Bulbs?	**Yes - 47%**
Did you install the LED Night Light?	**Yes - 96%**
Did you install the Evolve TSV & Showerhead?	**Yes - 60%**
Did you use the Shower Timer?	**Yes - 57%**



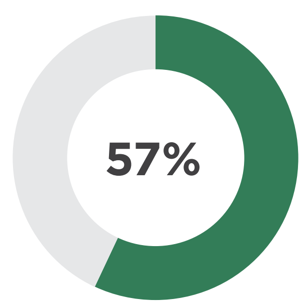
Reported households with ALL 9 LED Light Bulbs installed.



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:	**39,667**		
Number of Electric Only Participants:	**16,378**		
Number of Non-Electric Participants:	**23,289**		
	Annual	**Lifetime**	
Projected reduction from Showerhead retrofit:	**77,814,546**	**778,145,462**	gallons
Measure Life: **10 years**	**1,878,884**	**18,788,842**	kWh
Projected reduction from Shower Timer installation:	**34,988,052**	**69,976,104**	gallons
Product Life: **2 years**	**2,399,402**	**4,798,804**	kWh
	109,901	**219,803**	therms
Projected reduction from Kitchen Faucet Aerator retrofit:	**33,084,416**	**330,844,159**	gallons
Measure Life: **10 years**	**603,366**	**6,033,655**	kWh
Projected reduction from Bathroom Faucet Aerator retrofit:	**23,820,779**	**238,207,794**	gallons
Measure Life: **10 years**	**723,252**	**7,232,525**	kWh
Projected reduction from **9**-watt LED Light Bulbs:	**1,658,874**	**21,731,249**	kWh
Measure Life: **13.1 years**			
Projected reduction from **6**-watt LED Light Bulbs:	**829,437**	**10,865,624**	kWh
Measure Life: **13.1 years**			
Projected reduction from LED Night Light:	**476,000**	**4,760,040**	kWh
Measure Life: **10 years**			
TOTAL PROJECTED PROGRAM SAVINGS*:	**169,707,793**	**1,417,173,519**	gallons
	6,169,817	**69,411,935**	kWh
	109,901	**219,803**	therms
TOTAL PROJECTED PROGRAM SAVINGS PER HOUSEHOLD*:	**10,361.94**	**86,529.10**	gallons
	156	**1,750**	kWh
	3	**6**	therms

**Totals do not include kWh savings from the Shower Timer measure at Idaho Power's request.*

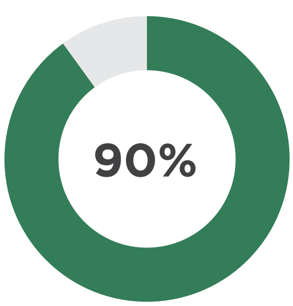
C. Participant Response

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.

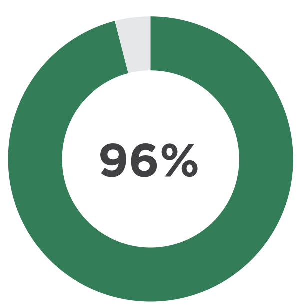
SURVEY TYPE	KITS SHIPPED	IN-KIT SURVEYS RECEIVED	IN-KIT SURVEY RESPONSE %	FOLLOW-UP SURVEYS RECEIVED*	FOLLOW-UP SURVEY RESPONSE%*
Electric	16,378	1,488	9%	2,542	16%
Non-Electric	23,289	2,749	12%	3,158	14%
TOTAL	39,667	4,237	10%	5,700	15%

Includes Q4 2018 served, excludes Follow-up Surveys from Q4 2019 due to three month survey distribution.

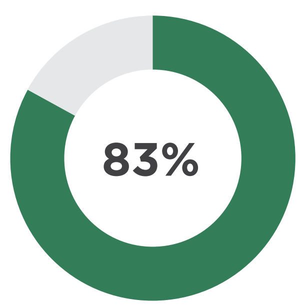
How satisfied were you with the kit ordering process? **Very Satisfied - 93%**
Did you receive your kit within 3 weeks? **Yes - 96%**
How likely would you be to tell a friend or family member to order a kit? **Very Likely - 83%**
How likely are you to participate in another energy efficiency program? **Very Likely - 77%**



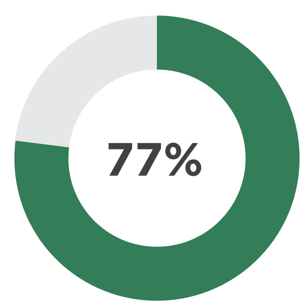
Reported households that were very satisfied with the ordering process.



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.

*An Electric Kit.

Appendices

Appendix A

Appendix B

Appendix C

Projected Savings from 9-watt LED Retrofit

9-watt LED Light Bulb retrofit inputs and assumptions:

Lamps per participant:	**6**	
Number of participants:	**39,667**	
Deemed savings per lamp (kWh):	**6.97**	kWh[1]
Measure life:	**13.1**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**1,658,874**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**21,731,249**	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:	**39,667**	
Deemed savings per lamp (kWh):	**6.97**	kWh[1]
Measure life:	**13.1**	years[1]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**829,437**	kWh[2]
The LED retrofit projects a **lifetime** reduction of:	**10,865,624**	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:	**16,378**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.21**	[1]
Deemed Savings:	**114.72**	[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:	**1,878,884**	kWh[5]
TSV Combo showerhead retrofit projects a **lifetime** reduction of:	**18,788,842**	kWh[5]
Potential Water Savings with 100 Percent Installation:		
TSV Combo showerhead retrofit projects an **annual** reduction of:	**77,814,546**	gallons[4]
TSV Combo showerhead retrofit projects a **lifetime** reduction of:	**778,145,462**	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).*

Appendix A

Projected Savings from Kitchen Faucet Aerator Retrofit

Kitchen Faucet Aerator retrofit inputs and assumptions:

Kitchen Faucet Aerator per electric DHW kit:	**1**	
Number of electric DHW participants:	**16,378**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.21**	[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:	**603,366**	kWh[4]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**6,033,655**	kWh[5]

Potential Water Savings with 100 Percent Installation:

Kitchen Faucet Aerator retrofit projects an **annual** reduction of:	**33,084,416**	gallons[6]
Kitchen Faucet Aerator retrofit projects a **lifetime** reduction of:	**330,844,159**	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:	**16,378**	
Domestic electric hot water reported:	**100%**	[1]
Number of people per household:	**2.21**	[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:	**723,252**	kWh[4]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**7,232,525**	kWh[5]

Potential Water Savings with 100 Percent Installation:

Bathroom Faucet Aerator retrofit projects an **annual** reduction of:	**23,820,779**	gallons[6]
Bathroom Faucet Aerator retrofit projects a **lifetime** reduction of:	**238,207,794**	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).*

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:	**12.00**	kWh per year
Energy saved over life expectancy:	**120.00**	kWh
Installation / participation rate of:	**94.69%**	[3]
Number of participants:	**39,667**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**476,004**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**4,760,040**	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:	**47.81%**	[1]
% of water heated by electricity:	**52.19%**	[1]
Installation / participation rate of Shower Timer:	**53.04%**	[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:	**39,667**	[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:	**34,988,052**	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	**69,976,104**	gallons[7]

Projected Electricity Savings:

Shower Timer installation projects an **annual** reduction of:	**2,399,402**	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	**4,798,804**	kWh[9]

Projected Natural Gas Savings:

Shower Timer installation projects an **annual** reduction of:	**109,901**	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	**219,803**	therms[11]

1. *Data Reported by Program Participants.*
2. *Average of the baseline GPM and the retrofit GPM*
3. *(March 4, 2010). EPA WaterSense® Specification for Showerheads Supporting Statement. Retrieved from http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf*
4. *Provided by manufacturer.*
5. *Navigant EM&V Report for Super Savers Program in Illinois PY7*
6. *Annual water savings = Water Flow (Average of baseline and retrofit flow) × (Baseline Shower duration - Shower Timer duration) × Participants × Days per year × SPCD × Installation Rate of Shower Timer*
7. *Projected Annual Water Savings x Product Life*
8. *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Participants*
9. *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.18 kWh/gal x % of Water Heated by Electricity x Product Life x Participants*
10. *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Participants*
11. *Projected Annual Water Savings x Percent of Water that is Hot Water x 0.009 Therms/gal x % of Water Heated by Natural Gas x Product Life x Participants*

Enrollment Survey Response Summary

1 How is the water heated in your home?

Electricity	52%
Gas	47%
Other	1%

2 Do you own or rent your home?

Own	62%
Rent	38%

3 What is the primary method of heating your home?

Gas forced air	49%
Heat pump	9%
Electric forced air	26%
Baseboard or ceiling cable	11%
Other	6%

4 What is the primary method of cooling your home?

Central A/C	65%
Window A/C	23%
Heat pump	4%
Other	3%
None	6%

5 What, if any, energy-saving improvements are you planning to make in the next two years?

Windows	20%
Furnace or A/C	13%
Insulation	8%
Appliances	22%
Smart thermostat	22%
Other	15%

6 How did you hear about this kit offering?

Direct mail from Idaho Power	52%
Email from Idaho Power	37%
Friend or Family	3%
Idaho Power employee	2%
Info in bill	2%
Idaho Power website	2%
Other	1%
Blank	1%

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	62%
Apartment, Condo, Townhouses, or Multi-family with 2-3 units	17%
Apartment, Condo, Townhouses, or Multi-family with 4 or more units	15%
Mobile/Manufactured home	5%
2 How many people live in your home?	
5 or more	8%
4	11%
3	14%
2	39%
1	25%
3 How many of the LEDs did you install?	
All of them	41%
7-8	5%
5-6	16%
3-4	18%
1-2	10%
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	22%
Stored for later use	68%
Gave them to someone else	4%
Other _________	7%
5 Have you installed the Evolve Showerhead?	
Yes	45%
Not yet, but will	41%
No, won't use	14%
6 Have you installed the Kitchen Faucet Aerator?	
Yes	51%
Not yet, but will	31%
No, won't use	18%
7 Have you installed the Bathroom Faucet Aerator #1?	
Yes	53%
Not yet, but will	35%
No, won't use	12%
8 Have you installed the Bathroom Faucet Aerator #2?	
Yes	36%
Not yet, but will	38%
No, won't use	27%

Due to rounding of numbers, percentages may not add up to 100%

In-Kit Survey Response Summary *(continued)*

9 Have you used the LED Night Light?	
Yes	88%
Not yet, but will	10%
No, won't use	2%
10 Have you used the Shower Timer?	
Yes	53%
Not yet, but will	32%
No, won't use	14%
11 Have you used the Flow-Rate Test Bag to test the flow rate of your shower or faucets?	
Yes	26%
Not yet, but will	56%
No, won't use	18%
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	20%
< 121 F	23%
Did not check water temperature	43%
13 Did you adjust the temperature of your electric water heater?	
Yes, I lowered it	12%
Yes, I raised it	3%
No, I did not adjust	85%
14 Did you adjust the temperature of your refrigerator?	
Yes, I lowered it	29%
Yes, I raised it	14%
No, I did not adjust	57%
15 Did you adjust the temperature of your freezer?	
Yes, I lowered it	24%
Yes, I raised it	11%
No, I did not adjust	65%
16 How satisfied were you with the kit ordering process?	
Very satisfied	90%
Somewhat satisfied	9%
Somewhat dissatisfied	0%
Very dissatisfied	1%
17 Did you receive your kit within 3 weeks?	
Yes	96%
No	4%

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	83%
Somewhat likely	15%
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	50%
No	50%

20 Have you ever gone to Idaho Power's website to look for information about energy efficiency programs and incentives?

Yes	36%
No	64%

21 How likely are you to participate in another energy efficiency program?

Very likely	77%
Somewhat likely	20%
Somewhat unlikely	2%
Very unlikely	1%

Due to rounding of numbers, percentages may not add up to 100%

Follow-Up Survey Response Summary

1	Did you install the LEDs received in your kit?	
	Yes, I installed all of them	47%
	Yes, I installed some of them	47%
	No, I didn't install any of them	6%
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	43%
3	Have you installed the Evolve Showerhead?	
	Yes	60%
	No, won't use	40%
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	64%
	No, won't use	36%
6	Have you installed the Bathroom Faucet Aerator #2?	
	Yes	47%
	No, won't use	53%
7	Have you used the LED Night Light?	
	Yes	96%
	No, won't use	4%
8	Have you used the Shower Timer?	
	Yes	57%
	No, won't use	43%
9	Have you used the Flow-Rate Test Bag to test the flow rate of your shower or faucets?	
	Yes	37%
	No, won't use	63%
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	41%
	No	59%

Follow-Up Survey Response Summary *(continued)*

12	After receiving the kit, did you reduce the temperature of your water heater?	
	Yes	25%
	No	75%
13	Did you review and/or complete the Mini Home-Assessment included in the kit?	
	Yes	68%
	No	32%
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	35%
	No	65%

Idaho Cities & Towns Served

IDAHO CITIES & TOWNS SERVED		
ABERDEEN	GRAND VIEW	NOTUS
AMERICAN FALLS	GREENLEAF	OAKLEY
ARBON	HAGERMAN	OLA
ATOMIC CITY	HAILEY	OREANA
BELLEVUE	HAMMETT	PARMA
BLACKFOOT	HANSEN	PAUL
BLISS	HAZELTON	PAYETTE
BOISE	HEYBURN	PICABO
BRUNEAU	HILL CITY	PINE
BUHL	HOLLISTER	PINGREE
BURLEY	HOMEDALE	PLACERVILLE
CALDWELL	HORSESHOE BEND	POCATELLO
CAMBRIDGE	IDAHO CITY	POLLOCK
CAREY	INDIAN VALLEY	RICHFIELD
CARMEN	INKOM	RIGGINS
CASCADE	JEROME	ROCKLAND
CASTLEFORD	KETCHUM	ROGERSON
CHUBBUCK	KIMBERLY	RUPERT
COBALT	KING HILL	SALMON
CORRAL	KUNA	SHOSHONE
COUNCIL	LEADORE	STAR
DIETRICH	LEMHI	STERLING
DONNELLY	LETHA	SUN VALLEY
EAGLE	LOWMAN	SWEET
EAST MAGIC	MARSING	TENDOY
EDEN	MCCALL	TWIN FALLS
EMMETT	MELBA	WEISER
FAIRFIELD	MERIDIAN	WENDELL
FEATHERVILLE	MESA	WEST MAGIC
FILER	MIDDLETON	WILDER
FORT HALL	MIDVALE	SWEET
FRUITLAND	MOUNTAIN HOME	TENDOY
FRUITVALE	MURPHY	TRIUMPH
GARDEN CITY	MURTAUGH	TWIN FALLS
GARDEN VALLEY	NAMPA	WEISER
GIBBONSVILLE	NEW MEADOWS	WENDELL
GLENNS FERRY	NEW PLYMOUTH	WEST MAGIC
GOODING	NORTH FORK	WILDER
TOTAL NUMBER OF CITIES & TOWNS SERVED: 106		
TOTAL NUMBER OF HOUSEHOLDS SERVED: 38,571		

Oregon Cities & Towns Served

OREGON CITIES & TOWNS SERVED		
ADRIAN	HEREFORD	OXBOW
AROCK	HUNTINGTON	RICHLAND
BROGAN	JAMIESON	UNITY
DREWSEY	JORDAN VALLEY	VALE
HALFWAY	NYSSA	WESTFALL
HARPER	ONTARIO	
TOTAL NUMBER OF CITIES & TOWNS SERVED: 17		
TOTAL NUMBER OF HOUSEHOLDS SERVED: 1,096		

Idaho Power Regions Served

REGIONS (IDAHO)	ELECTRIC	NON-ELECTRIC
CANYON	3,573	7,086
CAPITAL	5,638	9,439
EASTERN	2,197	2,149
SOUTHERN	2,337	2,523
WESTERN	1,904	1725
NUMBER OF HOUSEHOLDS IMPACTED:	15,649	22,922
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	38,571	

REGIONS (OREGON)	ELECTRIC	NON-ELECTRIC
CANYON	12	1
WESTERN	717	366
NUMBER OF HOUSEHOLDS IMPACTED:	729	367
TOTAL NUMBER OF HOUSEHOLDS IMPACTED:	1,096	

AM Conservation Group

080-0052-10-00 IP DTC

2020 Flex Peak Program
End-of-Season Annual Report

January 10, 2021

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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 2020 Program season, the Company's sixth year of operating the Program. In its sixth year, the Program had a decrease in load reduction and realization rates from the prior year (2019) which are explained in later detail within this report. There were no new sites added, and overall participation resulted in the highest hourly load reduction for the season of 24.2 megawatts (MW). The average realization rate for the three load reduction events that occurred in the 2020 Program season was 65%. Enrollment in the Program decreased slightly for the 2020 Program season and 98% of previously participating sites re-enrolled in the Program. The total Program costs through December 31, 2020 were $541,350 The cost of having this resource available was $22.55 per kilowatt (kW) based on the maximum demand reduction of 24.2 MW achieved on July 16, 2020.

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

[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 under contract
- MW of demand response realized and incented per dispatch
- Percent of nominated MW achieved in each dispatch event by participant
- Cost analysis of the Program
- Number of events called
- Total load dropped for each event
- Event duration
- Total capacity payments made
- Total energy payments made
- Number of customers who failed to meet their load
- Number of Program applications denied due to Program subscription limit
- 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.
- 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.

[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.

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 2020. The first event occurred on July 16, the second on July 30, and the third on August 5. The maximum realization rate achieved during the season was 68% during the event on July 16 and the average for all three events combined was 65%. 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 16 event at 24.2 MW.

Participants had a committed load reduction of 35.8 MW in the first week of the Program season. This was a small decrease from the 2019 season at 36.3 MW. This weekly commitment, or "nomination", was comprised of customers participating in the Program totaling 141 sites. All these sites participated in the 2019 season. The committed load reduction at the end of the season was 35.94 MW. The maximum available capacity of the program came from a nominated amount in week seven of the season at 36.05 MW. Past years certain events have achieved higher than a 100% realization rate which would make this the maximum potential available capacity for the program.

The first event was called on Thursday, July 16. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 35.8 MW. The average load reduction was 23.6 MW. The highest hourly load reduction was 24.2 MW during hour two. The realization rate for this event was 66%.

The second event was called on Thursday, July 30. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 36.05 MW. The average load reduction was 22.3 MW. The highest hourly load reduction was 23 MW during hour three. The realization rate for this event was 62%.

The third event was called on Wednesday, August 5. Participants were notified at 2 p.m. for a four-hour event from 4-8 p.m. The total nomination for this event was 35.9 MW. The average load reduction was 23.6 MW. The highest hourly load reduction was 23.9 MW during hour two. The realization rate for this event was 66%.

Enrollment specific to the Oregon service area included five participants totaling eight sites enrolled. These eight sites had an average nominated capacity for the season of 11.4 MW and achieved a maximum reduction during the season of 9.9 MW during hour three on the July 30 event.

Participation

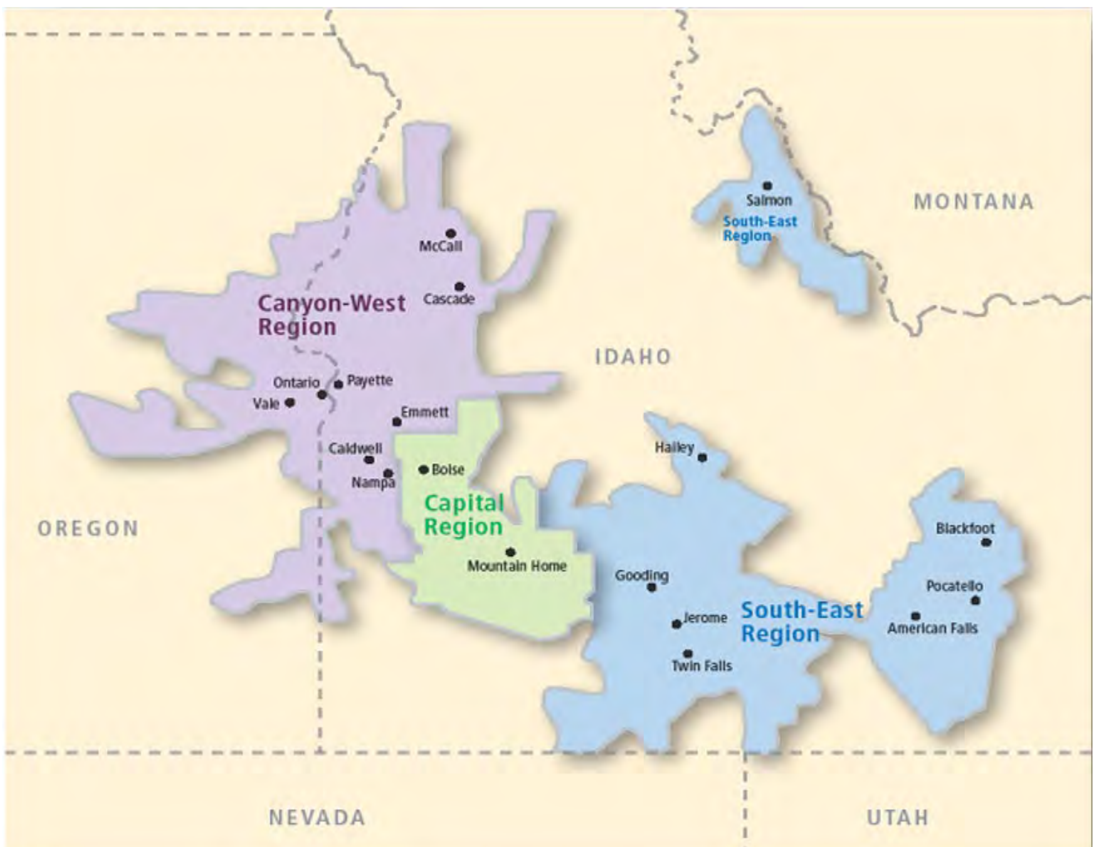
The number of sites enrolled in the Program for 2020 was 141 from 62 participants. The average number of sites enrolled per participating customer was 2.3. The Program did not experience significant attrition and re-enrollment in the Program was high as 141 of the 145 sites participating from the prior season re-enrolled. Four sites did not re-enroll from the 2019 season. One site reduced its operating hours significantly which no longer made it a good program candidate, one site had some significant construction upgrades and changes during the Summer that was not conducive to participating. The remaining two sites had disenrolled in 2019 midway through the season and chose not to sign up in 2020.

This past season Idaho Power continued the auto-enrollment option where existing participants were re-enrolled in the Program automatically and a confirmation packet was mailed 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 process has proven to be 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 2019 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 2020.

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.



[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 2 represents the enrolled capacity (total nominations) that were enrolled in 2020 and the distribution by Idaho Power's regional service areas.

Figure 2.

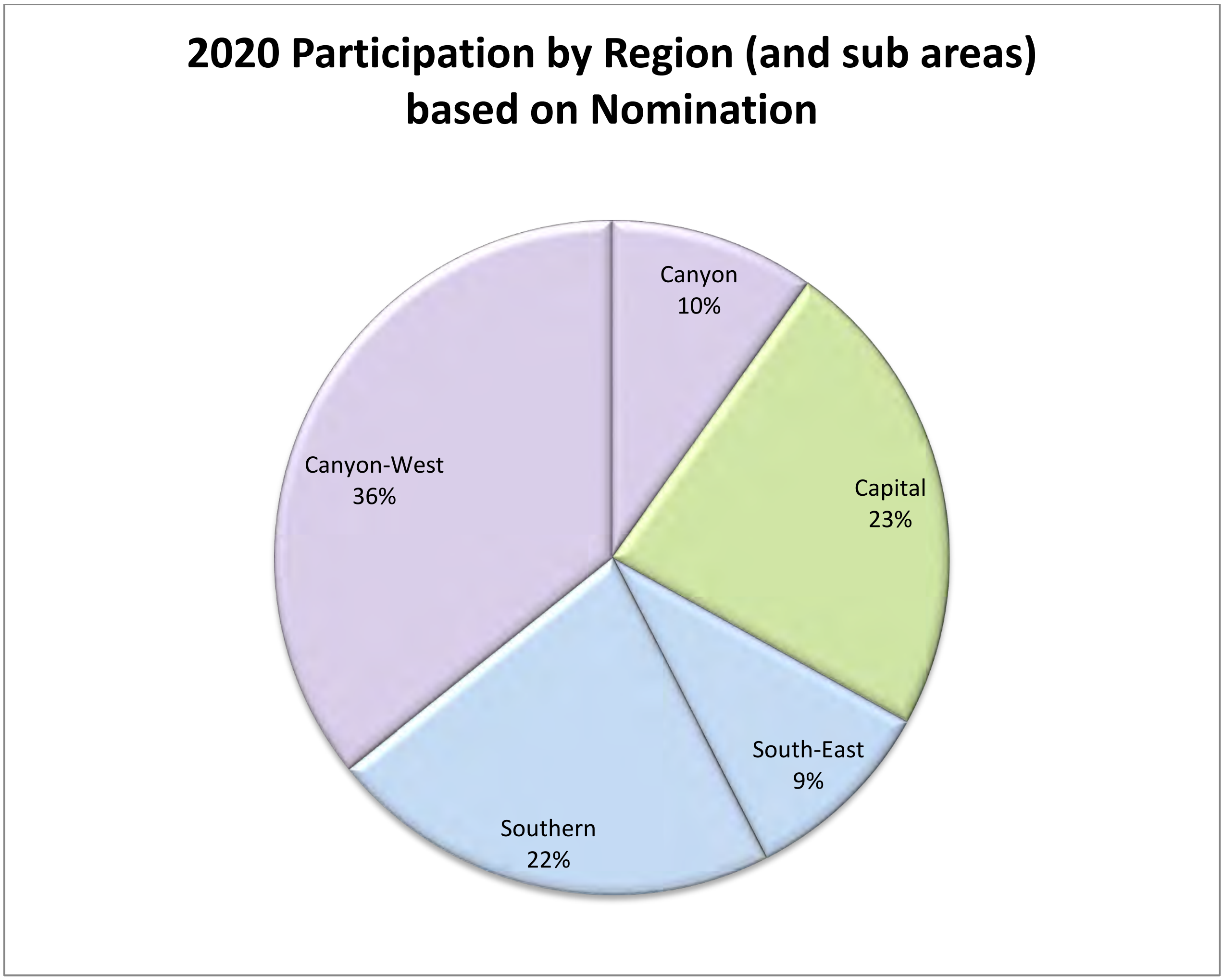
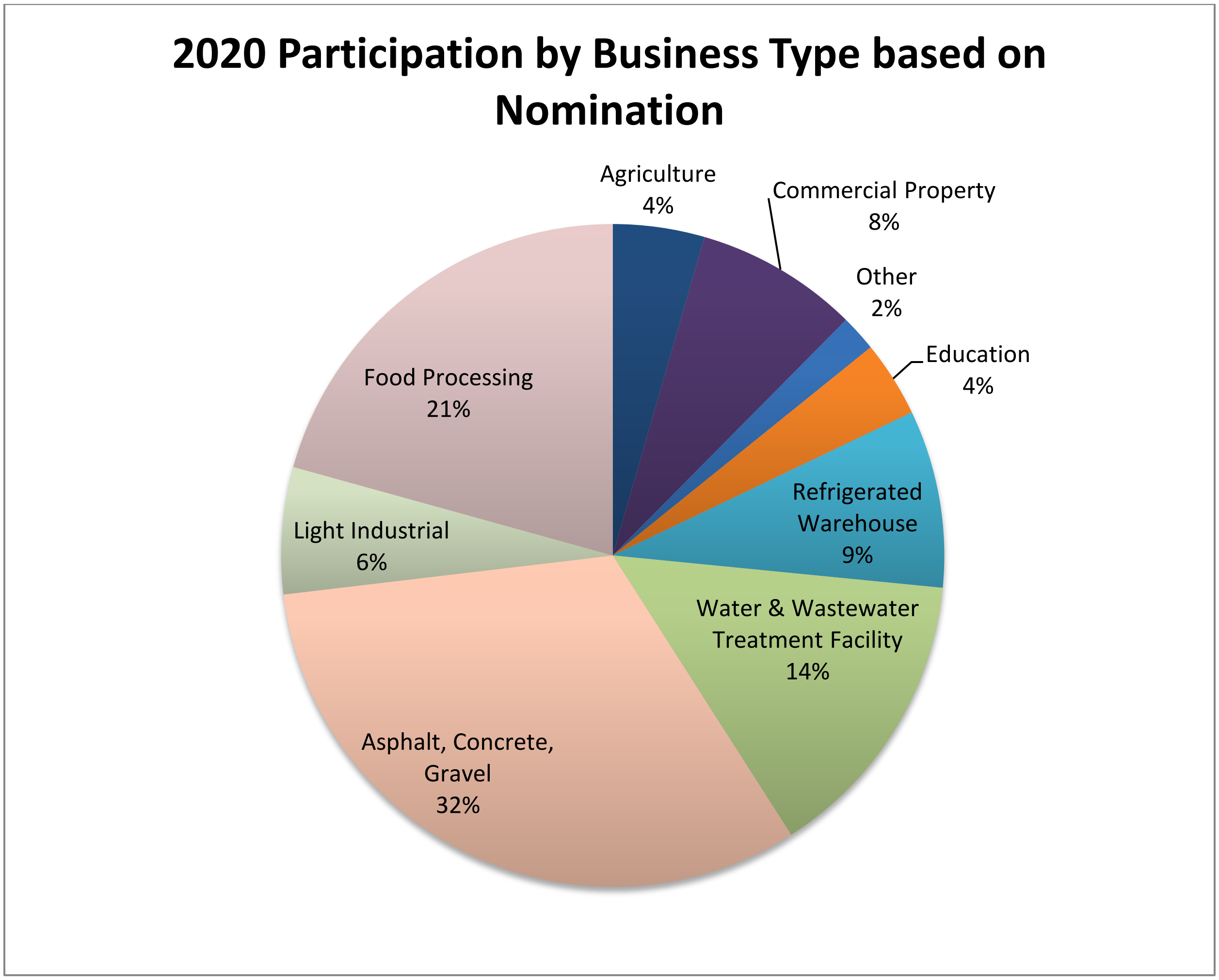


Figure 3 represents the enrolled capacity in 2020 and the diversity based on business type.

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 2020 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. For the 2021 program year Idaho Power will issue an RFP for a third-party impact evaluation to be conducted.

The baseline methodology used in 2020 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% 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 nomination group with the most sites was in the 0-50 kW range, accounting for approximately 38% of the sites.

Figure 4.

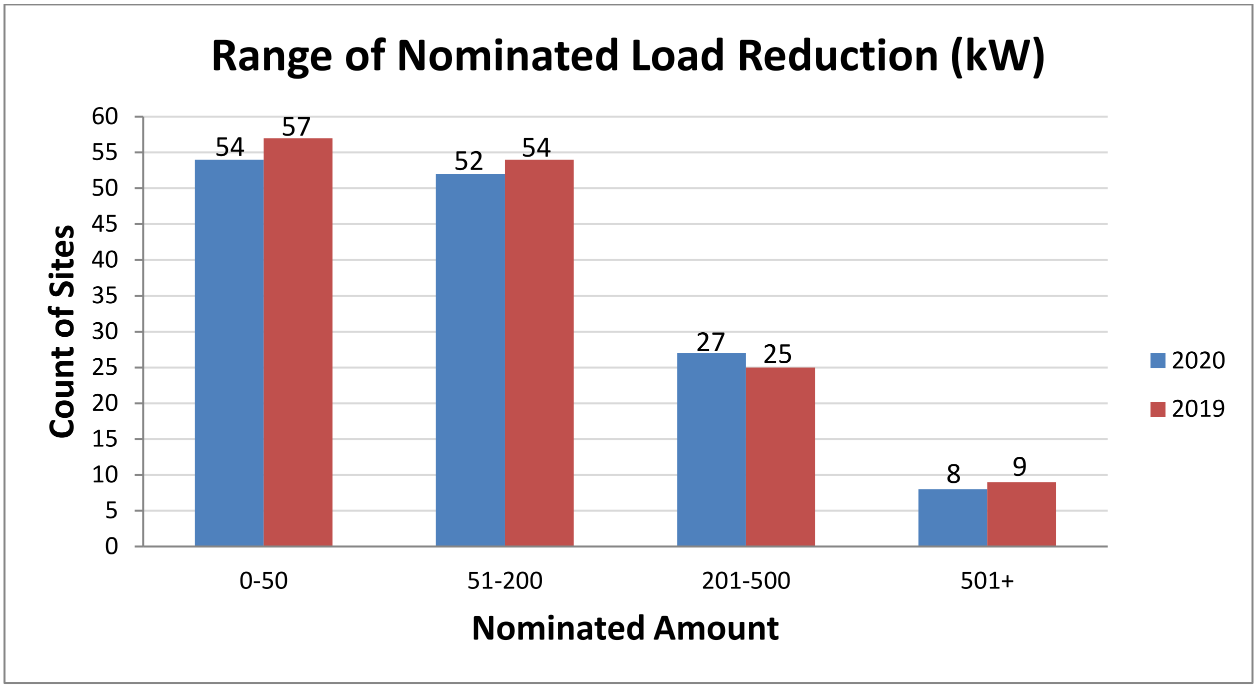


Table 2 shows the Program realization rates for 2020 based on average load reduction per event.

Table 2.

Curtailment Event	**Event Timeframe**	**Nominated Demand Reduction**	**Average Demand Reduction (MW)**	**Max Demand Reduction (MW)**	**Realization Rate***
July 16	4-8 pm	35.8	23.6	24.2	66%
July 30	4-8 pm	36	22.3	23	62%
August 5	4-8 pm	35.9	23.6	23.9	66%
Average		35.9	23.2	23.7	65%

** 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 23 MW for the July 30 event to a high of 24.2 MW for the July 16 event. The July 30 event's average of 22.3 MW reduction achieved a realization rate of 62%, while the August 5 event's average of 23.6 MW reduction achieved a realization rate of 66%. Combined, the three events had an average realization rate of 65%.

Event performance and realization rates for the 2020 season were significantly reduced due to the impact of COVID-19 on customer's operations and ability to reduce load. Typically, we achieve a realization rate of 85% or greater in past seasons. COVID19 had a significant impact on reduction results. This year, many customers did not reduce energy use during program events because they were trying to increase production and recoup revenue after having been shut down for several months prior to the program season.

Many national account big box stores and HVAC dependent businesses were not able to curtail load due to increased outside air (OSA) requirements and using more energy to meet air quality with facilities. Buildings increased their outside air requirements for HVAC to reduce stagnant air that may circulate the virus inside buildings so more airflow from outside was added. The Idaho Power Corporate Headquarters was a prime example. This facility used more energy all summer than normal due to increased OSA and then having to cool that air down. Nationally, commercial and industrial demand response was impacted significantly based on industry studies from the Peak Load Management Alliance.

Figure 5.

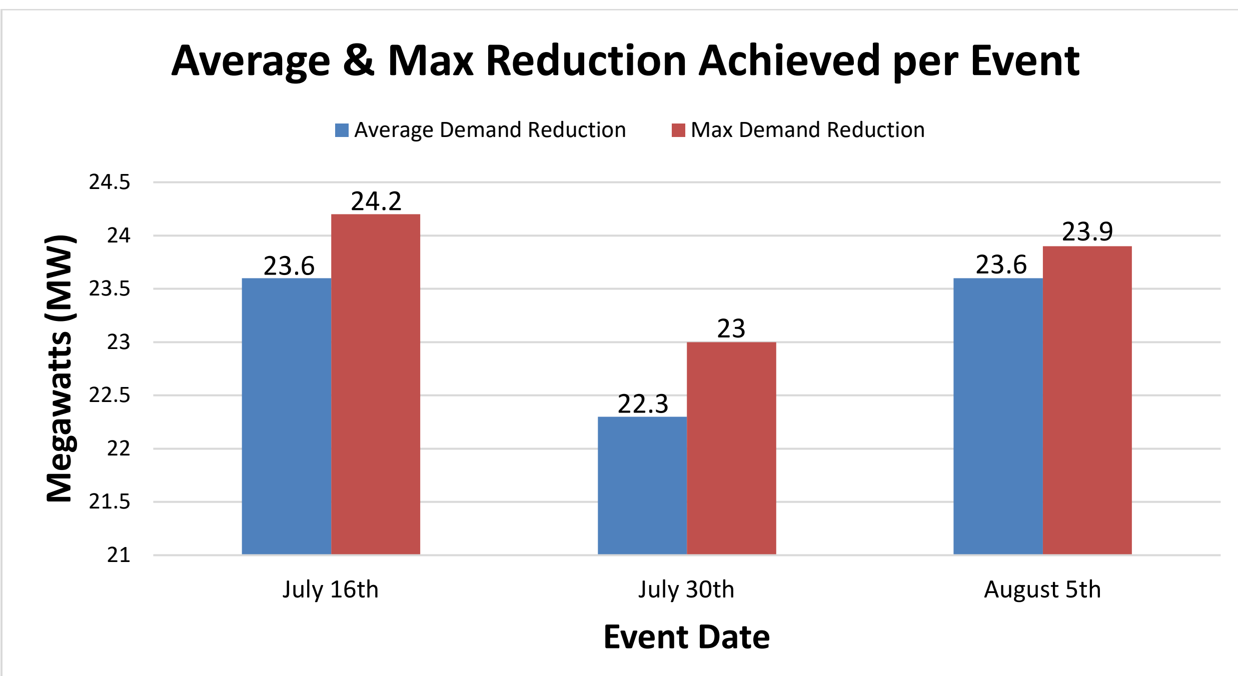


Table 3 shows the realization rate for each participant in the Program for 2020.

Table 3.

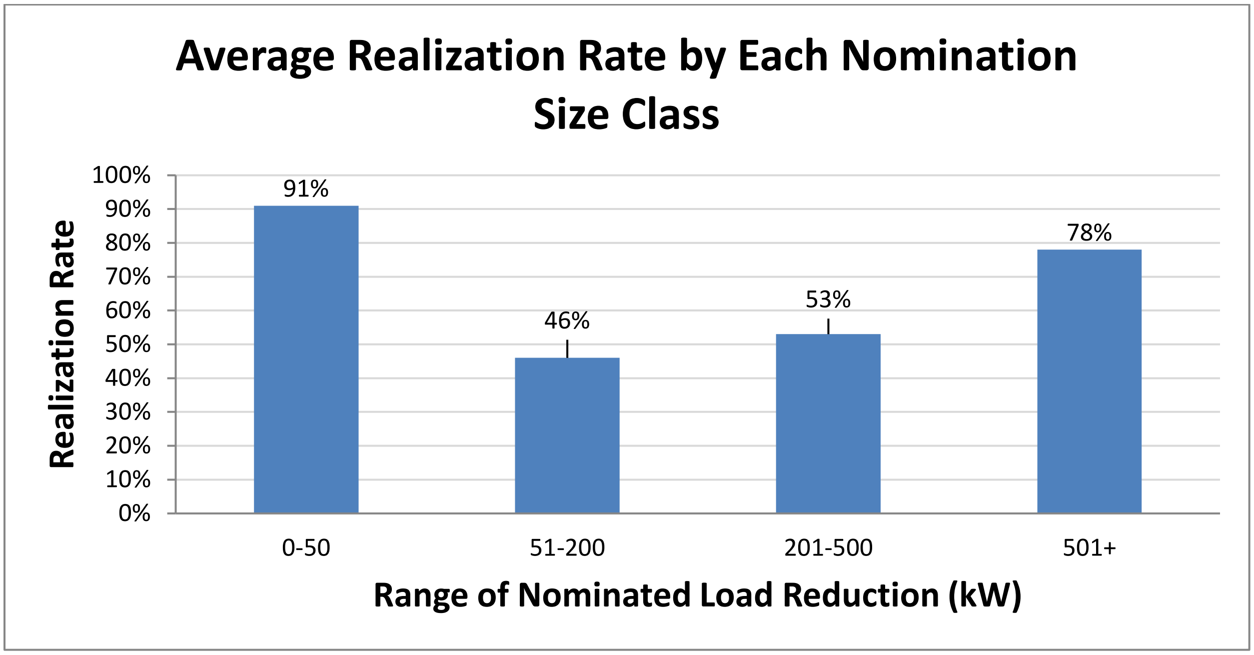
Participant Number	July 16 Event Realization	July 30 Event Realization	August 5 Event Realization	Season Realization
1	56%	57%	68%	60%
2	106%	117%	58%	94%
3	98%	57%	36%	64%
4	47%	110%	46%	68%
5	91%	45%	34%	57%
6	1%	1%	9%	4%
7	156%	91%	105%	117%
8	24%	13%	12%	16%
9	141%	116%	119%	125%
10	135%	161%	282%	193%
11	1%	9%	10%	7%
12	49%	42%	41%	44%
13	10%	90%	84%	61%
14	13%	63%	11%	29%
15	111%	127%	96%	111%
16	99%	2%	2%	34%
17	26%	36%	11%	24%
18	132%	64%	104%	100%
19	88%	95%	92%	91%
20	76%	51%	8%	45%
21	186%	159%	299%	214%
22	28%	51%	53%	44%
23	82%	28%	0%	37%
24	140%	46%	13%	66%
25	124%	90%	116%	110%
26	1%	6%	0%	2%
27	41%	20%	0%	20%
28	55%	255%	289%	200%
29	0%	0%	0%	0%
30	107%	127%	125%	120%
31	35%	58%	23%	39%
32	48%	20%	0%	22%
33	13%	477%	1201%	564%
34	0%	30%	4%	11%

Participant Number	July 16 Event Realization	July 30 Event Realization	August 5 Event Realization	Season Realization
35	107%	37%	44%	63%
36	10%	0%	0%	3%
37	106%	0%	0%	35%
38	59%	63%	0%	41%
39	20%	16%	22%	19%
40	286%	168%	148%	201%
41	292%	60%	37%	130%
42	5%	61%	20%	29%
43	0%	0%	1%	0%
44	63%	2%	162%	75%
45	93%	74%	108%	91%
46	8%	10%	99%	39%
47	8%	28%	47%	28%
48	0%	0%	74%	25%
49	0%	22%	1%	8%
50	1%	0%	178%	60%
51	1%	19%	0%	7%
52	16%	7%	0%	8%
53	0%	0%	18%	6%
54	50%	12%	37%	33%
55	28%	32%	5%	21%
56	104%	103%	121%	109%
57	120%	93%	106%	107%
58	66%	74%	98%	79%
59	14%	39%	25%	26%
60	29%	14%	23%	22%
61	73%	95%	55%	75%
62	3%	1%	9%	4%

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 91%. The 0-50 kW group had the largest portion of sites enrolled in the Program, totaling 54 sites which accounted for 38% of total enrolled sites. The second smallest size class, 51–200 kW, had 52 sites enrolled and achieved the lowest average realization rate at 46%. The 201-500 kW group had 27 sites enrolled and achieved a realization rate of 53%. The largest size class, 501+ kW, had eight sites enrolled and achieved the highest average realization rate across the three events at 78%. 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. This trend with the smallest group and largest group performing above the middle segments has been apparent for several seasons now.

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 for 2020 totaled $542,480. Incentive payments were the largest expenditure comprising approximately 83% of total costs.

The incentive payments from the three events called during the 2020 Program season were broken down as follows: the fixed capacity payments total was $450,450 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.

The total Program costs for 2020 are estimated to be $22.42 per kW based on the maximum demand reduction of 24.2 MW, or $23.38 per kW, based on average load reduction for the season of 23.2 MW.

Table 4 below displays the 2020 Program costs by expense category.

Table 4.

Expense Category	2020 Program Costs
Materials & Equipment	$960
Marketing & Administration	$91,071
Incentive payments	$450,450
Total	**$542,480**

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 2020, the cost of operating all three of Idaho Power's DR programs was $7.7 million. It is estimated that if the three programs were dispatched for the full 60 hours, the total costs would have been approximately $10.9 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 2020 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.

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.

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 2020 Annual Report when all the data will be available.

Program Marketing

Though the terms of IPUC Order No. 32923 and OPUC Order No. 13-482 do not require program marketing, Idaho Power energy advisors regularly communicate with current participants and encourage them to enroll new sites. The Flex Peak Program also continued to be included in the C&I Energy Efficiency Program collateral.

Customer Satisfaction Results

Idaho Power did not conduct a post-season survey this year as one with conducted in 2019 and the program conducts surveys on a three-year cycle.

Program Activities for 2021

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 2021 season will begin in the first quarter of 2021 to encourage participation. Idaho Power will engage with existing participants to discuss past performance and upcoming season details. The Program Specialist has already started working with potential candidates for the 2021 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 continue to be marketed as part of the C&I Energy Efficiency Program. 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 will continue to target enrollment of national chain customers within our service area.

Conclusion

The Program currently contributes approximately 10% 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 $23.38 per kW based on average reduction (23.2 MW) for the season.

An IDACORP Company

Historical DSM Expense and Performance

2002–2020

Historical DSM Expense and Performance, 2002–2020

		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			
2020	22,536	765,020	765,020		19			
Total		**$ 29,832,096**	**$ 29,832,096**					
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			

		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)**
2016	137	767,997	767,997		42			
2017	141	658,156	658,156		36			
2018	140	433,313	433,313		33			
2019	145	626,823	626,823		31			
2020	141	542,480	542,480		24			
Total		**$ 15,427,378**	**$ 15,427,378**					
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			
2020	2,292	6,407,412	6,407,412		292			
Total		**$ 105,503,015**	**$ 105,503,015**					
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

		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)
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**
Easy Savings : Low-Income Energy Efficiency Education								
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
2020	155	9,503	9,503	10,628		3	0.299	0.299
Total	**7,406**	**$ 707,809**	**$ 707,809**	**1,392,934**		**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
2020	97,228	3,106,820	3,106,820	9,481,801		11	0.038	0.038
Total	**467,134**	**$ 15,458,763**	**$ 15,458,763**	**74,345,524**		**11**	**$ 0.024**	**$ 0.024**
Energy Efficiency Packets								
2002	2,925	755	755	155,757		7	0.001	0.001
Total	**2,925**	**$ 755**	**$ 755**	**155,757**		**7**	**$ 0.001**	**$ 0.001**
Energy Efficient Lighting								
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

		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	1,190,139	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
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
2020	1,148,061	1,667,159	3,065,781	13,942,202		14	0.012	0.022
Total	**15,232,422**	**$ 28,572,409**	**$ 60,695,685**	**261,004,362**		**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 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)
2020	51	46,352	46,352	56,944		16	0.075	0.075
Total	**12,430**	**$ 5,913,934**	**$ 5,913,934**	**15,498,312**		**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
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**
Heating & Cooling Efficiency Program								
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

		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)
2019	681	499,179	1,512,183	1,412,183		15	0.028	0.084
2020	1,019	606,559	1,911,792	1,839,068		14	0.033	0.103
Total	**5,616**	**$ 6,364,417**	**$ 16,243,307**	**15,029,782**		**18**	**$ 0.036**	**$ 0.093**
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
2020	97	130,546	130,546	31,938		12	0.448	0.448
Total	**2,652**	**$ 1,659,692**	**$ 1,864,130**	**1,082,033**		**11**	**$ 0.178**	**$ 0.200**
Home Energy Reports 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
2020	127,138	899,203	899,203	10,427,940		1	0.081	0.081
Total	**176,028**	**$ 1,294,421**	**$ 1,294,421**	**22,154,466**		**1**	**$ 0.055**	**$ 0.055**
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**

		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)
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
2020	33	89,829	89,829	28,041		11	0.372	0.372
Total	**2,133**	**$ 653,529**	**$ 653,529**	**1,797,404**		**11**	**$ 0.042**	**$ 0.042**
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
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
2020	0	5,313	5,313	0		45		
Total	**109**	**$ 84,928**	**$ 173,040**	**126,713**		**28**	**$ 0.048**	**$ 0.097**
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

		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	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
2020	116	180,422	437,263	366,678		44	0.031	0.075
Total	**1,368**	**$ 1,458,338**	**$ 3,060,284**	**5,510,739**		**38**	**$ 0.017**	**$ 0.036**
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
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

		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)
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
2020	248	473,504	865,989	649,522		58	0.044	0.081
Total	**5,434**	**$ 6,321,801**	**$ 11,547,422**	**9,814,080**		**34**	**$ 0.043**	**$ 0.079**
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
2020	0	28,490	28,490	52,662		30	0.038	0.038
Total	**12,903**	**$ 864,376**	**$ 864,376**	**123,960**		27	**$ 0.501**	**$ 0.501**
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
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
2020	6,894	99,141	98,629	148,404		12	0.073	0.073
Total	**135,058**	**$ 4,298,280**	**$ 7,308,320**	**10,443,274**		**13**	**$ 0.043**	**$ 0.073**

		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)
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
2020	27	208,715	208,715	47,360		23	0.277	0.277
Total	**1,425**	**$ 10,226,801**	**$ 10,239,011**	**5,372,843**		**24**	**$ 0.143**	**$ 0.143**
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
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

		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	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
2020	115	1,361,163	1,703,879	218,611		30	0.432	0.540
Total	**5,571**	**$ 21,841,003**	**$ 32,773,794**	**30,628,960**		**25**	**$ 0.053**	**$ 0.079**
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
2020	0	24,414	24,414	0		30		
Total	**247**	**$ 723,399**	**$ 1,070,224**	**1,101,093**		**25**	**$ 0.049**	**$ 0.072**

		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	**5,990**	**$ 22,739,672**	**$ 34,174,209**	**32,390,910**		**25**	**$ 0.052**	**$ 0.078**
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
2020	1,379	103,678	103,678	258,368		11	0.047	0.047
Total	**5,660**	**$ 1,081,156**	**$ 1,081,156**	**1,270,132**		**10**	**$ 0.106**	**$ 0.106**
New Construction								
2004		28,821	28,821					

		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	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
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
2020	119	2,383,983	4,175,611	14,565,936		12	0.018	0.031
Total	**1,260**	**$ 25,335,974**	**$ 57,951,566**	**181,555,230**		**12**	**$ 0.015**	**$ 0.035**
Retrofits								
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

		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)
2019	1,033	6,281,056	17,700,769	42,674,418		12	0.013	0.037
2020	630	3,587,277	11,964,431	20,965,215		12	0.019	0.063
Total	**16,543**	**$ 57,208,841**	**$ 134,761,010**	**396,012,003**		**12**	**$ 0.016**	**$ 0.037**
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
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					
2020	2	1,374	1,374					
Total	**238**	**$ 113,271**	**$ 113,271**					

		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)
Oregon School Efficiency								
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**
Small Business Direct Install								
2020	139	339,830	339,830	780,260		9	0.058	0.058
Total	**139**	**$ 339,830**	**$ 339,830**	**780,260**		**9**	**$ 0.058**	**$ 0.058**
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
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
2020	169	18,059,396	41,604,451	94,006,717		15	0.018	0.042
Total	**2,266**	**$ 114,852,657**	**$ 247,638,815**	**778,604,617**		**13**	**$ 0.015**	**$ 0.033**
Green Motors Rewind—Industrial								
2016	14			123,700		7		
2017	13			143,976		7		
2018	25			64,167		7		

		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)
2019	12			117,223		8		
2020	10			56,012		8		
Total	**74**	**$ 0**	**$ 0**	**505,078**		**7**		
Irrigation								
Irrigation Efficiency Rewards								
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
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
2020	1,018	3,401,673	16,857,055	12,847,823		15	0.025	0.125
Total	**13,634**	**$ 37,014,247**	**$ 161,772,127**	**218,967,140**		**8**	**$ 0.025**	**$ 0.108**
Green Motors Rewind—Irrigation								
2016	23			73,617		19		
2017	27			63,783		19		
2018	26			67,676		19		
2019	34			44,705		20		
2020	23			36,147		20		
Total	**133**	**$ 0**	**$ 0**	**285,928**		**19**		

		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)
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**					
Distribution Efficiency Initiative								
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					
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					
2020		1,811,869	1,811,869					
Total		**$ 9,924,588**	**$ 9,924,588**					

		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)**
Local Energy Efficiency Fund								
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					
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								

		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		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		172,215	172,215					
2019		160,851	160,851					
2020		223,731	223,731					
Total		**$ 3,025,287**	**$ 3,025,287**	**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**					
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				

		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)
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	18,368,135				
2020		2,789,210	2,789,210	15,990,638				
Total		**$ 39,513,801**	**$ 39,513,801**	**373,856,184**				
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			
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	203,301,810	332.5			
2020		49,354,064	100,218,669	196,808,914	336.0			
Total Direct Program		**$ 556,367,488**	**$ 999,006,887**	**2,437,208,001**				

		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)
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		$741,287						
2014		1,065,072						
2015		1,891,042						
2016		2,263,893						
2017		2,929,407						
2018		1,335,208						
2019		1,194,640						
2020		1,202,238						
Total		**$ 20,025,416**						
Total Expenses								
2002		2,061,375						
2003		2,528,685						
2004		3,969,550						
2005		6,700,972						
2006		11,484,013						
2007		15,662,377						
2008		21,193,521						
2009		34,846,766						

		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		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						
2020		50,556,303						
Total 2002–2020		**$ 576,392,905**						

[a] Levelized Costs are based on financial inputs from Idaho Power's *2017 Integrated Resource Plan* and calculations include line loss adjusted energy savings.
[b] Program life benefit/cost ratios are provided for active programs only.
[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 May 2021.

ACLARA ACE™

Adaptive Consumer Engagement

Idaho Power Corporation
Home Energy Report Year 3
Final Program Summary

Version 1.3

Updated: 2/26/2021

Table of Contents

Revision History

Date	Version	Description	Author/Editor
12-1-2020	1.0	Initial Draft	Cory Knoll
1-29-2021	1.1	Edited to include full year calculations	Cory Knoll
2-24-2021	1.2	Additional edits/comments	Cory Knoll
2-26-2021	1.3	Final Version	Cory Knoll

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 three Final Program Summary, version 1.3 approved by:

Client Name:	
Name, Title:	
Signature	
Date:	
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Date:	
For Aclara	
Name, Title	
Signature:	
Date:	

Executive Summary

1. 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 pilot program was renewed for a second year in August 2018, with the addition of a second winter heating group and the optimization of existing treatment customers from year one. Year two of the pilot program was extended from August 2019 through February 2020 to ensure continuity of treatment, in preparation for an expansion of the program in year three.

The program was expanded for 3.5 more years—through December 31, 2023--in February 2020 (which is detailed in this report). This expansion planned for the addition of 130,000 more participants; however, during the implementation phase it was determined that 108,424 customers were eligible to be added to the program as treatment participants. As of the launch of this expansion, 18,492 treatment customers from the pilot program remained eligible after optimizing the existing population.

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

2. RESULTS AND FINDINGS

Main takeaways from year three of the program are as follows.

Each existing treatment group saved well over 1%; the new treatment group is ramping up quickly.

[1] Uplight in this case is formerly known as Ecotagious. Ecotagious was acquired by Uplight in August 2019, after the completion of the program.

T1, T2, T3, and T4 were treated throughout the entire program year; T6 started receiving HERs in June 2020. All savings calculations for T1, T2, T3, T4, and T6 factored in only the period of active treatment. T5 savings included an active and an inactive period.

- T1: 1.25% or 267.72 kWh per customer
- T2: 1.76% or 363.31 kWh per customer
- T3: 1.48% or 223.38 kWh per customer
- T4: 3.25% or 339.66 kWh per customer
- T5: 0.49% or 39.67 kWh per customer

- T6: 0.56% or 50.06 kWh per customer

See section 1.3 for definitions of the treatment group.

Collectively, all treatment groups saved .74%

Using a weighted average calculation, these five treatment groups saved 0.74% or 87.03 kWh per customer. In 2020, total savings calculated are 10,316,562 kWh. Although T-5 did not receive reports after February of 2020, when compared with their control group, they showed persistent savings. Including the savings from T5, the overall annual savings from this program are 10,427,940 kWh.

T4 outperformed in savings (%)

Although all treatment groups saw statistically significant savings throughout program year three, T4 had the highest percent savings relative to its respective control group, C4. The T4 treatment group was established in year one of the pilot and had the lowest overall year-round pre-treatment usage of all the remaining active treatment groups, 9,000-12,000 kWh per year. In 2020, T4 and C4 customers had an average total consumption 10,477 kWh compared to an average of 14,237 kWh across all treatment groups.

Email Adoption Rates Remain Low

- 13 total old customers switched to email (0.1%)
- 87 total new customers switched to email (0.08%)

All new treatment customers in 2020 were notified of the option to receive email reports in their welcome letters, yet email adoption remained low throughout the year.

Opt-Out Rates Stayed Below 0.25%

In 2020, 154 participants opted out of the program – a 0.11% opt-out rate (0.05% for existing, quarterly report participants, 0.13% for new, bimonthly participants). From the beginning of the pilot through December 2020, there have been 457 cumulative opt-outs for a cumulative opt-out rate of 0.34%

The overall program opt-out rate was 0.22% in year 2, and 0.64% in year 1.

Reports Delivered in 2020

	Recipients	# Email Reports	# Paper Reports
February	T1, T2, T3, T4, T5	16	20,197
May	T1, T2, T3, T4	11	18,129
June	T6	0	106,947
August	T1, T2, T3, T4, T6	57	123,044
October	T6	75	102,314
November	T1, T2, T3, T4	13	17,350
December	T6	85	100,564
		257	488,545

1 Program Overview

1.1 Team Structure

The IPC Home Energy Report program has been a joint effort between Idaho Power Company, Aclara, and Uplight (formerly Ecotagious) since 2017. Uplight acquired Ecotagious in July of 2019.

Aclara and Uplight have been partnering on this program since 2017, 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.

1.2 Objectives

1.2.1 2020 OBJECTIVES

The following business requirements were captured during an onsite meeting on August 22, 2019 and incorporated into the design of this expansion from the pilot project:

- Maximize the total kWh saved, ensuring a UCT of >1 (with a buffer), and maintain high customer satisfaction levels.
- Meet cost-effectiveness guidelines from a Total Resource Cost (TRC) and UCT perspective.
    - >1 UCT + buffer
- Maintain or enhance the current customer satisfaction levels.
    - Maintain low opt-out rate
    - Drive positive customer interactions
    - Maintain low volume of program-related calls to the Customer Interaction Center
- Average annual savings of 1-3%
    - So long as savings are detectable and statistically significant
- Encourage customer engagement with energy usage, including utilization of online tools and lift for other EE programs.

1.2.2 ADDITIONAL OBJECTIVES

Monitor persistent savings of T5 group

In the expansion program, T5 customers were removed from treatment because their overall usage was low and they had not achieved statistically significant savings in the pilot program. IPC would like to continue to monitor their persistent savings in year three to determine if combining them with the rest of the treatment population could yield additional combined savings. Because the T5 customers had been treated in year two, the savings calculated using a difference-in-difference methodology can be attributed to treatment in previous years.

What are the combined savings of all treatment groups including T5?

Including T5 in the combined savings for all treatment groups in year three increases the cumulative savings by 111,378 kWh to 10,427,940 kWh. The inclusion of T5 also reduces the margin of error in the calculation from 11.39 to 11.15, improving statistical significance. The weighted average savings per customer is 86.72 kWh with T5 and 87.03 kWh without T5.

1.3 Treatment Groups Defined

1.3.1 2020 TREATMENT GROUPS

In May of 2020, customers from T1, T2, T3, and T4 that had not been removed through attrition were selected to continue to participate in the HER program. All T5 customers were removed from treatment entirely based on savings results from the pilot (July 2017 through December 31, 2019). The remaining Idaho Power customers were run through eligibility criteria (defined in section 2.3.2) to create a new T6 group. This included some C1, C2, C3, and C4 customers from the pilot that had been removed from control groups by DNV-GL to expand the pool of eligible customers.

- **T1:** customers with high winter use (electric heating) added in Year One,
- **T2:** customers with high winter use (electric heating) added in Year Two,
- **T3:** customers with high year-round energy use added in Year One,
- **T4:** customers with medium year-round energy use added in Year One, and
- **T5:** customers with low year-round energy use added in Year One, and
- **T6:** expansion customers based on eligibility criteria determined after the pilot.

The total number of customers receiving reports was expanded significantly.

In year one of the pilot program, the total number of customers receiving reports was approximately 25,500. In year two, the total was around 24,000. In the 2020 expansion, the addition of the T6 group brought the total number of customers receiving reports up to just over 125,000. Between March 1, 2020 and December 31, 2020, a total of 125,216 customers received at least one report throughout the year. 18,128 of those were existing customers from year 2 and 107,088 were new customers added to treatment in June 2020.

New customers received bimonthly treatment while existing customers received quarterly treatment.

During the pilot program, there appeared to be no meaningful savings benefit from sending customers reports bimonthly rather than quarterly. Therefore, in 2020, all existing customers (carried forward from the pilot) were sent quarterly reports starting with the February reports. All new customers were sent reports on a bimonthly schedule with the intention of shifting them to a quarterly treatment schedule in 2021.

Table 1 – 2020 Report Delivery Schedule by Cohort

	2020											
	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
T1, T2, T3, T4		✓			✓			✓			✓	
T5*		✓										
T6						✓		✓		✓		✓

1.3.2 ELIGIBILITY SCREENING

Eligibility screening for T1, T3, T4, and T5 was initially conducted in year one, and these groups persisted into year two.

Eligibility screening for T2 was conducted in year one with the T1 group; however, heating source data for these customers was unavailable until year two, at which time they were re-evaluated for eligibility.

The eligibility criteria applied in years one and two were also applied in year three to determine the eligible participants in the T6 group, with new criteria added based on learnings from the pilot.

Table 2 - Eligibility Criteria for 2020 Expansion

Idaho only	Required Idaho service addresses
AMI Data	Required AMI data
Active only	Removed all accounts without >12 months active history
Individual only	Filtered out all non-individual accounts
Exclude Do Not Contact	Filtered out do not contact list
Net Metering and Master metered accounts (I03)	Removed all Net Metering and Master metered accounts (I03)
Exclude non-English	Removed all known language types other than English
Comparable homes only	Removed homes built prior to 1860, or more than 6 bathrooms, or more than 8 bedrooms, and homes with <350 ft^2 or>7000 ft^2
Homes only	Effectively excludes junk accounts (barn, shop, garage, well, pump, etc., etc.)
Exclude manufactured homes	Excluded all manufactured homes
Exclude multi-family	Exclude Multi-family
Remove duplicates	Remove duplicates

For the expansion in 2020, all T5 and C5 customers were removed from both participation and eligibility based on savings results from the two-year pilot. Additionally, a third party (DNV-GL) randomly removed 29,369 customers from C1, C2, C3, and C4 to free them up for possible treatment in the expansion. The analysis by DNV-GL determined how many customers could be removed from these control groups while still allowing for statistical significance in calculating savings cumulatively across all treatment groups.

In April 2020, eligibility screening was conducted to establish a new T6 group from the remaining Idaho Power customers and those freed up from C1, C2, C3, and C4.

Idaho Power scrubbed the initial count of customers and applied the following filters:

IPC Applied Filters

This list is consistent with filters applied during the pilot phase.

- Required Idaho service addresses
- Required AMI data
- Required residential accounts (I01)
- Required meters associated with a home
- Removed:
    - All non-individual accounts
    - Accounts with less than 12 months active history
    - Do not contact list
    - Net Metering (I84), Master metered accounts (I03) and Time-of-Day (I05)
    - Known language barriers
    - Built prior to 1860, more than 6 bathrooms, more than 8 bedrooms, homes with <350 ft^2 or >7000 ft^2. Used CoreLogic GIS data.
    - Used premise type and installation type to remove the following:
        - Manufactured homes
        - Multi-family
    - Duplicates

The criteria for culling customers during eligibility screening are listed in Table 3.

Table 3 – Criteria and Rationale for Culling Customers During Eligibility Screening

Priority Order	Criteria Filter Applied	Qty	Description
1	Initial Count	444,935	Provided by IPC; all customers with active status and AMI data for the past 12 months.
2	Excluding Pilot T Groups and C5	334,589	Excluding treatment and control customers carried over from pilot and all T5/C5 customers
3	Initial Count of Eligible Customers Based on IPC filters/scrub	171,923	Provided by IPC; all eligible customers after IPC scrubbed the population for using eligibility criteria "IPC Applied"
4	Active/MoveOut	167,812	No Longer Active and MoveOuts after 03012019
5	Sufficient Data (AMI, DST, XY)	166,412	AMI data complete for 13 months
6	Benchmarking	165,204	Removed those with benchmarking data (home size and location) that caused them to have insufficient number of comparable homes
7	Floor Size	165,161	Non-zero and <7,000 SF
8	Bill Payer Occupied	148,029	Removed service zip codes that do not match billing zip codes
9	Negative Hourly AMI	147,935	Customers with negative AMI are likely to never see reports
10	>0 Usage Each Month	147,456	Every month should have some usage
11	Some kWh in past 9 months	146,161	163 kWh/month
12	Correct Rate Code	146,161	
13	Remove Old VIPs	146,155	
14	Savings Potential	108,500	Remove customers with less than 7,000 kWh of usage
15	Duplicates	108,498	2 duplicates removed
16	Additional Benchmarking	108,424	Customers that fall into a benchmarking cluster that does not have at least 100 participants when AC flag is applied

Figure 2 - Eligibility Funnel for 2020 Expansion

1.4 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.

For the 2020 expansion, data acquisition and integration were primarily maintenance, including receiving weekly electric customer-billing data and regular 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.

One important change that was made to customer data acquisition was the frequency with which electric AMI data is transferred from IPC to Aclara. In years one and two, AMI data was transferred weekly; however, in the spring of 2020, the data transfer frequency was updated to daily with data available to Aclara shortly after midnight each day. The AMI data that was transferred in 2020 generally lagged 5 days from the time AMI data is read from the meter. As a result, AMI data is available as soon as 5 days after it is read. The value this change brings to the program is the ability to send reports up to 5 days sooner.

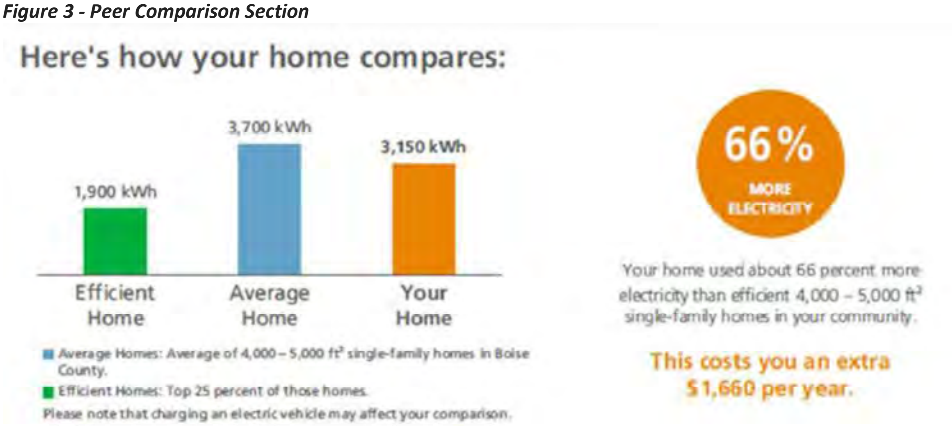
Table 4 - Data Requirements

Integration Point	Description	Format	Frequency	Initiator	Recipient
Public Record Data	Aclara calls Melissa 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 daily	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

1.5 Additional Benchmarking Flags (AC and ESH)

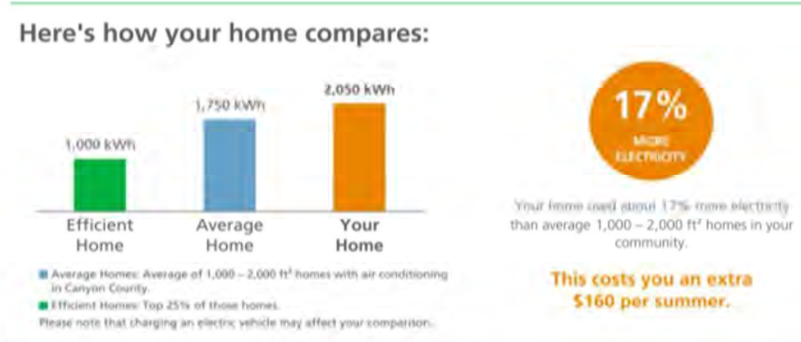
Benchmarking flags are used to cluster customers based on similar home properties for the purpose of calculating peer comparisons and identifying how each treatment customer's usage compares to the average and efficient homes of similar properties. In the pilot program, the flags used to identify benchmarking clusters were 1) Square Footage, 2) Home Type, and 3) County.

Figure 3 - Peer Comparison Section



During the expansion, two dynamic benchmarking flags were added to improve the accuracy of peer comparisons and those were 4) Air Conditioning and 5) Electric Heating. This way customers with air conditioning were only compared with other customers with air conditioning and those customers with electric heating were only compared with other customers with electric heating. This dynamic design was messaged to customers in small print under the peer comparison charts as shown in figure 3. The electric heating flag was used in years one and two to create benchmarking groups for T1 and T2 during the winter months. The benefit of the dynamic benchmarking system is improved benchmark groupings that consider whether customers have electric heating. This allows for benchmarks that match each customer's primary heat source, if known. The dynamic benchmarking system also allows the same segmentation with air conditioning.

Figure 4 - Year Three Peer Comparison with AC Flag



1.6 Aligning Tip Selection with Season

In order to get timely and relevant tips out to customers at the beginning of a season (either winter or summer), the standard protocol of reporting on the last quarter or two months, and using the results to suggest tips for the next quarter or two months, was not as successful in year one as intended (a customer receiving tips based on the past two months electricity may not find them to be relevant to the coming two months if there is a change of season).

In 2020, the solution employed was to send a seasonal report at the beginning of the season with suggested actions/tips based on behavior last season.

1.7 COVID-19 Adjustments

In response to the COVID-19 pandemic and its impacts on both customer behavior and Idaho Power operations, some adjustments were made to report content:

- Tips were reviewed to ensure the use of sensitive messaging regarding increased energy use.
- The promotion of paperless billing, MyAccount, alerts, and energy-related activities for families were substituted for promotions involving contractor visits.
- Customer Interaction Center hours were updated to reflect the availability of agents.

2 2020 Program Results

2.1 Objectives: Findings

2.1.1 ENERGY SAVINGS

Cumulative Savings During Treatment Period

In total, each treatment group showed savings of between 0.56 percent and 3.25 percent. This added up to a total combined savings of 10,316,562 kWh across all groups in treatment as of December 31, 2020. Savings calculations from all treatment groups were statistically significant. See table 5 for savings per cohort.

Additionally, the T5 treatment group was treated with home energy reports through February 2020 and did continue to show persistent savings post-treatment. All treatment customers in 2020, including the T5 post-treatment period, shows total combined savings of 10,427,940 kWh. See table 6 for the treatment and persistence savings for the T5 group; and table 7 for combined savings including T5.

Table 5 – 2020 Cumulative Savings by Cohort
T1234 Treatment Period: Jan 1, 2020 - Dec 31, 2020
T6 Treatment Period: Jun 1, 2020 - Dec 31, 2020

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	267.72	1.25%	298.91	0.039593	1,445,666
Winter Heating – T2	363.31	1.76%	302.86	0.009356	1,734,800
Year-Round - T3	223.38	1.48%	154.82	0.002342	1,237,313
Year-Round - T4	339.66	3.25%	138.84	8.14E-07	881,080
Expansion - T6	50.06	0.56%	29.33	0.000412	5,017,703
					10,316,562

Table 6 – 2020 Cumulative Savings by T5
T5 Treatment Period: Jan 1, 2020 - Feb 29, 2020
T5 Persistent Period: Mar 1, 2020 - Dec 31, 2020

Cohort	Avg kWh Savings per Customer	Average savings percent	Cumulative Aggregate Savings (kWh)
Year-Round - T5	39.67	0.49%	67,831

Table 7 – 2020 Combined cumulative Savings for all Treatment Groups including T5

Cohort	Avg kWh Savings per Customer	Average savings percent	Cumulative Aggregate Savings (kWh)
T123456	86.72	0.74%	10,427,940

2.1.2 MONTHLY SAVINGS BY TREATMENT GROUP

Table 8 - Monthly Average Percentage Savings per Cohort

	T1B	T1Q	T3B	T3Q	T4B	T4Q	T1	T2	T3	T4	T6
Jan 2020	3.54%	0.85%	1.28%	2.62%	3.20%	4.57%	NA	2.09%	NA	NA	NA
Feb 2020	2.57%	1.56%	0.88%	3.26%	3.64%	2.95%	NA	1.87%	NA	NA	NA
Mar 2020	2.65%	2.48%	0.94%	2.09%	3.29%	3.29%	NA	2.21%	NA	NA	NA
Apr 2020	NA	NA	NA	NA	NA	NA	1.83%	1.95%	1.14%	2.93%	NA
May 2020	NA	NA	NA	NA	NA	NA	1.55%	1.54%	1.31%	2.59%	NA
Jun 2020	NA	NA	NA	NA	NA	NA	1.39%	-0.05%	1.04%	3.44%	0.27%
Jul 2020	NA	NA	NA	NA	NA	NA	1.26%	0.43%	1.71%	2.82%	0.75%
Aug 2020	NA	NA	NA	NA	NA	NA	1.32%	0.21%	0.97%	2.12%	0.61%
Sep 2020	NA	NA	NA	NA	NA	NA	1.42%	0.79%	1.77%	2.68%	1.08%
Oct 2020	NA	NA	NA	NA	NA	NA	1.48%	1.77%	1.58%	2.80%	0.32%
Nov 2020	NA	NA	NA	NA	NA	NA	1.03%	1.25%	1.89%	1.70%	0.50%
Dec 2020	NA	NA	NA	NA	NA	NA	1.77%	2.87%	2.31%	4.16%	0.52%

2.1.3 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.

Year One

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.

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 some potential T1 participants due to a lack of adequate county benchmarks, the sample size at the time of the first report was 25,677.

Year Two

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.

Program Year 2020

The treatment customers from the pilot continued treatment (except T5) and a new treatment group and new control group were created to expand the number of customers in treatment. After optimization of the existing treatment groups was complete, a total of 18,492 customers were identified as existing customers eligible for treatment in year three. The following changes were made to the existing treatment customers:

1. The T5 treatment group was removed from participation because this group showed the lowest propensity to save energy during the pilot.
2. All remaining treatment customers from the pilot (years one and two) were moved to a consolidated quarterly treatment schedule.
3. The C5 control group was removed from eligibility for treatment.

The following changes were made to the existing control groups:

The C1, C2, C3, and C4 control groups were reduced in size significantly. 75,973 customers were removed from these four control groups to free them up for treatment in year three as T6 customers. The number of customers removed from each control group was determined by DNV-GL with consideration given to the impact their removal would have on the statistical significance of calculated savings across all treatment groups. See table 9 for a record of the changes made to the C1, C2, C3, and C4 control groups.

Table 9 - Reduction in Existing Control Groups

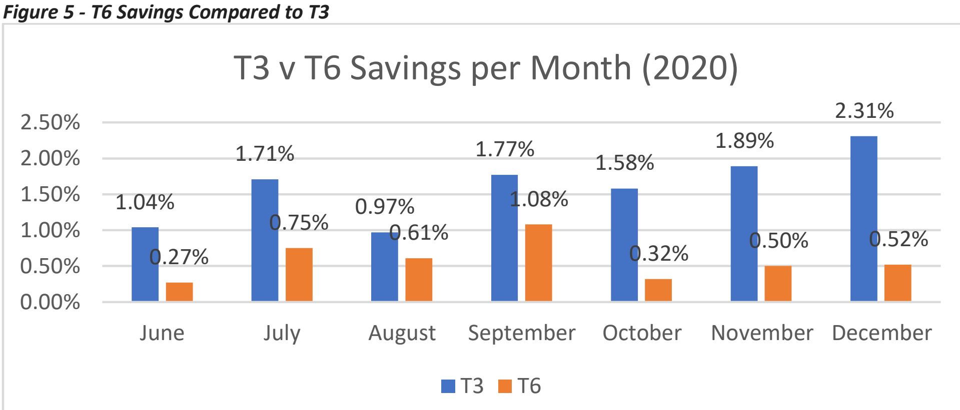
Group	Original Control Group Size	Reduced New Control Group Size
C1	12,090	1,450
C2	5,024	800
C3	35,194	3,520
C4	31,995	2,560

In the spring of 2020, a new treatment group (T6) was created based on eligibility criteria applied to the remaining population. The number of new customers eligible for treatment as of the start of year three was 108,498.

2.1.4 COMBINED SAVINGS FOR NEW CUSTOMERS (T6) VS. EXISTING CUSTOMERS (T1234)

Treatment of new T6 customers began in June 2020 and continued throughout 2020. Treatment of existing customers (T1, T2, T3, and T4) started prior to the start of 2020 and continued throughout 2020. An analysis of savings within the new customer group compared to the existing customer group found that in year three, new customers (T6) saved 7.15 kWh per month on average and the existing customers (T1, T2, T3, and T4) saved 24.12 kWh per month on average. The T6 group savings by month are showing a favorable increase in both the summer cooling season as well as the winter heating season. The T6 group is much larger than all treatment groups and more closely represents the entire Idaho Power customer base than any other group. Savings from the T6 group did not show the same trend as those from any of the existing waves but did follow similar directional patterns.

Figure 5 - T6 Savings Compared to T3



2.2 Email Reports

2.2.1 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. With the expansion of the HER program to include the T6 group in June 2020, 106,941 (new) customers received welcome letters introducing them to the program. The welcome letters also contained information regarding the option to receive reports by email instead of print.

As of December 31, 2020, 107 customers have opted to receive email reports rather than print reports.

Figure 6 - HER Header with Email Sign-Up Information

Figure 7 - HER Welcome Letter FAQ regarding Email Option

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.

2.2.2 DELIVERY, OPEN, AND BOUNCE RATES

In 2020, a total of 261 email reports had been sent to Idaho customers and seeds (i.e., IPC employees receiving an eHER in order to evaluate it). Of these, all 261 emails were successfully delivered, and a total of 82 were opened. The total clickthrough rate (that is, the rate of clicks on links contained within the emails) was 26.8 percent.

2.3 Customer Feedback

2.3.1 CUSTOMER SERVICE LINE CALLS AND OPT-OUT RATES

Table 10 - CSA Calls and Opt-Out Rates

	2018	2019	2020
Total Calls	411	246	1,087
Opt-Out Calls	0.64%	0.22%	0.124%

In 2020, IPC customer solutions advisors (CSAs) received 1087 calls related to the HER program, compared to 246 calls in 2019 and 411 calls in 2018. The 2020 opt-out rate was 0.124% percent compared to 0.22 percent in year two and 0.64 percent in year one.

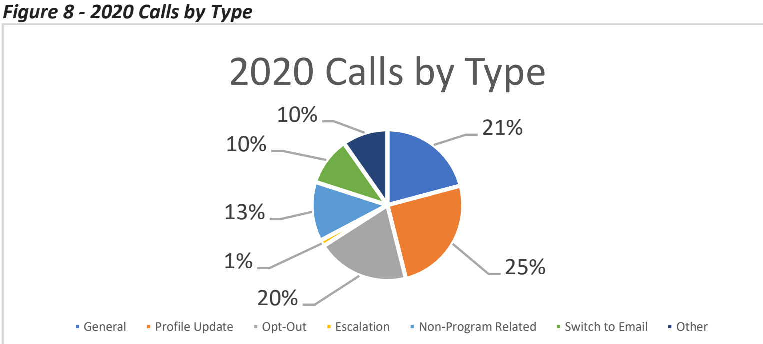
From January to December 2020, CSAs classified each call they received into one of seven categories:

- General
- Profile Update
- Opt-Out
- Escalation
- Non-Program-Related
- Switching to Email Reports
- Other

Table 11 – Reasons for Calls to CSAs in 2020 by Category

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
General	7	1	1	1	5	48	58	35	3	27	9	33	228
Profile Update	4	2	1	0	4	57	80	43	17	43	4	21	276
Opt Out	4	2	0	0	4	56	45	31	4	27	7	31	211
Escalation	0	0	0	0	0	0	1	5	3	3	0	2	14
Non-Program-Related	0	1	0	0	0	16	19	25	16	27	10	25	139
Switch to Email	1	0	0	0	1	36	29	18	0	14	2	12	113
Other	0	0	0	0	2	39	18	17	3	13	3	6	106

Figure 8 - 2020 Calls by Type



Following are some sample notes from CSAs regarding phone calls from customers about the HER program:

- *“Customer called with a question about her a/c usage pattern.”*
- *“[Customer] wanted information on how to cut down his energy usage.”*
- *“[Customer] wanted to know how to qualify for a smart thermostat incentive.”*
- *“Based on the findings on the report, customer is interested in a Home Energy Audit.”*
- *“Daughter is moving out of home receiving HER and father was taking over the service there. Got CSA number off the report.”*
- *“[Customer] enjoys the reports very much and thinks it is interesting to see how he does during the different times of the year.”*
- *“Customer feels that the information isn't useful.”*
- *“Customer has 7-9 stock tank heaters that they run in the winter and receiving the report upsets her.”*

2.4 Additional Metrics

2.4.1 MICROSITE ENGAGEMENT

Table 12 - Microsite Activity by Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Unique Clicks	0	0	0	4	1	21	16	42	4	16	7	14	125
Total Clicks	0	0	0	10	2	21	21	46	5	20	7	19	151
Unique Page Views	12	12	5	34	31	51	48	74	11	58	15	41	392
Total Page Views	13	12	5	45	34	55	52	79	12	62	21	48	438

Microsite usage has increased with the launch of the expansion in June 2020, as expected. From January 1, 2020 to December 31, 2020, there were a total of 392 unique page views (that is, people who navigated to the site) and 125 unique clicks within the site. 76% of unique page views for the year occurred after the T6 expansion customers began receiving their reports.

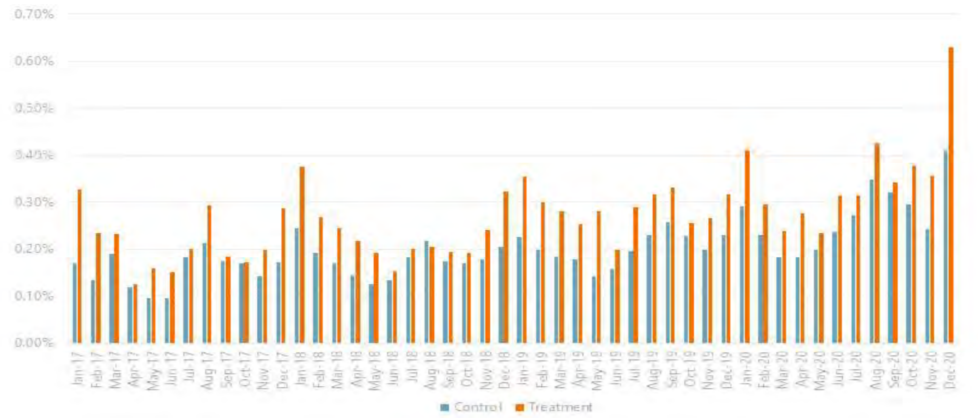
Low microsite usage is to be expected, as the site serves only to supplement the HER program and does not offer extra value to customers beyond answering basic FAQs. It is not a venue for customers to update their home profiles or opt out of the program; it functions primarily to help reduce call volumes.

The microsite link — http://idahopower.com/homeenergyreport — is available from HER reports.

2.4.2 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 9 - My Account Activity Treatment vs Control Program to Date



2.4.3 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 permanent attrition rate in Y3 was 9.4% with 11,850 customers either opting out or being permanently removed for one of the following reasons: move-outs, incompatible location type, incompatible property type, or non-deliverable. Additionally, 280 customers were removed for having insufficient benchmarking groups. In October 2020, the decision was made to permanently remove these customers going forward. The October benchmarking analysis identified an additional 334 participants at-risk for future removal due to the size of their benchmarking groups (fewer than 100 active participants in a benchmarking group compromises the county peer comparisons).

NEW CUSTOMER (T6) ATTRITION RATES

Table 13 - T6 Attrition Rates in 2020

T6	Jun	Aug	Oct	Dec	Total
Permanent Removals					
Move Outs	517	689	3155	1874	6235
Location	28	33	207	0	268
Property	3	11	15	13	42
Opt Outs	0	63	48	26	137
Temporary Removals					
AMI Insufficient/Negative Usage	5	358	413	422	1198
USPS - Non Deliverables[2]	1009	1053	964	988	4014
Total Removals	1562	2207	4802	3323	11894
Insufficient Benchmarking	28	34	207	0	269
Reports Delivered	**106,941**	**105,267**	**102,314**	**100,560**	**415,082**

[2] USPS – Non Deliverables were temporarily removed from eligibility each month; then those customers regained eligibility for treatment the following month until after October of 2020. Starting with the November reports, any customer listed as non-deliverable was permanently removed from the program. Throughout 2020, 1,905 customers were permanently removed because their addresses were non-deliverable by USPS.

EXISTING CUSTOMER (T12345) ATTRITION RATES

Table 14 - T1234 Attrition Rates in 2020

T12345	**Feb**	**May**	**Aug**	**Nov**	**Total**
Permanent Removals					
Move Outs	263	238	90	470	1061
AMI Insufficient/Negative Usage	119	0	0	0	119
Location	0	0	0	0	0
Property	2	2	0	1	5
Opt Outs	7	5	2	3	17
Temporary Removals					
AMI Insufficient/Negative Usage	0	67	81	33	181
USPS - Non Deliverables	44	15	26	19	104
Total Removals	435	327	199	526	1487
Insufficient Benchmarking	0	0	12	0	12
Reports Delivered	**20,197**	**18,126**	**17,773**	**17,346**	**73,442**

3 Lessons Learned & Future Recommendations

3.1 Process Improvements

Based on the findings from year two, the following process improvements were implemented in 2020:

Daily AMI Data Transfer

In the pilot program (years one and two), AMI data was transferred via FTP from Idaho Power to Aclara on a weekly basis. This limited the timeframe within which reports could be generated because updated AMI data was not available regularly enough to generate reports any day of the week.

In the spring of 2020, a shift was made to the AMI data transfer process to begin sending the file daily as opposed to weekly. This change resulted in updated AMI data available on a daily basis and has reduced the time needed between report template approval and report generation by multiple days.

Evaluate Content-Approval and Revision Process

Although content and design for reports had been pre-approved for this program, context for those approvals was lacking. Therefore, when the content appeared in layout with the target delivery date and audience identified, the content often needed to be tweaked. Since the current process did not take this into account, it decreased the efficiency of report generation and delivery. At times, these final edits also impacted the time allowed for QA, which introduced more opportunities for error.

In 2020, additional time was allocated to the initial content review and approval process to ensure reviews were not unnecessarily rushed. The addition of 1-2 days during the content review phase has reduced the number of late process tweaks; however, additional time may be needed.

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 such as changes in occupancy in households and the inclusion of vacation homes.

To minimize this issue, an additional eligibility filter was added during the expansion implementation phase to require that all customers had a minimum of 163 kWh in at least 9 of the past 12 months.

To mitigate the number of reports sent out with zero usage, each report run is analyzed to ensure that all treated customers have at least 97.5% AMI readings over the past 12 months. Those that do not are removed from treatment for that cycle.

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 2020, as part of the expansion, customers were no longer permanently removed if they could not be treated in any given month for insufficient billing, USPS non-deliverable[3], or AMI data error. In October, the decision was made to begin removing the USPS non-deliverable customers permanently because these customers are unlikely to receive any future reports if they were determined by the USPS to be non-deliverable in any given month. Aclara/Uplight and Idaho Power are continuing to review the participants that move into the USPS non-deliverable status to ensure the best customer experience for these participants going forward.

Monitor Incoming Customer Calls

Occasionally, issues are discovered through review of the customer solutions advisor (CSA) summary report. For example, a small number of HER participants had called to let Idaho Power know they had received a current HER report for a report period corresponding to a period after they had vacated a premise.

Program Managers made a commitment heading into the expansion to closely monitor the CSA summary reports each and every week to ensure that issues brought up by program participants are acknowledged and addressed. As a result, a handful of critical issues were spotted and addressed throughout Year 3.

- Home profile updates were not reflected quickly enough to be captured in the next report. A change was made to reduce the amount of time between the receipt of home profile updates and the generation of reports.
- All opt-outs were not being captured and processed. A change was made to the data ingestor to ensure all opt-outs were processed and an additional level of quality control was implemented.
- A customer received another participant's home energy report. This led to the shifting of the barcode used for QA by the printer so that their backup printers could also scan to ensure the proper report was inserted into each envelope.

Permanently Remove Customers with Insufficient Benchmark Groups

Benchmarking customers are non-treated energy users grouped into clusters that take into consideration home attributes such as square footage, county, home type, and the presence of air conditioning or electric heating. These customers are not impacted by typical attrition because they are not treated; however, they are impacted by move-outs. An improvement made in October 2020 was to remove any treatment customers that do not have at least 100 comparable active, benchmark homes from the program permanently instead of temporarily. This decision was to ensure a positive and consistent customer experience. With fewer than 100 homes in the benchmark cluster, the only way to maintain report delivery was to expand the geographic region beyond the participant's county. It was determined the variations in weather patterns and inconsistency in a participant's comparison group had a high propensity to lead to customer dissatisfaction.

3.2 Lessons Learned

In 2020 there were several lessons learned, detailed below. These learnings serve as a mechanism identifying program improvement opportunities, in subsequent years.

Welcome Letters Can Only be Sent with Initial Report
Those customers that did not receive treatment in the first month cannot be sent a welcome letter in a future month and therefore should be removed from treatment. It was discovered in November 2020 that the costs and level of effort associated with sending one off welcome letters is prohibitive and should be avoided. As a result, welcome letters should only be sent with the initial batch of reports and customers that are untreatable with the first report drop should be excluded from participation. With the expansion, 1,562 new customers were untreated when the welcome letters were sent in June of 2020.

AC and ESH Benchmarking Flags Cause an Increase in Attrition

The addition of air conditioning and electric heating benchmarking flags reduced benchmarking cluster sizes, resulting in more removals based on sufficient availability of benchmarking data. In future eligibility evaluations, the use of these benchmarking flags should be scrutinized to determine the value added. There were 280 customers permanently removed due to insufficient benchmarking data in 2020.

Opt-in to Email Remains Low with Language Added to Welcome Letter

It was observed that opt-ins for email reports were still very low, even after including language about the option in the welcome letter and continuing to display similar language on print reports, which was done in year two. Email was the most preferred method of delivery according to responses in the survey conducted in 2019 but it is likely that adoption is low due to the level of effort needed in order to opt-in to email. There is no way to determine if email report recipients have a higher savings than print report recipients because the email population remains too small and there is not a control group associated with either segment. If there is a push to encourage customers to opt-in to the email channel, the barriers to opt-in need to be lessened.

Missed Opt-outs

A customer that called to opt-out was not successfully removed from the program and had to call to opt-out a second time. It was determined that this was the result of a broken translation between the CSA survey report and the ingestion of data into the database. This underlying issue was resolved in October 2020; however, as a second checkpoint, the CSA survey reports are now also being manually reviewed prior to each report run to ensure all opt-outs have been removed.

3.3 Recommended Improvements

Based on the findings from 2020, Aclara/Uplight has the following recommendations for enhancing the program in 2021 and beyond:

Evaluate Messaging to Ensure the Appropriate Use of Tips for Each Season

Throughout the year, tips and messaging were tailored to the seasons so that the focus of each reports correlates with the weather. For example, in November, customers were presented with a winter heating focused set of tips. In some months, there are additional opportunities for focused messaging based on the season. In February, all customers were treated with an Appliances & Lights focused report; however, the program is designed so that customers receive their reports at the beginning of the month so the winter heating focus could continue into the February reports.

In 2021, it is recommended that the messaging schedule be re-evaluated for additional opportunities that may lead to increased savings.

Review Net Metering Later in the Eligibility Process

The eligibility process takes several weeks to complete and the eligibility of each customer can change during this process. One attribute that is changing for customers frequently is the change over to net metering. It is recommended that future eligibility processes remove net metering accounts towards the end of the selection process as they did change over the course of the 2020 expansion selection process. The number of net metering accounts created is growing quickly and those customers often have negative usage readings, making them ineligible for treatment in any given month. Removing these types of accounts closer to the end of the eligibility process should catch a greater number of net meters before final selection is complete.

Review Benchmarking Insufficiencies during Eligibility Process

Many of the customers that were permanently removed due to insufficient benchmarking data could have been identified during the eligibility screening process in 2020. It is recommended any future eligibility processes involve an analysis of how many customers will likely be untreatable in any given month due to benchmarking insufficiencies. A sufficient benchmarking cluster is defined as 100 customers; however, some benchmarking customers can become inactive over time. For this reason, a threshold of 115 per benchmarking cluster is recommended.

Consider Another Customer Satisfaction Survey

The last customer satisfaction survey was conducted in year two and gave us a valuable look into how favorably customers viewed this program, as well as how likely they were to change their energy consumption behavior based on the reports they received. There was no survey conducted in 2020 to determine the trend in customer satisfaction scores over time. Now that the program has expanded in scope by nearly 500%, there is an opportunity to measure this important metric across a more determinative sample size.

Incorporate Self-Service Opt-in to Email Function

The number of households who decided to switch from paper to email reports continues to be low – only 107 households. In the pilot program years, it was determined that a likely cause of low enrollments was the requirement that customers had to call in to opt into email reports. Aclara/Uplight was unable to provide a self-service option to allow customers to opt-in to email through the customer portal without contacting Idaho Power. Since this continues to be a likely cause of low adoption in the expansion program, the recommendation is that a self-service opt-in function be added to the customer portal.

Identify a Place to Capture EV Ownership in Preparation for EV Messaging

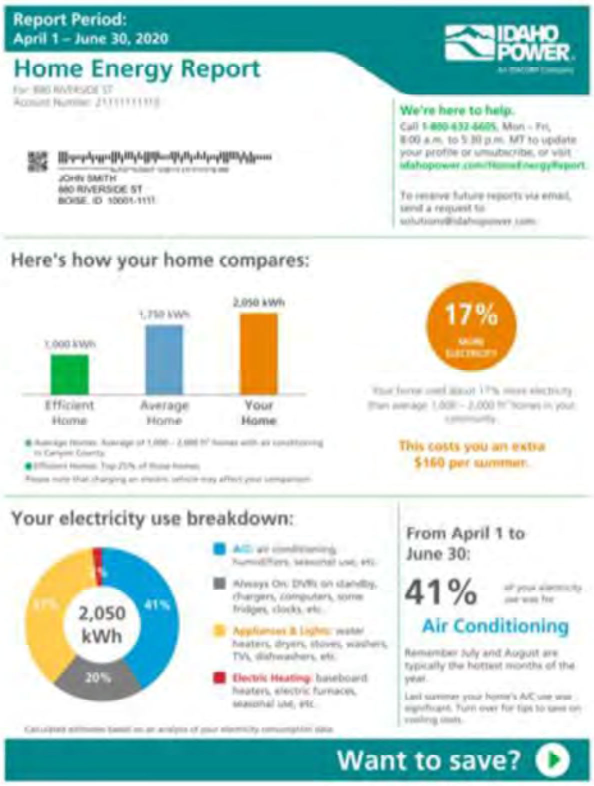
Although EV messaging is currently static on the reports, it is becoming more critical for both customer satisfaction and accurate comparisons. It is recommended that a single web-capture location be identified for capturing EV ownership to facilitate accurate identification of participants to receive custom EV messaging.

4 Appendices

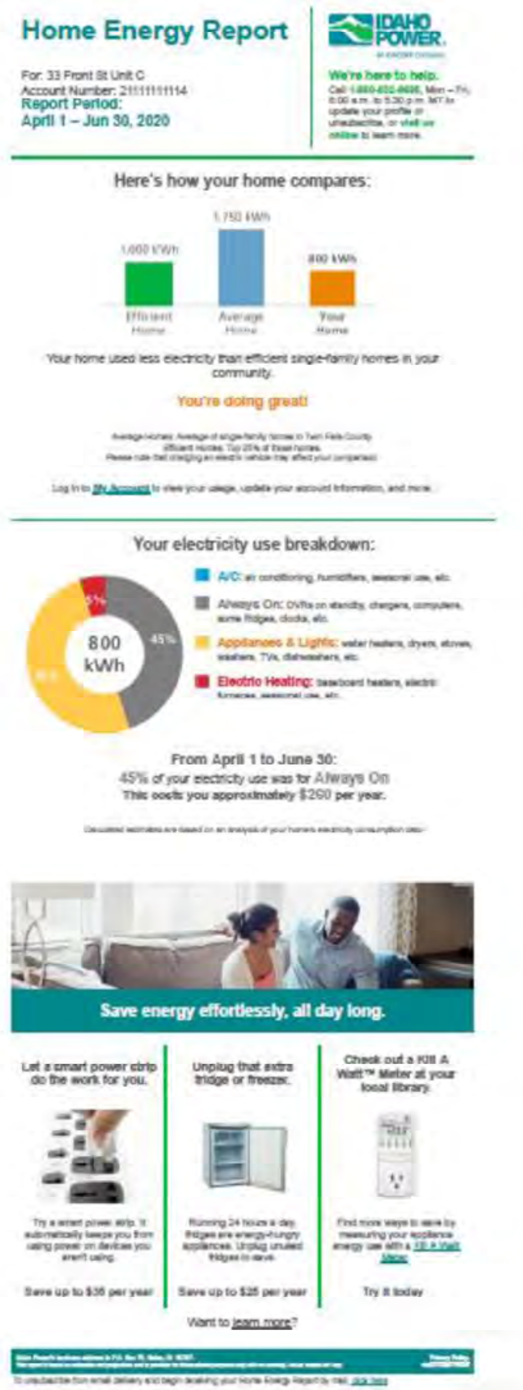
4.1 Appendix A: Sample Home Energy Reports

A-1. Sample Print HER — Always-On Tips

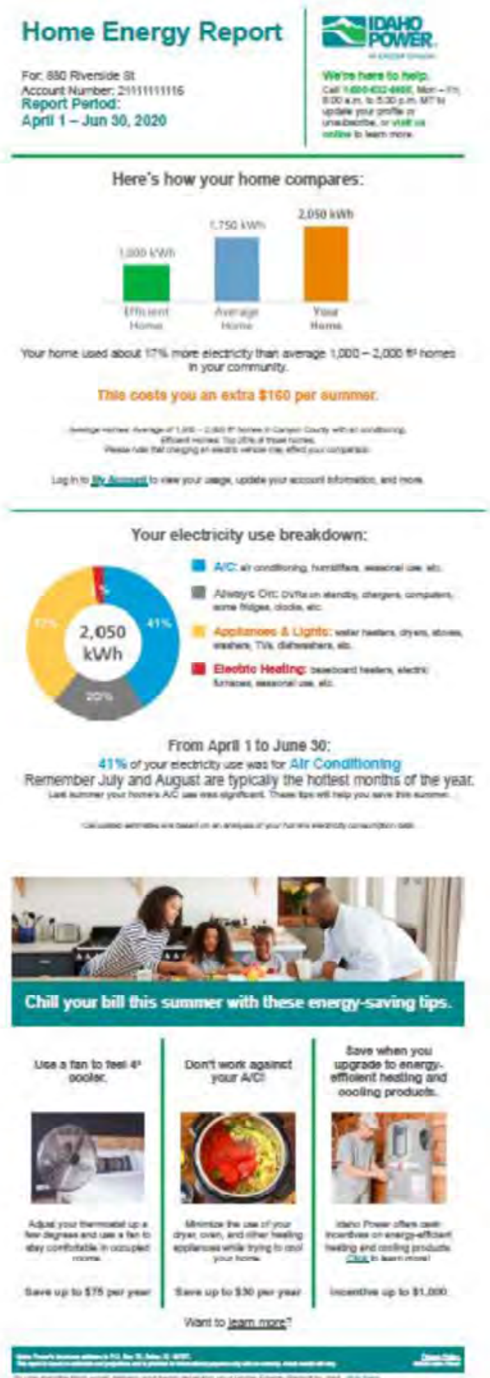
A-2. Sample Print HER — A/C Tips



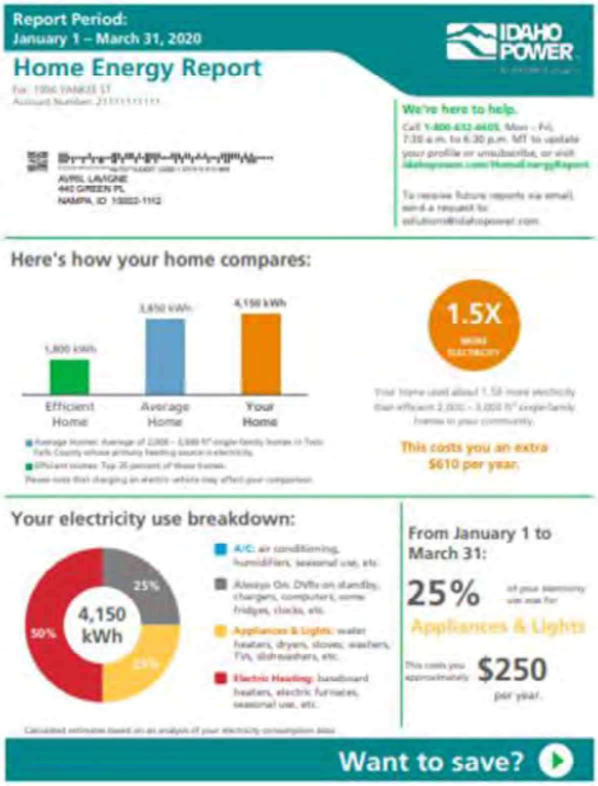
A-3. Sample Email Report — Always-On Tips



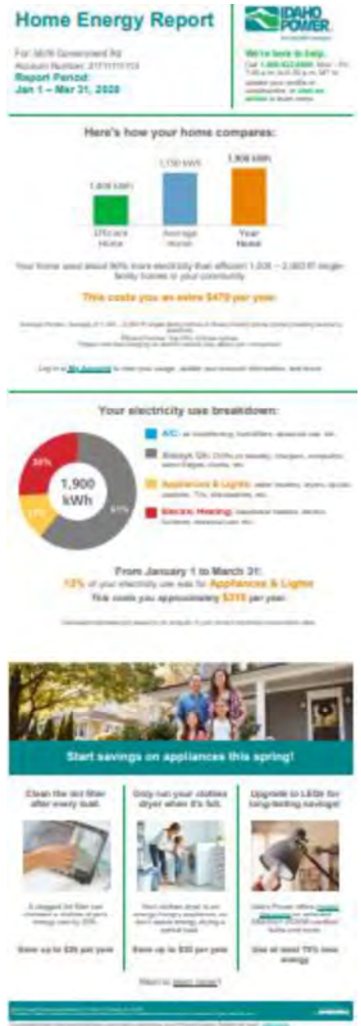
A-4. Sample Email Report — A/C Tips



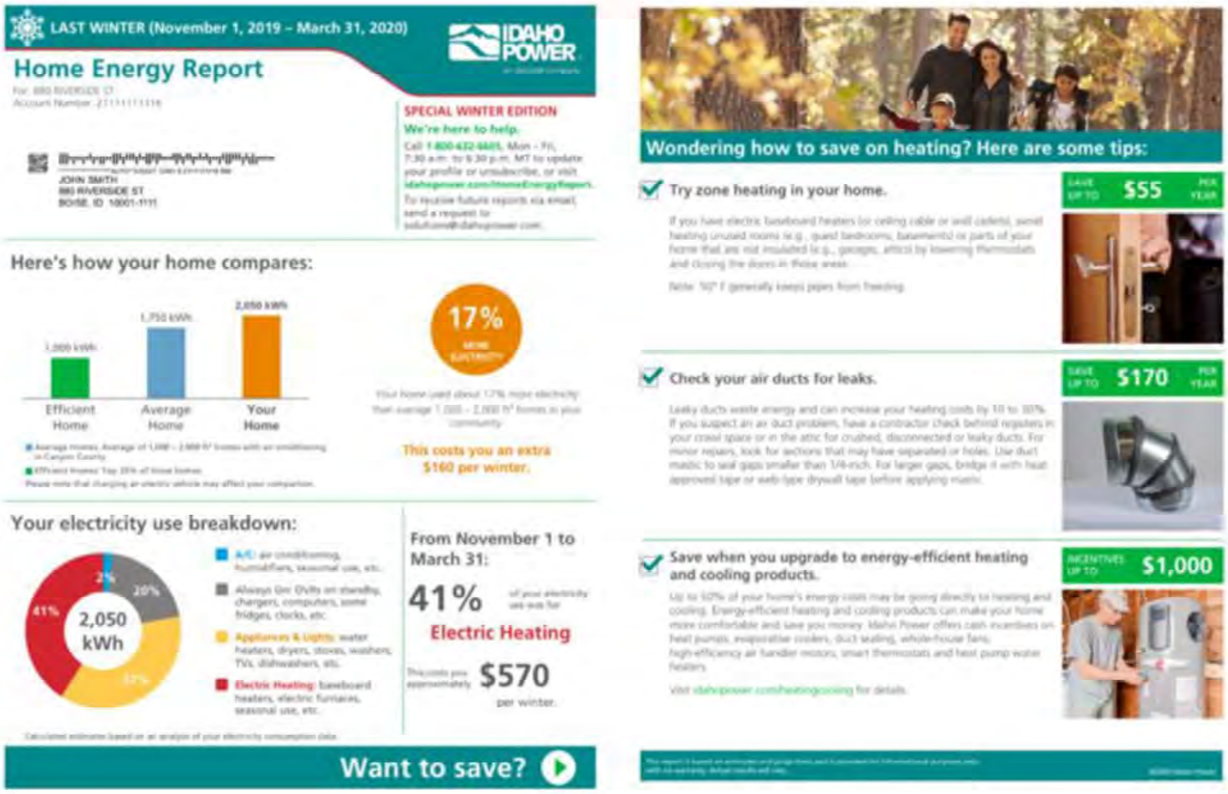
A-5. SAMPLE PRINT REPORT — APPLIANCES & LIGHTS TIPS



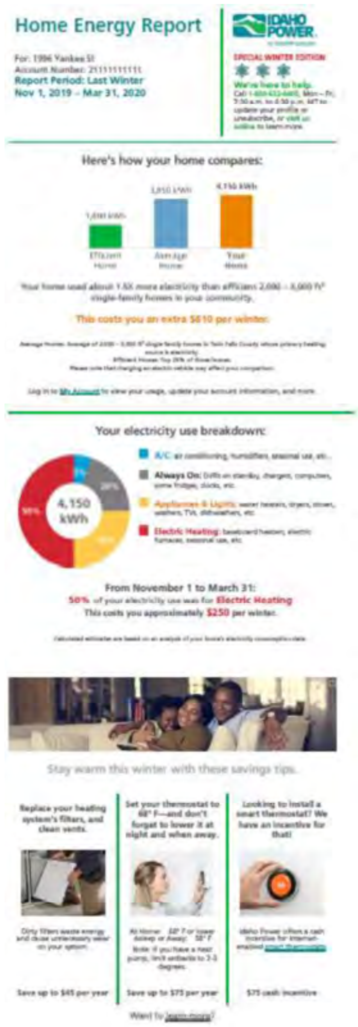
A-6. Sample Email Report — Appliances & Lights Tips



A-7. Sample Print Report — Heating Tips



A-8. Sample Email Report — Heating Tips



4.2 Appendix B: 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	April 30, 2020	January 1, 2020 – March 31, 2020
Q2	July 29, 2020	April 1, 2020 - June 30, 2020
Q3	November 4, 2020	July 1, 2020 - September 30, 2020
Q4	February, 2021	October 1, 2020 - December 31, 2020

IDAHO POWER ENERGYWISE
PROGRAM SUMMARY REPORT

2019-2020

SUBMITTED BY:

FRANKLIN ENERGY

Idaho Power EnergyWise Program Summary Report 2019-2020

Made possible by:

IDAHO POWER®

An IDACORP Company

Submitted by:

FRANKLIN ENERGY

August 2020

“The kids like the kits because they can share what they learn in class with their family. They also liked learning about how much their video game consoles cost to run.”

Tanya Scheibe, Teacher

Lake Ridge Elementary School

Table of Contents

“I liked how the chapters in the books were broken up into manageable sections. The little activities were great for helping focus on finding key information.”

Brian Fischer, Teacher
Eagle Hills Elementary School

Executive Summary

Franklin Energy is pleased to present this Program Summary Report to Idaho Power, which summarizes the 2019-2020 Idaho Power EnergyWise Program. The program was implemented in the Idaho Power service area in the states of Idaho and Oregon by 9,800 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 EnergyWise Kit are also included.

Participant Satisfaction

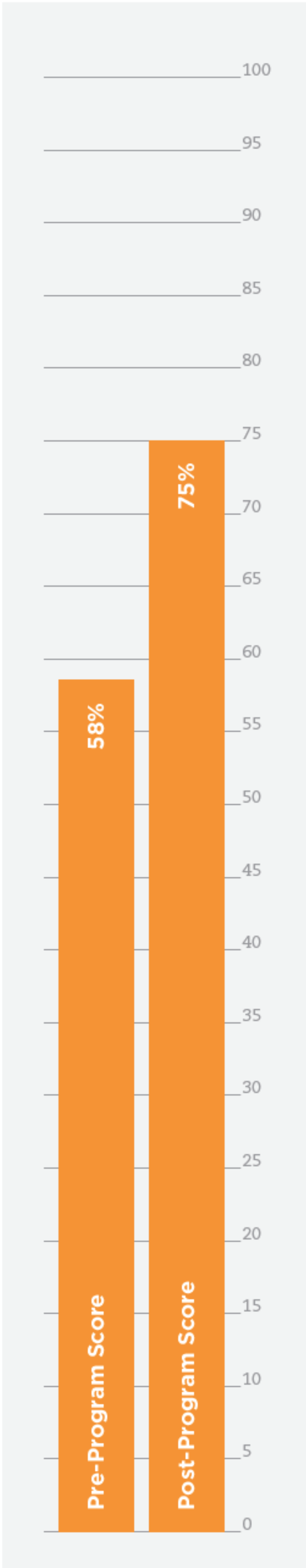
A successful program excites and engages participants. Students, parents, and teachers are asked to evaluate the program and provide personal comments. A sample of the feedback is given in the margin. ›

Teachers who indicated that the products in the kit were easy for students to use.

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.



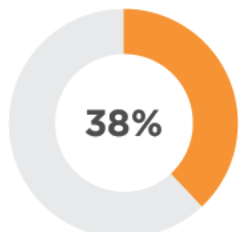
Knowledge Gained

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 **58%** to **75%**.

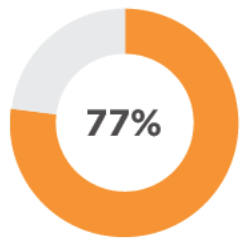
Measures Installed

Students completed take-home activities as part of the program and reported on the kit measures they installed in their homes.

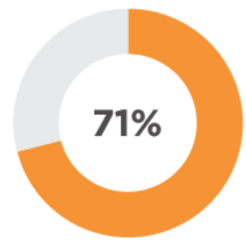
A summary of responses can be found in Appendix B.



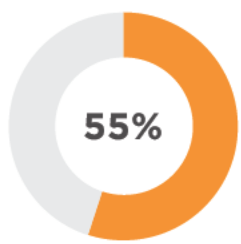
Students who reported they installed the High-Efficiency Showerhead.



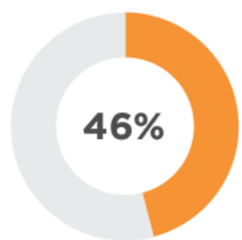
Students who indicated they installed the LED Night Light.



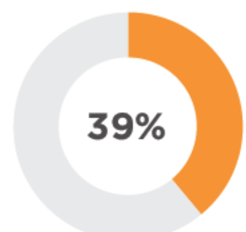
Students who reported they used the Shower Timer.



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	9,800	3,085	2,409	1,285	1,546	1,475
Students	9,439	2,978	2,314	1,240	1,490	1,417
Surveys Received	2,970	772	1,138	475	270	315
Percent Response	31%	26%	49%	38%	18%	22%

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	
13,512,502	gallons of water saved
1,961,084	kWh of electricity saved
54,398	therms of gas saved
13,512,502	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS	
135,125,024	gallons of water saved
21,005,950	kWh of electricity saved
543,976	therms of gas saved
135,125,024	gallons of wastewater saved

PROJECTED ANNUAL SAVINGS PER HOME	
1,379	gallons of water saved
200	kWh of electricity saved
6	therms of gas saved
1,379	gallons of wastewater saved

PROJECTED LIFETIME SAVINGS PER HOME	
13,788	gallons of water saved
2,143	kWh of electricity saved
56	therms of gas saved
13,788	gallons of wastewater saved

***Per Idaho Power's request, the associated savings for the shower timer have not been included in savings totals.*

"This was a wonderful idea! I'm so glad that my children have been a part of this program. They now can see and understand why and how power is important. Also, the money that goes out for power."

[redacted]

J R Simplot Elementary School

Program Overview

The Idaho Power EnergyWise 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 2019-2020 program was taught in grade 3-6 throughout the Idaho Power service area.

The Idaho Power EnergyWise Program team identifies and enrolls students and teachers within the designated service area. The program physically begins with classroom discussions using a Student Guide that provides the foundations of using energy and water efficiently. It is 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 EnergyWise 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 Franklin Energy program design is the use of new knowledge through reporting. At the end of the program, the Idaho Power EnergyWise program team tabulates all participant responses—including home survey information, teacher responses, student letters, and parent feedback—and generates this Program Summary Report.

"I know this is probably costly to Idaho Power, but my daughter was very excited to tell me everything she learned, this was awesome! I'm active military, I have lived in many places, and you have the lowest prices. Thank you for this program and all you do!"

[redacted]
Prospect Elementary

Program Materials

Each participant in the Idaho Power EnergyWise 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

EnergyWise 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 EnergyWise 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

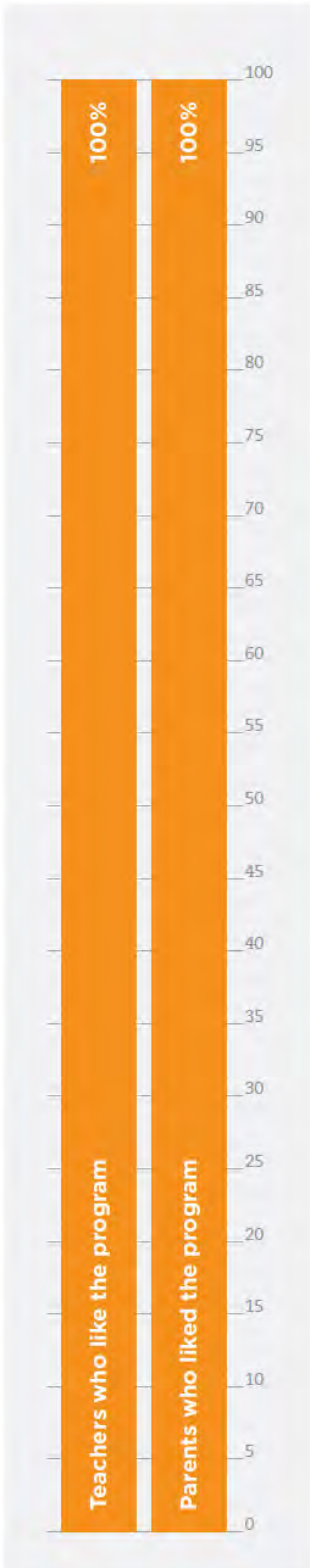
Extra Activities Booket

Teacher Survey Form

Pre/Post Student Survey Answer Keys

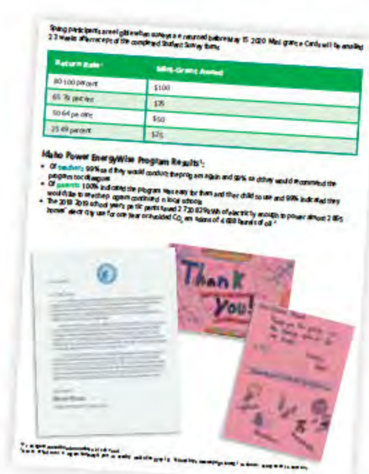
Electricity Poster

Self-Addressed Postage-Paid Envelope

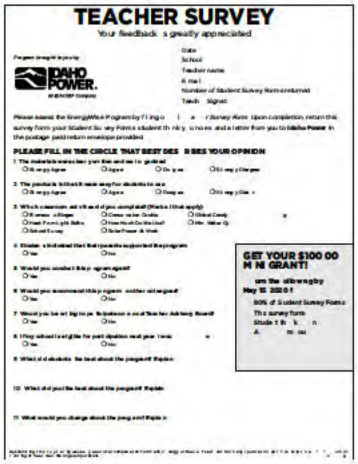


Custom Branding

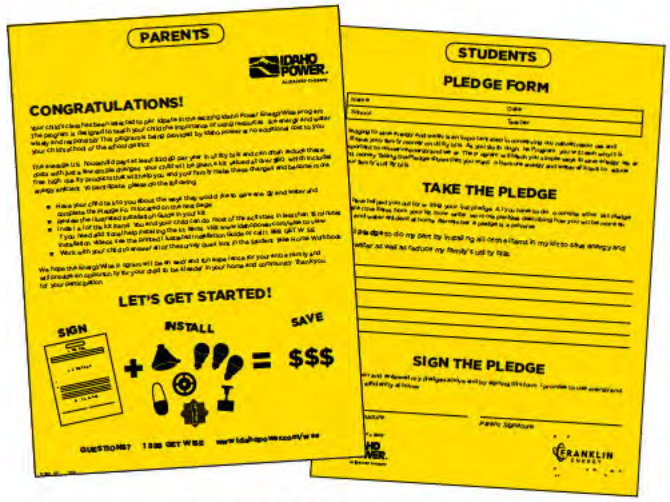
In addition to increasing resource awareness and efficiency, the program has been designed to strengthen bonds between Idaho Power and the community. One of the steps taken to ensure the greatest possible exposure is to feature the Idaho Power logo throughout each EnergyWise Kit. In addition to the kit, 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 Energy and Education Outreach Advisors' (EOEA) program promotion.



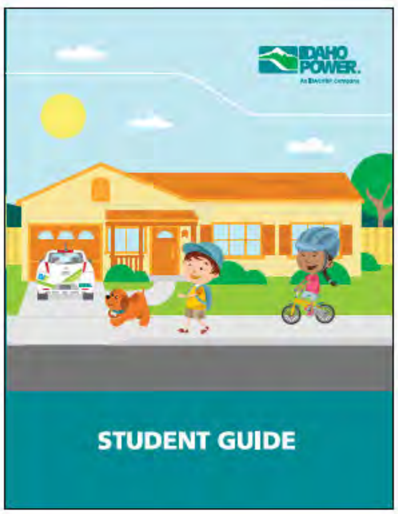
Program Materials



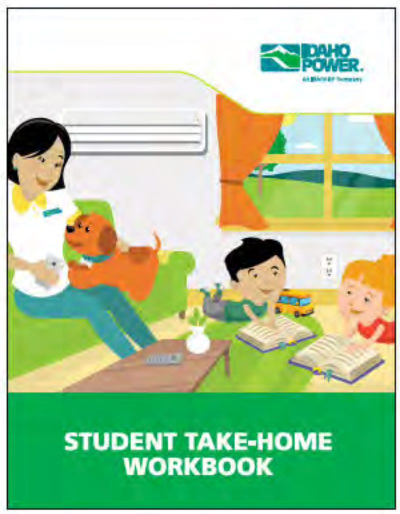
Teacher Survey Form



Parent Letter/Pledge Form



Student Guide



Student Take-Home Workbook

Teacher Book

Certificate of Achievement

Kit Box

Introduction Video (flash drive) Pen

“The lessons were very engaging for students. They liked learning about energy and how to conserve it.”

Andrea Chester, Teacher

West Canyon Elementary

Program Implementation

The 2019-2020 Idaho Power EnergyWise 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 Franklin's Outreach Team and Idaho Power EOEAs
7. Teachers enrolled in the program individually by Franklin's Outreach Team and Idaho Power EOEAs
8. Implementation dates scheduled with teachers by Franklin's Outreach Team and Idaho Power EOEAs
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 2019-2020 school year.

Franklin Energy 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 EnergyWise 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 EnergyWise 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 EnergyWise Program is a reflection of true teamwork. On behalf of the entire implementation team at Franklin Energy, we would like to thank you for the opportunity to design and implement the Idaho Power EnergyWise Program. It has been a pleasure working with you, we look forward to many more years of program success.

Sincerely,

Chase Griswold
Program Manager, CAPM

Libby Wilson
Director of Program Services

Program Team

Program Team

The success of the Idaho Power EnergyWise 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 EnergyWise Program implementation team consisted of the following:

Outreach

Our outreach team is the face of the Idaho Power EnergyWise 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.

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).

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 EnergyWise 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 EnergyWise 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.

"I loved the workbook and how it was made into activities for kids to complete. Having it be hands-on is very helpful."

[redacted]
Gooding Elementary/Middle School

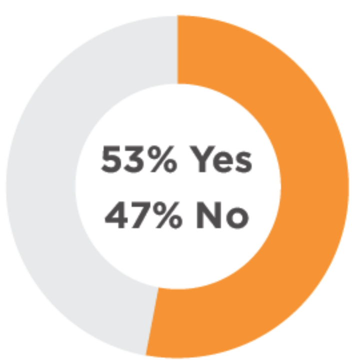
Program Impact

The Idaho Power EnergyWise 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:

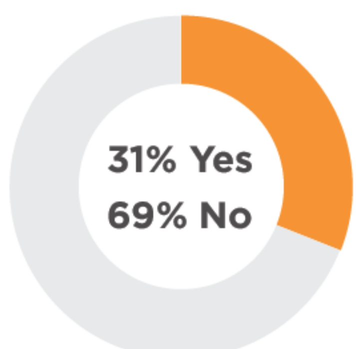
A. Home Survey for Capital Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 107 participating teachers in the Capital region, 23 (21%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,978 participating children in the Capital region, 772 (26%) returned completed surveys.

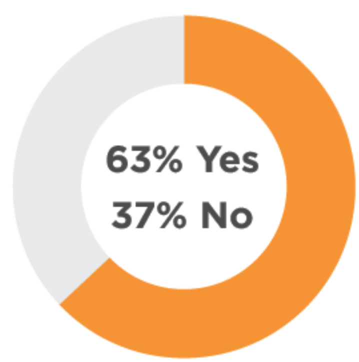
Did your family install the first 9-watt LED Light Bulb?	**Yes - 53%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 31%**
Did your family change the way they use energy?	**Yes - 63%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

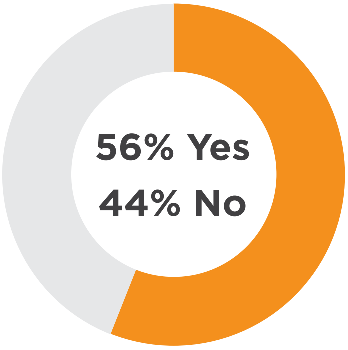


Students who indicated their family changed the way they use energy.

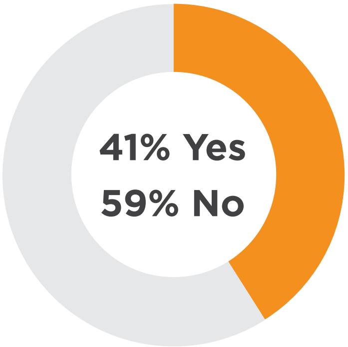
Home Survey for Canyon Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 95 participating teachers in the Canyon region, 24 (25%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 2,314 participating children in the Canyon region, 1,138 (49%) returned completed surveys.

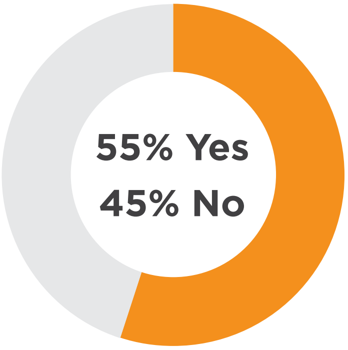
Did your family install the first 9-watt LED Light Bulb?	**Yes - 56%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 41%**
Did your family change the way they use energy?	**Yes - 55%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

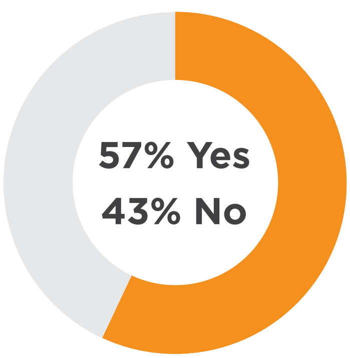


Students who indicated their family changed the way they use energy.

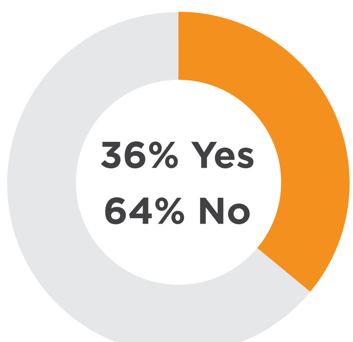
Home Survey for Eastern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 45 participating teachers in the Eastern region, 10 (22%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,240 participating children in the Eastern region, 475 (38%) returned completed surveys.

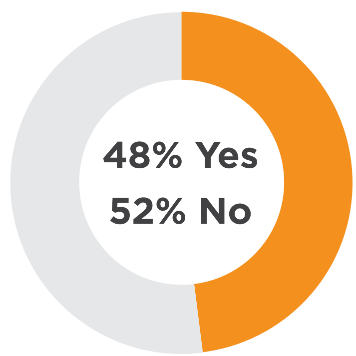
Did your family install the first 9-watt LED Light Bulb?	**Yes - 57%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 36%**
Did your family change the way they use energy?	**Yes - 48%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

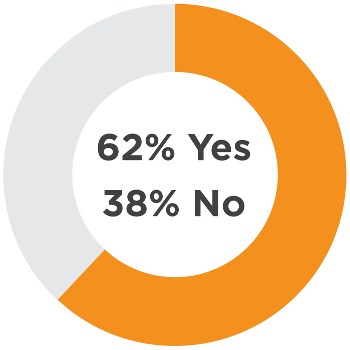


Students who indicated their family changed the way they use energy.

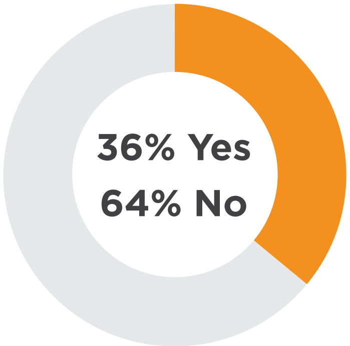
Home Survey for Southern Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 56 participating teachers in the Southern region, 10 (18%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,490 participating children in the Southern region, 270 (18%) returned completed surveys.

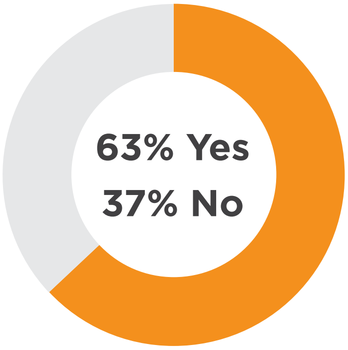
Did your family install the first 9-watt LED Light Bulb?	**Yes - 62%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 36%**
Did your family change the way they use energy?	**Yes - 63%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

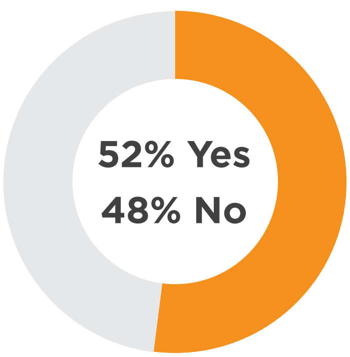


Students who indicated their family changed the way they use energy.

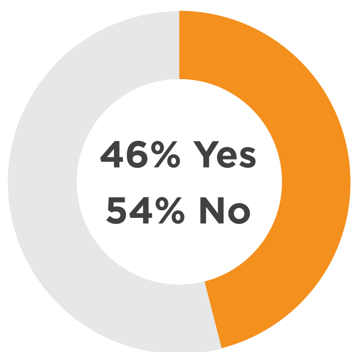
Home Survey for Western Region

Participating teachers were asked to return their students' completed home check-up and home activities results. Of the 58 participating teachers in the Western region, 6 (10%) returned survey results for the program. Parents and students were asked to install the kit measures and complete the home activities. Of the 1,417 participating children in the Western region, 315 (22%) returned completed surveys.

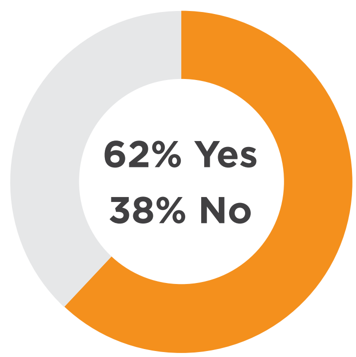
Did your family install the first 9-watt LED Light Bulb?	**Yes - 52%**
Did your family install the new High-Efficiency Showerhead?	**Yes - 46%**
Did your family change the way they use energy?	**Yes - 62%**



Students who indicated they installed the first 9-watt LED Light Bulb.



Students who indicated they installed the High-Efficiency Showerhead.

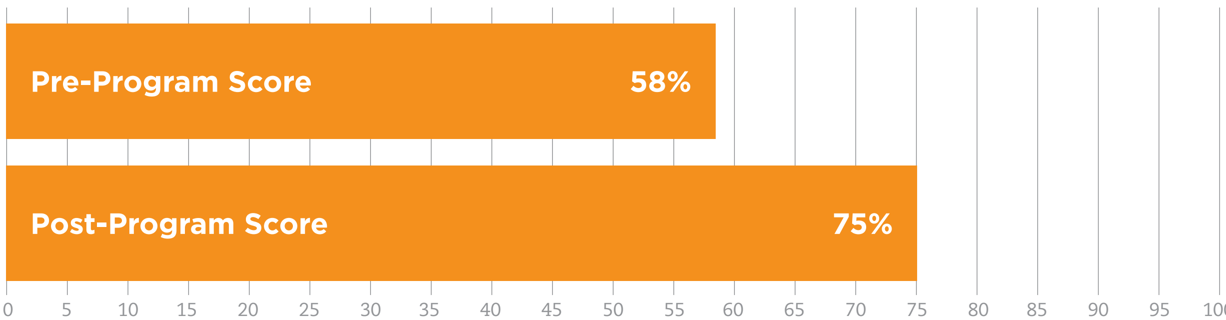


Students who indicated their family changed the way they use energy.

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 **5.8** questions correctly prior to being involved in the program and then improved to answer **7.5** questions correctly following participation. Of the 9,439 student households participating, 2,970 returned survey responses.

Scores improved from 58% to 75%.



Pre-Program and Post-Program Test Questions

		Pre	Post
1	Which layer of Earth do we live on?		
	Crust	62%	85%
	Mantle	8%	3%
	Inner Core	8%	3%
	Outer Core	23%	9%
2	Non-Potable water is safe to drink.		
	True	25%	11%
	False	75%	89%
3	Which of these is not a renewable resource?		
	Wind	20%	8%
	Plants	7%	4%
	Gold	54%	78%
	Animals	19%	10%
4	Saving water saves energy.		
	True	84%	94%
	False	16%	6%

Pre-Program and Post-Program Test Questions

		Pre	Post
5	Which are fossil fuels?		
	Coal	22%	13%
	Oil	13%	6%
	Natural Gas	14%	9%
	All of the above	51%	72%
6	Which type of energy is created in the process of Photosynthesis?		
	Nuclear Energy	19%	14%
	Thermal Energy	26%	21%
	Chemical Energy	30%	51%
	Electric Energy	25%	14%
7	Which Kit item will save the most natural resources?		
	Compact Fluorescent Lamp	31%	29%
	High-Efficiency Showerhead	32%	52%
	FilterTone® Alarm	18%	10%
	LED Night Light	18%	9%
8	Which major appliance uses the most energy?		
	Dishwasher	21%	14%
	Refrigerator	59%	63%
	Dryer	21%	24%
9	An LED (light emitting diode) light bulb uses more energy than an incandescent bulb.		
	True	36%	16%
	False	64%	84%
10	On-peak time is the best time to play video games.		
	True	32%	16%
	False	68%	84%

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, 9,800 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 9,439 student households participating, 2,970 returned survey responses.

Projected Resource Savings

A list of assumptions and formulas used for these calculations can be found in Appendix A.

	Annual	Lifetime	
Number of Participants:	**9,800**		
Projected reduction from Showerhead retrofit:	13,512,502	135,125,024	gallons
Product Life: **10 years**	866,826	8,668,258	kWh
	45,436	454,359	therms
Projected reduction from first **9**-watt LED Light Bulb:	281,282	3,375,390	kWh
Product Life: **25,000 hours** (**12** years)			
Projected reduction from second **9**-watt LED Light Bulb:	223,942	2,687,304	kWh
Product Life: **25,000 hours** (**12** years)			
Projected reduction from third **9**-watt LED Light Bulb:	192,329	2,307,946	kWh
Product Life: **25,000 hours** (**12** years)			
Projected reduction from LED Night Light retrofit:	215,831	2,158,308	kWh
Product Life: **10,000 hours**			
Projected reduction from FilterTone® installation:	180,874	1,808,744	kWh
Product Life: **10 years**	8,962	89,618	therms
TOTAL PROGRAM SAVINGS:	13,512,502	135,125,024	gallons
	1,961,084	21,005,950	kWh
	54,398	543,976	therms
TOTAL PROGRAM SAVINGS PER HOUSEHOLD:	1,379	13,788	gallons
	200	2,143	kWh
	6	56	therms

***Per Idaho Power's request, the associated savings for the shower timer have not been included in savings totals*

***Lifetime LED savings based on assumption that inefficient bulb would stay in place for 12 years.*

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 EnergyWise Program. Of the 176 participating teachers, 73 returned teacher program evaluation surveys.

Teacher Response

(A summary of responses and regional data can be found in Appendix D)

100% of participating teachers indicated they would enroll in the program again given the opportunity.

100% of participating teachers indicated they would recommend the program to their colleagues.

What did students like best about the program? Explain.

"They loved to experiment with the different items in the kits."
Jill Mesecher, Mill Creek Elementary School

"Having the kits to take home and use."
Courtney Craner, Central Elementary School

"The kits, they also enjoyed the night lights."
Staci Miller, Mill Creek Elementary School

"They liked activities in the books such as crosswords and the classroom activities, with items such as the night light, and shower timer."
Brian Fischer, Eagle Hills Elementary School

"The hands-on information and activities."
Matea Schindel, Snake River Elementary

"They loved the kits and were dying to take them home."
Karla Miller, Silver Trail Elementary School

"The ability to apply what they learned in class at home."
Lindsay Strong, Snake River Elementary

"Students were excited about using the kits at home."
Andrea Chester, West Canyon Elementary

"They loved the kits and the activities."
Rachel Thomas, Green Acres Elementary School

"They loved the EnergyWise kits. It allowed them to use the information from the book at home."
Cody Perry, Tendoy 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.

"Extra science materials with all the visuals."
Courtney Craner, Central Elementary School

"The kits, encourages power conservation."
Staci Miller, Mill Creek Elementary School

"Easy to use and integrate the content."
Matea Schindel, Snake River Elementary

"I liked having the materials handy in the classroom and the student books."
Karla Miller, Silver Trail Elementary School

"The real world science for students."
Lindsay Strong, Snake River Elementary

"The students were able to report how using the kit changed their energy habits."
Christin Brown, Gate City Elementary School

"Can do as little or much as needed."
Kathy Walker, Green Acres Elementary School

"The workbooks are on the student's level."
Rachel Thomas, Green Acres Elementary School

"I liked that the students were able to talk with their parents."
Emry Smith, West Canyon Elementary

"Good information, the text provided helped with real life learning."
Julie Bodily, Four Rivers Community School

"I like the energy kits best because I love that my students have the opportunity to learn and connect with their families."
Kayden Tague, Whitney Elementary School

"The family involvement with the take home materials."
Joleena Malugani, Washington Elementary School

"The program is fairly user friendly. I also liked the hands-on projects."
Zachary Dwello, Nampa Christian 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 EnergyWise Program. Of the 9,439 participating families, 47 parents returned program evaluation surveys.

Parent Response

(A summary of responses and regional data can be found in Appendix E)

100% of participating parents indicated that the program was easy to use.

100% of participating parents indicated they would continue to use the kit items after the completion of the program.

100% of participating parents indicated they would like to see this program continued in local schools.

As a parent, which aspect of the program did you like best?

"Working on it together and discussing positive ways to impact the planet."
[redacted], **Silver Sage Elementary School**

"The light bulbs and showerhead."
[redacted], **Fruitland Elementary School**

"Overall education and encouragement of conservation."
[redacted], **Reed Elementary**

"Getting our children involved in saving energy."
[redacted], **Tendoy Elementary**

"Learning about energy."
[redacted] **Chief Joseph School Of The Arts**

"Water conservation with shower length and electricity usage."
[redacted], **Crimson Point Elementary**

"It being interactive & kid friendly."
[redacted] **Cynthia Mann Elementary School**

"Shower timer!"
[redacted], **Cynthia Mann 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?

"I know this is probably costly to Idaho Power, but my daughter was very excited to tell me everything she learned, this was awesome! I'm active military, I have lived in many places, and you have the lowest prices. Thank you for this program and all you do!"

[redacted], **Prospect Elementary**

"Thank you very much for this program it was fun for my son to do and our whole family was involved and learning together."

[redacted] **Prospect Elementary**

"Awesome job!"

[redacted] **Cynthia Mann Elementary School**

"Thank you for helping empower the kids to make smart choices. Well done and please let us know how we can help continue the program."

[redacted], **Cynthia Mann Elementary School**

"Thanks for the light bulbs!"

[redacted], **Idaho Arts Charter School (K-4)**

"My son really enjoyed this and is much more energy savvy now. He talked about all the projects often since they are things we did in the house that he sees everyday."

[redacted], **Gooding Elementary/Middle School**

"Thank you for the wonderful kit! My child loved all the gadgets especially the thermometer! I love the light bulbs."

[redacted], **Gooding Elementary/Middle School**

"Thank you it was a great conversation starter about how we can do better in our home."

[redacted] **Pioneer School Of The Arts**

"Thank you."

[redacted], **Wapello Elementary School**

F. Teacher Letters

Dear Idaho Power,

Thank you so much for the opportunity to participate in this program! It was a great chance for the students to experience hands on how they can conserve energy and make our city a cleaner and better place to live.

The students really enjoyed receiving their kits and completing the activities at home. I know that many were excited about the simple ways that they can conserve such as using the shower timer, switching out light bulbs, and simply plugging in an LED night light. The ease of the Energy Kits was great for the students, parents, and teacher.

It was such a simple process to go through the text with the students. I loved how organized the materials were and how meaningful the activities were. As a whole, the program is organized extremely well. In fact, I recently sent in a request for an energy kit for my home through Idaho Power.

The students learned a lot about conservation through this program. In fact, during our Passion Project Time (a time students get to research and learn about a topic of their choice) many students were interested in related topics and what they could do to conserve energy and help the environment. It was great to see students take a real interest and dip deeper into a topic that was interesting to them.

I am excited to participate in this program again next year. I hope to be able to spend more time on activities to make the program even more meaningful for the students.

Thank you again for providing schools and students with such a simple, well organized, and meaningful way for students to learn about conservation and energy. It is a great experience for all students!

With much appreciation,

Laura VanDerschaaf
5th Grade – Lake Ridge Elementary

Birch Elementary School
6900 Birch Lane
Nampa, ID 83687
(208) 461-5960

November 13, 2019

Dear Idaho Power,

I would like to thank you for allowing us to participate in the Energy Wise education program.

The kids learned a lot about energy and how to be more energy efficient in their homes. I think teaching children how to conserve energy has fallen by the wayside, so these lessons help families become more energy conscious at home and at school. The lessons were interesting, easy to teach, and the kids had a fun time installing the items in the kit.

Thanks again for making this program available to our schools and for the monetary donation. We really appreciate it!

Sincerely,

Mary Jo Pegram

Mary Jo Pegram
4th Grade Teacher

Valley View Elementary School

3555 N. Milwaukee St., Boise, ID 83704 Phone# (208) 854-6370 Fax # (208) 854-6371

April 23, 2020

Dear Idaho Power,

Valley View Elementary fifth grade has been fortunate to participate in the Idaho Power Energy Wise Program. We volunteer to participate in this program each year because we clearly see the benefit of educating students on the importance of energy awareness and understanding.

Thank you for allowing us to be a part of a comprehensive program that provides useful resources and materials. The lessons are easy to understand and the home support materials are a nice extension to the lessons.

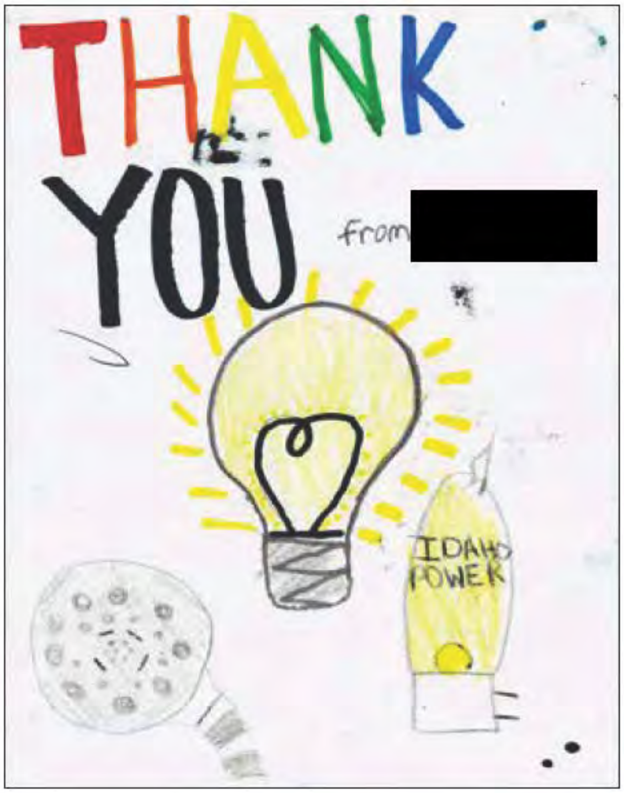
Parents appreciate the materials kit and information. Many students have commented on how they use the energy saving tools and their parents have saved money. Students have also reported family discussions regarding energy and power.

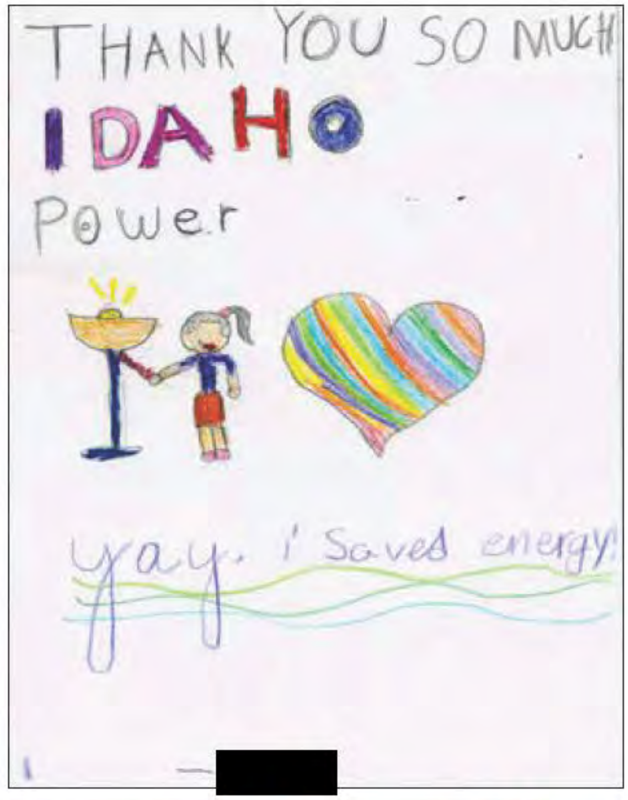
Once again, we are grateful for the opportunity to share this program with our students. As you know, they are our future and as such, we want to give them the best knowledge we can so they can positively contribute to helping our community and environment.

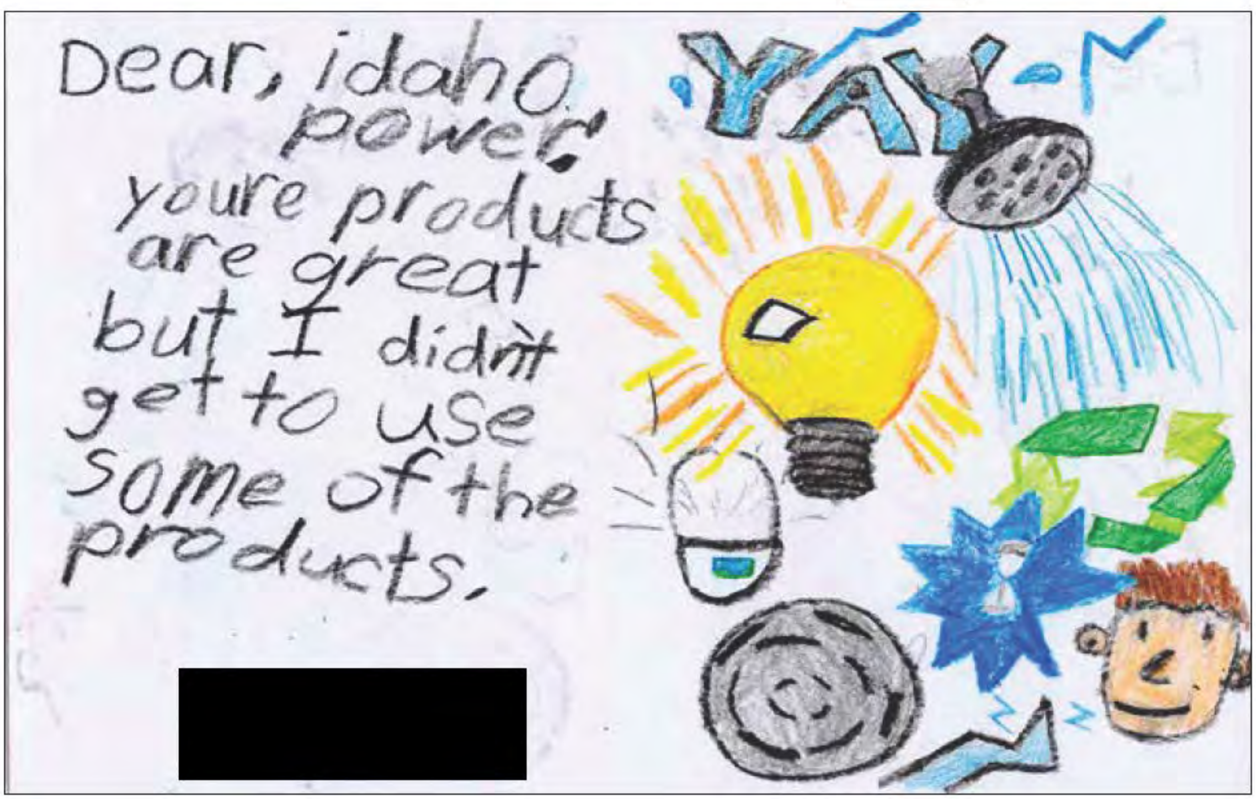
Sincerely,

Meko Myers & Shawna Hiller
Valley View Elementary

G. Student Letters

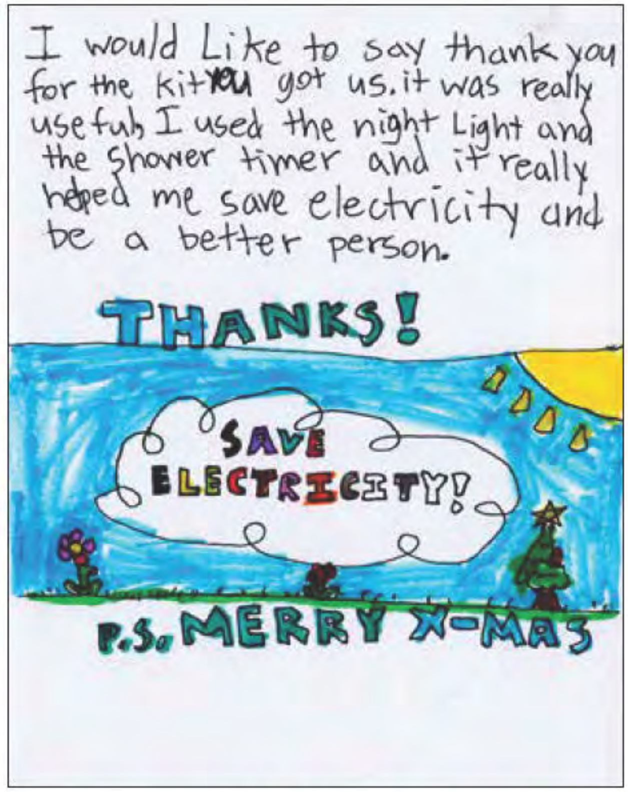


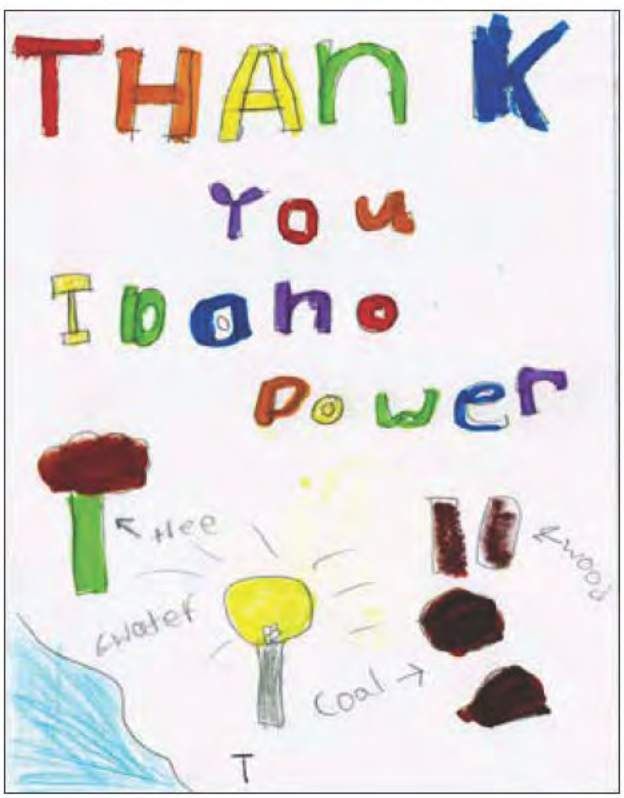


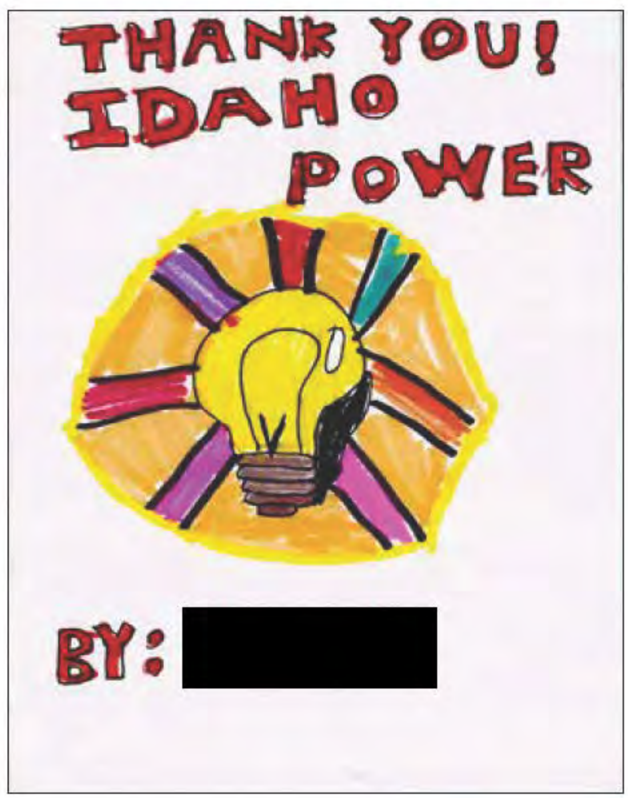


Student Letters

(continued)

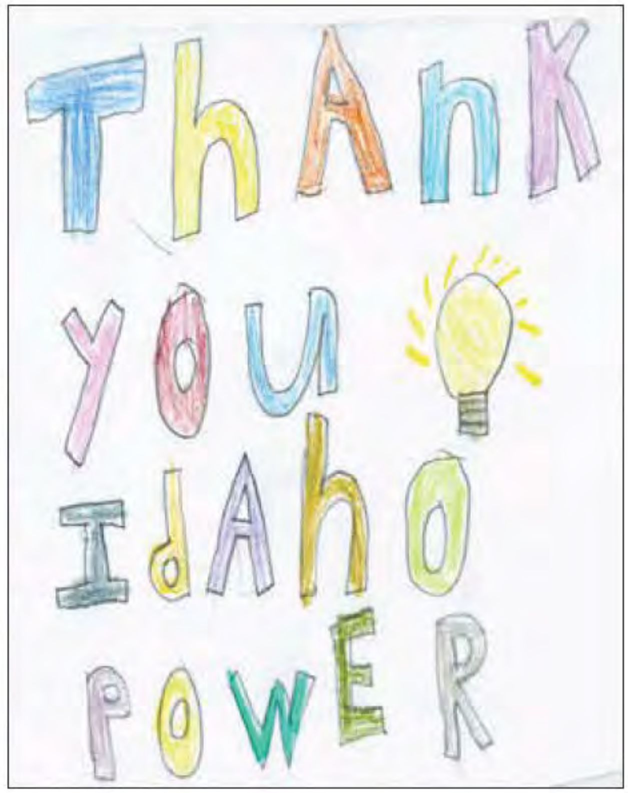






Student Letters

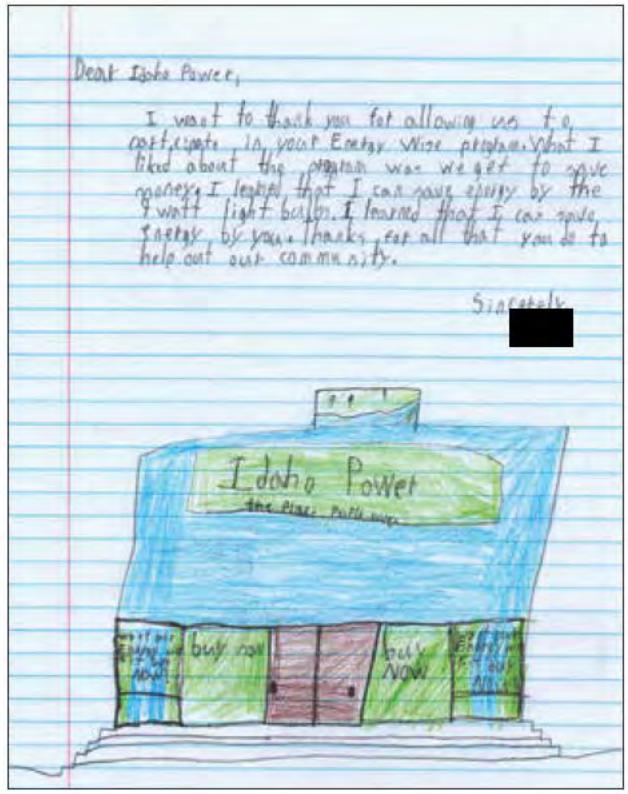
(continued)



Thank you for everything
you have done! I am very
thankful for the kits
and the items. I also really
injoyed the presantation. The
activity we did with the
class was very exciting!
My houses electricity went
out last Thursday, but I
knew it was ok and
I knew you would
fix it and it would
be ok. ♥

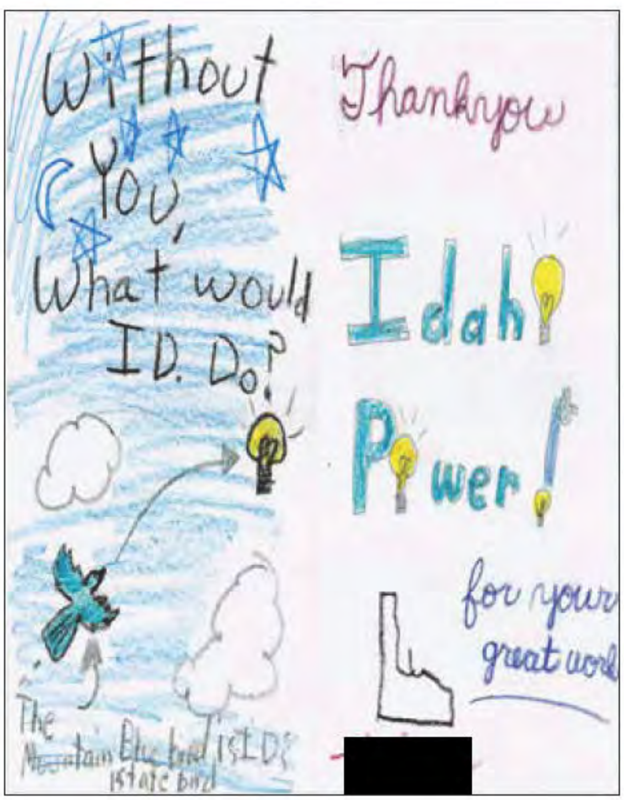
From: Elemetary Student

(continued)


Dear Idaho Power,

I want to thank you for allowing us to participate in your Energy Wise program. What I liked about the program was we get to save money. I learned that I can save energy by the 9 watt light bulbs. I learned that I can save energy by you. Thanks for all that you do to help out our community.

Sincerely [redacted]




Dear Idaho Power,

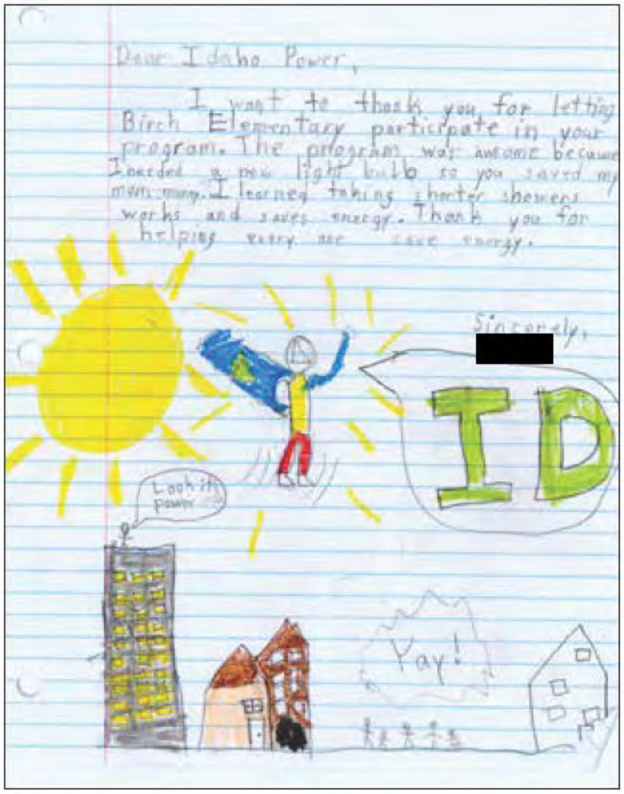
I want to thank you for allowing us to participate in your Energy Wise program. What I liked about the program was my family doing it with me. I learned that I can save energy by turning down the fridge. Thanks for all that you do to help out our community.

Sincerely,

[redacted]

Student Letters

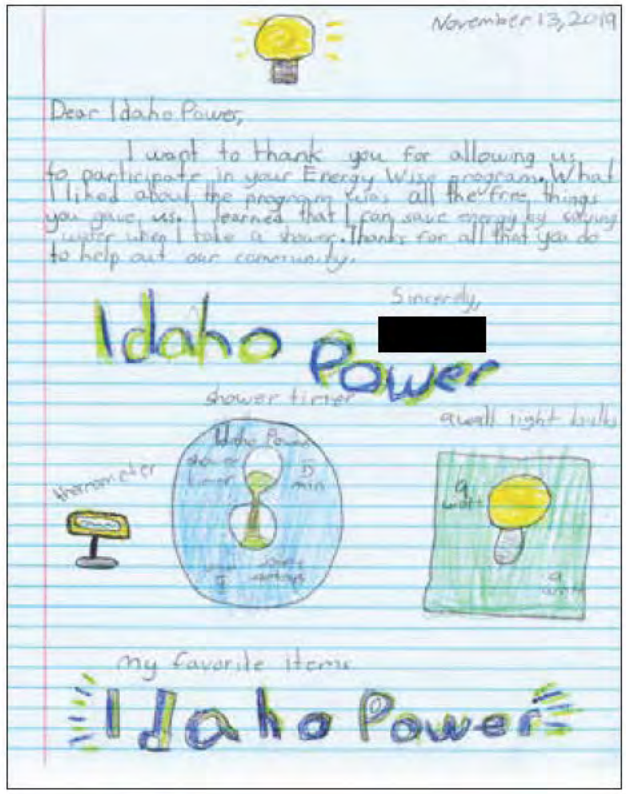
(continued)



Dear Idaho Power,

I want to thank you for letting Birch Elementary participate in your program. The program was awsome because I needed a new light bulb so you saved my mom mony. I learned taking shorter showers works and saves energy. Thank you for helping every one save energy.

Sincerely, [redacted]

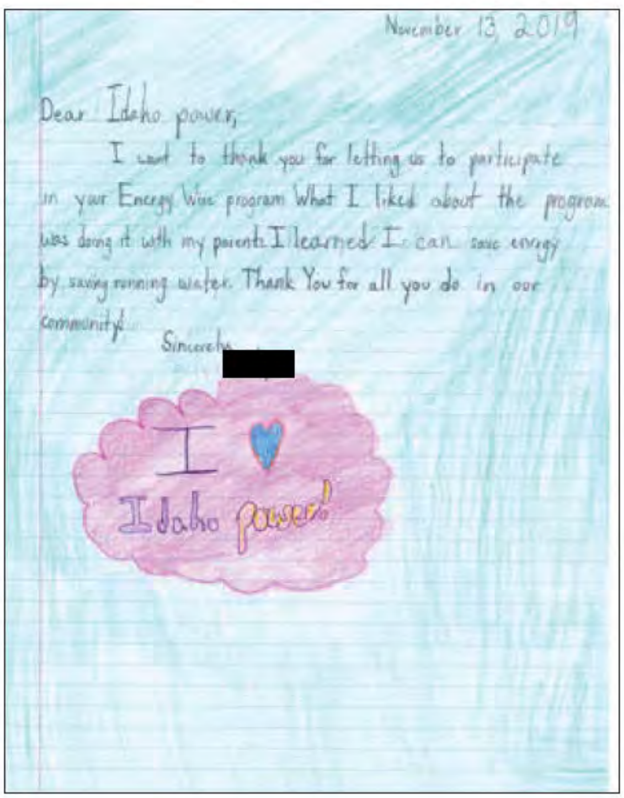


November 13, 2019

Dear Idaho Power,

I want to thank you for allowing us to participate in your Energy Wise program. What I liked about the program was all the free things you gave us. I learned that I can save energy by saving water when I take a shower. Thanks for all that you do to help out our community.

Sincerely, [redacted]

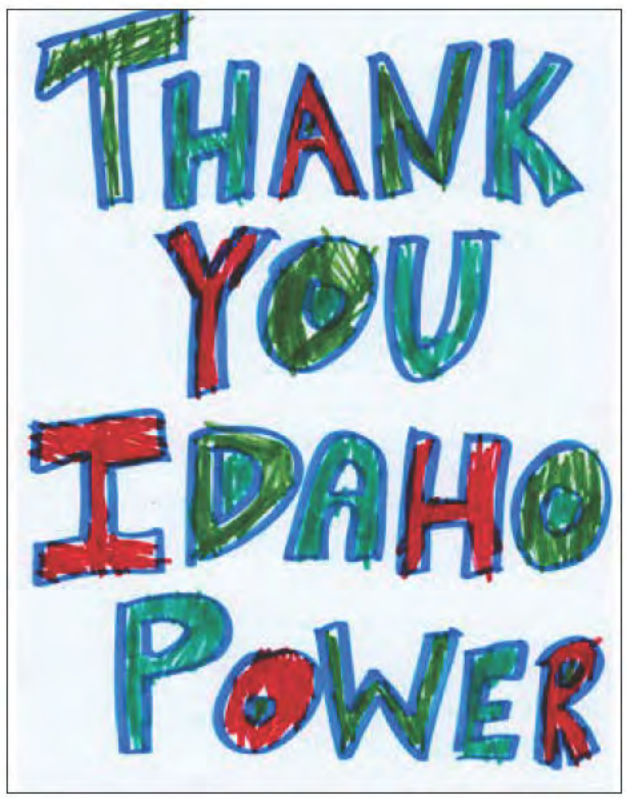


November 13, 2019

Dear Idaho power,

I want to thank you for letting us to participate in your Energy Wise program What I liked about the program was doing it with my parents I learned I can save energy by saving running water. Thank You for all you do in our community!

Sincerely, [redacted]

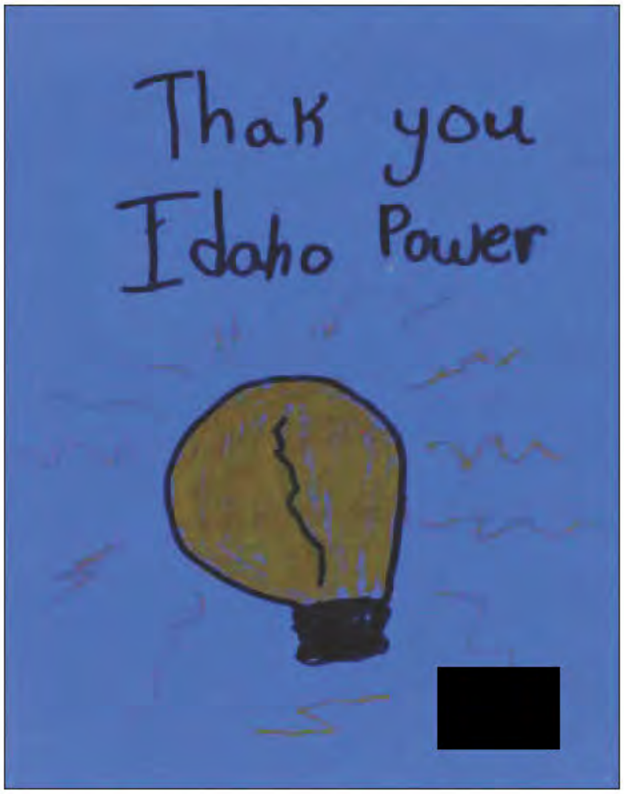


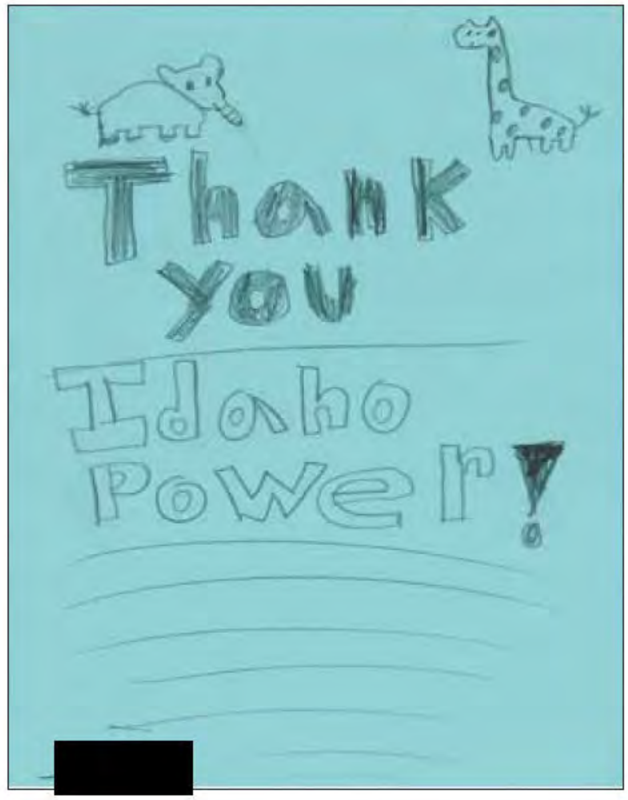
Student Letters

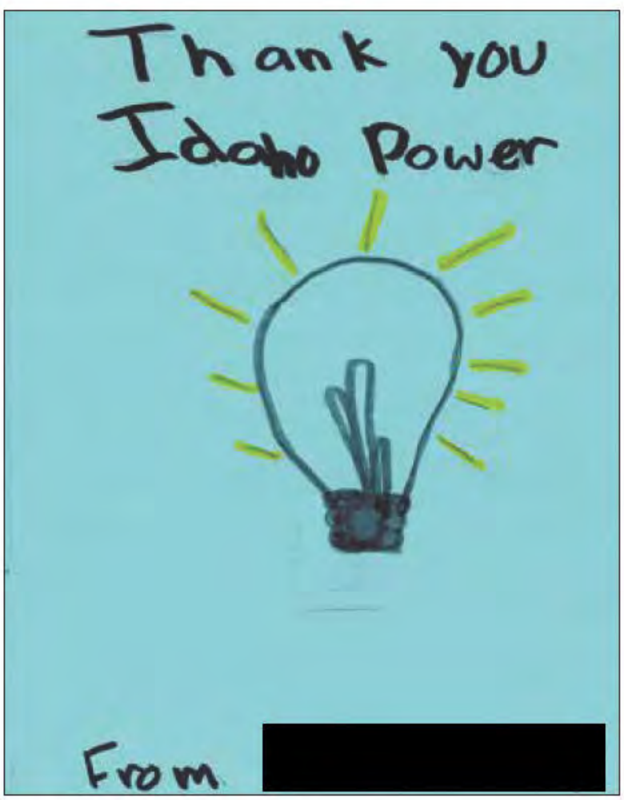
(continued)

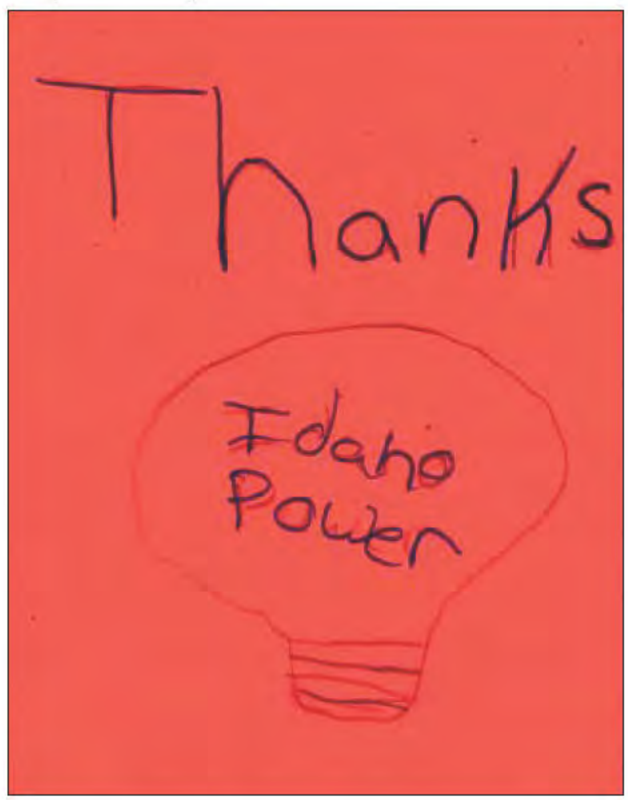
Student Letters

(continued)



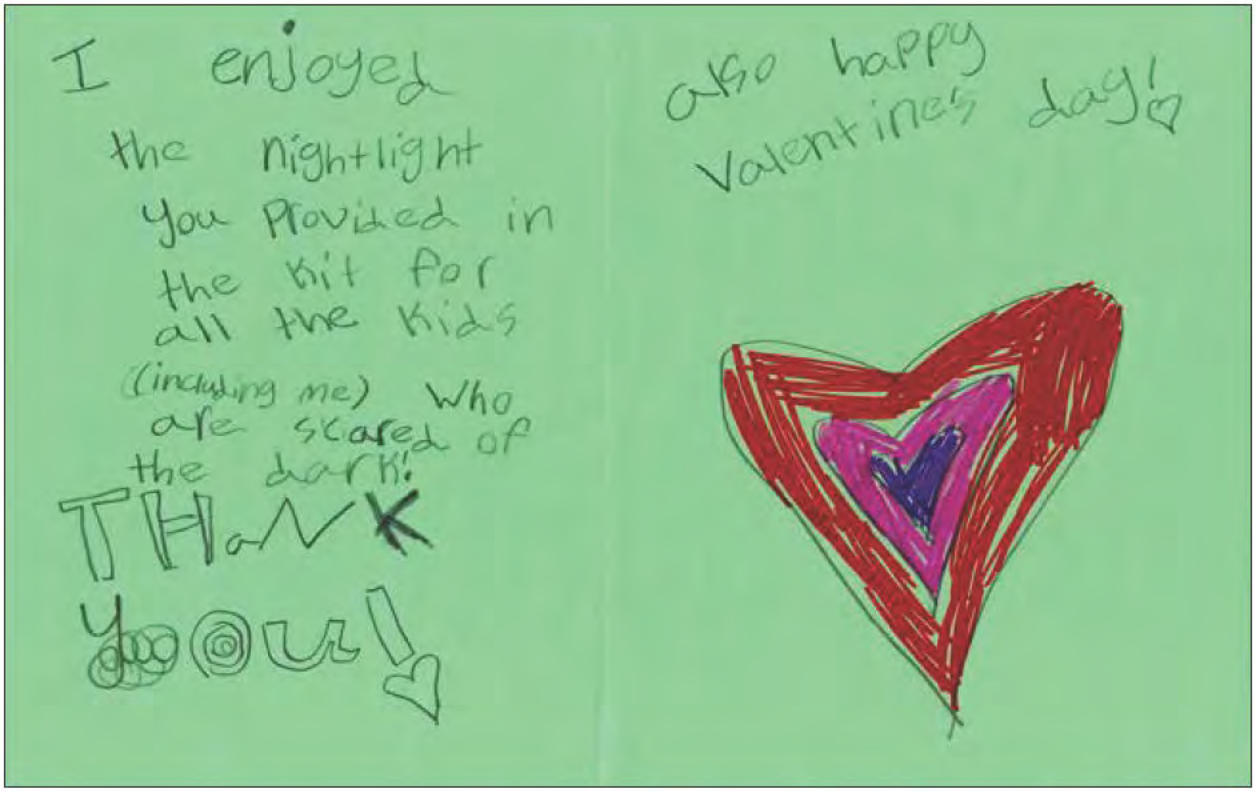






Student Letters

(continued)



"I liked the supplies and discussions that we were able to have on saving energy. I also liked the important information contained in the program."

Shawna Hiller, Teacher

Valley View 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:	5.05	people[1]
Average number of full bathrooms per home:	2.00	full bathrooms per home[1]
% of water heated by gas:	51.18%	[1]
% of water heated by electricity:	48.82%	[1]
Installation / participation rate of:	37.63%	[1]
Average Showerhead has a flow rate of:	2.02	gallons per minute[1]
Retrofit Showerhead has a flow rate of:	1.30	gallons per minute[1]
Number of participants:	9,800	[1]
Shower duration:	8.20	minutes per day[2]
Showers per day per person:	0.67	showers per day[2]
Product life:	10	years[3]

Projected Water Savings:

Showerhead retrofit projects an **annual** reduction of:	13,512,502	gallons[4]
Showerhead retrofit projects a **lifetime** reduction of:	135,125,024	gallons[5]

Projected Electricity Savings:

Showerhead retrofit projects an **annual** reduction of:	866,826	kWh[2,6]
Showerhead retrofit projects a **lifetime** reduction of:	8,668,258	kWh[2,7]

Projected Natural Gas Savings:

Showerhead retrofit projects an **annual** reduction of:	45,436	therms[2,8]
Showerhead retrofit projects a **lifetime** reduction of:	454,359	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:	51.18%	[1]
% of water heated by electricity:	48.82%	[1]
Installation / participation rate of Shower Timer:	70.82%	[1]
Average showerhead has a flow rate of:	2.02	gallons per minute[1]
Retrofit showerhead has flow rate of:	1.30	gallons per minute[1]
Number of participants:	9,800	[1]
Average of baseline and retrofit showerhead flow rate:	1.66	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:	9,003,673.55	gallons[6]
Shower Timer installation projects a **lifetime** reduction of:	18,007,347.10	gallons[7]

Projected Electricity Savings:

Shower Timer installation projects an **annual** reduction of:	577,585	kWh[8]
Shower Timer installation projects a **lifetime** reduction of:	1,155,170	kWh[9]

Projected Natural Gas Savings:

Shower Timer installation projects an **annual** reduction of:	30,275	therms[10]
Shower Timer installation projects a **lifetime** reduction of:	60,550	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:	**23.61%**	[4]
Number of participants:	**9,800**	[4]

Projected Electricity Savings:

The FilterTone installation projects an **annual** reduction of:	**180,874**	kWh[5]
The FilterTone installation projects a **lifetime** reduction of:	**1,808,744**	kWh[6]

Projected Natural Gas Savings:

The FilterTone installation projects an **annual** reduction of:	**8,962**	therms[7]
The FilterTone installation projects a **lifetime** reduction of:	**89,618**	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' F lter 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:	**59.46**	watts[3]
Installation / participation rate of:	**55.46%**	[3]
Number of participants:	**9,800**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**281,282**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**3,375,390**	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

***Lifetime LED savings based on assumption that inefficient bulb would stay in place for 12 years.*

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:	**57.80**	watts[3]
Installation / participation rate of:	**45.65%**	[3]
Number of participants:	**9,800**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**223,942**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,687,304**	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

***Lifetime LED savings based on assumption that inefficient bulb would stay in place for 12 years.*

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:	**57.93**	watts[3]
Installation / participation rate of:	**39.10%**	[3]
Number of participants:	**9,800**	[3]

Projected Electricity Savings:

The LED retrofit projects an **annual** reduction of:	**192,329**	kWh[2,4]
The LED retrofit projects a **lifetime** reduction of:	**2,307,946**	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

***Lifetime LED savings based on assumption that inefficient bulb would stay in place for 12 years.*

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:	**77.36%**	[3]
Number of participants:	**9,800**	[3]

Projected Electricity Savings:

The Energy Efficient Night Light retrofit projects an **annual** reduction of:	**215,831**	kWh[4]
The Energy Efficient Night Light retrofit projects a **lifetime** reduction of:	**2,158,308**	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

***Lifetime LED savings based on assumption that inefficient bulb would stay in place for 12 years.*

Home Check-Up

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	**9,800**	3,085	2,409	1,285	1,546	1,475
Students	**9,439**	2,978	2,314	1,240	1,490	1,417
Surveys Received	**2,970**	772	1,138	475	270	315
Percent Response	**31%**	26%	49%	38%	18%	22%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What type of home do you live in?						
Single Family Home (Mobile)	8%	5%	11%	8%	9%	9%
Single Family Home (Manufactured)	8%	4%	7%	9%	10%	15%
Single Family Home (Built)	67%	76%	63%	67%	65%	56%
Multi-Family (2-4 units)	10%	9%	11%	10%	10%	10%
Multi-Family (5-20 units)	5%	5%	6%	5%	3%	9%
Multi-Family (21+ units)	2%	1%	2%	2%	2%	2%
2 Was your home built before 1992?						
Yes	38%	28%	34%	55%	39%	48%
No	62%	72%	66%	45%	61%	52%
3 Is your home owned or rented?						
Owned	74%	79%	74%	72%	69%	72%
Rented	26%	21%	26%	28%	31%	28%
4 How many kids live in your home (age 0-17)?						
1	10%	9%	10%	10%	9%	14%
2	30%	35%	30%	25%	27%	27%
3	27%	27%	27%	26%	29%	27%
4	17%	16%	16%	21%	19%	15%
5+	16%	13%	17%	18%	17%	18%

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	9%	8%	8%	11%	11%	13%
	2	69%	77%	68%	66%	69%	61%
	3	13%	9%	15%	16%	13%	12%
	4	5%	3%	6%	5%	4%	7%
	5+	3%	2%	3%	2%	3%	7%
6	Does your home have a programmable outdoor sprinkler system?						
	Yes	66%	82%	71%	49%	55%	43%
	No	34%	18%	29%	51%	45%	57%
7	Does your home have a programmable thermostat?						
	Yes	76%	83%	80%	68%	68%	63%
	No	24%	17%	20%	32%	32%	37%
8	What is the main source of heating in your home?						
	Natural Gas	41%	56%	40%	38%	36%	20%
	Electric Heater	42%	36%	42%	45%	51%	48%
	Propane	4%	2%	4%	4%	5%	4%
	Heating Oil	1%	1%	1%	0%	0%	2%
	Wood	5%	2%	5%	3%	5%	17%
	Other	7%	3%	8%	9%	3%	9%
9	What type of air conditioning unit do you have?						
	Central Air Conditioner	71%	84%	76%	55%	65%	52%
	Evaporative Cooler	7%	6%	6%	9%	5%	8%
	Room Unit	13%	7%	9%	21%	17%	25%
	Don’t Have One	10%	3%	9%	16%	13%	14%
10	Does your home have a Dishwasher?						
	Yes	86%	94%	91%	76%	75%	72%
	No	14%	6%	9%	24%	25%	28%

Due to rounding of numbers, percentages may not add up to 100%

Home Check-Up

(continued)

	Total	Capital	Canyon	Eastern	Southern	Western
11 How many half-bathrooms are in your home?						
0	58%	42%	55%	78%	69%	62%
1	34%	49%	37%	15%	24%	26%
2	6%	6%	6%	5%	6%	9%
3	2%	2%	2%	2%	1%	2%
4+	1%	1%	1%	1%	0%	0%
12 How many full bathrooms are in your home?						
1	21%	11%	18%	27%	30%	36%
2	55%	55%	61%	44%	55%	52%
3	20%	25%	18%	24%	11%	10%
4	4%	8%	2%	3%	3%	2%
5+	1%	1%	1%	1%	1%	0%
13 How many toilets are in your home?						
1	15%	6%	13%	22%	21%	29%
2	40%	29%	41%	45%	50%	50%
3	33%	47%	37%	23%	22%	16%
4	9%	15%	7%	9%	4%	4%
5+	2%	4%	2%	2%	2%	1%
14 How is your water heated?						
Natural Gas	51%	64%	54%	46%	39%	28%
Electricity	49%	36%	46%	54%	61%	72%

Due to rounding of numbers, percentages may not add up to 100%

Home Activities

	Total	Capital	Canyon	Eastern	Southern	Western
Total Participants	**9,800**	3,085	2,409	1,285	1,546	1,475
Students	**9,439**	2,978	2,314	1,240	1,490	1,417
Surveys Received	**2,970**	772	1,138	475	270	315
Percent Response	**31%**	26%	49%	38%	18%	22%

	Total	Capital	Canyon	Eastern	Southern	Western
1 What is the flow rate of your old showerhead?						
0 - 1.0 GPM	10%	8%	9%	11%	9%	15%
1.1 - 1.5 GPM	21%	19%	21%	20%	27%	22%
1.6 - 2.0 GPM	21%	23%	21%	19%	25%	13%
2.1 - 2.5 GPM	22%	23%	22%	25%	22%	17%
2.6 - 3.0 GPM	16%	15%	17%	14%	12%	16%
3.1+ GPM	11%	11%	10%	12%	5%	17%
2 Did you install the new High-Efficiency Showerhead?						
Yes	38%	31%	41%	36%	36%	46%
No	62%	69%	59%	64%	64%	54%
3 If you answered "yes" to question 2, what is the flow rate of your new showerhead?						
0 - 1.0 GPM	23%	20%	21%	33%	20%	26%
1.1 - 1.5 GPM	41%	42%	38%	38%	50%	45%
1.6 - 1.75 GPM	36%	37%	41%	29%	30%	29%
4 Did you use the Shower Timer?						
Yes	71%	71%	72%	66%	67%	74%
No	29%	29%	28%	34%	33%	26%
5 Did your family install the first 9-watt LED Light Bulb?						
Yes	55%	53%	56%	57%	62%	52%
No	45%	47%	44%	43%	38%	48%

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	16%	17%	16%	13%	12%	20%
60-watt	38%	38%	35%	46%	43%	34%
75-watt	15%	14%	16%	10%	16%	18%
100-watt	11%	10%	13%	11%	9%	9%
Other	20%	19%	20%	21%	19%	19%
7 Did your family install the second 9-watt LED Light Bulb?						
Yes	46%	44%	47%	43%	47%	47%
No	54%	56%	53%	57%	53%	53%
8 If you answered "yes" to question 7, what is the wattage of the incandescent bulb you replaced?						
40-watt	17%	18%	18%	14%	13%	22%
60-watt	38%	37%	38%	40%	40%	38%
75-watt	13%	14%	13%	11%	18%	13%
100-watt	9%	10%	10%	9%	5%	8%
Other	22%	20%	22%	25%	24%	19%
9 Did your family install the third 9-watt LED Light Bulb?						
Yes	39%	38%	41%	38%	36%	40%
No	61%	62%	59%	62%	64%	60%
10 If you answered "yes" to question 9, what is the wattage of the incandescent bulb you replaced?						
40-watt	18%	16%	20%	13%	12%	23%
60-watt	36%	37%	34%	35%	36%	37%
75-watt	14%	9%	14%	14%	23%	14%
100-watt	10%	12%	10%	10%	5%	9%
Other	23%	23%	21%	29%	24%	17%
11 Did your family install the FilterTone® Alarm?						
Yes	24%	23%	28%	18%	20%	22%
No	76%	77%	72%	82%	80%	78%

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%	23%	20%	13%	21%	13%
3 - 4 Degrees	19%	22%	19%	15%	20%	17%
5+ Degrees	14%	15%	15%	14%	10%	10%
Didn't Adjust Thermostat	48%	40%	46%	58%	48%	59%
13 How much did your family turn up the thermostat in summer for cooling?						
1 - 2 Degrees	18%	20%	22%	12%	19%	11%
3 - 4 Degrees	18%	22%	17%	11%	18%	21%
5+ Degrees	15%	16%	18%	12%	9%	10%
Didn't Adjust Thermostat	49%	42%	43%	65%	54%	58%
14 Did you install the LED Night Light?						
Yes	77%	79%	77%	76%	82%	74%
No	23%	21%	23%	24%	18%	26%
15 Did your family lower your water heater settings?						
Yes	23%	23%	25%	21%	19%	26%
No	77%	77%	75%	79%	81%	74%
16 Did your family raise the temperature on your refrigerator?						
Yes	16%	15%	19%	15%	13%	17%
No	84%	85%	81%	85%	87%	83%
17 Did you complete the optional online energy use activity?						
All of it	5%	3%	6%	4%	4%	8%
Some of it	18%	15%	20%	14%	24%	17%
None	77%	82%	74%	82%	71%	74%
18 Did you work with your family on this Program?						
Yes	61%	66%	59%	49%	67%	67%
No	39%	34%	41%	51%	33%	33%

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	52%	56%	51%	43%	58%	54%
No	48%	44%	49%	57%	42%	46%
20 Did your family change the way they use energy?						
Yes	58%	63%	55%	48%	63%	62%
No	42%	37%	44%	52%	37%	38%
21 How would you rate the Idaho Power EnergyWise® Program?						
Great	48%	49%	48%	44%	53%	53%
Pretty Good	39%	41%	38%	38%	40%	39%
Okay	10%	9%	11%	14%	6%	6%
Not So Good	2%	1%	3%	5%	2%	2%

Due to rounding of numbers, percentages may not add up to 100%

Participant List

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Adams Elementary School	Simone Mansfield	1	25	No
Capital	Adams Elementary School	Maggie Wilson	1	25	No
Western	Aiken Elementary School	Patty Eidson	1	23	No
Western	Aiken Elementary School	Candace Zugner	1	26	No
Capital	Amity Elementary School	Megan Fuller	1	27	Yes
Western	Annex Charter School	Julie Alexander	1	21	No
Western	Annex Charter School	Dean Seward	1	19	Yes
Canyon	Birch Elementary School	Carol Briggs	1	27	Yes
Canyon	Birch Elementary School	Brenda Fly	1	27	Yes
Canyon	Birch Elementary School	Juilana Lookhart	1	27	Yes
Canyon	Birch Elementary School	MaryJo Pegram	1	27	Yes
Southern	Carey Public School	Jan Morey	1	16	Yes
Southern	Castleford Elementary School	Carrie March	1	17	No
Southern	Castleford Elementary School	Caree Thomas	1	17	No
Canyon	Centennial Elementary School	Doris Atherton	1	29	Yes
Canyon	Centennial Elementary School	Diane Gharring	1	29	Yes
Canyon	Centennial Elementary School	Chris Wilmes	1	29	No
Canyon	Central Elementary School	Courtney Craner	1	28	Yes
Canyon	Central Elementary School	Aubrey Crisp	1	26	Yes
Capital	Chief Joseph School Of The Arts	Linda Conry	1	25	Yes
Capital	Chief Joseph School Of The Arts	Kelley Gove	1	25	No
Capital	Christine Donnell School of Arts	Tyler Bishop	1	29	Yes
Capital	Christine Donnell School of Arts	Amy Hymas	1	29	Yes
Capital	Christine Donnell School of Arts	Debra Tiffany	1	30	Yes
Eastern	Chubbuck Elementary School	Christenia Coast	1	21	No
Eastern	Chubbuck Elementary School	Lori Schmitt	1	20	No
Eastern	Claude A. Wilcox Elementary School	Lacie Christensen	1	32	Yes
Eastern	Claude A. Wilcox Elementary School	Monique Gannon	1	31	Yes
Eastern	Claude A. Wilcox Elementary School	Tricia Hemsley	1	31	Yes
Capital	Collister Elementary School	Lisa Baker	1	31	No
Canyon	Crimson Point Elementary	Tonia Burbank	1	30	No
Canyon	Crimson Point Elementary	Julie Butler	1	30	No
Canyon	Crimson Point Elementary	Randi Davis	1	12	No
Canyon	Crimson Point Elementary	Lisa Schmidt	1	30	No
Capital	Cynthia Mann Elementary School	Rachael Cromie	1	31	No

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Cynthia Mann Elementary School	Beth Laugheed	1	12	No
Capital	Cynthia Mann Elementary School	Emily Rebich	1	26	No
Canyon	Desert Springs Elementary School	Lindsay Mangum	1	26	Yes
Canyon	Desert Springs Elementary School	Stacey Pearson	1	26	Yes
Canyon	Desert Springs Elementary School	Janelle Smith	1	26	Yes
Canyon	Desert Springs Elementary School	Jackie Sodaro	1	26	Yes
Eastern	Donald D. Stalker Elementary School	Lisa Clark	1	22	No
Eastern	Donald D. Stalker Elementary School	LaNita McRae	1	23	No
Western	Donnelly Elementary	Brakae Campbell	1	25	Yes
Western	Donnelly Elementary	Melissa Maini	1	23	No
Capital	Eagle Hills Elementary School	Noell Bautista	1	27	Yes
Capital	Eagle Hills Elementary School	Jillian Cole	1	29	Yes
Capital	Eagle Hills Elementary School	Brian Fischer	1	28	Yes
Capital	Eagle Hills Elementary School	Samantha Purcell	1	26	No
Canyon	East Canyon Elementary	Amber Faille	1	23	No
Canyon	East Canyon Elementary	Michelle Gooch	1	23	No
Canyon	East Canyon Elementary	Tiara Shippy	1	23	No
Capital	Eliza Hart Spalding Elementary School	Shawna Brenna	1	26	No
Capital	Eliza Hart Spalding Elementary School	Brian Jensen	1	26	No
Capital	Eliza Hart Spalding Elementary School	Krista Johnson	1	26	No
Capital	Eliza Hart Spalding Elementary School	Sarah Williams	1	26	Yes
Eastern	Ellis Elementary School	Kim Benson	1	24	No
Eastern	Ellis Elementary School	Margo Lamont	1	24	No
Eastern	Ellis Elementary School	Sherry VanEvery	1	24	No
Capital	Foothills School of Arts and Science	Justin Brune	1	12	No
Capital	Foothills School of Arts and Science	Jude McDougall	1	13	No
Western	Four Rivers Community School	Julie Bodily	1	28	Yes
Western	Four Rivers Community School	Zuri Montoya	1	27	Yes
Capital	Frontier Elementary	Joshua Thompson	1	53	No
Western	Fruitland Elementary School	Amber Bridgewater	1	20	Yes
Western	Fruitland Elementary School	Ish Green	1	18	No
Western	Fruitland Elementary School	Suzy Hrizuk	1	21	Yes
Western	Fruitland Elementary School	Linda Langley	1	17	No
Western	Fruitland Elementary School	Heather Llanas	1	20	Yes
Western	Fruitland Elementary School	Stacy Wescott	1	18	Yes

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	Fruitland Middle School	Jaris Lewis	1	30	Yes
Western	Fruitland Middle School	Makayla MacKenzie	1	30	No
Western	Fruitland Middle School	Alison Parrot	1	30	Yes
Western	Fruitland Middle School	Deborah Schmid	1	30	No
Western	Fruitland Middle School	Chance Stringer	1	30	No
Capital	Galileo STEM Academy	Beth Bivens	1	33	No
Capital	Galileo STEM Academy	Nicole Sarty	1	33	No
Capital	Galileo STEM Academy	Stacie Swenwold	1	33	Yes
Western	Garden Valley Elementary	Tonya Smith	1	25	Yes
Capital	Garfield Elementary School	Sonia Galaviz	1	26	Yes
Capital	Garfield Elementary School	Katie Tunca	1	26	Yes
Eastern	Gate City Elementary School	Christin Brown	1	28	Yes
Eastern	Gate City Elementary School	Lacey Smart	1	28	Yes
Capital	Glenns Ferry Middle School	Liza Martin	1	36	Yes
Southern	Gooding Elementary/Middle School	Tracie Anderson	1	29	No
Southern	Gooding Elementary/Middle School	Winona Gurney	1	30	Yes
Southern	Gooding Elementary/Middle School	Cameron Knigge	1	30	No
Southern	Gooding Elementary/Middle School	Samantha Knittle	1	110	Yes
Southern	Gooding Elementary/Middle School	Kate Rippee	1	29	No
Capital	Grace Jordan Elementary School	Darwood Ashmead	1	31	No
Capital	Grace Jordan Elementary School	Jason Fewkes	1	28	No
Capital	Grace Jordan Elementary School	Shannon Nicholson	1	28	No
Eastern	Green Acres Elementary School	Rachel Thomas	1	28	Yes
Eastern	Green Acres Elementary School	Kathy Walker	1	28	Yes
Canyon	Greenhurst Elementary School	Tami Ashley	1	21	No
Canyon	Greenhurst Elementary School	John Stull	1	21	Yes
Eastern	Groveland Elementary	Kalli Lopez	1	18	Yes
Eastern	Groveland Elementary	Melissa Schreiber	1	18	No
Southern	Hansen Elementary School	Marcie Parkinson	1	24	No
Southern	Harrison Elementary School	Cortney Day	1	30	No
Southern	Harrison Elementary School	Alger	1	25	No
Southern	Harrison Elementary School	Boyle	1	30	No
Capital	Hawthorne Elementary School	Susie Noland	1	28	No
Western	Henry L Slater Elementary School	Sarah Huckins	1	22	No
Western	Henry L Slater Elementary School	Karen Klus	1	22	No

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	Henry L Slater Elementary School	Stephanie Lardy	1	24	No
Western	Henry L Slater Elementary School	Linda Pelroy	1	22	No
Western	Henry L Slater Elementary School	Thomas	1	22	No
Western	Henry L Slater Elementary School	Josh Weible	1	22	Yes
Southern	Heritage Academy School	Renette Reyes	1	15	No
Capital	Highlands Elementary School	Eileen Beatty	1	24	No
Capital	Highlands Elementary School	Matt Brown	1	8	No
Capital	Highlands Elementary School	Gretchen Carter	1	12	Yes
Capital	Hillsdale Elementary School	Angie Fraas	1	32	Yes
Capital	Hillsdale Elementary School	Hannah Kessler	1	28	Yes
Capital	Hillsdale Elementary School	Michelle Montoya	1	29	Yes
Capital	Hillsdale Elementary School	Jocelyn Robinson	1	28	Yes
Southern	Hilltop SDA School	Bobi Crenshaw	1	11	No
Western	Homedale Elementary	Kayla Blackstock	1	22	No
Western	Homedale Elementary	Robyn Chandler	1	22	No
Western	Homedale Elementary	Lesa Folwell	1	22	No
Western	Homedale Elementary	Toby Johnson	1	22	No
Western	Homedale Middle School	David Hann	1	1	No
Western	Homedale Middle School	Heather Landa	1	100	No
Capital	Hunter Elementary School	Rene Bilkiss	1	27	Yes
Capital	Hunter Elementary School	Cinda Bodell	1	27	Yes
Capital	Hunter Elementary School	Diane Escandon	1	27	Yes
Capital	Hunter Elementary School	Rebecca Lenon	1	27	Yes
Capital	Hunter Elementary School	Angela Zweifel	1	26	Yes
Canyon	Idaho Arts Charter School (K-4)	Jill Schmoll	1	30	Yes
Eastern	Indian Hills Elementary	Heidi Austin	1	25	No
Eastern	Indian Hills Elementary	Mark Bowman	1	25	No
Eastern	Indian Hills Elementary	Deri Hall	1	25	No
Eastern	Indian Hills Elementary	Janet Plowman	1	25	No
Canyon	Iowa Elementary	Pepper Allen	1	27	No
Canyon	Iowa Elementary	Shetila Henry	1	27	No
Canyon	Iowa Elementary	Veronica Knutson	1	27	No
Eastern	J R Simplot Elementary School	Michelle Anderson	1	26	No
Eastern	J R Simplot Elementary School	Madison Brambila	1	26	No

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Eastern	J R Simplot Elementary School	Bill Morris	1	52	No
Eastern	J R Simplot Elementary School	Lachele Wheeler	1	26	Yes
Capital	Joplin Elementary School	Amy Bass	1	28	No
Capital	Joplin Elementary School	Kirsten Grover	1	28	No
Western	Keating Elementary School	Amanda Wilde	1	20	No
Western	Kenneth Carberry Elementary School	Alissa Combe	1	24	No
Western	Kenneth Carberry Elementary School	Karen Nichols	1	23	No
Western	Kenneth Carberry Elementary School	Paige Parker	1	25	Yes
Western	Kenneth Carberry Elementary School	Katrina Savitz	1	24	Yes
Southern	Kimberly Elementary School	Roberta Beck	1	22	No
Southern	Kimberly Elementary School	Cathy Bohman	1	22	No
Southern	Kimberly Elementary School	Deanna Miller	1	22	No
Southern	Kimberly Elementary School	Rachelle Mueller	1	22	Yes
Capital	Koelsch Elementary School	Roxy AlmaTaya	1	28	Yes
Capital	Koelsch Elementary School	Kellie Penn	1	27	Yes
Canyon	Lake Ridge Elementary School	Deanna Menssen	1	32	Yes
Canyon	Lake Ridge Elementary School	Tanya Scheibe	1	32	Yes
Canyon	Lake Ridge Elementary School	Amy Taylor	1	32	Yes
Canyon	Lake Ridge Elementary School	Laura VanDerschaaf	1	33	Yes
Canyon	Lewis & Clark Elementary	Teri Kelly	1	22	Yes
Canyon	Lewis & Clark Elementary	Adam Trowbridge	1	24	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	27	Yes
Eastern	Lewis and Clark Elementary	Tamara Palmer	1	26	Yes
Capital	Liberty Elementary School	Tara Diemart	1	29	No
Southern	Lincoln Elementary School	Danielle Alger	1	25	No
Southern	Lincoln Elementary School	Alexis Boyle	1	30	No
Southern	Lincoln Elementary School	Courtney Day	1	30	No
Canyon	Lincoln Elementary School	Joana John	1	26	No
Capital	Lowell Elementary School	Jayna Eichelberger	1	24	Yes
Capital	Lowell Elementary School	Cory James	1	26	Yes
Capital	Maple Grove Elementary	Amber Bigelow	1	9	No
Capital	Maple Grove Elementary	Marie Lichte	1	28	No
Capital	Maple Grove Elementary	Scott Roe	1	30	No

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Western	Marsing Elementary School	Stevi Campbell	1	31	Yes
Western	Marsing Elementary School	Jodette Lemos	1	31	Yes
Western	Marsing Elementary School	Danielle Swanson	1	21	No
Capital	Mary McPherson Elementary School	Stephanie Clark	1	34	No
Capital	Mary McPherson Elementary School	Stacee Marshall	1	33	Yes
Capital	Mary McPherson Elementary School	Annie Nuuvali	1	34	No
Western	May Roberts Elementary School	Amanda DeVos	1	27	No
Western	May Roberts Elementary School	Carol DeWitt	1	27	No
Western	Meadows Valley School	Courtney Fisher	1	18	Yes
Western	Meadows Valley School	Brent LaFay	1	18	No
Canyon	Melba Elementary	Carrie Bowers	1	26	Yes
Canyon	Melba Elementary	Marie Rockwood	1	26	Yes
Canyon	Melba Elementary	Katie Strawser	1	26	Yes
Canyon	Middleton Heights Elementary School	Kim Platt	1	22	No
Canyon	Mill Creek Elementary School	Lyna Butler	1	24	Yes
Canyon	Mill Creek Elementary School	Stephani Little	1	24	Yes
Canyon	Mill Creek Elementary School	Jill Mesecher	1	23	Yes
Canyon	Mill Creek Elementary School	Staci Miller	1	24	Yes
Canyon	Mill Creek Elementary School	Allison Villastrigo	1	24	Yes
Capital	Morley Nelson Elementary School	Alisha Coy	1	27	Yes
Capital	Morley Nelson Elementary School	Tobin Goodan	1	32	No
Capital	Morley Nelson Elementary School	Kimberly Vuturo	1	32	No
Capital	Morley Nelson Elementary School	Julia Zarbnisky	1	26	No
Southern	Morningside Elementary School	Katie Mancari	1	22	No
Southern	Morningside Elementary School	Sandy Paul	1	23	No
Southern	Morningside Elementary School	Stephen Rahe	1	23	No
Southern	Murtaugh Elementary School	Anita McClure	1	30	No
Southern	Murtaugh Elementary School	Brooke Stanger	1	27	No
Canyon	Nampa Christian School	Zachary Dwello	1	21	Yes
Western	New Plymouth Elementary School	Christy Norris	1	25	Yes
Western	New Plymouth Elementary School	Jolene Taggart	1	27	Yes
Western	New Plymouth Elementary School	Dorothy Woods	1	25	Yes
Capital	North Elementary	Sherri Redmond	1	75	Yes
Capital	North Star Charter School	Carol DeFriez	1	30	Yes
Capital	North Star Charter School	Michelle Obenchain	1	30	No

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	North Star Charter School	Mariah Rodeghiero	1	30	No
Western	Nyssa Elementary School	Paula Barnhart	1	18	Yes
Western	Nyssa Elementary School	Trisha Bunker	1	37	Yes
Southern	Oregon Trail Elementary School	Chrystine Heimdal	1	35	No
Canyon	Owyhee Elementary	Brenda Allen	1	23	No
Canyon	Owyhee Elementary	Christa Roesberry-Barber	1	24	Yes
Canyon	Owyhee Elementary	Becki Wheeler	1	23	Yes
Western	Park Intermediate	Kathleen Cahill	1	22	No
Western	Park Intermediate	Jenny Conant	1	21	No
Western	Park Intermediate	Emily McLeod	1	21	No
Western	Park Intermediate	Jessica Mosley	1	25	Yes
Western	Park Intermediate	Grace Sharp	1	22	Yes
Canyon	Park Ridge Elementary School	Allison Garrison	1	25	Yes
Canyon	Park Ridge Elementary School	Andrea Wallin	1	25	Yes
Capital	Peregrine Elementary School	Kristie Brokaw	1	21	No
Capital	Peregrine Elementary School	Barbara Nesbit	1	22	Yes
Capital	Peregrine Elementary School	Carri Thornburg	1	25	No
Capital	Peregrine Elementary School	Britnie Winters	1	25	No
Southern	Pioneer Montessori School	Hannah Beane	1	11	No
Capital	Pioneer School Of The Arts	Nadine Bennett	1	30	Yes
Capital	Pioneer School Of The Arts	Anissa Bramlet	1	29	Yes
Capital	Pioneer School Of The Arts	Brent Jons	1	30	No
Capital	Pioneer School Of The Arts	Cindy Potts	1	30	No
Eastern	Pocatello Community Charter School	Stephanie England	1	26	No
Eastern	Pocatello Community Charter School	Cara Sonneman	1	26	No
Capital	Ponderosa Elementary School	Deborah Lichter	1	33	Yes
Capital	Ponderosa Elementary School	Veronica McAchran	1	34	Yes
Capital	Ponderosa Elementary School	Kris Pfaff	1	35	Yes
Southern	Popplewell Elementary School	Cathy Butenschoen	1	30	No
Southern	Popplewell Elementary School	Bill Clements	1	30	No
Southern	Popplewell Elementary School	Melinda Fontana	1	30	No
Southern	Popplewell Elementary School	Kelly Perron	1	30	No
Capital	Prospect Elementary	Daly Hull	1	26	No
Capital	Prospect Elementary	Stephanie Lewis	1	25	Yes

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	Prospect Elementary	Sophia Roe	1	27	No
Capital	Prospect Elementary	Kit Shuman	1	26	No
Capital	Prospect Elementary	Sharleen Thurston	1	26	Yes
Canyon	Purple Sage Elementary School	Shalynn Carpenter	1	18	Yes
Canyon	Purple Sage Elementary School	Melissa McPherson	1	22	Yes
Canyon	Purple Sage Elementary School	Katie Ward	1	21	Yes
Southern	Raft River Elementary School	Angie Spencer	1	30	Yes
Canyon	Reed Elementary	Adrianna Cuchillo	1	29	No
Canyon	Reed Elementary	Jennifer Dolan	1	29	Yes
Canyon	Reed Elementary	Mary Holmes	1	29	No
Canyon	Reed Elementary	Arielle Jensen	1	29	No
Capital	River Valley Elementary School	Dena Jozwik	1	27	No
Southern	Rock Creek Elementary	Donna Alexander	1	31	Yes
Southern	Rock Creek Elementary	Andy Arenz	1	32	No
Southern	Rock Creek Elementary	Pauli Connelly	1	31	No
Southern	Rock Creek Elementary	Julie Delia	1	32	Yes
Eastern	Rockland Elementary School	Heidi Stiffler	1	11	No
Canyon	Ronald Reagan Elementary School	Nicole Kemp	1	26	No
Canyon	Ronald Reagan Elementary School	Lisa Martell	1	26	No
Canyon	Ronald Reagan Elementary School	Sheryll Sharp	1	26	Yes
Capital	Roosevelt Elementary School	Alicia Bradshaw	1	28	No
Capital	Roosevelt Elementary School	Kathryn ONeil	1	29	No
Capital	Rose Hill Montessori	Julie Douglas	1	22	No
Canyon	Ross Elementary School	Yvette Marshall	1	29	No
Canyon	Sacajawea Elementary School	Jennifer Howell	1	30	No
Canyon	Sacajawea Elementary School	Terra Hurd	1	30	No
Canyon	Sacajawea Elementary School	Penny Washburn	1	30	No
Southern	Sawtooth Elementary School	Emily Martin	1	25	Yes
Capital	Seven Oaks Elementary School	Jennifer DeMarini	1	26	Yes
Capital	Seven Oaks Elementary School	Heather Neptune	1	25	Yes
Capital	Seven Oaks Elementary School	Liz Paradis	1	25	Yes
Western	Shadow Butte Elementary School	Christina Henery	1	26	No
Western	Shadow Butte Elementary School	Kristina Maxwell	1	27	No
Western	Shadow Butte Elementary School	Melissa Stringfield	1	25	No
Canyon	Sherman Elementary School	Jennifer Castricone	1	18	Yes

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Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Canyon	Sherman Elementary School	Josephine Fisher	1	19	No
Canyon	Sherman Elementary School	Jennifer Jensen	1	19	No
Canyon	Sherman Elementary School	Kaitlynn Johnson	1	19	No
Southern	Shoshone Elementary School	Charli Cenarrusa	1	18	No
Southern	Shoshone Elementary School	Denice Christiansen	1	18	No
Capital	Silver Sage Elementary School	Lisa Jimenez	1	28	Yes
Capital	Silver Sage Elementary School	Kelcey Moore	1	26	Yes
Canyon	Silver Trail Elementary School	Kim Birkinbine	1	27	Yes
Canyon	Silver Trail Elementary School	Dan Hoehne	1	25	Yes
Canyon	Silver Trail Elementary School	Karla Miller	1	27	Yes
Canyon	Skyway Elementary School	Mark Elli	1	30	Yes
Canyon	Skyway Elementary School	Elizabeth Pierce	1	30	No
Canyon	Skyway Elementary School	Casi Spengler	1	30	No
Canyon	Skyway Elementary School	Jamie Warren	1	30	No
Canyon	Snake River Elementary	Heather Packer	1	18	No
Canyon	Snake River Elementary	Matea Schindel	1	19	Yes
Canyon	Snake River Elementary	Lindsay Strong	1	18	Yes
Capital	Star Elementary School	Angela Fulkerson	1	36	Yes
Capital	Star Elementary School	Joyanna Galan	1	31	Yes
Capital	Star Elementary School	Carmi Scheller	1	36	Yes
Capital	Stephensen Elementary School	SD Rhatigan	1	32	Yes
Capital	Stephensen Elementary School	Trouten	1	31	No
Eastern	Stoddard Elementary School	Alicia Cody	1	23	Yes
Eastern	Stoddard Elementary School	Fairley Faroni	1	21	No
Eastern	Stoddard Elementary School	Natasha Luker	1	20	No
Eastern	Stoddard Elementary School	Craig Ockermen	1	21	Yes
Southern	Summit Elementary School	Don Adams	1	25	Yes
Southern	Summit Elementary School	John Derr	1	26	Yes
Southern	Summit Elementary School	Jorma Fletcher	1	26	No
Southern	Summit Elementary School	Stacey Lakey	1	25	Yes
Southern	Summit Elementary School	Suzi McGinnis	1	26	No
Southern	Summit Elementary School	Tracy Park	1	27	Yes
Southern	Summit Elementary School	Michele Putnam	1	25	Yes
Southern	Summit Elementary School	Maggie Stump	1	26	Yes
Southern	Summit Elementary School	Audra Thompson	1	25	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Southern	Summit Elementary School	Kimberly Wallace	1	25	Yes
Southern	Summit Elementary School	Anne Winder	1	25	Yes
Southern	Summit Elementary School	Brad Winder	1	25	Yes
Eastern	Syringa Elementary School	Aubrey Eldredge	1	24	No
Eastern	Syringa Elementary School	Andrea Gulden	1	23	No
Eastern	Syringa Elementary School	Cindel Vasquez	1	23	No
Southern	Syringa Mountain Charter School	Angie Grant	1	18	No
Southern	Syringa Mountain Charter School	Shawn Myers	1	26	No
Capital	Taft Elementary School	Jessica Rose	1	25	No
Capital	Taft Elementary School	Sarah Wright	1	23	Yes
Eastern	Tendoy Elementary	Cody Perry	1	24	Yes
Eastern	Tendoy Elementary	Diana Son	1	25	Yes
Capital	Trail Wind Elementary School	Kori Bevis	1	29	No
Capital	Trail Wind Elementary School	Karen Palazzolo	1	30	No
Eastern	Tyhee Elementary School	Amy Bare	1	30	No
Eastern	Tyhee Elementary School	Jayne Johnson	1	29	Yes
Eastern	Tyhee Elementary School	Haley Luce	1	29	No
Southern	Valley Elementary	Jennifer Bailey	1	23	Yes
Southern	Valley Elementary	Holly Hall	1	23	Yes
Capital	Valley View Elementary School	Shawna Hiller	1	25	Yes
Capital	Valley View Elementary School	Meko Myers	1	25	Yes
Canyon	Van Buren Elementary School	Becky Gans	1	21	No
Canyon	Van Buren Elementary School	Jenny Hartvigsen	1	21	No
Canyon	Van Buren Elementary School	Aimee Stacy	1	23	No
Canyon	Van Buren Elementary School	Cindy Wells	1	23	No
Western	W.W. Jones Elementary School	Vicki McConnell	1	3	Yes
Eastern	Wapello Elementary School	LaNae Porter	1	24	No
Eastern	Wapello Elementary School	Kristine Schnittgen	1	26	Yes
Canyon	Washington Elementary School	Kyle Backlund	1	26	No
Canyon	Washington Elementary School	Joleena Malugani	1	26	Yes
Canyon	Washington Elementary School	Heather Mueller	1	26	Yes
Canyon	West Canyon Elementary	Andrea Chester	1	25	Yes
Canyon	West Canyon Elementary	Sirrah Elliott	1	24	Yes
Canyon	West Canyon Elementary	Chuck Knox	1	25	Yes
Canyon	West Canyon Elementary	Emry Smith	1	23	Yes

Note: "T" represents number of teachers and "S" represents number of students

Participant List

(continued)

REGION	SCHOOL	TEACHER	T	S	SURVEYS RETURNED
Capital	West Elementary School	Travis Henke	1	25	Yes
Capital	West Elementary School	Tricia Henke	1	25	No
Capital	Whitney Elementary School	Tasha Crowell	1	26	Yes
Capital	Whitney Elementary School	Eden Rodriguez	1	33	No
Capital	Whitney Elementary School	Kayden Tague	1	22	Yes
Eastern	William Thomas Middle School	Kelly Coleman	1	125	Yes
Canyon	Willow Creek Elementary School	Kim Chierici	1	4	Yes
Canyon	Willow Creek Elementary School	Nicole Gibbs	1	4	Yes
Canyon	Willow Creek Elementary School	Kayla Stone	1	5	Yes
Canyon	Willow Creek Elementary School	Melissa Sullivan	1	4	Yes
Canyon	Wilson Elementary School	Keelee Babcock	1	22	Yes
Canyon	Wilson Elementary School	Afton McSherry	1	23	No
Canyon	Wilson Elementary School	Debbie Peterson	1	23	Yes

	TOTALS	361	9,439	
	TOTAL PARTICIPANTS	9,800		
TOTAL PARTICIPATING 2019-2020 TEACHERS	361	176	49%	YES
		185	51%	NO
TOTAL STUDENT SURVEYS RETURNED	2,970			
TOTAL INCENTIVE PAID OUT	$14,000			
FULL YEAR SURVEY RETURN PERCENTAGE	31%			

Teacher Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	361	107	95	45	56	58
Surveys Received	73	23	24	10	10	6
Percent Response	20%	21%	25%	22%	18%	10%

	Number	Percent
1 The materials were clearly written and well organized.		
Strongly Agree	52	71%
Agree	20	27%
Disagree	0	0%
Strongly Disagree	1	1%
2 The products in the Kit were easy for students to use.		
Strongly Agree	40	56%
Agree	31	44%
Disagree	4	0%
Strongly Disagree	1	0%
3 Students indicated that their parents supported the program.		
Yes	65	90%
No	7	10%
4 Would you conduct this Program again?		
Yes	72	100%
No	0	0%
5 Would you recommend this program to other colleagues?		
Yes	72	100%
No	0	0%
6 If my school is eligible for participation next year, I would like to enroll.		
Yes	71	99%
No	1	1%

Due to rounding of numbers, percentages may not add up to 100%

Parent/Guardian Program Evaluation Data

	Total	Capital	Canyon	Eastern	Southern	Western
Participants	9,439	2,978	2,314	1,240	1,490	1,417
Surveys Received	41	28	28	14	17	7
Percent Response	.97%	1.29%	.99%	.74%	.82%	.95%

Total Parent Responses **41**

		Number	Percent
1	Was the Program easy for you and your child to use?		
	Yes	41	100%
	No	0	0%
2	Will you continue to use the Kit items after the completion of the Program?		
	Yes	41	100%
	No	0	0%
3	Would you like to see this Program continued in local schools?		
	Yes	41	100%
	No	0	0%

Due to rounding of numbers, percentages may not add up to 100%

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2020 Irrigation Peak Rewards Program Report

February 2021

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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 2020.

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 2020 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 customers signed up for past participanting service points in February 2020. Contents of the packet included an IPR brochure, program application, incentive structure details, eligible pump locations and an estimated incentive for each pump location.

IPC presented IPR details at irrigation workshops. In 2020 only two workshops were completed as the others scheduled were cancelled due to COVID uncertainty. IPC 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 400.52 MW with 2,292 pumps enrolled for the 2020 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

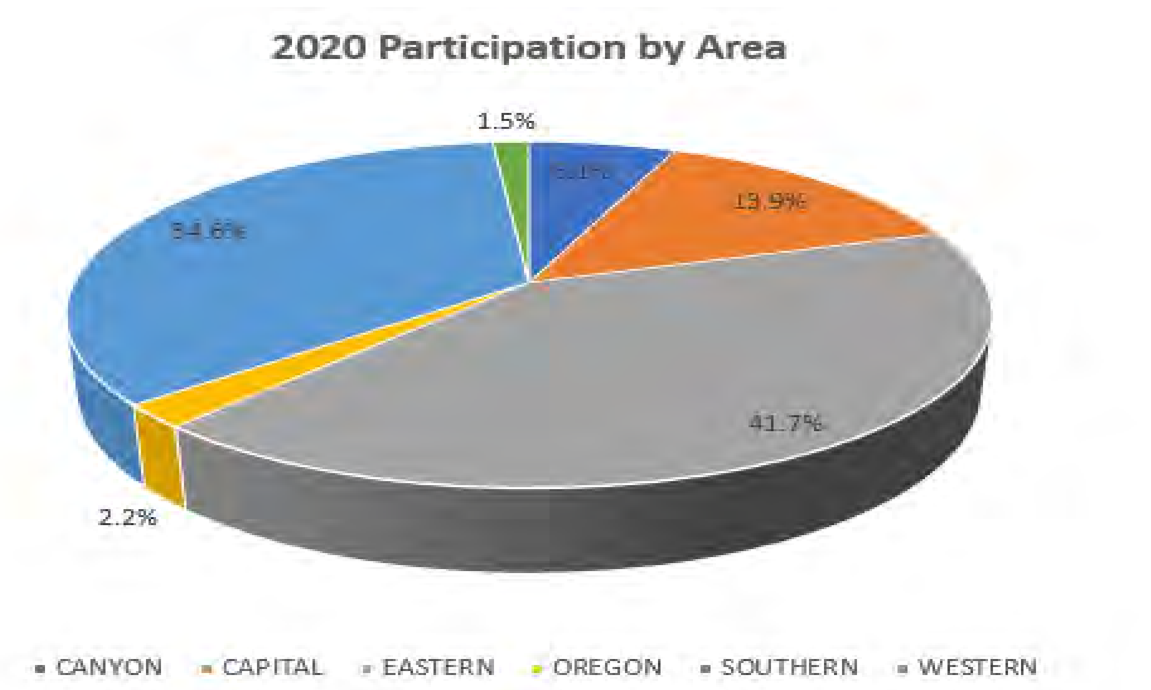

Figure 2
Distribution of participants by service area

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	164	12	128	140	85.37%	35.22
Capital	379	31	287	318	83.91%	87.32
Eastern	1126	0	995	995	84.81%	134.70
Southern	980	5	789	794	81.02%	130.89
Western	62	0	35	35	56.45%	2.78
Oregon	63	3	48	51	79.37%	9.62
Totals	**2,774**	**51**	**2,241**	**2,292**	**82.62%**	**400.52**

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 hourly data 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 turned off and stayed off during the event. During the 2020 season 2,307 DRUs were active and installed at 1,917 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 2020 season 298 cellular devices were active and installed at 262 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 information and assumptions made using 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 DRUs and cell devices have been identified, including:

- Inoperable
- Damaged
- DRU missing a fuse
- 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 step of the data analysis is gathering 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
- 2020 dispatch option
- 2020 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 four hours prior to the dispatch group start time.
- The event hour reduction is calculated using the average of the event time frame for each dispatch group.
- Data with errors are removed from the data set.
- Load reduction for automatic AMI dispatch option is calculated and then extrapolated to represent all load including those without interval metering data.
- 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 from AMI, MV-90 and manual data loggers without errors.
- 1998 pump locations have interval data, representing 83.51 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.
6/24/2020	78.63	162.67	236.38	292.43	213.80	129.76	56.05
7/21/2020	61.75	118.38	190.55	240.52	178.77	122.14	49.97
7/31/2020	43.10	111.64	181.82	225.96	182.86	114.31	44.14

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.
6/24/2020	0.00	0.00	7.59	8.09	8.09	8.09	.49
7/21/2020	0.00	0.00	5.95	6.34	6.34	6.34	.39
7/31/2020	0.00	0.00	5.60	5.96	5.96	5.96	.36

June 24

The first event occurred on a Wednesday. Notifications to the participants went out as designed and the commands sent to the DRU's and Cell devices occurred without delays. Interval metering data for the AMI group reflected an average of 70 percent of the nominated load were running during the base hours. Of the 70 percent the data indicates a 90 percent reduction. The manual or large payment group reflected nearly 90 percent on during the base hours for a 83 percent load reduction. The total load reduction for the 5 – 6:00 pm hour was 292.43 MW including line losses.

July 21

The second event occurred on a Tuesday. Notifications to program participants were successful and the AMI and cell commands were initiated and delivered timely resulting in the expected load reduction. Interval metering data for the AMI automated dispatch group reflected an average of 58 percent of the nominated load running during the base hours. Of the pumps running 91 percent stayed off during the event. The manual or large payment group data shows 84 percent of the load on during the base hours and nearly 80 percent turned off during the event hours. The total load reduction for the 5 – 6:00 pm hour was 240.52 MW including line losses.

July 31

The third event occurred on a Friday. The notifications to participants went out as designed and the communication to the DRUs and Cell devices occurred without delays. It is common for irrigation load to taper in July and the 2020 season was no different. Of the nominated pump load, the AMI automated dispatch group had 55 percent of the pumps running during the base hours. We experienced a record ‘opt out’ amount of 10.18 MW or 7 percent of the load on during base. For the manual or large credit participants the load on in base was just over 80 percent and of that load nearly 76 percent turned off during the event time. The total load reduction for the 5 – 6:00 pm hour was 225.96 MW including line losses.

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 10.47 percent for the 2020 season. For the max potential number the average of 9.9% was utilized as event date of June 24th experienced a 9.9% average and the peak date was June 26th. Due to the event date being in the same two week timeframe as the load reduction event the reduction was not the season average. By removing the average left on IPC more accurately calculates 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	Explicit Opt Out	Inexplicit opt out	Device Failure	Early On	Average percent of MW on during an event
6/24/2020	0.85%	1.51%	1.74%	5.48%	0.32%	9.90%
7/21/2020	0.75%	0.84%	1.14%	5.91%	0.17%	8.82%
7/31/2020	0.68%	5.78%	1.29%	4.83%	0.13%	12.71%

This rate is typically the 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. The 2020 maximum potential realization rate of 67.90 percent on June 26th, which results in a maximum potential load reduction for IPR of 298.34 MW for the 2020 IPR season.

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 2020 with an estimated curve showing expected load. Each day shows a similar reduction to the interval metering data analysis.

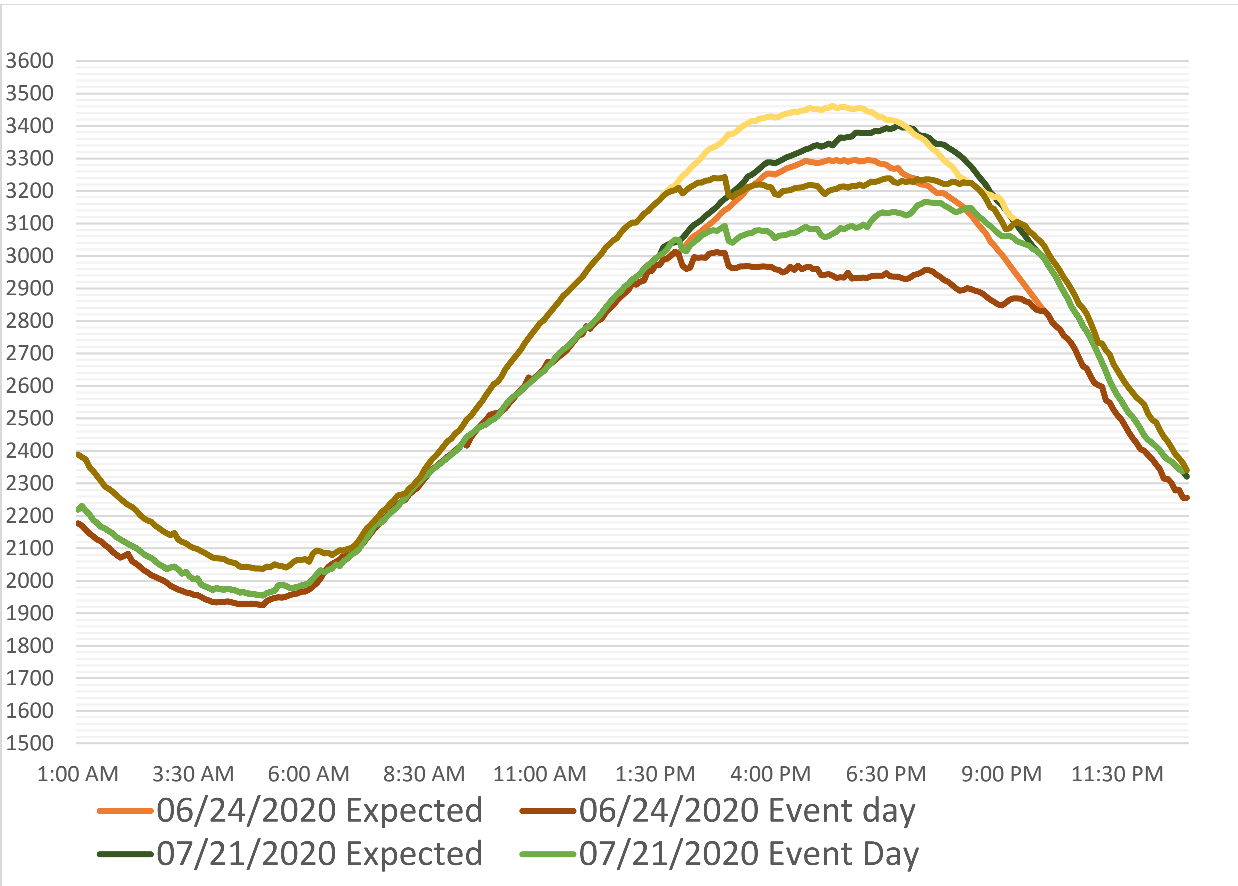

Figure 3
Load reduction results—total system load data

COSTS

IPR spent a total of $6,407,412.42 with the incentive credit being the largest portion at 96.9 percent of total program costs. Incentives paid for the 2020 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 $3.0 million dollars.

Table 6
Annual program costs by category

Expense Item	2020 Total Cost
Materials & Equipment	$55,009.51
Purchased Service	$138,803.91
Other Expense	$1,192.73
Incentives	$6,124,936.89
Labor/Administrative Expense	$87,469.38
Total	$6,407,412.42

CUSTOMER SATISFACTION

The general sentiment of Peak Participants is positive with most folks asking for more notice of an event and to enroll more pumps into the program. For an additional touch point with our Peak Rewards participants a letter was mailed to each participant with a summary of peak credits and totals for the 2020 season.

CONCLUSIONS

Highlights from the 2020 season include the following:

- 2,292 pumps enrolled
- 400.52 MW of nominated billing demand
- Maximum potential demand-reduction of 298.34 MW including line losses
- Event 1: June 24 – actual reduction 292.43 MW including line losses

- Event 2: July 21 – actual reduction 240.52 MW including line losses
- Event 3: July 31 – actual reduction 225.96 MW including line losses
- 2,307 active AMI DRUs
- 298 active IPC cellular devices
- 82.62 percent of eligible pump locations with devices participated
- Exchanged 179 Cell devices to DRU's in October 2020
- Peak Credit letter mailed showing the summary of credits
- The cost of running the program for three events this season was $6.4 million
- The cost of having this resource available was $21.48 per kW
- The estimated cost of running the program at the full 60 hours per season or an additional 48 hours is another $3.0 million

Appendix 1
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:

$$\text{Total Program DR} = DR_{MDO} + DR_{Group}$$